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Great Excavations: Methodological considerations arising after a major archaeological infrastructure project for the A14 Cambridge to Huntingdon Road Improvement Scheme

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1. Introduction

Between 2016 and 2022, MOLA Headland Infrastructure (MHI; a partnership between Museum of London Archaeology and Headland Archaeology) led a number of archaeological contractors on a major series of excavations in advance of road improvements on the A14 between Cambridge and Huntingdon in the east of England, UK (Figure 1; see synthesis in West *et al*. forthcoming). This was a large nationally significant infrastructure project (NSIP) requiring a development consent order (DCO) to proceed, which involved consultations with a wide variety of stakeholders. The archaeology package, funded by National Highways through the A14 Integrated Delivery Team (IDT), was one of the UK's largest archaeological investigations at the time, covering a total of 232ha and encompassing 30 sites across 22 miles of previously unexplored land traversing the West Cambridge clay plain. It produced some spectacular results, ranging from Pleistocene woolly mammoths to deserted medieval villages, alongside Neolithic and Bronze Age monuments and associated cemeteries, Iron Age and Roman settlements, Saxon settlements and nineteenth century railway remains.

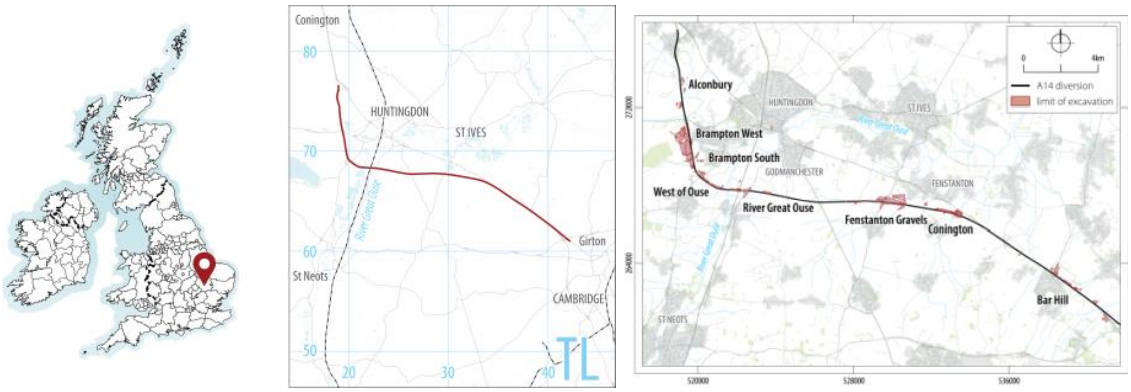

Figure 1: Location of project. *Click to enlarge.*

As may be expected given the scale of the project, there were considerable challenges to all elements of the archaeology scope of works, from pre-determination studies to the final dissemination of results and archiving. Many of these challenges were overcome by solid partnerships and good teamwork, with a clear vision of the end goals and the

implementation of innovative methodological techniques. Many of the processes applied were successful, but there were also areas where, on reflection, improvements could have been made. This paper draws together and evaluates some of the main methodologies utilised within the different stages of the project, and provides some 'lessons learned' that may be useful for future archaeological projects, particularly those associated with large infrastructure.

There have of course been other 'lessons learned' methodological articles, published either during or following the completion of major archaeological projects, whether research-based (Donelly *et al*. 2014; Fulford and Holbrook 2018), community-based (Mitchell and Colls 2020; Sayer 2022) or for developer-funded fieldwork (Carver 2013; Raynor 2022). Carver's (2013) paper highlights the challenges and opportunities of large infrastructure developments, drawing upon the Crossrail project while it was still active. Although many of the 'lessons learned' noted there have been enacted upon in projects like the A14 road improvement scheme (e.g. the importance of central contracts and promoting discoveries), others (e.g. sufficient early planning for mitigation) have still to be sufficiently addressed.

2. Evaluation of A14 methodologies

To deliver a more balanced methodological evaluation, perspectives from different project stakeholders are captured here: those of the client (National Highways and A14 IDT), principal archaeological contractor (MHI) and curator (Cambridgeshire Historic Environment Team; CHET). All of these bodies have subtly different ways of measuring 'success', whether it is ensuring that there are no delays to the opening of the road scheme, creating quality end-products of high academic worth within time and on budget, engaging with as wide a public audience as possible, or making sure that heritage assets are dealt with in the most appropriate manner.

Three main stages of archaeological work followed the environmental impact assessment (Highways Agency 2014) for the A14 scheme: pre-determination investigations, excavation and post-excavation. The methodological considerations of each of these will now be briefly assessed.

2.1 Pre-determination non-intrusive and intrusive archaeological investigations

The earliest archaeological investigations, as part of the pre-determination phase of the A14 road improvement scheme, go back to 2003, with an aerial photographic assessment. Geophysical surveys followed in 2004, 2008, 2009, 2014 and 2016, a fieldwalking survey in 2009, and test pitting and trial trenching in 2008, 2009, 2014 and 2016, mostly undertaken by different organisations (Cambridge Archaeological Unit, Wessex Archaeology, Cotswold Archaeology, Oxford Archaeology, PCA and MHI; see Smith and West 2019 for details).

In general, the trial trenching part of this phase of work was felt to be problematic by all key stakeholders. Primarily this was because it was too limited in scope (in terms of number and location of trenches), particularly in the period prior to the DCO in June 2016, when land access permissions constrained the programme. This meant that an excavation strategy could not be fully developed or curatorially approved, as too little of the scheme area had been trial trenched. In addition, the use of multiple contracting units with different approaches to trenching led to variable and not always compatible results. The selection of excavation areas followed post-DCO trial trenching in the

second half of 2016. This resulted in large areas of the clays west of Cambridge being discounted from further (mitigation) work because of a lack of archaeological evidence, while also confirming the abundance of archaeological evidence on the gravel terraces and clays with till.

2.2 Archaeological excavation

As already highlighted, the scope of the excavation (i.e. the location and size of individual sites) was not very advanced at the beginning of the programme, and the final design of the mitigation scheme became a dynamic process that responded to design freezes still happening after the DCO was granted. Newly identified excavation areas were harder to embed in the wider scheme, as they were only slowly added to the IDT's A14 digital construction programme, but the combined efforts of the archaeological curator, consultant and contractor ensured that significant archaeological areas found through late evaluation could be added to the roster of sites and delivered within the plan. The various stages of evaluation ultimately led to the identification of 30 areas as either 'targeted excavation areas' (TEAs; complex archaeological remains) or 'strip map and sample areas' (SMSAs; less dense archaeological remains).

One of the major early issues affecting the programme was ensuring sufficient staffing levels to cover concurrent excavations across the length of the scheme. Nevertheless, despite very little lead-in time (approximately two weeks), a substantial project team (c.250 at its peak) was rapidly assembled, including core teams from MHI and other UK archaeological contractors, along with a large contingent of staff recruited from across Europe, something that would be difficult to achieve under current post-Brexit conditions. Two models were adopted for the deployment of staff. Most were fully integrated into MHI teams, while in some circumstances contracting units ran their own sites. On balance, full integration was preferable as it fostered a greater sense of belonging to an A14 team, and also ensured greater consistency in excavation methodology, although close cooperation was maintained with all teams working on the project. Alongside the issues of recruiting this size of team were the obvious challenges of onboarding, training and organising the new workforce, achieved through a dedicated administration team, training officer and project-specific manual. A dedicated health and safety (H&S) consultant was also employed to help the field team with the very robust H&S requirements of the programme.

Multiple excavation areas were to be worked concurrently and at speed across the 22-mile scheme, and the archaeological teams required suitable infrastructure support (such as wet/dry site compounds, walkways/barrow-runs). A central processing compound, or 'wet' field office, for environmental and finds processing had been an early recommendation to the contractors, to allow immediate feedback to the site from the specialist assessments, so that the on-site sampling strategy could be refined to maximise the return from the sites. A short lead-in period for MHI meant that this compound took a little while to set up, and at first only small quantities of samples were processed at a distance from the scheme, allowing little specialist feedback to the field teams. When the major off-site facility at St Neots was procured, it had up to six processing stations that could rapidly get through thousands of samples, while also acting as a vital IT and logistics base and specialist hub, crucial for a scheme of this size.

Overall, the amount of specialist feedback, including provision of finds spot dates, generally improved as the project progressed, especially once the central office was set

up. One area perhaps open to the most improvement was specialist advice on environmental sampling, which was not always as robust as it could have been. This was not helped by a paucity of site-specific advice from archaeological science or other specialist advisers within the written schemes of investigation (WSIs). This led to an uninformed sampling system being employed on some sites, occasionally led by the views of individual site staff rather than following a scheme-wide strategy or being research focused. This resulted in huge numbers of samples (c.9000) being taken, some of which were untargeted, achieving often repetitious results once processed. Nevertheless, the sheer number of samples taken did ensure there was a reasonable spread of well-preserved environmental remains for analysis during post-excavation.

An excavation programme of this scale and longevity enabled significant opportunities for training and development. This ranged from more formal training of new archaeologists, including recruitment of local unemployed individuals who received off-site teaching and on-site mentoring, to providing existing staff with more opportunities to learn new skills, such as digital surveying, finds and environmental processing, data entry, and participation in outreach events. The latter were typically advertised among the staff as placement opportunities, and in some cases led to individuals switching their career trajectories within the profession.

A diverse programme of community outreach and public engagement was planned for delivery by MHI but was initially brought in-house by the client to be rolled out through its outreach programme. This model was later considered by all to be unsatisfactory and, responding to CHET's scoping requirements, MHI and the IDT instead developed a comprehensive outreach package, including blog and social media posts, short films and articles, as well as numerous talks to local groups. The team also worked with local primary schools and hosted open days and events in local towns, alongside organising a community excavation with more than 80 people involved over six weeks towards the end of the fieldwork programme.

Overall, the excavation phase of the project had a fairly problematic start, primarily due to the lack of time for detailed advance preparation, although processes and systems were quickly developed that led to much greater success. Ultimately the excavations were rapidly completed despite the immense scale and logistical challenges, enabling various sections of the road improvement scheme to be delivered ahead of schedule, while producing a volume of interrogatable archaeological data to be taken forward into the post-excavation phase, and a large team of experienced field archaeologists.

2.3 Post-excavation and archive

This phase of the project commenced in April 2018 with the assessment stage, and concluded in March 2024 with the completion of the final outputs (outlined below). It involved more than 60 staff (specialists, managers, report authors, archivists and logistics staff) from six different contracting units, along with 15 freelance or university specialists, broadly divided into teams (such as environmental, pottery, stratigraphy), each with an assigned team leader to help coordinate their work.

Prior to the assessment stage, interim summary reports were rapidly produced by site staff after the completion of each excavation area. This meant that all initial interpretations (and baseline quantifications) were captured at an early stage, important within a project of this longevity, when site staff may move on to undertake other projects or work for other organisations.

A requirement to complete the post-excavation work within a set timescale saw the initial assessment stage commence while the fieldwork was ongoing and, perhaps more crucially, when there was a considerable backlog of environmental and finds processing. This did mean it was difficult to get a complete measure of the resource base required at that point. This first stage of work comprised a 'rapid assessment', with methodologies designed to quantify and broadly characterise the archaeological results, without recording too much detail. On the whole it was successful, being completed within 12 months, although taking such a rapid approach did result in some major differences between the assessment and final archive reports. Towards the end of the assessment phase, a seminar was held to share the initial findings with the wider project team and other local, specialist and academic invitees, and to generate discussion that would lead towards the production of the updated project design (UPD), spelling out the revised research aims and methodologies for the analysis stage of the project.

There were a number of immediate 'lessons learned' from the assessment stage that were implemented in the analysis part of the project. The first was to ensure a mobilisation period at the start that provided time for initial set-up tasks, including the establishment of a common data environment (CDE), in this case Microsoft SharePoint, which acted as a central repository for sharing digital information, vital for a project with such a disparate team. Further to this, a data officer role was created to facilitate access to the SharePoint information, as well as to the cloud-based Oracle database. Considerable time was spent digitising and uploading non-digital data to SharePoint, such as the c.100,000 context sheets and many thousands of section drawings. This meant that people could work on the data remotely, and, with fortuitous timing, it was completed a month prior to the COVID lockdown in March 2020, meaning that significant potential disruption to the project was avoided.

The main part of the analysis stage started with detailed stratigraphic analysis of the sites, which had been grouped into eight 'landscape blocks'. Detailed guidance documents were produced and distributed by the stratigraphic 'lead', adopting a coherent and consistent scheme-wide approach, which involved a geographical information system (GIS)-based methodology. Through these documents and regular team check-ins, this approach worked well, although there were still a few issues (how to define a 'settlement', use of sub-grouping, etc.) leading to some inconsistencies that were picked up at the initial editorial stage. There was also an attempt to produce volumetric data (calculating the m^3 of soil excavated), to better compare densities of material between and within sites (cf. Fulford and Holbrook 2018), but this was not used as extensively as originally anticipated and ran into occasional problems with survey data. One area for improvement was collaboration between the stratigraphic authors and specialists, which was variable at times. This was in the early days of 'normative' Teams and Zoom meetings, which now regularly facilitate efficient dialogue between stakeholders, and these resources were not always utilised as much as they could have been.

The large specialist teams were provided with general project guidance (such as how to use SharePoint and Oracle), and in some areas (e.g. pottery, animal bone), with multiple specialists working on the same material, specific methodological guidance was articulated by the specialist team leads. This worked very well, although the guidance was not always followed, leading to some minor inconsistencies that had to be rectified at a later stage. One methodological consideration for the bulk finds was dealing with the huge quantities of material (almost 3 tonnes of pottery, 5 tonnes of ceramic building material and 4 tonnes of animal bone), which resulted in a sampling approach being

developed for the full analysis, first outlined in the assessment reports. The varied percentages (50-70%) targeted for full analysis were based upon selected research-based criteria and were not consistent between sites. Their implementation was seen as controversial by some and is not necessarily advocated as the best and only approach in future large infrastructure projects. Nevertheless, in order to test the impact of such sampling strategies, a separate project undertaken by an A14-sponsored master's student at the University of Reading (now published as Hewson 2023) looked at the differences in interpretation between a sampled and fully analysed Roman pottery assemblage. The impact of sampling in this case study was found to be minimal, although this may not always be the case for all classes of material.

The pottery master's dissertation was one of four produced through project-sponsored studentships, all focused on different aspects of the project and most now published as peer-reviewed papers. These were regarded by all stakeholders as an extremely valuable part of the project, and moreover helped to bridge the still considerable gap between academic and developer-funded archaeological sectors. This was also achieved by establishing links with other academic projects (e.g. FeedSax at the University of Oxford) and through the implementation of an academic panel for the project drawn from across different universities, whose members provided invaluable advice and critical reviews of project outputs.

In keeping with the scale of the A14 project, the outputs were designed to be broad and wide-ranging, appealing to different audiences and with an emphasis on open access. Full details of the 220+ separate reports, publications and digital media outlets are outlined elsewhere (Smith *et al*. forthcoming; Smith and West 2019), and the general consensus is that they achieved the overarching aims and objectives of the project. Nevertheless, there were some compromises made, partly borne of the requirements to analyse and synthesise such a vast body of data over a relatively restricted timescale. Further detailed analysis could have been carried out in certain areas (e.g. the distribution of artefacts and ecofacts), although this was at least partly mitigated by uploading all the data to the Archaeology Data Service (ADS) and making it accessible through both database and spatial mapping queries, so that future researchers will be able to interrogate the data as they wish.

The final part of the project was the preparation and deposition of the archive. The digital data has been deposited with the ADS (MOLA Headland Infrastructure 2024), with whom a close collaboration was developed from the start, shaping how many of the digital outputs were structured. The physical archive is being deposited with Cambridgeshire County Council's publicly accessible, accredited storage facility, also facilitated by close dialogue with CHET throughout the project. However, two issues here may have led to unnecessary complications with this process. First, it was always the intention to deposit an 'archaeological archive' that was a subset of the complete 'project archive', involving some process of de-selection, although not necessarily discard (as per the CIFA archive toolkit guidance). De-selection methodologies were outlined at the assessment stage, although sometimes not at the level of detail required, which then led to the need for further consideration down the line. Second, obtaining a transfer of title (ToT) from the landowners, which was required to legally transfer the finds from them to the County, was a prerequisite of any deposition. The vital relationship between landowners and the artefacts recovered from their land was not developed early enough in the programme, and the process of obtaining the ToTs was left too late and took longer than expected. This resulted in a delay to the archive preparation beyond the original anticipated date for deposition.

3. Conclusion

The appraisal of the different stages of archaeological work outlined above has demonstrated the immense challenges of dealing with a project that was at the time largely unprecedented in scale and complexity. There were many areas of success, some steep and rapid learning curves, and also areas that could have been improved upon. Distilling the principal 'lessons learned' into a few small bite-sized points here does not consider the wealth of experience gained by all the key stakeholders involved with the project, but nevertheless hopefully allows some of this knowledge to be disseminated to wider audiences for future projects.

The first point to stress is ensuring that the pre-determination phase of work is sufficiently robust to allow detailed excavation logistics to be formulated well in advance, these also being informed through a comprehensive research framework. This means that access to land must be arranged so that evidence from fieldwalking, test pitting, geomorphological and trench-based surveys can be undertaken to complement aerial photographic and lidar studies and multi-spectral drone surveys and inform intelligent mitigation strategies.

The excavation phase should ideally include aspects that are often assigned to later post-excavation stages of work, including finds and environmental processing and some specialist assessment, which would allow detailed feedback to site and lead to refinements of the excavation strategy. Such 'iterative' approaches are not new, yet they are often difficult to implement.

The provision of a bespoke archaeology compound (inclusive of processing facilities) within the scheme area would aid this situation. An archaeology hub is a vitally important asset for a multi-discipline scheme, and it can also be the venue for outreach activities on schemes where public access is otherwise denied on H&S grounds. It also reduces the carbon impact of transporting huge quantities of material off site, and enables the disposal of silts and water back into the original landscape.

One point that applies to all phases of work is ensuring sufficient mobilisation time is available to set up the required infrastructure (e.g. centralised processing facilities, if required) and methodological procedures. Mobilisation time is also important during the post-excavation stage, especially if there are multiple contracting units involved. It enables the team structures to be clarified, any common data environment to be established, and sufficient guidance to be produced.

Within post-excavation, it is important to define and articulate the project outputs and methodologies as clearly and comprehensively as possible, while always having the needs of the end users (clients, curators, academics, researchers, public audiences) at the heart of the scheme's scope. All these stakeholders should be involved throughout the project, whether in the form of consultations, reviews, academic panels and/or direct contributions to outputs. In addition, ensuring good accessibility of final outputs (including data) is paramount, enabling the project to have a legacy.

Ultimately, one of the key lessons learned from the A14 archaeological programme is the importance of having strong lines of communication between all those involved. Regular weekly and monthly meetings within the core project delivery team and between the client (via the IDT archaeologist, whose role was pivotal), contractor(s) and curator started during excavation and continued to the end of post-excavation, ensuring

everyone remained informed and on track. Regular communication with the Cambridgeshire Historic Environment Record ensured that new event and monument data was continually provided from investigations deposited after the A14's initial searches had been obtained in 2014 for the environmental impact assessment, consideration of which helped to both shape the synthesis of the A14's archaeology and ensure its currency and relevance to other local projects.

Clear communication also extends to the landowners, so that matters of ToT can be dealt with at an early stage. Such engagement should be included in the initial landowner liaison meetings and at milestones in the programme (after evaluation reporting, when preparing the project design for the excavation strategy and, subsequently, the UPD), because of the time it often takes to engage with the landowners and explain the transfer process. This can be an interesting part of the archaeological programme and is based on gradually acquired levels of trust between landowners and contractors, curators and land liaison teams. Establishing this trust early on in projects is essential, as it can nurture landowner interest in the archaeological resource on their land while explaining that its value is inherently intellectual rather than financial. The treasure reporting process can also be explained in principle before excavations begin, which can help with managing a landowner's expectations when artefacts are classified in this way upon their discovery.

Many of these broad 'concluding lessons' may seem fairly obvious and straightforward, and there are some elements that may only be applicable to larger infrastructure projects. Yet for the most part they are relevant to archaeological projects of all scales and can be key to their smooth and successful delivery.

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