

<p>Institution: University of Aberdeen</p> <hr/> <p>Unit of Assessment: UoA 16 Architecture, Built Environment and Planning</p> <hr/> <p>a. Overview</p> <p>This submission covers two units within the University of Aberdeen: The Real Estate group, which is positioned within the University of Aberdeen Business School, College of Arts and Social Sciences, and the Transport and Environment group which sits in the School of Geosciences in the College of Physical Sciences. The primary research focus of both units falls within the remit of UoA16. In RAE 2008, the Real Estate group was entered to UoA 31 Town and Country Planning while staff within Transport and Environment were submitted to UoA 32 Geography and Environmental Studies.</p> <p><u>Real Estate</u> (7 Category A staff: <i>Hoesli; Hutchison; Liu; MacGregor; Roberts; Schulz; Wersing</i>) The Real Estate group's mission is to deliver internationally-recognised research on real estate, regional and rural development issues, with findings influencing academic, policy and professional debates. The group's positioning within the University of Aberdeen Business School ensures that key specialist areas of research (in particular, economics and finance) are supported. At the same time, the presence of an internationally-recognised Real Estate group provides a distinctive profile for the Business School. As in RAE 2008, research is focussed on three areas: property investment and market analysis; housing markets; and regional and rural development, facilitated through the Aberdeen Centre for Real Estate Research (CRER).</p> <p><u>Transport and Environment</u> (5 Category A staff: <i>Anable; Cottrill; Farrington; Nelson, Watts</i>) Since RAE 2008, research activity within Human Geography has been redefined to emphasise the group's core strengths in research on transport and the environment. This has been supported through strategic investment in posts (Anable, Cottrill and Watts) and the establishment of a new area of cross cutting research - the digital economy. The group has strong internal and external networks, facilitated through the Centre for Transport Research (CTR) and the RCUK dot.rural Digital Economy Hub, and has a particular strength in interdisciplinary research.</p> <hr/> <p>b. Research strategy</p> <p><u>Real Estate</u> Consistent with RAE 2008 submission, the group's research strategy is focused on the following three research areas:</p> <p><i>i) Property Investment and market analysis</i> The group has a long-established reputation in this research area and continues to benefit from strong national and international collaborations (including with Adair (Ulster), Bourassa (Louisville), Lizieri (Cambridge), and Hendershott (now retired)). Research draws on staff expertise in advanced econometric analysis. For example, research on the dynamics of real estate markets within the REF period has included several papers using advanced time series analysis techniques (Hoesli et al., MacGregor et al.; Schulz et al.), panel data regression (MacGregor et al.) and a Markov switching model (Hutchison et al.).</p> <p>Much of the research in this area is of direct relevance to industry actors and is supported through funding from the RICS and IPF. For example, research topics have included the sensitivity of commercial property values to changes in interest rates (MacGregor et al.) and the pricing criteria used by UK real estate investors and thus the appropriate risk free rate of return for use by overseas investors considering investing in UK commercial property (Hutchison et al.). In addition to econometric analyses, mixed methods have been used to provide new insights on investor behaviour. These have shown, amongst other things, the importance of allowing for covenant strength in property pricing (Hutchison et al.), and the possible role that Tax Increment Financing could have in assisting the regeneration of inner cities (Hutchison et al.).</p> <p><i>ii) Housing markets</i> This area of research activity was introduced in the RAE2008 submission but has been re-focussed and strengthened through international collaboration (including with Werwatz (Berlin),</p>

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Bourassa (Louisville)), increased collaboration within the group (as evidenced by joint publications), and the appointment of two new staff members: **Liu** and **Wersing**.

As with the previous research area, research on housing markets is characterised by state-of-the-art econometric analysis, exploiting access to a number of unique housing market databases. The majority of research is grounded in economic theory. The group has several outputs which explore price formation in housing markets (**Hoesli** et al; **Schulz** et al.) and there is a growing area of research on spatial analysis of house prices (**Liu** and **Roberts**) with work being taken forward through, amongst other means, an ESRC collaborative studentship (supervised by **Roberts** and **Schulz**). **Schulz** and **Wersing** (with Werwatz) have considered the issue of tenure choice. This and, more generally, the relationship between owner occupier prices and private rents has been identified as a key area for future research, supported through the ongoing collaboration with the Aberdeen Solicitor's Property Centre and access to their data on their rental properties from 2012 onwards.

iii) Regional and rural development

This area of research has continued to benefit from strong links with staff within the Business School (particularly Economics). Building on previous research, **Roberts's** work has highlighted how the nature of rural economies mediates the impact of different types of economic shocks. For example, analysis based on a unique time series of input-output tables of the Shetland economy was used to show the time it takes for rural economies to adjust to incoming sectors. Other research by **Roberts** has focussed on regional Computable General Equilibrium (CGE) modelling with applied examples considering the impact of new on-shore wind developments and the impact of migration from Eastern and Central European economies. Work in this area is policy-driven and has been supported by several major EU funded projects.

Forward strategy:

- a) *Research areas*: The group will further develop research capacity in its three research areas, ensuring the quality of outputs and relevance of research to industry is maintained. Internally, this will be supported by maintaining the group's distinctive research culture and management practices within the Business School. At the same time the group aims to further strengthen research linkages with other areas of the School, particularly Finance (building on current work in the Property Investment and Market Analysis research area on Tax Increment Financing, Public Private Partnership Initiatives and investor returns) and Economics (exploiting shared interests between researchers working on housing markets and staff in the labour economics group at Aberdeen).
- b) *External collaborations* will continue to be facilitated through the Aberdeen CRER and participation by staff members in the Scottish Institute for Research in Economics (SIRE) (a Scotland-wide pooling initiative aimed at strengthening the Scottish economics research base).
- c) Engagement with the University's key interdisciplinary themes will be increased, with the *Energy* theme and the *Environment and Food Security* theme particularly relevant to the interests of the group. This is being taken forward through **Roberts's** membership of the *Environment and Food Security* steering group and joint appointment from October 2012 as leader of the Social, Economic and Geographical Sciences group at the James Hutton Institute, a Scottish Government funded Institute part-based in Aberdeen with an international reputation in interdisciplinary land-based research and rural development research.
- d) *Research impact*: Following the approach and strategy set out in REF3a, the group will build on its existing strong links with industry stakeholders so as to enhance research funding opportunities and further extend the reach and significance of its research impact.

Transport and Environment

Research activity is focussed on two research areas:

i) Transport and Mobility

This area has achieved significant momentum through the formation of the Centre for Transport Research (CTR) in 2008 (directed by **Nelson**) which acts as the focus for transport research across the University. CTR has built an international reputation in the areas of public transport and intelligent mobility (**Nelson**), new technological applications to transport (**Nelson** and **Cottrill**), travel behaviour and the role of demand-side management in energy and climate change policy

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(**Anable**). Significant contributions include **Nelson's** application of social return on investment appraisal to a flexible transport context and contributions to the evaluation of flexible transport services. **Anable** has developed an integrated approach to modelling the behavioural and policy changes required to decarbonise the transport sector; was involved in a large empirical study of the factors influencing plug-in electric vehicles adoption, and established a new conceptual framework for low-carbon mobility behaviour drawing upon multi-disciplinary theories of habit. **Farrington** has continued his longstanding contribution to the literature on accessibility planning through the development and testing of a policy evaluation tool which incorporates both broad rural development impacts as well as the specific social cost-benefits of interventions.

ii) **Digital Economy and Rural Change**

Digital Economy has emerged as a new strength since 2008. Our long standing reputation in transport and rural research as noted in RAE 2008 was instrumental in securing the £11.8m RCUK *Digital Economy Research Hub* ('dot.rural') with **Farrington** its founding Director. **Nelson** (currently Co-Director) leads one of its four research themes 'Accessibility and Mobilities' undertaking multidisciplinary research across engineering and computer science to, for example, develop prototype platforms for flexible transport services using novel argumentation theory; or the development of passenger information systems to improve accessibility in rural communities. **Cottrill's** recent appointment has brought further expertise in intelligent transport systems, specifically trust and privacy issues. **Farrington** leads the 'Digital Engagement and Resilience' project which is documenting the patterns and precursors of transformational impact from digital technologies in rural areas. Research on *Rural Change* has achieved additional momentum through the new-blood appointment of **Watts** making original empirical and conceptual contributions by linking debates on agro-food governance with the new regionalism.

Forward strategy:

The forward strategy of the group is based on:

- a) *Continued targeting of investment in areas where we have the greatest international reputation.* Specifically, the group will continue to build expertise in sustainable infrastructure (including digital innovation), mobility and energy futures and new approaches to the analysis and synthesis of diverse data sources (including GPS, time-use data and spatial analysis of 'big data').
- b) *Investment in areas representing emerging societal and funding priorities,* particularly energy, health and food security. These coincide with three out of the four strategic research themes identified by the University in which Transport and Environment plays a key role through steering group membership in *Energy, Pathways to Healthy Living* and *Environment and Food Security*.
- c) *Delivering non-academic impact* by continuing to build critical relationships with policy makers, practitioners, end users and sponsors.
- d) Continuing to provide an environment whereby *multi-disciplinary collaborations* are encouraged and directly facilitated through joint appointments of senior staff (E.g. **Cottrill** joint Transport and Environment / Digital Economy).

c. People, including:

i. Staffing strategy and staff development

Real Estate

As a result of a recruitment process focussed strongly on research potential, and growing collaborations within the Business School, the research base of the group has been maintained at a similar level to that submitted in RAE2008. Two ECRs have been appointed as lecturers (**Liu** and **Wersing**) while two lecturers and one senior lecturer have moved to posts in other Departments (Devaney to a lectureship at Reading, Xiao to a senior lectureship at Hull; Tiwari to an Associate Chair in Melbourne, Australia). Two members of staff have been promoted (**Roberts** to professor and **Schulz** to senior lecturer). As a result of these adjustments, the demographic and career profile of the group is more balanced than previously.

Within the group, research is supported through six-monthly research meetings with the discipline research leader (**Roberts**) where individual research agendas are discussed and linked to the broader interests of the unit. Targets in terms of publications and external funding are set based on an expectation that all group members are fully research active. At School level, a workload model is overseen by the Head of School which seeks to redistribute and optimise the timing of teaching

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commitments to enable time for research and scholarship. Staff have a financial allocation to support conference and other research-related travel. A grant application mentoring scheme exists and staff are encouraged to attend a monthly Research Surgeries Programme which provides both general and tailored research and support advice to staff.

The research culture is reflected in an active Real Estate seminar series with external contributors during the REF period including Ahlfeldt (LSE); Cheshire (LSE); Cocco (LBS); French (Oxford Brookes); Gibb (Glasgow); Hilber (LSE); Kleinow (Herriot Watt); Neishim (UCL); and Westerheide, (ZEW). To strengthen international collaborations, the group has also hosted (with financial support from Aberdeen CRER) a number of external visitors for longer periods of time including Quan (Cornell), Werwatz, (TU Berlin) and Worzola (Clemson). Finally the group has an Honorary Chair Robin Goodchild (Jones Lang LaSalle) who facilitates research transfer and knowledge exchange between staff members and the wider real estate industry, thereby further stimulating research activity within the group.

Transport and Environment

The staffing strategy within Transport and Environment has been focused on identified areas of growth and retaining or recruiting outstanding young researchers. This is exemplified by investment in staff in energy and travel demand management (**Anable**, appointed as SL in 2008, promoted to Chair in 2013), digital connectivity (**Cottrill**, ECR) and the governance of food in rural areas (**Watts**, ECR). Pickup (Vectos Ltd) has been appointed as Honorary Chair to enhance contributions to European transport policy. CTR has provided a dynamic environment for research fellows, having supported 12 research posts for at least one year (often longer) over the period. The future strategy is to appoint staff and research students who further develop critical mass in these areas, and who are well placed to engage in both the University strategic research themes and emerging external research priorities.

Anable is research leader for the group. This involves the organisation of the CTR Research Seminar Series as well as internal 'Brown Bag' informal research workshops including research fellows, postgraduate research students and staff from across dot.rural. The research group puts in place an annual audit to monitor submissions and outcomes of grants which is used to inform mentoring and future strategy. As in the Business School, the School of Geosciences operates a proactive internal peer reviewing system for research grants and a workload model is overseen by the Head of School focussed on optimising the time for research and scholarship. This is dovetailed with the School's appraisal scheme in which all staff participate.

University level support for staff development

ECRs are allocated reduced teaching and administrative loads in their first three years, along with mentoring from a senior academic colleague. Over the reporting period five members of staff in Real Estate have been supported through this scheme, three staff in the Transport and Environment. More established staff benefit from a Principal Investigator training programme. A Research Leave Policy is in place with **Hutchison** and **Roberts** (Real Estate), **Nelson** and **Farrington** (Transport and Environment) having a period of leave during the REF period.

At University level, a dedicated Research and Innovation unit supports the identification of research and consultancy opportunities, gives assistance in the grant application process and subsequent management of budgets. These structures and initiatives have supported growth in external research grant income over the REF period from both senior staff and ECRs. Both Colleges provide financial support to staff in developing new projects with preference given to more junior staff.

The University's Researcher Development Unit (www.abdn.ac.uk/rsd) provides a progressive, institutional programme of personal, professional and career development opportunities for all research staff, irrespective of level or discipline. Activities are aligned with the national Researcher Development Framework to demonstrate progression across phases of a career. As a result, Aberdeen was one of the first UK universities to be awarded the Human Resources Excellence award from the European Commission for its researcher development programme. The University has Investors in People (IiP) status and in 2011 was awarded a bronze Athena Swan Award for fostering a supportive environment for female researchers. An Equality and Diversity Policy

applies to all aspects of employment across the University with Equality and Diversity training mandatory for all staff with supervisory and recruitment responsibilities.

ii. Research students

Real Estate

Doctoral research training in the group is provided through the ESRC-recognised Scottish Graduate School Doctoral Training Centre (DTC) for Urban Planning and Real Estate Pathway. For those on a 1+3 route, the initial year is through the completion of a MRes in Real Estate. The DTC pathway includes an annual summer school and occasional training days in specific real estate areas with, for example, a visiting scholar to the group (Quan, Cornell) running a one day programme on real estate securitisation for all DTC students in Autumn 2012.

Research students in the Real Estate group form part of a wider cohort across the Business School with synergies with students on finance and economics PhD training programmes particularly strong. Six students supervised by staff within the Real Estate group (with staff responsible for 3.7 FTEs) were awarded PhDs during the REF period with five subsequently taking up academic positions. As in the RAE2008 submission, a key objective going forward is to increase the number of postgraduate research students. This will be achieved through actively seeking funded studentships as exemplified by the ESRC collaborative studentship on neighbourhood effects which commenced within the group in January 2013. Funding for interdisciplinary studentships will be sought through the University's Research themes and facilitated through new links with the James Hutton Institute and its joint PhD studentship scheme.

Transport and Environment

The group are members of the ESRC Scottish Graduate School of Social Sciences Doctoral Training Centre and PGRs are expected to attend Advanced Research Training delivered both through the Human Geography pathway and by the DTC Summer School. Specialist training needs may be met by attendance at training courses delivered by external organisations such as the UK Energy Research Centre Summer School, the Social Science Network for Transport and Travel Summer School.

In addition to research fellow posts, research grant successes, such as dot.rural and UKERC, have provided inter-disciplinary RCUK funded studentships and additional PGRs have been funded by the James Hutton Institute, EU Joint Research Centre, Scottish Government, the Carnegie Trust, and various international governments. Thus, postgraduate student registration and completion has increased significantly with 18 awards during the REF period (with staff responsible for 15.1 FTEs). The inter-disciplinary agenda of the Transport and Environment group is articulated in the number of PGR students who are co-supervised (and in some case jointly funded) across other disciplines in Aberdeen (computing science, psychology and sociology) and this cross-disciplinary approach is integral to our strategy for increasing PGR numbers.

University-level support structures for research students

The training of research students follows well-established institutional requirements. All research students have a supervision team comprising at least two members of academic staff with supervisor training provided by the University. An annual progress review is overseen by each respective College. Each research student is assigned a progress review panel when they commence their studies. Progression from years 1 to 2 is contingent upon delivering a formal research presentation to the School and successful performance at an annual progress review meeting. All studentships are advertised externally and awarded competitively to the best students.

In addition to the discipline-specific skills, all research students are required to engage in generic skills training which comprises a suite of courses offered by the University. They are also encouraged to attend and present papers at national and international conferences, with financial support being available to support this. The quality of research student output has been recognised through the award of conference prizes (e.g. Anthony Owusu-Ansah, 2012 European Real Estate Society Conference; Anke Küttner 2012 International Environmental Geochemistry and Health poster competition (runner-up), Craig Morton UK Energy Research Centre poster prize 2011).

d. Income, infrastructure and facilities

i. Income

Overall the unit has generated £5.2m of grant spend over the REF period. This has been largely comprised of a steadily increasing stream of RCUK income, responsible for 65% of the total, with central government and EU sources making up the majority of the remainder. The source of funding has varied across research areas described below.

Real Estate

Funding for research on property investment and market analysis has mainly been from the RICS and IPF and has supported applied research on topics of direct relevance to the industry (see Impact Template 3a). Major grants, some won in collaboration with other institutions, include a RICS-funded projects on the Future of Built Environment Higher Education in Scotland (**Roberts** with Devaney), Tax Increment Financing (**Hutchison**) and the future of PPP/PFI (**Hutchison**). Work in the housing research area has been supported through a Housing Association project (**Liu**) and is being taken forward through, amongst other means, an ESRC-funded collaborative studentship on housing market analysis (**Roberts, Schulz**). **Roberts** has secured external grant funding for regional and rural development research in the form of three major EU projects, each supporting a research fellow post (TERA (€358k), CAP-IRE (€215k) and RURAL ECMOD (€60.5k)) as well as funding from local authorities and regional development agencies.

Transport and Environment

Transport and Environment has secured funding from a diverse range of sources over the REF period but a noticeable change since the RAE2008 submission is the growth in awards from highly competitive peer reviewed sources. Since 2008, in addition to dot.rural (a £11.8m award, spread across a number of Units of Assessment), staff in CTR have held 13 major (>£60k) RCUK, EU and government grants worth over £1.4m to the Unit. Research on transport and energy has been funded through the RCUK Energy Programme; work in relation to rural areas has been funded through the ESRC and the Environmental & Social Ecology of Human Infectious Diseases programme (MRC/NERC/ESRC/BBSRC), while **Farrington** was co-investigator on the £885k Policy Grid II interdisciplinary Digital Social Research project to develop computational support for integrative research in the natural and social sciences. CTR is a member of a number of public sector research frameworks alongside large transport consultancies in the UK, often providing the scientific lead on evaluation or modelling studies. For instance, **Anable** led the £750k evaluation of the Scottish Government's Smarter Choices, Smarter Places programme. Research income is monitored quarterly through reports to the CTR Strategic Management Board and Advisory Boards.

Research income targets for both groups are regularly re-assessed in the light of funding opportunities and linked to individual staff targets discussed as part of six monthly research meetings.

ii. Infrastructure and facilities (*Real Estate and Transport and Environment*)

Staff and all research students have dedicated offices and meeting rooms for interaction. The Transport and Environment group has also benefited from significant investment in newly refurbished office and meeting space for dot.rural which has a strong policy of co-locating researchers. More broadly, both groups benefit from research infrastructure provided at University level to all staff including the new University library within which Real Estate staff can access Eikon financial database and software, under license from Thomson-Reuters.

e. Collaboration or contribution to the discipline or research base

i. Contribution to the discipline base

Real Estate

Throughout the REF period, **MacGregor** has continued to edit the *Journal of Property Research*, widely acknowledged as the leading UK-based real estate journal. Staff members are also on the editorial boards of nine other academic journals: *Journal of Housing Research*, *Journal of Real Estate Research*, *Journal of Real Estate Finance and Economics*, *Real Estate Economics*, *Journal of European Real Estate Research*, *RICS Research Paper Series*, *Journal of Property Investment and Finance*, *Computational Statistics*, and *Bio-based and Applied Economics*. All staff act as referees for journal submissions and for various different funding bodies including the ESRC and IPF.

The research reputation of staff within the group is reflected in their invited participation in

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stakeholders groups including the Scottish Government's Expert Input-Output Users Group and North East Scotland Agriculture Advisory Group (NESAAG). This helps to maintain engagement with stakeholders and facilitates research impact. Several members of staff have won awards based on the quality of their research output during the REF period including the Aareal Award of Excellence in Real Estate Research 2012, "Best Research Paper" category (**Schulz** and **Wersing**) and **MacGregor's** Honorary Fellowship of the Society of Property Researchers in 2011. Over the REF period, staff members have been external examiners for PhDs in Manchester, Uppsala (Sweden), Ulster and Reading.

Transport and Environment

Key indicators of contributions by researchers based in the Transport and Environment group include the 2011 RGS/IBG Alan Hay Award for significant contributions to Transport Geography (**Farrington**) and representation on the editorial boards or guest editorships of 5 international journals (e.g. *Journal of Transport Geography*, *Energy Efficiency*, *Research in Transportation Business and Management*, *Transportation Planning and Technology*, *Transportation*). Group members have contributed to the organisation of six international conferences while both the 5th International Symposium of Travel Demand Management and the 44th Universities' Transport Study Group were hosted by CTR in Aberdeen.

Nelson is Chairman of the Universities' Transport Study Group (2013-16), and was academic advisor to the Yellow School Bus Commission. **Anable** sits on the Energy Scientific Advisory Committee of RCUK, has chaired several peer review panels for the EPSRC and recently won the World Conference on Transport Research award for most influential paper in Transport Policy 2010-13. Members of this group have been invited to act as external reviewers for international research programmes and PhD Defences in Austria, Australia, Belgium, Chile, Israel, Netherlands, Portugal and Sweden. **Nelson & Anable** are members of the EPSRC Peer Review College.

ii. Collaboration**Real Estate**

Through Aberdeen CRER, the group has maintained strong links with Real Estate groups based at Glasgow, Reading, and Ulster (all founding members of the Property Economics and Finance Research Network). The ESRC DTC pathway in Urban Planning and Real Estate also involves the group collaborating with researchers based in partner institutions (Glasgow, Urban Studies and Heriot Watt, Urban Studies). Further, several members of the group (**Schulz, Roberts**) are members of the Scottish Institute for Research in Economics (SIRE) benefiting from the research seminars, networks and training provided through this initiative.

The strength of international collaboration of the group is shown in part through joint publications with researchers based overseas (see REF2). As a further example, in Summer 2010, the group hosted a conference in Skye co-funded by the RICS Foundation. The seminar was attended by over 20 leading scholars in Real Estate including scholars from the US, Japan, Netherlands, Singapore Switzerland and Germany. It also involved the participation of industry experts, nominated by the RICS, who were asked to identify the practical relevance and impact of the research papers presented.

Transport and Environment

The magnitude and nature of grant income secured by the Transport and Environment group reflects its' strong internal (including with health economics, computer sciences, psychology and the business school) and external collaborations. The latter is exemplified by the group's involvement in the UK Energy Research Centre, a major RCUK funded multi-institutional initiative and other strong research collaborations involving links with Brighton, Cambridge, Cardiff, Glasgow, Imperial College, Lancaster, Leeds, Oxford, and UWE, plus international project partners including Sydney (Australia), EU Joint Research Centre, Ispra (Italy), UC Davis (USA) and Otago (NZ). **Nelson** represents the University on the Governing Body of the Northern Research Partnership (NRP) in engineering and related disciplines which is a pooling initiative between Aberdeen, Dundee and Robert Gordon Universities, whose remit includes transport. NRP is supported by the Scottish Funding Council.