

Thames Holocene

**A Geoarchaeological Approach to the Investigation of the
River Floodplain for High Speed 1, 1994–2003**

by Martin Bates and Elizabeth Stafford

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Abstract

The archaeological investigation of the route of High Speed 1 (HS1) (formerly known as the Channel Tunnel Rail Link), through the Thames Marshes, is not a conventional one, and this report is neither intended to be a complete landscape history of the Lower Thames, nor an exhaustive archaeological narrative of human occupation of the region. Rather, this work is primarily intended to present the methodological approach that was adopted for the investigation of approximately 18km (17%) of the HS1 route across an area of thick alluvium. By comparison with the remainder of the route, where conventional archaeological approaches to site location, assessment and, in some cases, excavation has been reported elsewhere (Booth *et al* 2011), the alluvial corridor of the Thames required a different approach.

From an early stage in the construction project (1994) it was determined that a geoarchaeological approach to the investigation of the alluvial corridor would be necessary because of the depth of sequences (in excess of 10m in many locations), and the relative invisibility of the archaeological resource in both the Historic Environment Record and to conventional survey. The project commenced with a thorough consideration of existing geotechnical and geomorphological records. This allowed the construction of a geoarchaeological model for the alluvial corridor whereby different parts of the route were categorised as of low, medium and high potential based on a combination of archaeological and geomorphological inferences. Careful integration of the results of the geoarchaeological investigation were subsequently matched against engineering and route construction parameters in order to determine a cost-effective and logical approach to archaeological mitigation.

The field survey that was developed, following model construction, included geophysical investigation of

buried sediment bodies, the use of boreholes, cone penetration testing and conventional test-pitting and trenching. These were deployed in key areas such as the Thames Tunnel portal in Swanscombe Marsh and the Ebbsfleet Valley. The project was successful in predicting the location of buried archaeological remains in a number of locations. Key amongst these are extensive remains excavated in the Ebbsfleet Valley (Andrews *et al* 2011a–b; Barnett *et al* 2011; Biddulph *et al* 2011; Wenban-Smith *et al* forthcoming), Mesolithic flint scatters at Tank Hill Road, Aveley (Leivers *et al* 2007) and Late Upper Palaeolithic and Neolithic scatters on Swanscombe Marsh (this volume). Other sites described here include an *in situ* Early Neolithic flint scatter on Rainham Marsh, close to the Neolithic site at Brookway Allotments (Meddens 1996), and evidence of seasonal Roman and medieval activity, including concentrations of pottery, animal bone and marine shell. The medieval activity, dated to the 11th to 13th centuries AD, may be associated with a phase of marshland reclamation and the building of sea-banks in the area of the former Wennington Creek.

Overall the investigation also confirmed, where fieldwork took place, that those areas of the route corridor considered of low archaeological potential did not contain significant evidence for human activity. The success of the project can therefore be measured not only in the prediction of zones of different archaeological potential but also in the fact that the project delivered a robust and well-structured archaeological response to specific construction impact, and in the process caused no major delays to the completion of HS1. This report makes the case for adopting a geoarchaeological approach to mitigating the impacts caused by future major construction projects in alluvial environments.

Résumé

L'investigation archéologique de la ligne à grande vitesse (High Speed 1, HS1) (autrefois connue comme Channel Tunnel Rail Link, liaison ferroviaire rapide avec le tunnel sous la Manche), traversant les marais de la Tamise, n'est pas une investigation conventionnelle. Ce n'est pas l'intention de ce rapport de présenter une histoire de paysage de la basse Tamise, ni un compte-rendu archéologique exhaustif de l'occupation humaine de la région. L'intention de cette étude est principalement de présenter l'approche méthodologique qui était abordée pour l'investigation sur à peu près 18km (17%) de la route HS1 traversant une région d'alluvion profonde. Par comparaison avec le reste de la route, en quel cas les approches archéologiques conventionnelles concernant la localisation des sites, l'évaluation et, parfois, l'excavation ont été publiées ailleurs (Booth *et al* 2011), le corridor d'alluvion de la Tamise nécessite une approche différente.

On a décidé très tôt pendant le projet de construction (1994) qu'une approche géoarchéologique serait nécessaire pour l'investigation du corridor d'alluvion à cause de la profondeur des strates (plus de 10m dans beaucoup de localités) et l'invisibilité de la ressource archéologique, autant dans l'inventaire de monuments historiques que pendant la prospection conventionnelle. Le projet commençait avec un examen approfondi des archives géotechniques et géomorphologiques existantes. Cela permettait la construction d'un modèle géoarchéologique du corridor d'alluvion, de catégoriser comme faible, moyen ou fort, le potentiel des éléments divers du tracé en raison d'une combinaison des inférences archéologiques et géomorphologiques. L'intégration méticuleuse des résultats de l'investigation géoarchéologique a été, par la suite, accordée avec les paramètres d'ingénierie et de construction de la route afin de déterminer une approche économique et logique des mesures d'atténuation archéologique.

La prospection de terrain réalisée à la suite de la construction du modèle inclut l'investigation géoarchéologique des couches de sédiments fossiles, des forages, de l'épreuve du pénétromètre cône, et des fosses

et tranchées de sondage conventionnelle. Ces méthodes étaient appliquées aux sites importants comme le portail du tunnel sous la Tamise à Swanscombe Marsh et la vallée de l'Ebbsfleet. Le projet a réussi à prévoir ou se trouvaient des vestiges archéologiques dans plusieurs localités. Parmi les découvertes les plus importantes il y a les nombreux vestiges dégagés dans la vallée de l'Ebbsfleet (Andrews *et al* 2011a-b; Barnett *et al* 2011; Biddulph *et al* 2011; Wenban-Smith *et al* forthcoming), des dispersions de silex mésolithique à Tank Hill Road, Aveley (Leivers *et al* 2007), et les dispersions paléolithiques supérieurs finals ainsi que néolithiques à Swanscombe Marsh (ce volume). Autres gisements publiés dans le tome incluent une dispersion *in situ* des silex du Néolithique ancien à Rainham Marsh (près du site néolithique à Brookway Allotments; Meddens 1996). Également, le témoignage d'activités saisonnières romanes et médiévales révèlent des concentrations de poterie, des restes d'ossements d'animaux et de mollusques marins. L'activité médiévale, datée du 11^{ème} au 13^{ème} siècle, pourrait être associée avec une phase de conquête des terrains dans les marais et à la construction de digues dans la zone de l'ancien ruisseau Wennington Creek.

Au total, les investigations ont aussi confirmé, dans les zones fouillées, que ces zones du corridor de la ligne à grande vitesse, censées avoir un potentiel archéologique faible ne révélaient pas d'activité humaine significative. Il est donc possible d'estimer le succès du projet, non seulement à la prévision des zones à potentiel archéologique divers mais aussi au fait que le projet a fourni une réponse archéologique robuste et bien structurée à un effet spécifique de construction. De plus, ce projet n'a pas provoqué de retards significatifs à l'achèvement de la ligne à grande vitesse. Ce rapport avance l'argument qu'il faille adopter une approche géoarchéologique sur l'effort d'atténuer les conséquences des grands projets de construction dans les environnements alluviaux.

Traduction: Jörn Schuster

Zusammenfassung

Die archäologische Untersuchung des Abschnitts der Hochgeschwindigkeitsstrecke High Speed 1 (HS1; ehemals Channel Tunnel Rail Link) durch die Themsemarschen, kann nicht als konventionell bezeichnet werden, und daher soll mit diesem Band weder eine vollständige Landschaftsgeschichte der unteren Themse vorgelegt werden, noch soll ein umfassender archäologischer Abriss der menschlichen Besiedlung der Region geboten werden. Vielmehr ist das Hauptanliegen dieser Arbeit die Beschreibung der Methodik für die Untersuchung des etwa 18km (17%) langen Abschnitts der HS1-Trasse durch eine Zone mit tiefgründigen alluvialen Sedimenten. Im Vergleich zum Rest der Trasse, über deren konventionelle archäologische Untersuchungsansätze wie Fundstellenlokalisierung, Voruntersuchung und, in einigen Fällen, Ausgrabung bereits andernorts berichtet wurde (Booth *et al* 2011), erforderte der alluviale Korridor der Themse eine andere Herangehensweise.

Schon kurz nach Beginn des Bauprojekts (1994) wurde entschieden, dass die Untersuchung des alluvialen Korridors wegen der Mächtigkeit der Schichtabfolgen (an vielen Stellen mehr als 10m) und der relativen Unsichtbarkeit archäologischer Befunde, sowohl in der archäologischen Landesaufnahme als auch bei konventionellen Prospektionen, eines geoarchäologischen Ansatzes bedürfte. Am Anfang des Projekts stand ein sorgfältiges Studium des vorhandenen geotechnischen und geomorphologischen Archivmaterials. Dies erlaubte es, ein geomorphologisches Modell des alluvialen Korridors zu erstellen, in dem das Potenzial der verschiedenen Abschnitte der Trasse aufgrund von archäologischen und geomorphologischen Überlegungen als niedrig, mittel und hoch eingestuft wurde. Die umsichtig integrierten Ergebnisse der geoarchäologischen Untersuchungen wurden daraufhin mit den technischen und konstruktiven Belangen der Strecke abgeglichen, um zu einem kosteneffektiven und logischen Ansatz für die archäologischen Ausgleichsmaßnahmen zu gelangen.

Im Rahmen der Geländeprospektionen, die der Erstellung des Modells folgten, wurden geophysikalische Untersuchungen fossiler Sedimentkörper und Drucksondierungen durchgeführt, und Bohrlöcher sowie konventionelle Testgruben und –schnitte angelegt. Diese

Methoden kamen in Schlüsselbereichen wie dem Portal des Themsetunnels in Swanscombe Marsh und dem Ebbsfleet Tal zur Anwendung. Mit Hilfe des Projekts konnten obertägig nicht sichtbare archäologische Denkmale auf einer Reihe von Fundstellen erfolgreich lokalisiert werden. Von besonderer Bedeutung sind u. a. die umfangreichen Fundbereiche im Ebbsfleet Tal (Andrews *et al* 2011a–b; Barnett *et al* 2011; Biddulph *et al* 2011; Wenban-Smith *et al* forthcoming), die mesolithischen Flintstreuungen in der Tank Hill Road, Aveley (Leivers *et al* 2007), sowie die spät jungpaläolithischen und neolithischen Streuungen in der Swanscombe Marsh (in diesem Band). Weitere hier beschriebene Fundstellen umfassen eine *in situ* gefundene frühneolithische Flintstreuung in der Rainham Marsh (in der Nähe des neolithischen Fundplatzes Brookway Allotments; Meddens 1996), und Hinweise auf jahreszeitlich bedingte Aktivitäten kaiserzeitlicher und mittelalterlicher Zeitstellung, angedeutet u. a. durch Fundkonzentrationen von Keramik, Tierknochen und Meeresmuscheln. Die mittelalterliche Aktivität, die in das 11. bis 13. Jh. datiert, steht möglicherweise in Zusammenhang mit einer Landgewinnungsphase und dem Bau eines Seedeichs im Bereich des ehemaligen Priels Wennington Creek.

Insgesamt bestätigten die Untersuchungen, zumindest in den untersuchten Bereichen, dass Trassenabschnitte, für die ein geringes archäologisches Potenzial prognostiziert wurde, auch keine bedeutenden Hinweise auf menschliche Aktivität enthielten. Der Erfolg des Projekts lässt sich daher nicht nur anhand der Genauigkeit der Vorhersage des unterschiedlichen archäologischen Potenzials in verschiedenen Bereichen messen, sondern auch anhand der Tatsache, dass mithilfe des Projekts eine robuste und gut strukturierte Reaktion auf spezifische konstruktionsbedingte Beeinträchtigungen möglich war, und so größere Verzögerungen bei der Fertigstellung der HS1-Trasse vermieden werden konnten. Dieser Bericht liefert Argumente für einen geoarchäologischen Ansatz für die Ausgleichsmaßnahmen der Beeinträchtigungen, die von zukünftigen Großbaustellen in alluvialen Bereichen zu erwarten sind.

Übersetzung: Jörn Schuster

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Figure 6 is based on material first published in Miall 1996, fig. 8.18; Brown 1997, fig. 1.1; Walker and Catt 1984, fig. 2, and Figure 9 is based on illustrations first published in Dalrymple *et al* 1992, figs 7 and 14; Dalrymple 1992, figs 12 and 23.

Location of the archive

The HS1 archives associated with the Thames Holocene study will in due course be housed in accordance with the location of each contributing Event Code, as follows: all Event Codes within Greater London will be housed with the Museum of London's Archaeological Archive and Research Centre, Mortimer Wheeler House, 46 Eagle Wharf Road, London, N1 7ED; all Event Codes within the County of Essex will be housed at Thurrock Museum, Thameside Complex, Orsett Road, Grays, Essex, RM17 5DX under the accession code THK 4037; and all Event Codes within the County of Kent will be temporarily stored by Kent County Council at Dover Eastern Docks, pending resolution of museum storage provision within that county. It should be noted that in order to keep the records of the single Event Code ARC TMS00 (Thames Crossing) in one location, and on the basis of the relative significance of discoveries during the project, it has been agreed that all records for the project, which examined both the Essex and Kent Thames riverbank, will be held with the Kent archive. It is intended that the entire digital archive will, in due course, be deposited and made accessible via the Archaeology Data Service.