**Institution: University of Central Lancashire**

**Unit of Assessment: 17 Geography, environmental studies and archaeology**

**a. Overview**

This submission covers two of the three disciplines included in UoA 17: **Archaeology** and **Environmental Studies**. The majority of people in this submission (Cummings, Peterson, Morris, Robinson, Sayer and Simmons) are archaeologists based in the School of Forensic and Investigative Science (referred from now on as FIS). As such, the bulk of this submission will relate to research and practice within this school. This school has been the fastest growing provider of forensic science within the university sector since its creation in 2000 and archaeology was introduced into the school as a separate discipline in 2004.

Environmental Studies is located within the Grenfell-Baines School of Architecture, Construction and Environment (referred from now on as GB-ACE), and this research group (Butt and Lowe) contributes research-informed teaching into the delivery of undergraduate degrees as well as a suite of taught Environmental Masters.

Both research groups have demonstrated sustained improvement during the REF assessment period. This is shown by growth in the volume and quality of research outputs, increased financial investment both internally and externally, and increased postgraduate numbers. As we now move forward, the university, via a range of mechanisms, is supporting the growth of these research areas, and we seek to further our distinctive position by increasingly exploring interdisciplinary research between these schools.

**b. Research strategy**

The Research and Innovation Office, headed by the Director of Research, manages research centrally and co-ordinates the delivery of the institution's Medium Term Strategy. The UoA has an annual delivery plan which outlines the group's research vision underpinned by implementation strategies (including grant bidding, publication targeting and international collaborations).

***Archaeology*** at UCLan is focussed on specific key fields. First, we investigate *prehistoric and historic societies worldwide*. We have a particular specialism in the archaeology of Britain (Cummings, Peterson, Morris, Robinson, Sayer). We also have a research focus on *landscapes and environmental archaeology.* In particular we are interested in landscapes and the use of natural places in prehistory (Cummings, Peterson, Robinson). We have a broad interest in *bio-archaeology*, particularly in relation to the skeletal remains of both animals and humans (Morris, Simmons). Finally, we have a growing focus on *forensic archaeology*, specifically on predicting time since death and understanding the rate of decomposition of humans (Simmons).

Can we expand on this further? More detail? You have space.

***Environmental Studies*** at UCLan is ecology-focussed and specialises in the study of earthworms within the Earthworm Research Group (ERG). This group has existed for ten years and contains two full time staff at UCLan (Butt, Lowe), but gains substantially from the many national and international links with associated staff from other HEIs and research organisations. The ERG utilises this group of organisms as a focal point for a wide range of environmental investigations. This research is particularly focussed on these animals as both indicators of change, and as catalysts for change within environmental systems.

Our overall research aim is to make a distinctive contribution to our relevant disciplines. Therefore, our strategy has been to focus and strengthen our core research areas, whilst recognising areas of individual specialism. In archaeology our goal was to grow in breadth and depth from our first time submission to the RAE2008. Archaeology has thus recruited two new members of staff who are submitted here (Morris and Sayer). Environmental Studies (ecology) was not submitted to the RAE 2008, so the aim here was that staff be submitted for the first time.

The objective of expanding our research base has been achieved in two different ways. Firstly, we have employed additional research-active members of staff, increasing the overall number of research-active staff in archaeology to six. Secondly, the university has invested in individual staff via internal sabbatical schemes (five staff in this submission have received internal sabbatical support in this REF cycle) and external visitor funding programmes. Also school-level directed funding has also been made available to support targeted research projects. On top of that, the UoA has received support through the University's *Undergraduate Research Internship Scheme*.

We have grown significantly our postgraduate research base. At any one time we now have around 20 postgraduate research students in Archaeology and Environmental Studies, and we detail below in C(ii) the growth in PhD completions since the RAE 2008. As such, we now have a vibrant research postgraduate culture and successful record of completions.

It should be noted that the our research environment is not based purely on academic staff and research students. Rather our taught postgraduate courses are also part of this culture, enriching their student experience as well as being a fertile ground for postgraduate research student recruitment. Of particular note is the MSc in Forensic Anthropology which attracts high quality international students and the MSc in Sustainable Waste Management.

In terms of future strategic aims and goals for research, these are threefold.

***1. Build on current momentum to enable research to thrive and grow.***
Our aim is to continue to promote, develop and sustain an active research culture. In archaeology, we want to grow, both in terms of size but also in terms of quality. As a new subject area submitted in 2008, with individuals at the start of their careers, our staff base is now maturing and gaining in experience and reputation. We wish to continue this upwards trajectory as we become further established researchers. Our highest priority is to increase our external income generation. Continuing to attract research postgraduate students is also essential to our growing research culture.

Within Environmental Studies the major aim is to consolidate and develop the research platform that has been created over recent years. We will continue to work collaboratively with individuals and groups from other HEIs and Research Establishments both nationally and internationally. Again, the main target here is to grow research income through enhanced external bidding, and use this to potentially employ Research Assistants/Fellows to strengthen the group and facilitate the development of recently investigated areas such as bio-monitoring and earthworms as ecosystem service providers.

***2. Expand interdisciplinary research.***
Archaeology is in the unique position of working within a school that has research areas in topics outside our core area of interest. We are increasingly involved in interdisciplinary research, which is of strategic future importance. For example, we are utilising chemical analytical techniques on different types of material culture (stone tools, pottery and rock art) with excellent results, drawing on the expertise of the school's chemists (in particular we are exploring the use of XRF and IC-PMS). This is an area we seek to expand in the coming years. Interdisciplinary research, utilising the wide range of analytical equipment housed by the school is also a priority, and we are currently exploring the application of various techniques on skeletal material. Furthermore, in order to enhance our interest in the archaeology of the modern world, we are increasingly making links with the oral historians in UCLan, and this looks to be an exciting avenue of future research.

Earthworm research has seen the development of soil restoration techniques and recent moves (e.g. in tagging animals) have enabled growth in the areas of ecotoxicology in anthropogenic soils and population dynamics in more natural habitats. We now aim to build on these newly developed techniques and apply them in agro-ecosystems and at brownfield sites which are in the process of rehabilitation. Use will be made of the ecosystem services provided by earthworms including biostimulation of soils, enhanced crop production and mass production of beneficial species as a protein source for livestock and even for potential human consumption. Our work in Scotland (Rum

and South Uist) will develop existing interest in anthropogenic interactions in small-scale agro-ecosystems (crofts) where marine organic inputs can be traced though food webs using isotopic signatures. This expansion of interdisciplinary research will thus ensure the distinctiveness of both archaeology and environmental studies at UCLan.

***3. Further our commitment to increasing public engagement.***
Our aim is to continue to engage with public outreach so that as many as people as possible benefit from our research. Having successfully run various individual research projects with a community engagement component, in the future the archaeology group will be drawing on their combined experience and knowledge and concentrating their efforts on community engagement at a single site. We have launched a new research excavation at Ribchester in Lancashire, which has community involvement as one of its principle aims. While we will continue with public outreach on our other research excavations, the Ribchester project will showcase our work to the wider community. In environmental studies we will continue to promote public outreach through science engagement in collaboration with partners in the OPAL (Open Air Laboratories) project and other public-focussed events. We are also in the process of developing a long term research project on South Uist, building on initial soil biodiversity assessment, and investigating interactions of current and past crofting practices with soil ecosystem services. This will have a significant public engagement component.

**c. People, including:**

**i. Staffing strategy and staff development**
It is the university's policy to employ research active staff..Since RAE 2008, two additional members of staff have joined archaeology (Morris, Sayer). They were strategic appointments in terms of strengthening our research base, enhancing what we already specialised in, while also bringing new areas of expertise. In Environmental Studies, Lowe was appointed in 2009 as a lecturer, having been a Research Fellow for five years. Loyalty to UCLan is evidenced by the fact that only one researcher has left for another post (Krish Seetah was appointed at the same time as Sayer, but left to take up a post at Stanford), ensuring continuity and therefore effective research.

As archaeology is still a maturing subject at UCLan, our policy has been to recruit at lecturer level, while promoting existing staff. Since the RAE 2008, all lecturers have been promoted to senior lecturers. Furthermore, two staff has been promoted to provide research leadership; each subject area is led by a Reader (archaeology: Cummings, environmental studies: Butt). The UoA overall is led by Cummings, who has benefitted from Research Leadership training from the Institute of Leadership and Management. While the university seeks to grow research active areas by appointing new members of staff, it also has a realistic approach to staffing. Undergraduate fees primarily cover staffing costs, and we have successfully increased our undergraduate numbers year upon year in order to grow our staff base.

The university has an on-going commitment to investment in our current staff in a number of ways. Firstly, the university offers a round of sabbaticals once a year. These provide up to six months research leave for researchers. Within this submission, five staff have benefitted from this scheme within the assessment period (Cummings, Peterson, Robinson, Sayer, Simmons). Each of these is worth £16K to the UoA and this money can be used to provide teaching cover as well as help fund parts of specific research projects. Secondly, all staff in archaeology have received funds of up to £10K per year in order to support their current research interests (this is part of the QR funding, and is set aside at school level for archaeology to spend).

The research infrastructure at UCLan is robust, as is our staff support network, involving appraisals of work-load at a school level and dedicated research, administrative and technical support. Equality of opportunity is actively promoted in the university. Each School has an equal opportunities officer and we have all been diversity trained. All research projects must go through the university's ethics committee and issues are identified at that stage. To ensure excellent research training UCLan has invested in the Vitae Research Development Framework to support all research staff and students, and was recently awarded the Vitae Excellence in Research

Training award and kitemark. UCLan is firmly committed to supporting and implementing the principles of the *Concordat to Support the Career Development of Researchers* that sets out the expectations and responsibilities of researchers, managers, employers and funders. In late August 2011, UCLan received formal confirmation from the European Commission that the institution had been successful in gaining the European Commission HR Excellence in Research Award. Furthermore UCLan has been classified as an 'employer of choice' in the recent staff survey.

**ii. Research students**

During the assessment period, over 19 research doctoral degrees have been awarded in this UoA. In archaeology we have placed considerable emphasis on growing our postgraduate research student cohort since the last RAE and have achieved considerable success here. We now have a lively and strong postgraduate research culture, with around 20 students enrolled on research degrees at any one time. We have particularly strong clusters of research students working on Californian material and British prehistory. Also noted that in subjects associated with archaeology we have awarded 5 Masters by Research: a further 3 Masters by Research students will have completed by the end of 2013. Environmental Studies currently have 8 PhD students.

Both schools have a clear structure of support for their postgraduate communities, with a dedicated Research Degrees Tutor (RDT) in each. The RDTs administer the process at subject level, and are members of the relevant Research Degrees Sub-Committee that oversees these processes more widely. Progress through the PhD is closely monitored to ensure a programme of original and robust work: from programme approval for an MPhil, which is transferred to PhD registration in the second year following a viva by an independent panel of staff. In addition to regular supervisor meetings, students also attend an annual series of monitoring interviews with their RDT. Research students have their own research offices (full-time students have their own desk and PC while part-time students have access to a hotdesk), and attend our research seminars run throughout the academic year. Archaeology research students also participate in staff's research excavations. Environmental studies students are required to participate in the school's Research Seminar series and are actively encouraged to participate in wider research areas to supplement their training through visits to, and investigations at, long-term field sites. Research students have targeted funding at school level to enable them to participate in national and international conferences.

More broadly, research students are administered by the Research Student Registry, who also provide a Certificate in Graduate Research Skills for all our research students. The Graduate Research Skills programme is a validated programme, and contains around £1700 worth of training; it contains vital information on skills such as Communication and Presentation; Reflective Practice; Project Management; Academic Writing; RefMan/RefWorks and NVivo; Teamworking; Coaching and much more. Part-time students can elect to come to parts of this course, but if they are unable, the university has invested close to £80k through the purchase of the on-line Research Masters Programme from Epigeum, which is ranked as being amongst the highest quality available. The Research Student Registry also promotes an integrated research culture by organising an annual postgraduate conference where students from across the university present talks and posters on their work. Our research students have consistently won prizes at this conference. There is also a thriving postgraduate research student society (PROGRESS) that organises monthly events, social outings as well as administers a small travel grant scheme.

**d. Income, infrastructure and facilities**

***Research facilities***

Archaeology is housed in high quality research accommodation, with dedicated research labs and space. The brand new **£12.5 million** JB Firth Building houses part of the school of FIS and was opened in 2011. This includes postgraduate research accommodation and laboratories.

We have a dedicated archaeological research laboratory, as well as an animal bone lab with a reference skeletal collection. This includes a large human skeletal bone collection and access to all the anthropology teaching laboratories for both research and post-excavation analysis. We also have a specially designed laboratory for the processing of soil (wet-sieving) and extensive storage for archaeological equipment and finds. There is a dedicated soil laboratory for ecological

research, including extensive temperature-controlled incubator space for soil-dwelling earthworm culture. We have newly equipped laboratories for DNA profiling and analysis, and a digital radiography unit to diagnose trauma and pathology in ancient and modern/forensically-relevant bones. Specialist equipment includes a suite of geophysical equipment, a portable XRF and a large number of centrally-loaned total stations (including integrated GPS total stations).

Also, the UoA has access to a SEM (scanning electron microscope) and ICPMS (inductively coupled plasma mass spectrometry): the latter is being employed as part of an interdisciplinary project between archaeology and chemistry on flint sourcing. GIS software is accessible throughout the university and we have Photomodeler software for 3-D mapping using photogrammetry. We have a thermal imaging camera, endoscope, and environmental chambers for rearing insects, and a FORDISC 3 on-site license for the training of students in metric race/sex/stature estimation.

We also have the UK's first dedicated taphonomic research centre: TRACES (Taphonomic Research in Anthropology: Centre for Experimental Studies). The university has invested in excess of £400K in this facility. Established in May 2009, TRACES comprises of 5 hectares of land and associated facilities in the north-west of England. Facilities include an on-site lab, office and teaching room, heavy machinery (tractor and digger) as well as state-of-the-art monitoring equipment including a weather station and thermo-couples with data loggers. At any one time, over a hundred animals are *in situ*, used to conduct experiments in all aspects of decomposition, trauma, forensic entomology, and forensic DNA.

Research accommodation is supported by dedicated laboratory managers, managed centrally by Learning and Information Services (LIS). Archaeology has its own technician to assist with lab classes: the technician also acts as a supervisor on research excavations. An associate lecturer in forensic anthropology also manages forensic archaeology equipment and collections. Environmental studies research is supported by a specific technician in GB-ACE who runs and maintains the soil laboratory. In total this amounts to approximately 2.5 FTE technical support soley for the UoA. On top of that, the University also has centralised staff in LIS for "day-to-day" technical tasks. LIS staff are fully integrated into the research structure at UCLan and meet regularly with the research community to ensure they are delivering the requirements of researchers.

***Research funding***

UCLan has a dedicated Funding, Development and Support unit. Their role is to actively search for funding opportunities, to provide extensive support for applications, assistance with governance and ethics as well as on-going support to the individual researcher throughout the lifetime of any successful bid.

Archaeology has been successful in obtaining numerous small research grants up to £16K from a variety of sources, both national and international. We have obtained a number of British Academy grants over the assessment period, and while in post at UCLan, Seetah gained substantial ERC funding as part of a larger research group based at Reading.

The UoA has benefitted from strong internal financial support amounting to £175K in this REF cycle. Considerable research funding has been provided by the university for both fields, including grants for research projects, research equipment grants, funded research degrees, funding attached to sabbaticals and internships.

Archaeology has had the autonomy to be able to reinvest all of the QR funding arising from RAE2008; we have chosen to appoint new members of staff (Morris and Sayer), invest in postgraduate scholarships and create an annual research account for staff to draw on for individual research projects. In addition to this the university has also provided centralised postgraduate research funding every year, including PhD scholarships including Gilbertson Excellence Scholarship (which pays the fees for UCLan graduates with first class degrees who undertake a research postgraduate qualification). These scholarships have attracted both home, EU and

international students.

Environmental Studies have been successful at obtaining regular small funding from a variety of charities, industrial partners and NGOs. This has enabled the staff to produce quality research, leading to the continuous output of peer-reviewed publications and a succession of PhD studentships; specific 50:50 funding with external agencies such as the Forestry Commission appears to be a successful model to follow.

***University research governance***

The University and School Research and Knowledge Transfer Committees determine policy and practice in relation to research governance. UCLan's Funding, Development and Support (FDS) Unit undertakes full costing of research and related activities and the Business Partner Unit (BPU) is responsible for the financial management/audit of projects once a grant has been awarded. FDS operates a critical friend system to facilitate contract and projects being completed on time and to budget with the contracted outputs and deliverables. New research programmes with external partners are guided by UCLan's Innovation and Enterprise Unit and Strategic Development Services e.g. writing contracts/letters of agreement and revenue sharing agreements, the identification of IP, Licencing and IP ownership. The university operates a robust e-Ethics Committee including external and service user representation to which all research projects must be submitted for review. This serves to enhance ethical and scientific quality, safeguard participants and investigators in research, monitor practice and performance and promote good practice and ensure lessons are learned.

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

Our staff collaborate with colleagues in other universities and academic institutions, both nationally and internationally.

In archaeology, significant collaborations exist with various institutions in California as part of Robinson's on-going project on south-central California (this includes the Wind Wolves Preserve, the Santa Barbara Museum and CSU Channel Islands). Sayer runs a major community archaeology project with colleagues in MMU, and Cummings is in charge of a substantial research project with Professor Richards at Manchester University. Simmons collaborates with archaeozoologists and archaeologists at the Hebrew University of Jerusalem and Tel Aviv University. She is on the steering committee for the British Association of Forensic Anthropology and is also chair of the accreditation committee. Simmons spent a month with the Office of the Chief Medical Examiner in New York City. Simmons ran a TAIEX/EU funded project (week long forensic anthropology short course) at UCLan for four anthropologists from the National Crime Lab in Ankara, Turkey. Staff in archaeology are increasingly involved in external peer review processes: Cummings is external examiner at Manchester University and Glasgow University, and Peterson is external examiner at Worcester University. All staff in this group regularly review papers for international journals including *American Antiquity*, *Antiquity*, *Archaeological Journal*, *Journal of Social Archaeology*, *Journal of African Archaeology*, *Journal of Forensic Science*, *International Journal of Osteoarchaeology*, *Medieval Archaeology*, *Cambridge Archaeological Journal* and the *European Journal of Archaeology*. We regularly contribute to national and international conferences, including the SAA in America (Robinson, Sayer), the EAA in Europe (Morris, Peterson, Robinson, Sayer), the European Society for Anthropological Sciences (Sayer), American Academy of Forensic Sciences (Simmons), and WAC (Peterson, Robinson) along with TAG and CHAT in the UK (Cummings, Morris, Peterson, Robinson, Sayer). We have reviewed funding applications for the AHRC, the Leverhulme Trust, ESRC, Irish Research Council for Humanities and Social Sciences, the Icelandic Centre for Research, Austrian Academy of Sciences, Czech Science Foundation, English Heritage and National Institute of Justice in the USA. We have externally examined PhD theses at Cambridge, Leicester, UCL and Bangor. We have been invited to give research papers at leading UK institutions (for example, Cummings: Aberdeen, Bradford and Reading; Peterson: Cardiff and Bangor; Robinson: Cambridge and Southampton; Sayer: Cambridge, Durham and Bristol). Archaeology runs a seminar series throughout the academic year, with a particular focus on research that intersects with our own interests as a group. Of particular note have been a number of speakers talking about research in

California, many of them joint meetings with the North American Archaeological Research Group (NAARG).

In Environmental Studies, staff have extensive links both nationally and internationally. Overseas research is conducted on an annual basis as well as receiving visitors from other countries. Important contacts are from Finland (MTT Agrifood Research Finland), Poland (University of Rzeszow), Spain (University of Vigo) and the USA (USDA in Georgia and Iowa). In the UK, funded projects link to The Forestry Commission, Scottish Natural Heritage, English Heritage, SEPA, Manchester Airport and BAE Systems. Butt is a member of the Editorial Board for *European Journal of Soil Biology* and he and Lowe both regularly act as reviewers for a range of soil ecology and ecotoxicology journals including *Agriculture*, *Ecosystem and Environment*, *Animal Behaviour*, *Applied Soil Ecology, Annals of Applied Biology, Basic and Applied Ecology, Behavioural Ecology, Biodiversity and Conservation, Biological Agriculture and Horticulture, Biology and Fertility of Soils, Biology Letters, Ecotoxicology, Environmental Pollution, European Journal of Soil Biology, Functional Ecology, Invertebrate Biology, Journal of Applied Ecology, Journal of Soils and Sediments, Molecular Ecological Resources, Pedobiologia, Plant and Soil, Soil Biology and Biochemistry, Soil and Tillage Research, Restoration Ecology*. Research proposals have been peer-reviewed for BBSRC, Czech Science Foundation, Greek Archimedes Phase II and numerous non-governmental organisations. Sessions are regularly chaired and workshops organised at the International Colloquium on Soil Zoology and International Symposium of Earthworm Ecology. Butt and Lowe also receive frequent invitations to give seminars at UK Universities such as Reading, Cardiff, Lancaster, Liverpool and Cumbria. Butt has acted as an external PhD examiner on 5 occasions since 2008 in the UK and also in Ireland, Belgium and India. In addition a Distinguished Visitor Programme has now been established by the University. This to promote specific areas and assist research group development. Environmental Studies will benefit from this with a visit in March 2014 from a Finnish Academic for further collaborative developments.