Institution: Plymouth University

Unit of Assessment: C16 Architecture and Built Environment Draft

a. Overview:

The School of Architecture, Design and Environment was formed in 2009 to establish a vibrant multi-and interdisciplinary portfolio of courses and programmes, supported by a culture of research and research-informed teaching. The new School has brought together the disciplines of Architecture, 3D Design and Environmental Building under one roof within the Faculty of Arts. Since 2009, the School has maintained a strong upward trajectory, attracting world-class researchers, publishing high quality research, winning several prestigious international awards, securing external funding, propagating a vibrant PGR community, and receiving a special commendation for research environment and strategy from the Royal Institute of British Architects (BA Architecture Revalidation 2012). Submission to the REF2014 represents the new School's confidence as an emergent centre for international research and in its continued growth in both staff and PGR student research activity post-2014. A submission of 14 researchers (12.9FTE), including four ECRs, is centred on two distinctive staff-student research clusters within the School: Culture Theory Space (CTS) and the Environmental Building Group (EBG).

CTS incorporates a broad range of interests within the architectural humanities. Researchers are concerned with spatial approaches to cultural history, cultural theory, human geography, urban theory and digital media, with members coming together as a group within the School for regular meetings and collaborative projects. The cluster is characterised by its multidisciplinary approach and by engagement with the wider cultural contexts of Architecture. Specialisms include History (Maudlin, Guidicini), Cultural and Urban Theory (Brown, Miles, Nawratek), Spatial Analysis (Murrani) and Digital Urbanism (Aurigi and Willis)The cluster collaborates internally with other research clusters in compatible fields within the University, including the Transatlantic Forum in the Centre for Humanities, Music and the Performing Arts, the Digital Media Group i-Dat, Land/Water, and Art and Sound in the Centre for Media, Art and Design Research. Recent group successes include the AHRC-funded Transatlantic Exchanges Forum and the EU-funded Superfast Cornwall digital social-networks project.

EBG conducts research in the areas of building performance simulation, measurement and monitoring, and construction innovation, connected by a common sustainability agenda. Areas of research are climate change impact studies for buildings (probabilistic building performance simulation), offsite production and construction methods (construction management and innovation), and the in-situ measurement of thermal properties of construction materials (thermal probes). EBG members' research is in the fields of Building Technology (de Wilde, Donohoe, Garmston, Goodhew, Pilkington) and Construction Management (Fuertes). The cluster has built and maintains close links with other research groups within the University, such as the Institute for Sustainability Solutions Research and the School of Psychology's Sustainability Group. Recent successes include the ESPRC-funded *e-Viz* energy imaging project and the Materials KTN/ CASE Award for the energy efficient renovation of UK homes.

b. Research strategy

Since 2009 the School has fostered a vibrant and diverse research culture shared by all staff and PGR students and has undertaken a significant shift from a predominantly teaching orientation (which characterised the three former departments, in different faculties, pre-2009) towards a clear focus on research and research-informed teaching. Our long-term strategy has two principal aims:

a) *to create a sustainable, research-rich environment within the School* by building a new infrastructure to support researchers and their activities (see Income, Infrastructure, Facilities); intensively recruiting research-active staff (10 of 14 submitted staff appointed since 2009); mentoring and supporting the research activities of existing staff (see People i); supporting early and mid-career staff – including avoiding heavy teaching loads - to ensure a long-term sustainable research culture takes root; increasing the number of PGR students (see People ii); and, increasing the range of fields studied at postdoctoral level and the number of staff involved with supervision (see People i).

b) *to build a reputation outside of the School for world-class research* by increasing our external research funding for both individual and collective projects (see Income, Infrastructure, Facilities); improving the quality and range of outputs produced by our researchers (see People i); and by extending our international collaborations and partnerships (see Collaborations).

In order to achieve these goals a key priority for the School has been to implement managerial and governance structures for the long-term encouragement and support of staff and student research activities. A series of new appointments have been made to drive this strategy: a new research-orientated Head of School, Professor Alessandro Aurigi; two new posts of Associate Head of School for Research, Professor Steve Goodhew and School Research Lead Professor Daniel Maudlin; as well as Research Leads for each cluster who mentor and support researchers, monitor outputs/activities, manage a cluster-specific £3k p.a. budget and organise training and events. A School Research Committee has been formed to oversee research-related activity within the School (including an ECR Rep, PGR Student Rep and the Subject Librarian). This is monitored by a Faculty Research Strategy Committee and supported by the Faculty Postgraduate and Research Office as well as the University's Research and Innovation Division. The Committee sets the School's research strategy, allocates the annual budget (currently £40k p.a., which includes funding for conference travel, events, research support officers and assistants, sabbaticals), peer reviews external grant applications, appoints Visiting Fellows and agrees sabbaticals. The Research Lead is also a member of the School Senior Management Group and sits on the interview panels for all new appointments. Staff research activities are organised through the activities of three highly active, research clusters: Culture Theory Space (CTS); the Environmental Building Group (EBG) and Design Knowledge (staff submitted under Art and Design). The different thematic concerns of the two clusters in C16 - cultural contexts and building technology, respectively - broadly reflect staff and PGR research activities within the subject areas of Architecture and Environmental Building. The clusters are also formally connected to the wider research structure within the University; CTS is associated with the Faculty of Arts' Centre for Media, Art and Design Research (MADR) and EBG is connected to the interdisciplinary Institute for Sustainable Solutions Research (ISSR). The activities of the two clusters include regular round-table thematic discussion groups, research skills workshops and collaborative projects for conferences and publications as well as research-in-progress presentations by staff and guest speakers.

The successful establishment of a strong research culture in the short-time since the School's launch has had much to do with the collective, regular participation of staff in the informal and supportive environment of these clusters, from Professors and Readers to ECRs and PGRs. Both have also benefitted from the appointment of professorial leadership. In 2011, Malcolm Miles, Professor of Cultural Theory, was appointed by the School to lead the CTS research cluster and to drive the research agenda, mentor staff, and develop new collaborative projects that engage staff with external academics, organisations and funding bodies. This approach has been successful with 8 CTS members submitted in the REF and non-submitted staff now engaged with their own PhDs or working to establish research profiles (see People). Within this new research-rich environment staff research activities have grown, from publications to the organisation of symposia and conferences, externally funded projects, and international partnerships and collaborations (see below). Professor Steve Goodhew was a further key appointment in 2011 with responsibility to lead research activities within EBG. EBG members include postgraduates, postdoctoral researchers and ECRs as well as established researchers such as Professor Pieter de Wilde. A strategic concern for the EBG has been to expand collaborative projects with industrial partners and this strategy has met with some notable successes (see Income). Collectively, these measures have seen CTS and the EBG emerge as strong locations for the sustained generation of internationally significant research at Plymouth University.

Plans for the future, post-2013, are that the continued growth of the School's research clusters will benefit from the support and collaborative opportunities generated by Plymouth University's new Arts and Humanities Research Institute (AHRI), in which we are a leading participant The ARHI, founded in 2013, promotes arts research, interacting with other similar institutes both within and outside the University and supports the sustainability and long-term planning of the research of

more than 200 academics across the Faculty of Arts, with 180 PGR students and scholars being submitted in five UOAs (16, 29, 30, 34, and 35). The research institute effectively allows for economies of scale and vital synergies between cognate subjects, and works to foster a lively interdisciplinary culture, hosting seminars, international conferences, postdoctoral and visiting research fellows. AHRI is thus central to our long-term strategic aim of developing and supporting sustainable world-class research. At the same time, the School's research expertise in Architecture and the Environmental Building will help drive the growth of the ARHI and generate potential external funding and partnership opportunities. And the University has recognised its potential and progress, investing in it as an area for development and expansion with new research-active appointments at ECR and Professorial level, funded PhD studentships and an allocated research budget. This is aligned to the University's institutional strategy until 2020 and associated Research Strategy, and will facilitate interdisciplinary research (see Income, Infrastructure, Facilities).

c. People, including:

i. Staffing strategy and staff development

Profile: From 2009-13, the School has been rapidly recruiting new staff with a particular focus upon active researchers and including a number of international appointments (our team includes American, Chinese, Dutch, German, Indian, Iranian, Italian, Japanese, Moroccan, Polish and Spanish members). Of the 14 staff submitted, only four were in place in 2009 when the School was established; of the subsequent appointments, three are at the level of Professor, three at mid-career Lecturer and four are ECRs. The School is also committed to a process of succession planning in order to ensure that recent gains are sustained and improved upon over the long-term. We have also focused upon outward-looking international research projects, collaborations and partnerships (see Income, Infrastructure, Facilities). Recent changes include:

- Appointment of 10 research-active new staff
- Expansion of PGR supervisory capacity by forming teams of ECRs and experienced Professors
- Expansion of research-related roles and responsibilities for junior staff; new research-active appointments and promotions for current staff to recognise researchers growing profiles).

Support: All staff and postgraduate research students are members of a research group, and interactions, exchange and a sense of community are fostered through regular joint thematic seminars and research skills workshops. Through the research clusters, the School supports a spectrum of research-active staff, from ECRs to Readers and Professors. Our strategy is to encourage and provide sustained support for researchers at all levels, and this continues to be achieved through a number of specific initiatives and schemes:

- The School has created a mentoring programme where senior staff and Visiting Research Fellows provide support to individual researchers. This Research mentoring complements the teaching and career mentoring programmes offered by the University.
- In addition to the long-term mentoring of staff, the cluster co-ordinators (see Strategy) conduct annual individual research reviews and agree personal goals with all staff.
- All full-time staff are allocated one-day per week research time within the term-time teaching and management schedule. This is a School policy, not university-wide, which stems from the implementation of a workload model throughout the School, which aims to protect research time and assign research hours according to levels of activity.
- The School has an ongoing programme of funding staff sabbaticals (Brown, Emmett, Nawratek, Pilkington to date) as well as supplementary teaching relief days allocated to individual staff as and when research and publication commitments require (Aurigi, Bradbury, Brown, Maudlin, Willis).
- Since 2012 the School has provided further support for staff through the appointment of two Research Support Officers who are responsible for organising events such as symposia and conferences, identifying external funding schemes and framing applications, as well as editorial work such as proof reading papers.
- Financial support is provided for researchers to travel to present papers at conferences and symposia and for staff to chair sessions, sit on editorial boards or judging panels. Financial

support is also provided for research-related travel, field work, materials and publication costs.

- Information on grant schemes and awards is continuously circulated and promoted and internal peer reviewing of applications, at both School and University level, is provided for all staff.

Equality and Diversity: The School has implemented and benefits from university-wide protocols and procedures for equality and diversity, thus ensuring a demographically balanced team and parity in terms of recruitment, levels of posts and promotions, workload, mentoring and access to funding, support and expertise; four of six new appointments in 2012-3 have been made to women. It is standard HR policy for all interview panel members to receive a two-day intensive training programme in equality and diversity, and all members of staff have completed an on-line training module. Equality and diversity is a standing agenda item for School Research Committee meetings, which facilitates periodic review to ensure that no groups have been disadvantaged.

Fellows: The School has established a programme of Visiting Research Fellows to bring leading international researchers to Plymouth for the benefit of staff and postgraduate researchers. Since 2012, Fellows have been appointed in: Architectural Philosophy (Prof. Andrew Ballantyne, Newcastle University); Building Technology (Robyn Pender, English Heritage); Digital Architecture (Dr Chris Speed, UCL, and Dr Ava Fatah, The University of Edinburgh); and Psychogeography (Gareth Rees, artist and writer). Fellows participate in research seminars, group publications resulting from conferences and seminars and, importantly, provide additional research mentoring for staff. This School-funded strategy connects our researchers to the wider national and international architectural community.

ECRs: In addition to the above provisions, as part of our long-term planning, a range of schemes and programmes have been introduced specifically for ECRs, such as research skills seminars: how to engage with research and develop a personal research profile; the practicalities of obtaining funding; attending conferences; submitting to journals etc. This is an important aspect of our long-term succession planning. ECRs are also involved in the Faculty and University Researcher Forums (these are a central element in the University's engagement with the Concordat to Support the Career Development of Researchers, for which the University received the EU HR Excellence in Research Award). As part of our commitment to career development, a number of staff are also engaged with their own PhD theses, which they are undertaking part-time at Plymouth (Murrani completed 2010, Emmett completed 2012 following a School-supported sabbatical) and with other institutions, such as the Bauhaus School of Architecture, Germany (Evans in progress).

Senior Staff: While established researchers within the School are adept at planning their own research activities, the School aims to provide the fullest possible tailored support to both senior and mid-career researchers. In addition to guidance and support for new undertakings, it is financial support and flexible time management that is principally required by senior staff to meet their research commitments. Wherever possible, flexibility is provided within the teaching and assessment schedule for participation in external activities such as conferences, external PhD examining or for staff to take up fellowships (see Collaborations).

ii. Research students

Profile: The School places a significant emphasis upon the continued development of our postgraduate community. There has been a sharp increase in PGR student numbers from 5 MPhil/PhD enrolled in 2009 to 30 in 2013. This is an increase of over 150% in PGR student numbers in 5 years: with a large international contingent (students come from a diversity of countries including France, Germany, Iraq, Israel, Malaysia, Nigeria, Romania and Poland as the UK). This increase is partly in response to the School's enhanced external reputation where potential students now contact supervisors based on their external profiles from publications and conferences. The School has also secured several PhD studentships including external studentships from the ESPRC CASE Award Scheme, Superfast Cornwall Postgraduate Research Programme, the European Social Fund – Combined Universities of Cornwall and a Plymouth University Faculty of Arts studentship. Progression from our own A programmes to PhD level has also increased with the introduction of M-level programmes. The total number of PhD completions within the current REF period is low at 5, however, numbers will increase sharply post-2013 when

current students begin to complete.

Supervision: School staff are committed to doctoral supervision and as the postgraduate community grows the School is working to increase its supervisory capacity e.g. by putting ECRs on supervisory teams. It also benefits from the wider support of Plymouth University's Graduate School, which provides training in PhD supervision. Supervisory teams (typically a Director of Studies and two further supervisors – often from complementary disciplines/other Schools) are carefully selected by the School PGR Co-ordinator to ensure an appropriate balance of knowledge and experience in a PGR's chosen subject area. Several cross-Faculty, interdisciplinary supervisory teams have also been established (e.g. with English, Art History, Fine Art, Tourism and Psychology).

Support: Each postgraduate researcher is supported by a supervisory team of two or three staff members. They are further supported by the School Research Student Co-Ordinator who also monitors PGR progress and acts as an alternate point of call if students do not wish to speak to their supervisors. The Research Student Co-ordinator works closely with the School's PGR student Representative. The postgraduate representative sits on the School Research Committee, and their active participation has led directly to initiatives such as the Postgraduate Forum, PGR online message board and the School's open access online journal, launched in 2013. Students are all members of a relevant staff-student research cluster and take an active part in cluster activities, including seminar presentations, conference participation (internal and external) and many had their work selected for publication in a number of journals and edited collections. PGRs are also provided with opportunities to develop career-orientated skills through relevant part-time teaching within the School, involvement with projects as research assistants or by working with staff on Plymouth University's Spatial Use Strategy Framework. These opportunities have been welcomed by students. Student training opportunities are developed, managed and monitored by the Doctoral Training Centre in Arts and Humanities (DTC) which provides a wide range of HEFCE bench-marked training in postgraduate research skills through seminars, training days, workshops and online materials. All PGRs undertake credit-rated skills training provided by the DTC and further skills training is offered by the University's Graduate School. The DTC administrates a rigorous annual monitoring process for MPhil/PhD progression, including internal reviews, and provides staff with a range of support mechanisms through this process. The School Research Student Co-ordinator sits on the DTC Board representing the School and was closely involved with the format of a new monitoring process launched in 2012/13.

Progression: The postgraduate community has been further enhanced by four new M-level programmes introduced to develop postgraduate studies from undergraduate through to PhD. In 2009, the School launched MRes Architecture and the interdisciplinary MA Eighteenth Century with English and Art History; followed in 2011 by MSc Sustainable Construction (Project Management) and MSc Sustainable Construction (Cost Management), which are professionally accredited by the Royal Institute of Chartered Surveyors (RICS);. These programmes provide an alternative postgraduate research route from the professional Master of Architecture programme. The success of these initiatives is evidenced in students now progressing from BA programmes to PhD within the School.

d. Income, infrastructure and facilities

Income: Both research groups within the School - *Culture Theory Space* and the *Environmental Building Group* - have achieved early successes in attracting external research income across different bodies and award schemes, highlighting the School's potential for increased research income in the future. Between 2009 and 2013, the School has secured over £2.5 million in external research funding (including current projects and funded studentships not included in REF funding data). CTS hosted the US Embassy and AHRC-funded Transatlantic Exchanges Network (£30k, Maudlin) with Plymouth University's English department and other network partners in the UK (University of Exeter, Brunel University) and USA (Amherst College, Boston University). This project has led to joint publications (*The Materials of Exchange*, Ashgate, 2013, and *Building the British Atlantic World*, UNC Chapel Hill, 2014). Other funding includes an AHRC Research Fellowship (£32.7k, Maudlin), an EU Marie Curie Integration Grant for Digital Architectures (£80.7k, Aurigi and Willis) and the EU-funded Cordiale Project: Managing Landscape Change (£150k,

Mackie and Watson). The *Environmental Building Group* has also won various awards from the EPSRC: the BuildTEDDI Scheme, including: 'eViz - Energy Visualisation for Carbon Reduction' (£1.4m, shared with Psychology – de Wilde); the First Grant Scheme - (£199k, de Wilde); Materials KTN/ CASE Award for the energy efficient renovation of UK homes (£85k, de Wilde and Pilkington); and an Industrial CASE Award (£88k, Goodhew). EBG has further secured two Knowledge Transfer Partnerships: one via SWERDA, with partner C3 Resources (£89k, de Wilde with R&I and School of Computing); and the other with Loft Genie (£50k, de Wilde). Other awards include two EU ESF-CUC grants for Thermography (£60k, de Wilde) and Delivering Zero Carbon Homes in Cornwall: (£80k, de Wilde).

Infrastructure: The School of Architecture, Design and Environment's design studios, seminar rooms and staff offices occupy four floors of the eight-storey Roland Levinsky Building. This award-winning, 13,000 m^2, £36-million building, designed by Henning Larsen Architects, was opened in 2007. The building functions as an arts centre that is open to the public, and includes a gallery and exhibition space (used by the School for various curated public events, such as the Cabinet Exhibition 2011), cinema and restaurant, as well as housing lecture theatres, seminar rooms and staff and student office space, and has become a popular gateway to Plymouth University's city-centre campus. The building is shared with Fine Art, Illustration, Graphic Communication and Theatre and Performance, creating a vibrant, interdisciplinary community of both staff and students. PGR students have general office space and computing facilities in the Roland Levinsky Building as well as 24-hour access to computing facilities in the Babbage Computer Suites.

Facilities: School computers are equipped with a comprehensive suite of industry-standard software (3D Studio Max, AutoCAD Arch, Building Design Suite, Sketch Up, Archicad, Vectorworks Designer, etc.). Staff and PGRs are supported by two full-time technicians located in the School office. Staff and students also have access to new model-making workshops, a photographic studio, an audio visual editing suite, and the Brunel Laboratories (Environmental Building), all supported by full-time technicians. The University's Charles Seale-Hayne Library is located close to the Roland Levinsky Building on the main campus; Architecture and Environmental Building have a dedicated subject librarian and an allocated acquisitions budget, e.g. the Rare Books Room has recently acquired the complete back catalogues of *Architecture Review* and *The Architect's Journal*. The library also has extensive online resources including e-books, image and map archives and subscribes to leading e-journal and online archive services (for example: Eighteenth-Century Collections Online, Environment Complete, JStor, Oxford Art Online, RIBA Catalogue, Times Digital Archive, Web of Science, Wiley Online Library, Science Direct). The library provides regular e-resource training sessions for staff and students and has 1,000 study places and 176 workstations. The University of Plymouth Press continues to expand and publish original work, including several titles by *Culture Theory Space* members such as *Culture & Agency: Contemporary culture and urban change* (2010); *Cultural Memory: Reformations of the past in the present, and present in the past* (2010); and *City as a Political Idea* (2011). Staff and PGR students also have exclusive access to a number of historic houses, collections and archives in the South West for research (and internships) thanks to some pioneering partnerships that the School has established with the National Trust SW and Mount Edgcumbe (Plymouth County Council). For example, a current PGR is investigating the material cultural and collecting practices of the Carew-Pole family at the National Trust's Antony House through exclusive access to the house and the family's collections and archives.

e. Collaboration and contribution to the discipline or research base
The School is engaged with a number of ongoing research collaborations coordinated through our research clusters and has begun to make a significant contribution to research regionally, nationally and internationally:

Regionally: The *Environmental Building Group* hosted a SWERDA KTP project and is currently undertaking an EPSRC industrial Partnership with partners in Devon and Cornwall (C3 Resources, Cornish Lime and Wates Retail). The *Culture Theory Space* group has developed a unique partnership agreement with the National Trust South West, securing exclusive access to historic houses and collections for staff and PGRs; and with Plymouth City Council at Mount Edgcumbe

historic house and gardens, providing opportunities for work placements as well as for original staff and postgraduate research in buildings, landscape and archive-based architectural history. The EU-funded Superfast Cornwall project brings together industry, academic and charitable partners for a two-year investigation into network connectivity and social exclusion in rural areas.

Nationally: Collectively and individually, staff continue to forge new links and collaborate with leading UK universities, including UCL, Loughborough, Cardiff and Cambridge. For example, CTS members are part of the Connected Communities Programme; the AHRC-funded UK Network: Creative City Limits with UCL; and the EPSRC Funded Limes Net Network. School staff have acted as external doctorate examiners for the Welsh School of Architecture, University of Cardiff, the Bartlett School of Architecture, UCL and Newcastle University. Staff sit on the Boards of UK organisations such as IBPSA (International Building Performance Simulation Association) – England; the Vernacular Architecture Group; and the AHRC Peer Review College. Additionally, *The Highland House Transformed* was named *The Scotsman* newspaper's History Book of the Year 2009.

Internationally: Staff have been invited to act as external doctorate examiners for the Georgia Institute of Technology, Atlanta; KU Leuven, Belgium (MPhil/PhD transfer); and Eindhoven University of Technology, Eindhoven. They have also developed further collaborations with KU Leuven, Belgium; TU Munich in Germany; University of North Carolina; Innsbruck and TU Vienna, Austria; and Hunan University in China, leading to joint projects and publications, as well as invited lectures. In terms of staff career development, the School has recently established an exchange programme with the Catholic University of Panura, Brazil, for staff to take research leave connected to projects at partner institutions overseas with similar research interests in digital urbanism (Panura). The School is a member of the Leverhulme Trust-funded international network *Relating Identities: Locality, Region, Nation and Empire* and hosts the AHRC *Transatlantic Exchanges Network* (Universities of Exeter, Brunel, Westminster, Boston and Amherst College). School staff hold positions with numerous international bodies such as the European Group for Intelligent Computing in Engineering (EG-ICE); the Editorial Board of *Architectural Histories*; the Advisory Council of the International Association for Study of Traditional Environments (IASTE based at UoC, Berkeley); the Board of the Association of Researchers in Construction Management (ARCOM); and the Advisory Group for the World Monuments Fund (WMF), New York. Individual staff have won international awards, such as the IASTE bi-annual Jeffrey Cooke Award for outstanding research in both 2008 and 2010, and the ARCOM Best Research Paper Award in 2009. Many staff are engaged with international collaborative publishing projects with other institutions that have developed from participation in networks or from research group activities involving convening international conferences at Plymouth (Transatlantic Exchanges, 2010; Fixed? Architecture, Incompleteness and Change', 2011; Augmented Urban Spaces, 2012; Urban Utopias 2013) as well as collaboration in various EG-ICE Conferences (Plymouth, 2008; Enschede, 2011; Herssching, 2012; Vienna, 2013; ECPPM, Ireland, 2010; FutureBuild 2013, Bath) and symposia (Culture and Agency, 2009), including edited-collections such as: *Consuming Architecture: the use, appropriation and interpretation of buildings* (Routledge, 2013); *Building the British Atlantic World* (UNC Chapel Hill, 2013); *Shared Encounters* (Elsevier, 2013); and a guest-edited thematic issue of the international journal *Building and Environment* on 'Implications of a Changing Climate for Buildings'. Finally, staff regularly act as referees for international journals, including: *Architectural Heritage; Journal of Housing, Design History; Traditional Dwellings and Settlements Review; Open House International; International Journal of Engineering Education: Building and Environment: Energy and Buildings: Applied Energy: Energy Policy: Journal of Advanced Engineering Informatics;* and *Journal of Building Performance Simulation*.