Palaeontological Impact Assessment (PIA)

(Part 1 of HIA)

For the Proposed Rehabilitation and Refurbishment of the existing Latimer's Landing jetty at the Port of East London

Prepared For

Transnet Capital Projects

(Contract number 1125637)

By

Dr L. Rossouw

NATIONAL MUSEUM
NASIONALE MUSEUM • MUSIAMO WA SETJHABA
BLOEMFONTEIN

an agency of the
Department of Arts and Culture

TEL: +27 51 4479609 E-MAIL: LLOYD@NASMUS.CO.ZA
P.O. BOX 266
BLOEMFONTEIN
9300

Version 1.0
20 July 2015

Executive Summary

A Phase 1 Palaeontological Impact Assessment was carried out for the rehabilitation and refurbishment of the historical Latimer's Landing jetty at the Port of East London, Eastern Cape Province. Specific activities that may affect potentially intact palaeontological and prehistoric archaeological remains include the removal of the existing rock armour below and behind the jetty, levelling of the slope of the riverbank behind the jetty and the replacement of timber piles with new reinforced concrete piles to support the refurbished jetty. Results of the assessment indicate that potential impact resulting from the removal of the existing rock armour and the replacement of timber piles with new reinforced concrete piles, is likely to be very minor. Field rating linked to these activities: Generally Protected C (GP.C). Potential impact resulting from the levelling of the slope of the riverbank behind the jetty will be moderate to high if extensive (deep) excavations are to be conducted during the proposed activity, which may affect intact / unweathered fossil-bearing Adelaide Subgroup sediments. Field rating linked to this particular activity: Generally Protected A (GP.A).

Table of Contents

Introduction

Transnet SOC Ltd is proposing to undertake the rehabilitation and refurbishment of the historical Latimer's Landing jetty at the Port of East London, in an effort to re-establish leisure and tourism at the port. (**Fig. 1 - 3**).

The proposed development will involve the following activities:

1. Removal of all existing jetty furniture and services;
2. Removal of the existing timber deck and timber piles to below deck level;
3. Removal of the existing rock armour;
4. Levelling of the slope as required;
5. Replacement of timber piles with new reinforced concrete piles;
6. Re-establishment of the rock revetment using existing rock armour where possible;
7. Replacement of the timber deck with a reinforced concrete deck, consisting of precast concrete with in-situ infill;
8. Provision of scour protection;
9. Re-installation of jetty furniture and services;
10. Cladding of the concrete deck with a timber finish using timber from disassembled timber deck where possible.

The proposed development triggers Section 34 (1) of the National Heritage Resources Act, 1999 (Act No 25 of 1999), which states that "No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority". A Heritage Impact Assessment was conducted by the National Museum's Archaeological Impacts Unit in order to assess the condition of the jetty and to satisfy all requirements necessary for the development in terms of the aforementioned Act. A site visit and subsequent assessment took place in July 2015.

Assumptions an Limitations

It is assumed, for the sake of prudence, that fossil remains are always uniformly distributed in fossil-bearing rock units, although in reality their distribution may vary significantly. Also, in most cases, sampling of fossils for the purpose of palaeontological mitigation cannot usually be conducted prior to the commencement of construction/excavation activities. Given its locality and extent, the proposed development footprint is associated with an estuarine and shoreline environment. Emphasis is therefore placed on the prehistoric record

of the coastal zone around East London. It is also assumed that historical construction activities at the Port of East London, including that of the jetty, could have impacted on potentially *in situ* palaeontological and Stone Age archaeological heritage in the past. In the case of archaeological heritage in particular, it is considered unlikely that significant sites or features will be found within the affected area, except where historical structures may have inadvertently covered up intact archaeological sites.

The heritage assessment was conducted on the presumption that all relevant information pertaining to the jetty was provided by the client.

Terms of reference for assessment

Specific activities that may affect potentially intact palaeontological and archaeological remains have been identified as the following (**Fig. 4**):

- Removal of the existing rock armour;
- Levelling of the slope as required;
- Replacement of timber piles with new reinforced concrete piles.

The evaluation was subsequently based on the following considerations:

- Identify and map possible palaeontological and Stone Age archaeological resources that may be affected by the proposed development;
- Identify and map relevant palaeontological and Stone Age archaeological resources in the vicinity of the study area;
- Determine and assess the potential impacts of the proposed development on potential palaeontological and Stone Age archaeological resources;
- Recommend mitigation measures to minimize potential impacts associated with the proposed development.

Methodology

Information sources for the study include published archaeological and palaeontological literature, geological maps and aerial photographs (Google Earth). A Garmin Etrex Vista GPS hand model (set to the WGS 84 map datum) and a digital camera were used for recording purposes during field assessment.

Field Rating

Site significance classification standards, as prescribed by SAHRA, were used to assess the proposed development (**Table 1**).

Description of the Affected Area

Locality Data

1 : 50 000 scale topographic map: 3327BB East London

1 : 250 000 scale geological map: 3326 Grahamstown

General Site Coordinates: 33° 1'21.49"S 27°53'44.96"E

The jetty is situated on the left bank of and 2 km inland from the mouth of the Buffalo River (**Fig. 5**).

Geology

The geology of the region has been described by several authors (Mountain 1974; Le Roux 1989; Johnson and Le Roux 1994). The site and surrounding area is underlain by the late Middle to early Late P Middleton Formation of the Adelaide Subgroup *(*Beaufort Group, Karoo Supergroup) (**Fig. 6**). Jurassic-age dolerite intrusions (*Jd*), located on the right bank at the mouth of the Buffalo River are partially capped by Algoa Group sediments made up of Pliocene to Early Pleistocene, Nanaga Formation (*T-Qn*) aeolian sand and dune rock (Le Roux 1992). Late Pleistocene, calcareous Nahoon Formation sandstones (*Qn*, Algoa Group) overlie bedrock sediments along the coastline (Le Roux 1989).

Background

The prehistoric footprint of the Eastern Cape shoreline between Port Elizabeth and the Great Kei River is primarily represented by hunter-gatherer and pastoralist sites, Early Iron Age to pre-colonial sites of Nguni-speaking farming communities, archaeologically significant trace fossils and Quaternary beach terraces that occasionally contain rolled Stone Age artefacts in secondary context (Westphal, 1963; Deacon, 1966; Rudner 1968, 1979, Davies 1971; Cronin 1982, Nogwaza 1993; Binneman 1996; 2003, 2005; Binneman and Webley 1992). Historically, the Buffalo River mouth became a vital landmark when the territory between the Keiskamma and Kei Rivers was annexed by the British during the 6th Frontier War of 1834, which led to further investigations into the possibility of the Buffalo as a port and the subsequent establishment of a British military headquarters in 1847 (Tankard 1985) (**Fig. 7**). A more comprehensive summary of the history of East London is provided in Part 2 of the heritage impact assessment for the proposed development.

The sedimentary bedrock underlying the Buffalo River Mouth area consists of non-marine, silica-bearing rocks of the Middleton Formation that were deposited under fluvial conditions within the main Karoo Foreland Basin during the late Middle to early Late Permian, about 260 million years ago (Catuneanu and Bowker 2001; Johnson *et al.* 2006). It partially corresponds to the Teekloof Formation from the south-western part of the country and is biostratigraphically subdivided to include the upper *Pristerognathus Assemblage Zone (AZ)*, the *Tropidostoma AZ,* as well as the lower *Cistecephalus AZ* (Smith and Keyser 1995a,b,c). The sequence is characterized by a variety of vertebrate fossils including amphibians, as well as anapsids and therapsids (Rubidge 2005). The therapsid taxa Dicynodontia and Gorgonopsia show diversification in the *Tropidostoma* and especially in the *Cistecephalus* AZs, while the *Cistecephalus* AZ is characterized by the predominance of a number of dicynodont species including *Diictodon, Pristerodon, Cistecephalus, Aulacephalodon* and *Oudenodon*. Plant fossils include *Glossopteris* and *Schizoneura*. The vertebrate fauna are mostly preserved as dispersed isolated fossils in inter-channel mudrocks. Plant and trace fossils occur in the uppermost *Pristerognathus* AZ but it is generally characterized by a marked drop in vertebrate biodiversity (Smith and Keyser 1995a; Bordy *et al*. 2011; Nicolas and Rubidge 2010). Historically, the East Londen area has yielded very few vertebrate fossils. Poorly preserved reptile remains have previously been recovered from several localities believed to be along the left bank of the Buffalo River, and along the shore, as well as near Morgan Bay (Mountain 1974). Late Mesozoic sediments found to the west of East London and south of the Buffalo River, are confined to a series of small limestone deposits at Needs Camp and at Goda River Mouth near Kidd's Beach. A localized, Late Cretaceous deposit of fossil-bearing limestones found about 27 km west of the study area at the Lower Need's Camp quarry, contain large numbers of microfossil remains, including foramenifera, ostracods, polyzoans and echinoid spines (McLachlan & McMillan 1976). McGrowan and Moore (1971) also reported on a reptilian tooth recovered from these deposits. Semi- to well-consolidated aeolianites and sandy limestones of the Plio-Pleistocene Nanaga Formation (*T-Qn*) sporadically contain fossilized terrestrial gastropods (*Tropidophora*), fragmentary marine shells and foraminifera.

Davies (1971) has demonstrated how high-level shoreline terraces left behind by Quaternary sea-level transgressions at 18 m, 30 m, and 60 m asl., occasionally yield rolled ESA artefacts **(Fig. 8**). In addition, Quaternary-age surface sediments in the region can be highly fossiliferous in places, such as fossil dunes and coastal caves (Roberts *et al.* 2006). Shell

fragments and foraminifera are common in the Nahoon Formation and fossil bone fragments have been observed in the Pleistocene Nahoon Formation aeolinites (Algoa Group) at Black Rock and Kasuka between East London and Port Alfred (Le Roux 1989). Three hominid footprints preserved as casts were found in 1964 in Nahoon Formation aeolianite near Bats Cave (Deacon 1966) (**Fig. 9**). New OSL dates obtained from quartz grains from within the footprint-bearing aeolianite indicate an age of 124 ± 4 ka for the footprints (Jacobs & Roberts 2009).

The majority of Stone Age archaeological sites found along the Eastern Cape coastline is associated with Later Stone Age and pastoralist sites (Rudner 1968; Binneman 2001). Khoi languages were spoken along Cape coastal belt as far to the east as East London and it is also suggested that the Khoekhoe extended further to the north-east, but were subsequently absorbed by the Nguni (Westphal 1963). High concentrations of Later Stone Age and pastoralist shell midden sites, as well as several Early Iron Age pottery assemblages, have been recorded along the coastline around East London, with at least three midden sites previously recorded at the entrance to the port. (Rudner 1968, Binneman 1996) (**Fig. 10 - 12**). Widespread concentrations of EIA pottery have been recorded further up the river at Canasta Place, about 13 km north-west of the river mouth (Nogwasa 1994).

Impact Statement and Recommendation

Potential impacts and appropriate recommendations are summarized in **Table 2**. The Buffalo River Mouth area is underlain by terrestrial sediments that are known to contain fossil heritage, with localities known from around East London, but outside the Port of East London area. From the field assessment it would appear that most of the original (intact) superficial overbank deposits at the mouth of the Buffalo River have been severely impacted over time by large scale earth moving activities resulting from the construction of the port.

1. With this in mind, impact on potentially intact Stone Age archaeological remains within undisturbed overbank sediments is likely to be very minor during the removal of the existing rock armour, levelling of the slope and the replacement of timber piles with new reinforced concrete piles. Further mitigation for these activities is not regarded as necessary. Field rating linked to this particular activity: Generally Protected C (GP.C).
2. Palaeontological impact resulting from the removal of the **existing rock armour below the water line** is likely to be minor because potentially intact / unweathered

Adelaide Subgroup sediments are mostly capped by a substantial layer of alluvial mud, silt and reworked soils. Further mitigation for this activity is not regarded as necessary. . Field rating linked to this particular activity: Generally Protected C (GP.C).

3. Palaeontological impact resulting from the removal of the **existing rock armour above the water line** is likely to be minor because potentially intact / unweathered Adelaide Subgroup sediments are capped by palaeontologically sterile alluvium and reworked soils. Further mitigation for this activity is not regarded as necessary. Field rating linked to this particular activity: Generally Protected C (GP.C).
4. Palaeontological impact resulting from **levelling of the slope** (approximately 1300 m^2 surface area) is likely to be minor, but moderate to high if extensive (deep) excavations are to be conducted during the proposed activity, which may affect intact / unweathered fossil-bearing Adelaide Subgroup sediments. While exposure as a result of excavation activities and subsequent reporting of fossils could be seen as a beneficial for research purposes, any damage to, or loss of potential fossil material due to inadequate mitigation are considered a negative palaeontological impact. Negative impact on potentially *in situ* fossil material resulting from levelling of the slope, is rated high without the implementation of the following mitigation measures: *unweathered sedimentary bedrock exposed during levelling of the slope should be monitored for potential fossil remains by the responsible Environmental Control Officer. When exposed, fossil remains should be left in situ if possible and the Environmental Control Officer should report it SAHRA and/or a professional palaeontologist without delay so that the material can be properly removed*. Field rating linked to this particular activity: Generally Protected A (GP.A).
5. Palaeontological impact resulting from the replacement of timber piles with new reinforced concrete piles is likely to be minor given the total surface area that will be affected by the activity. Further mitigation for this activity is not regarded as necessary. Field rating linked to this particular activity: Generally Protected C (GP.C).

References

Binneman J.N.F. 1996. Preliminary report on the investigations at Kulubele, an EIA farming settlement in the Great Kei River Valley, Eastern Cape. *Southern African Field Archaeology* 5: 28-35.

Binneman J.N.F. 2001. An introduction to a Later Stone Age coastal research project along the south-eastern Cape coast. *Southern African Field Archaeology* 10: 75 – 87.

Binneman J.N.F. 2005. Archaeological research along the south-eastern Cape coast Part 1: open-air shell middens. *Southern African Field Archaeology* 13 & 14: 49 – 77.

Binneman J.N.F. & Webley, L. 1992. Preliminary notes on an EIA site in the Great Kei River Valley, Eastern Cape. *Southern African Field Archaeology* 1: 108-109.

Bordy, E.M., Linkermann, S. and Prevec, R. 2011. Palaeoecological aspects of some invertebrate trace fossils from the Mid- to Upper Permian Middleton Formation, Eastern Cape, South Africa. *Journal of African Earth Sciences* 61, 238 – 244.

Catuneanu, O. and Bowker, D. 2001. Sequence stratigraphy of the Koonap and Middleton fluvial formations in the Karoo foredeep, South Africa. *African Earth Sciences* 33: 579-595.

Davies, O. 1971. Pleistocene shorelines in the southern and south-eastern Cape Province (Part 1). *Annals of the Natal Museum* 21(1): 183 – 223.

Deacon, H.J., 1966. The dating of the Nahoon footprints. *South African Journal of Science* 62: 111–113.

Jacobs, Z. and Roberts, D. L. 2009. Last Interglacial Age for aeolian and marine deposits and the Nahoon fossil human footprints, Southeast Coast of South Africa. *Quaternary Geochronology* 4: 160–169.

Johnson, M.R. and Le Roux F.G. 1994. The Geology of the Grahamstown area. Geological Survey, Pretoria.

Le Roux, F.G. 1989. Lithostratigraphy of the Nahoon Formation. *SA Comm. Strat*. 9: 1-14.

Le Roux, F.G. 1992. Lithostratigraphy of the Nanaga Formation. *Lithostratigr. Ser. S. Afr. Comm. Strat.* 15 : 1 -9.

McGrowan, B. and Moore, A.C. 1971. A reptilian tooth and Upper Cretaceous microfossils from the lower quarry at Needs Camp, South Africa. *Transactions of the Geological Society of South Africa* 74: 103 – 105.

Mclachlan, I.R. & Mcmillan, I.K. 1976. Review and stratigraphic significance of Southern Cape Mesozoic palaeontology. *Transactions of the Geological Society of South Africa* 79: 197-212.

Mountain, E.D. 1974. The geology of the area around East London, Cape Province. Geological Survey, Pretoria.

Nelson, S.A. 2007. Coastal Zones. http:/www.tulane.edu/~sanelson/coastalzones.htm

Nicolas, M., Rubidge, B.S., 2010. Changes in Permo-Triassic terrestrial tetrapod ecological representation in the Beaufort Group (Karoo Supergroup) of South Africa. *Lethaia* 43, 45–59.

Nogwaza, T. 1994. Early Iron Age pottery from Canasta Place, East London District. *Southern African Field Archaeology* 3: 103 – 106.

Roberts *et al.* 2006. Coastal Cenozoic deposits. **In:** M.R. Johnson, C. J. Anhaeusser and R.J. Thomas (Eds). *The Geology of South Africa*. Geological Society of South Africa.

Rubidge, B. S. 1995. (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1, 1 – 45.

Rubidge, B.S., 2005. Re-uniting lost continents – fossil reptiles from the ancient Karoo and their wanderlust. *South African Journal of Geology* 108, 135–172

Rudner, J. 1968. Strandloper pottery from South and South West Africa. *Annals of the South African Museum* 49(2).

Rudner, J. 1979. The Use of Stone Artefacts and Pottery among the Khoisan Peoples in Historic and Protohistoric Times. *South African Archaeological Bulletin* 34(129): 3-17.

Smith, R.H.M. and Keyser, A.W. 1995a. Biostratigraphy of the Pristerognathus Assemblage Zone In: B.S. Rubidge (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1: 13 – 17.

Smith, R.H.M. and Keyser, A.W. 1995b. Biostratigraphy of the Tropidostoma Assemblage Zone In: B.S. Rubidge (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1: 18 – 22.

Smith, R.H.M. and Keyser, A.W. 1995c. Biostratigraphy of the Cistecephalus Assemblage Zone In: B.S. Rubidge (ed.) *Biostratigraphy of the Beaufort Group*. Biostrat. Ser. S.Afr. Comm. Strat. 1: 23 – 28.

Westphal, E. 0. J. 1963. The linguistic prehistory of southern Africa: Bush, Kwadi, Hottentot and Bantu linguistic relationships. *Africa* 33 (3): 253-6.

Tankard, K.P.T. 1985. *East London. The creation and development of a frontier community, 1835 – 1873*. Unpublished MA – thesis. Rhodes University.

Tables and Figures

Table 1. Field rating categories for sites as prescribed by SAHRA.

Field Rating	**Grade**	**Significance**	**Mitigation**
National Significance (NS)	Grade 1	-	Conservation; national site nomination
Provincial Significance (PS)	Grade 2	-	Conservation; provincial site nomination
Local Significance (LS)	Grade 3A	High significance	Conservation; mitigation not advised
Local Significance (LS)	Grade 3B	High significance	Mitigation (part of site should be retained)
Generally Protected A (GP.A)	-	High/medium significance	Mitigation before destruction
Generally Protected B (GP.B)	-	Medium significance	Recording before destruction
Generally Protected C (GP.C)	-	Low significance	Destruction

Table 2. Summary of potential impacts.

Geological Unit	Rock types and Age	Potential Palaeontological / Archaeological heritage in in vicinity of study area	Palaeontological significance	Archaeological significance	Impact resulting from removal of the existing rock armour	Impact resulting from levelling of the slope	Impact resulting from installation of concrete piles
Regolith	Modern spoil Reworked soils. Alluvium, Quaternary to Recent	Rare (localized) large vertebrate skeletal remains, microfossil remains Intact or uncapped stone tool assemblages, Shell middens Prehistoric & Historical structures; Graves	Moderate	High	Low No further mitigation necessary	Low No further mitigation necessary	Low No further mitigation necessary
Middleton Formation (Adelaide Subroup, Beaufort Group, (Karoo Supergroup)	Fluvially derived, mudstone-dominated succession. Late Middle to Early Late Permian	Terrestrial and freshwater tetrapods of the upper *Pristerognathus AZ to* lower *Cistecephalus AZ;* plant and trace fossils.	High	Low	Low No further mitigation necessary	Moderate – High Monitoring of deep excavatopns for potential fossil remains by Environmental Control Officer; reporting of exposed fossil remains to SAHRA and professional palaeontologist (Albany Museum, Grahamstown)	Low No further mitigation necessary

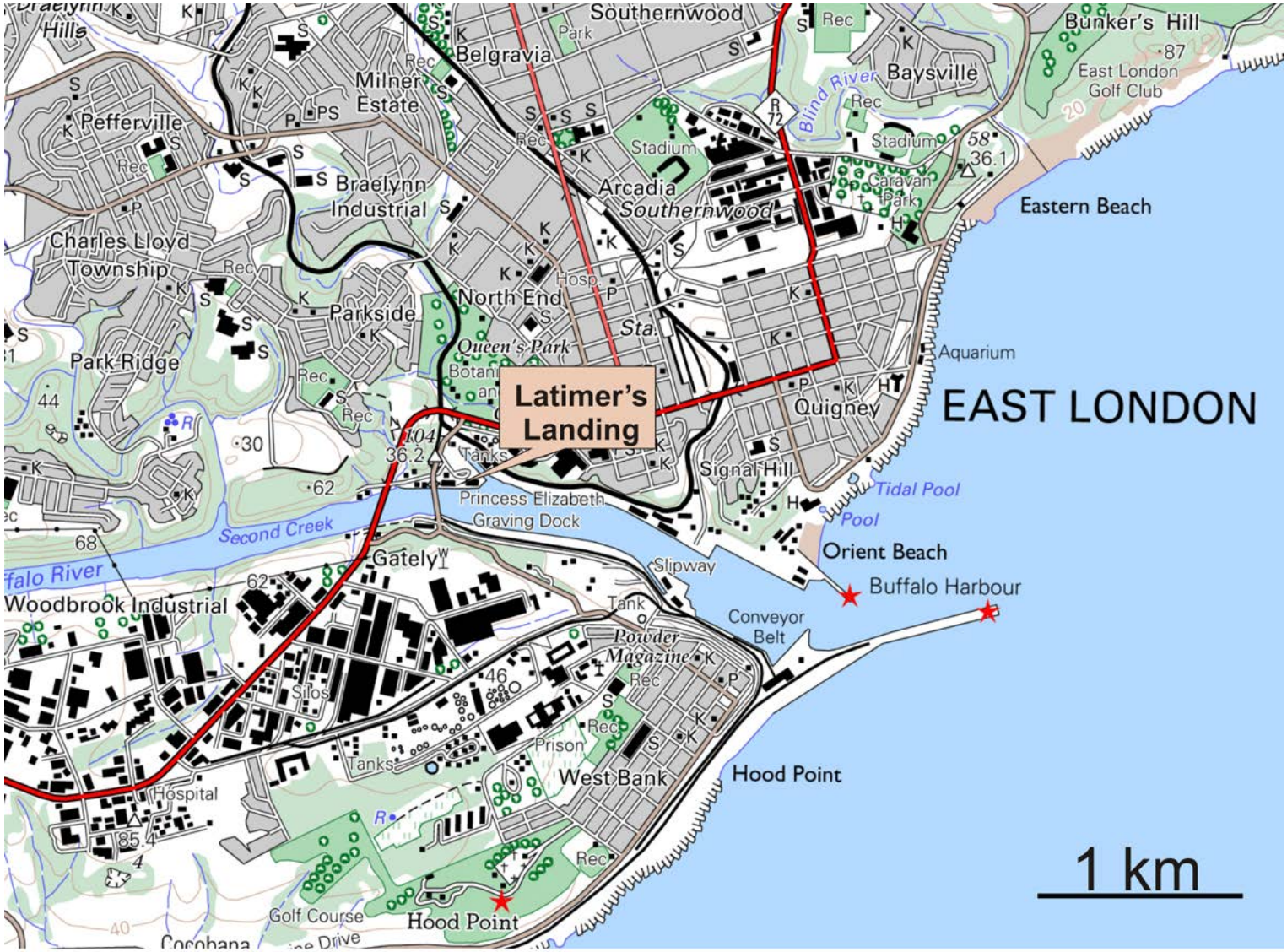

Figure 1. Position of Latimer's Landing marked on portion of 1:50 000 scale topographic map of East London (3327BB East London).

Figure 2. General view of the jetty, looking towards the river mouth (top) and due east with the jetty's timber deck in the foreground (bottom).

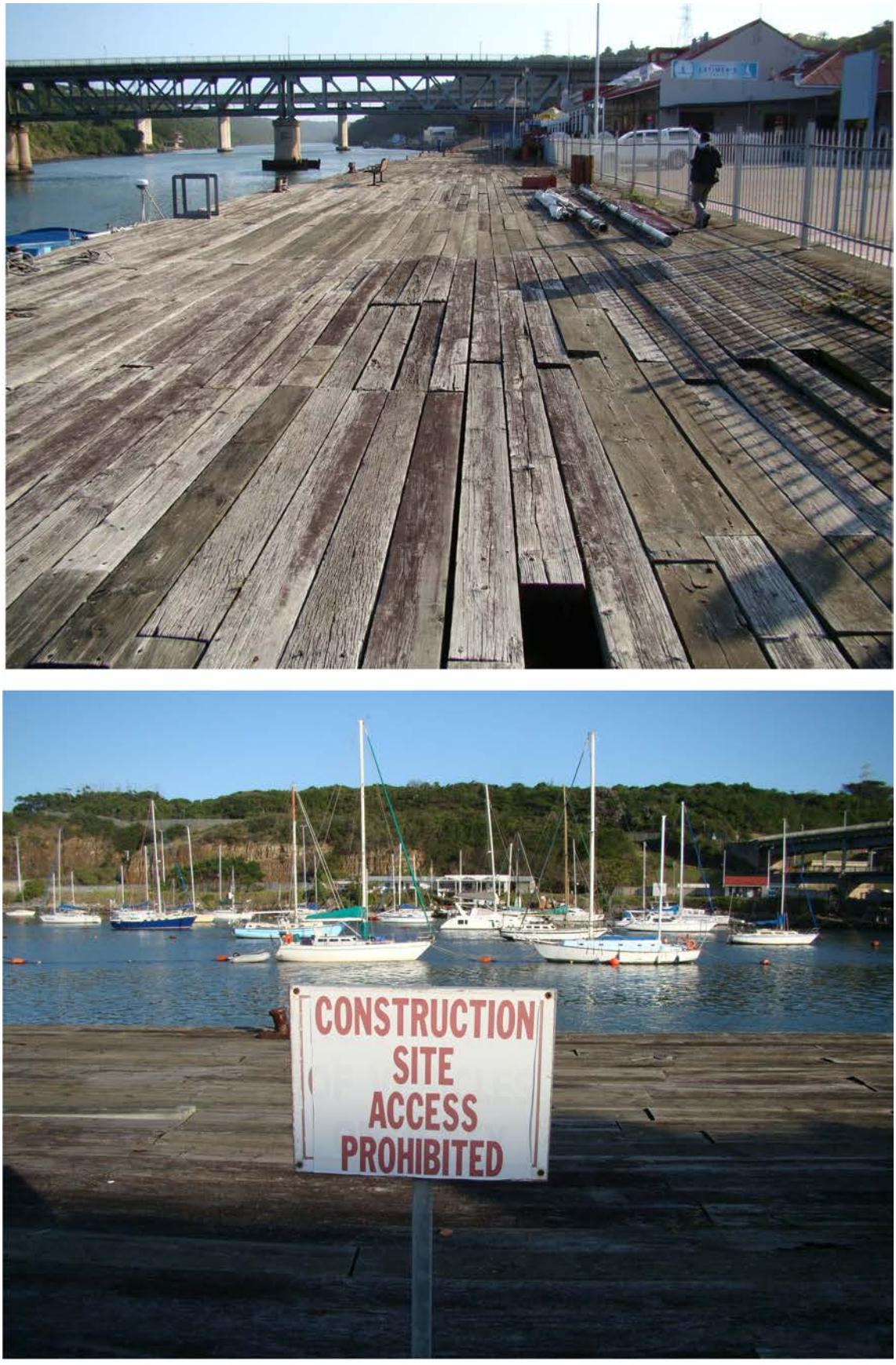

Figure 3.General view of the jetty, looking west (top) and south towards the right bank of the Bufallo River (bottom).

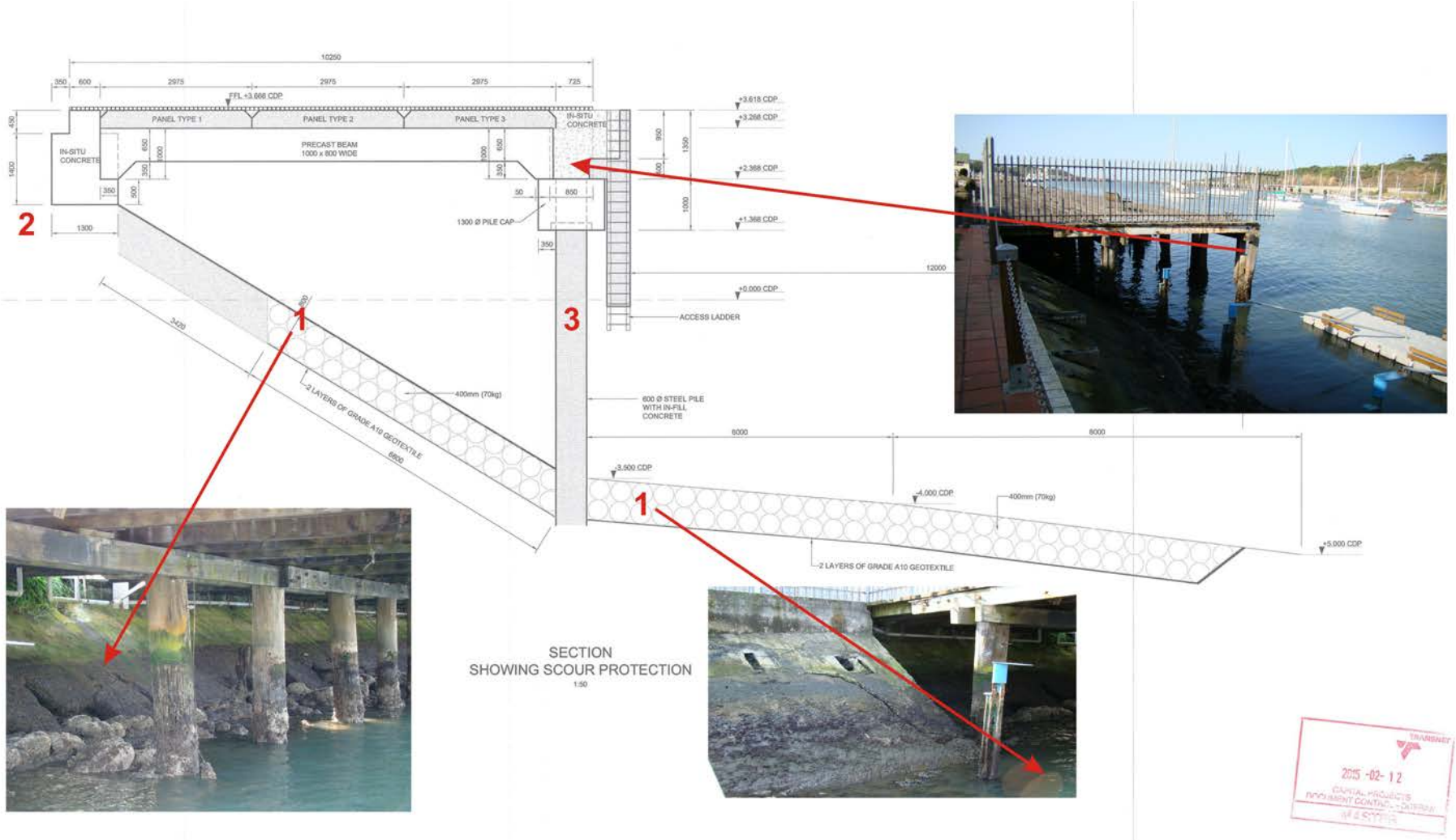

Figure 4. Specific activities that may affect potentially intact palaeontological and archaeological remains have been identified as the following: (1) removal of the existing rock armour; (2) levelling of the slope as required and (3) replacement of timber piles with new reinforced concrete piles.

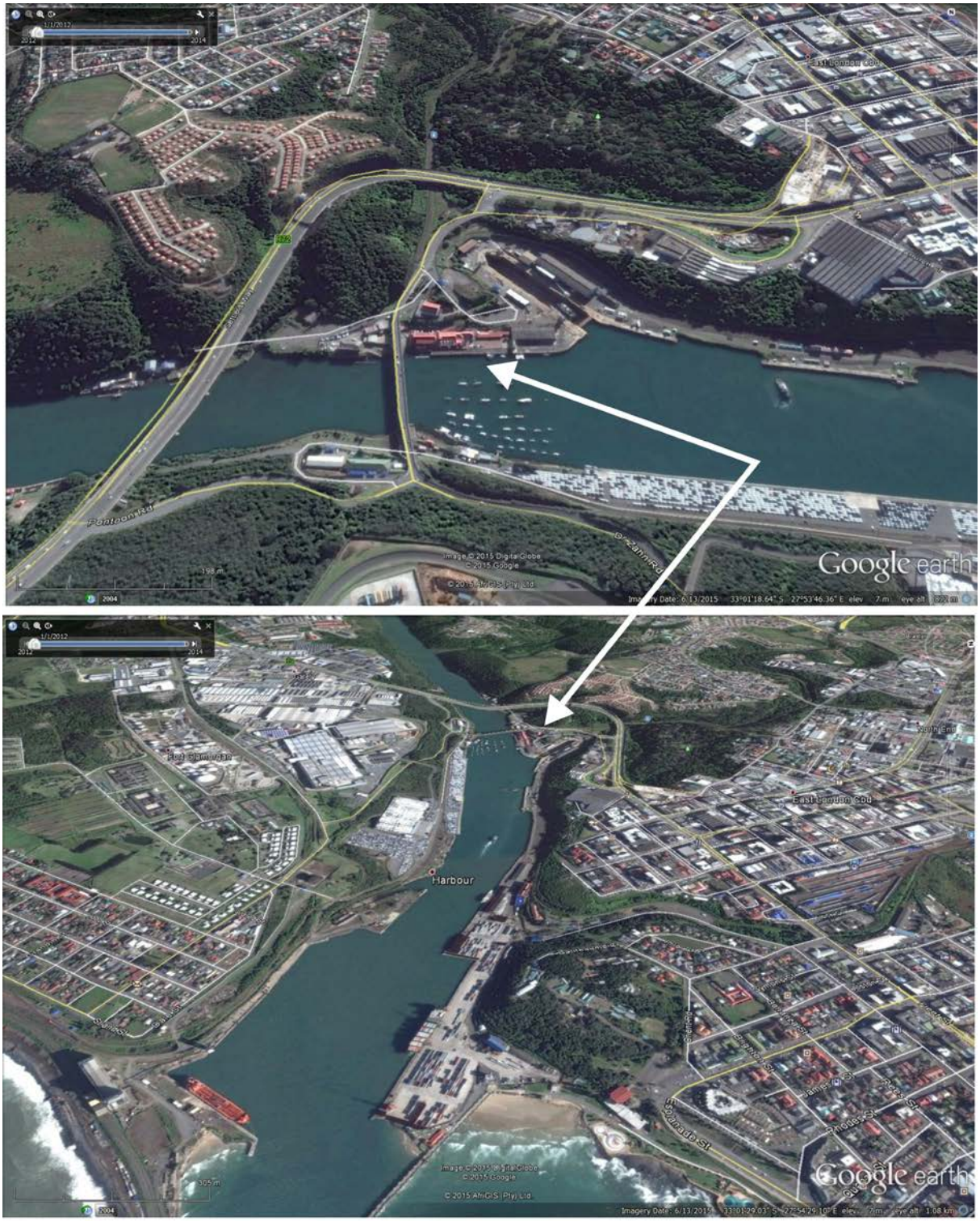

Figure 5. Aerial view of Latimer's Landing.

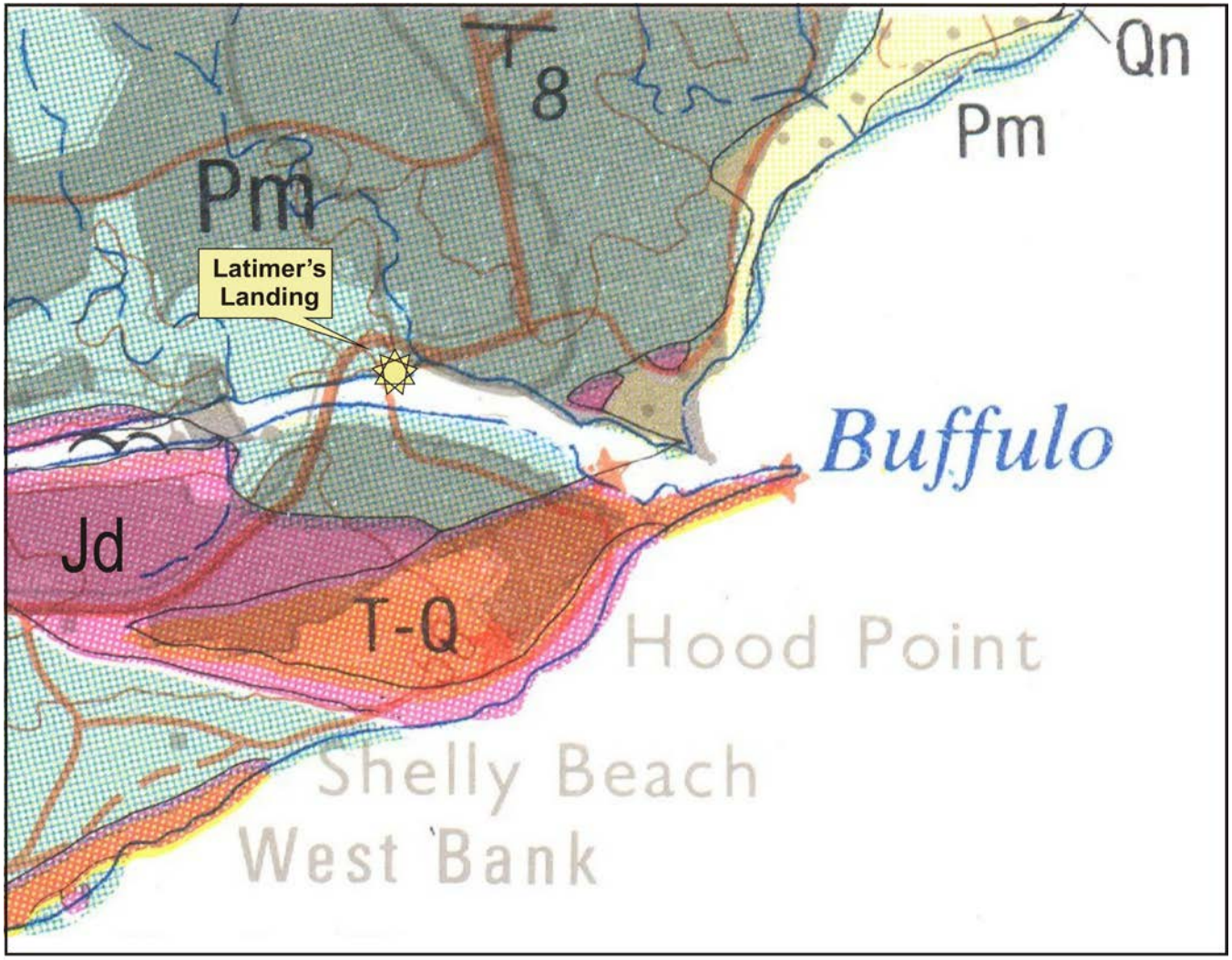

Figure 6. Portion of 1: 250 000 geological map 3326 Grahamstown (Council for Geoscience, Pretoria) showing the location of the historical jetty on the left bank of the Buffalo River at the Port of East London. Geology in the study consists of late Middle to early Late Permian fluvial sediments of the Middleton Formation, *Pm* (AdelaideSubgroup, Karoo Supergroup), Early Jurassic dolerite intrusions of the Karoo Dolerite Suite, *Jd* and Pliocene to Late Pleistocene Algoa Group sediments, *T-Q* and *Qn*.

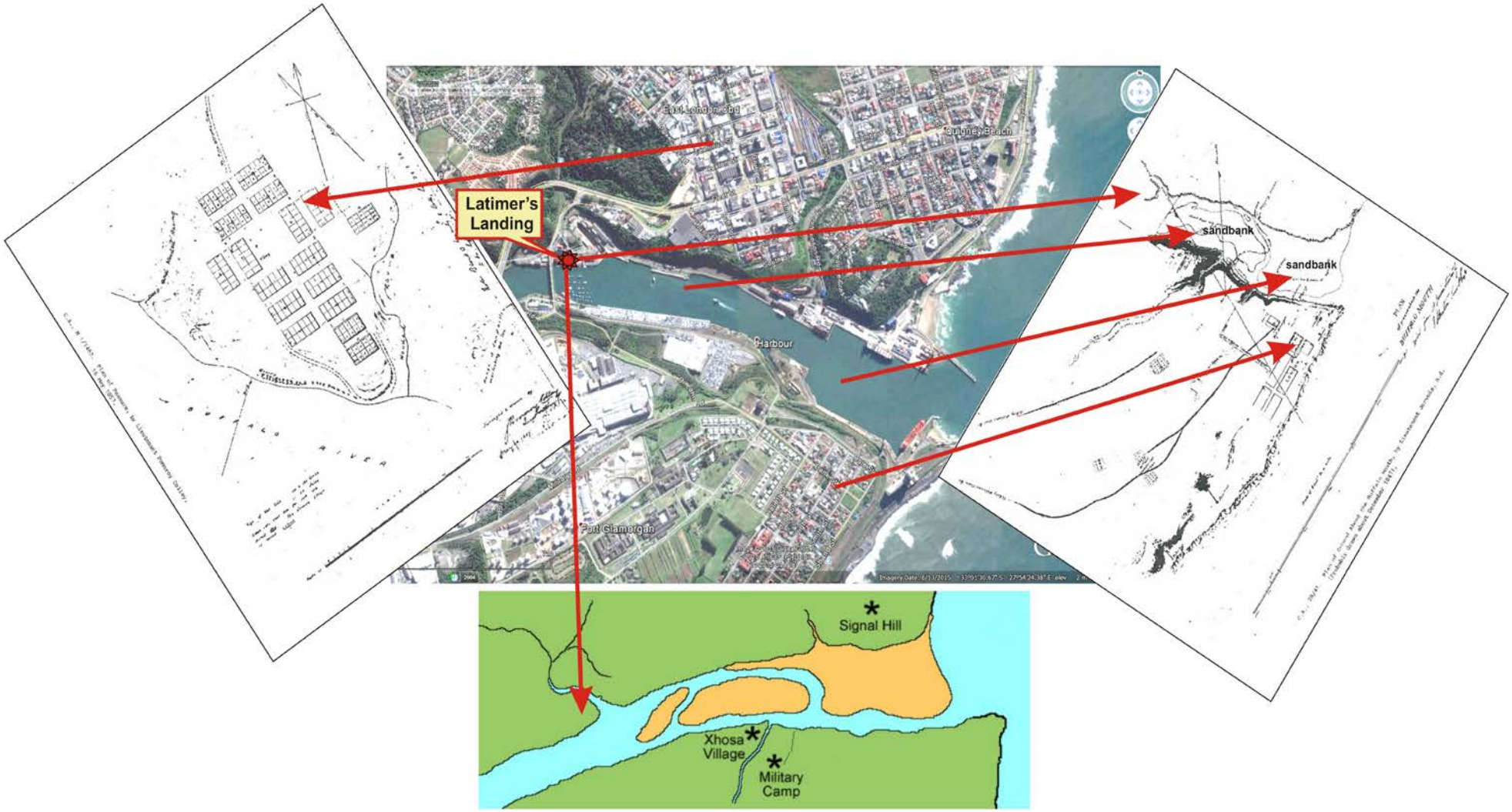

Figure 7. Position of Latimer's Landing (top center) in relation to historical descriptions of the Bufallo River Mouth c. 1857 (top left), c. 1847 (top right) and c.1836 (bottom) Maps taken from Tankard (1985).

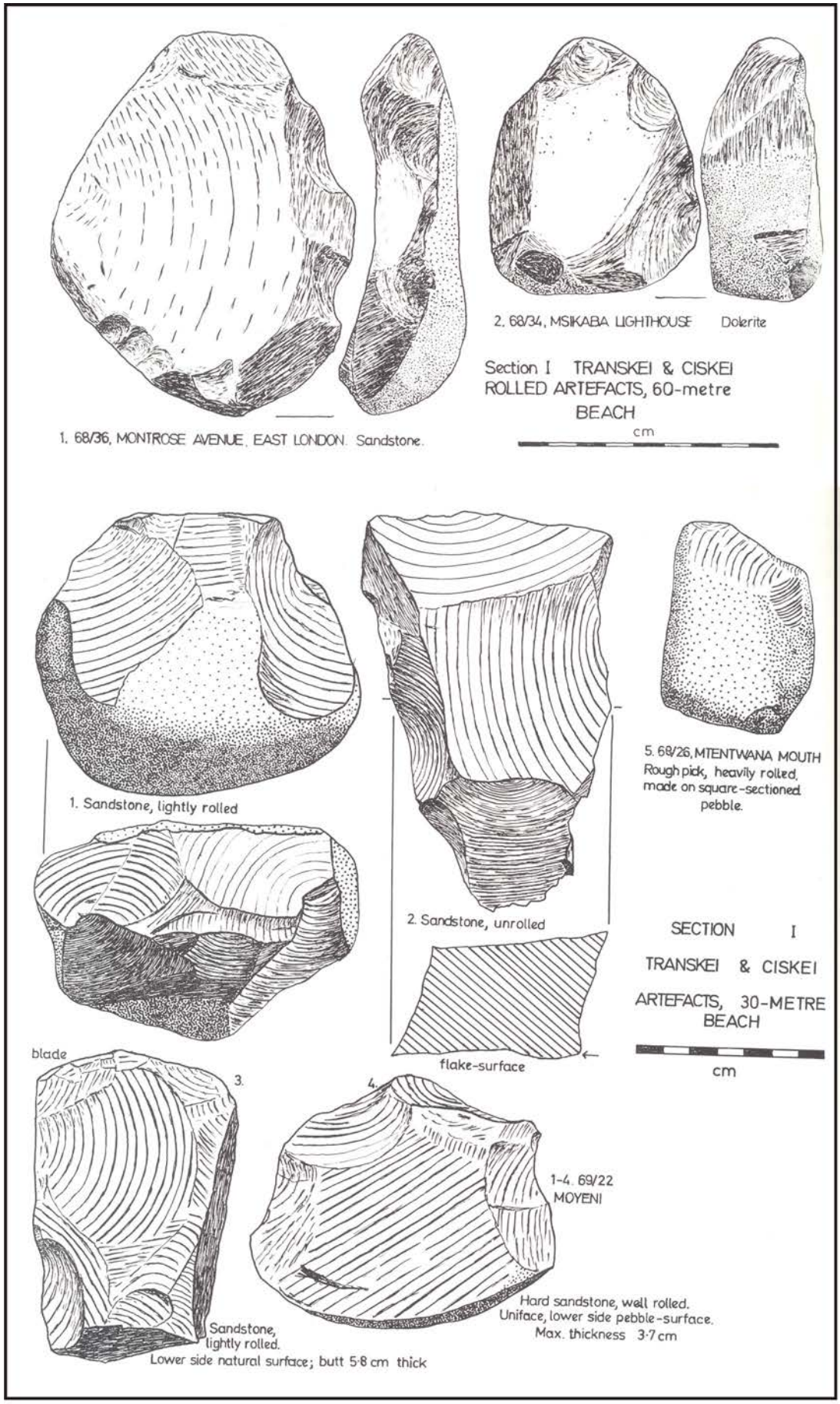

Figure 8. Examples of rolled ESA artefacts recorded in 30 m and 60 m high (asl) Pleistocene beach terraces near East London (drawings from Davies 1971).

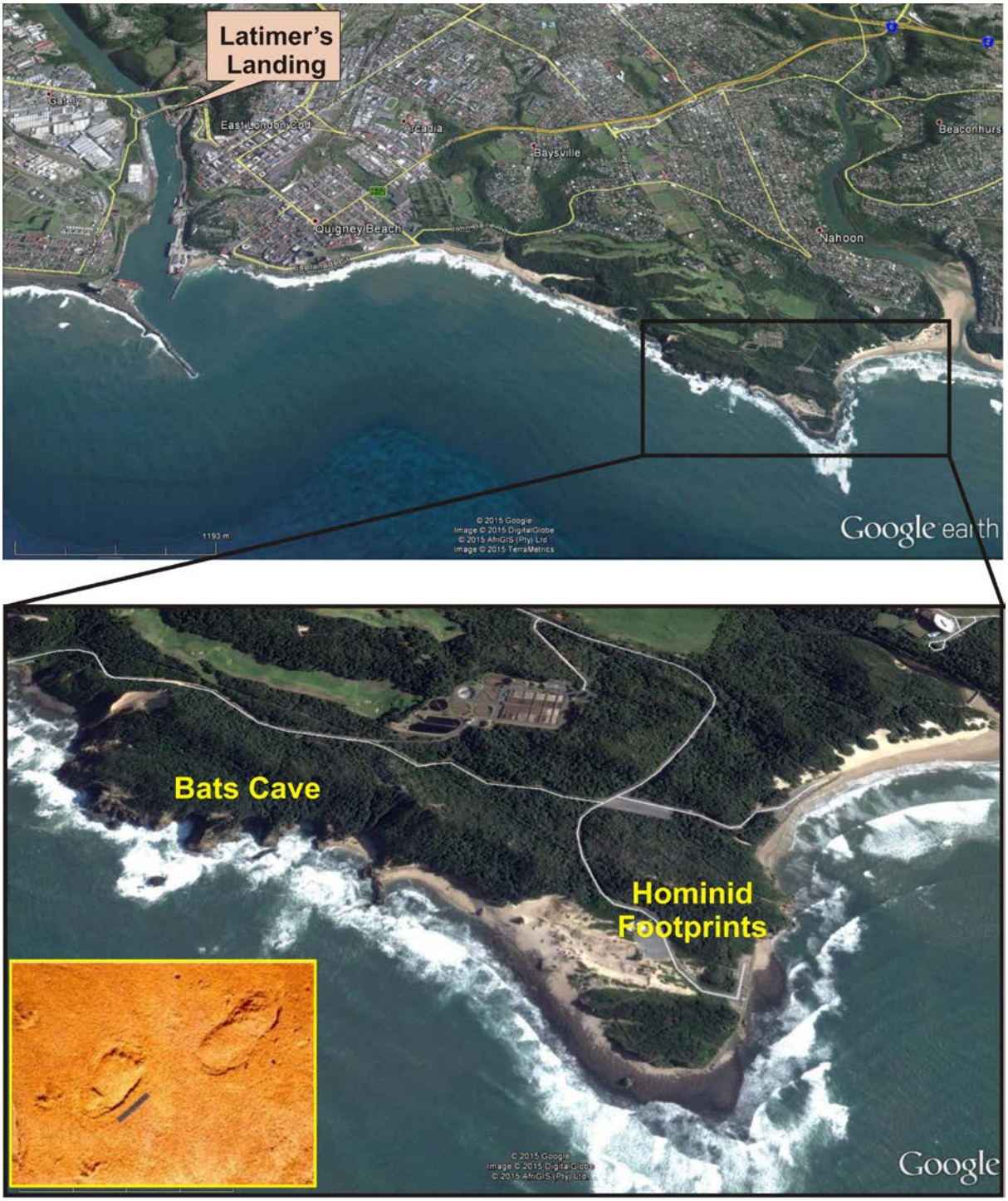

Figure 9. Aerial view of the hominid footprint locality near Bats Cave at Nahoon Point (inset photograph from (Jacobs & Roberts 2009).

#	Site	Material
1	Kaysers Beach	Shell middens, Stone tools, Pottery
2	Qulu River Mouth	Shell middens, Pottery
3	Cove Rock	Shell middens, Stone tools, Pottery
4	Leach Bay	Shell middens, Stone tools, Pottery
5	Blind River Mouth	Shell middens, Pottery
6	Shelley Beach	Shell middens, Pottery
7	Westbank	Shell middens, Pottery
8	Buffalo River Mouth	Shell middens, Stone tools, Pottery
9	Signal Hill	Shell middens, Stone tools, Pottery
10	Eastern Beach	Shell middens, Bones, Clay pipe
11	Bonza Bay	Shell middens, Pottery
12	Gonubie River Mouth	Shell middens, Pottery
13	Krause Beach	Shell middens, Pottery
14	Cintza River Mouth	Shell middens, Glass beads, European ceramics

Figure 10. Location of shell midden sites recorded by Rudner (1968) between Kaysers Beach and the Cintza River Mouth.

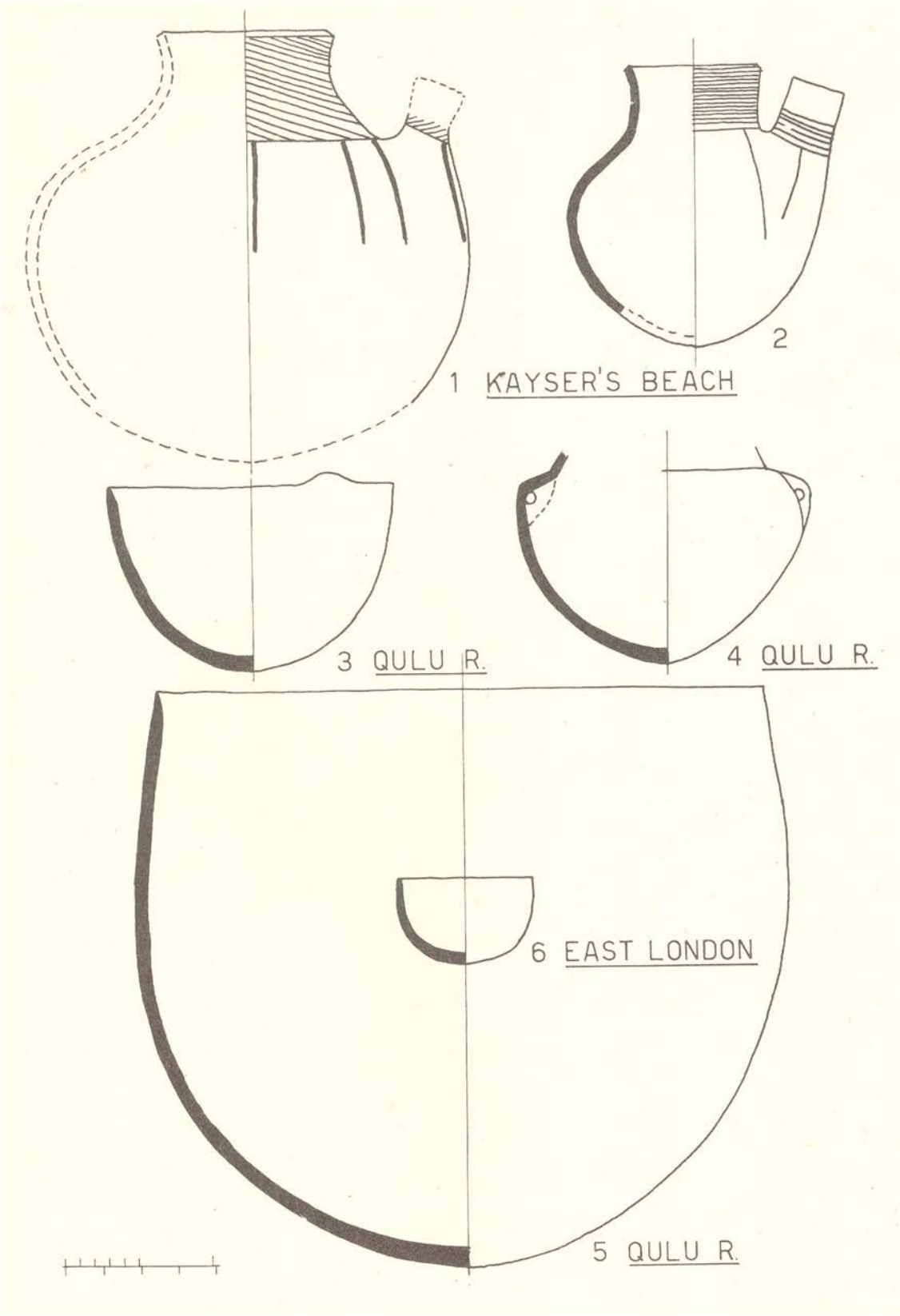

Figure 11. Styles of Khoi pottery found in coastal shell middens near East London (drawings from Rudner 1968) .

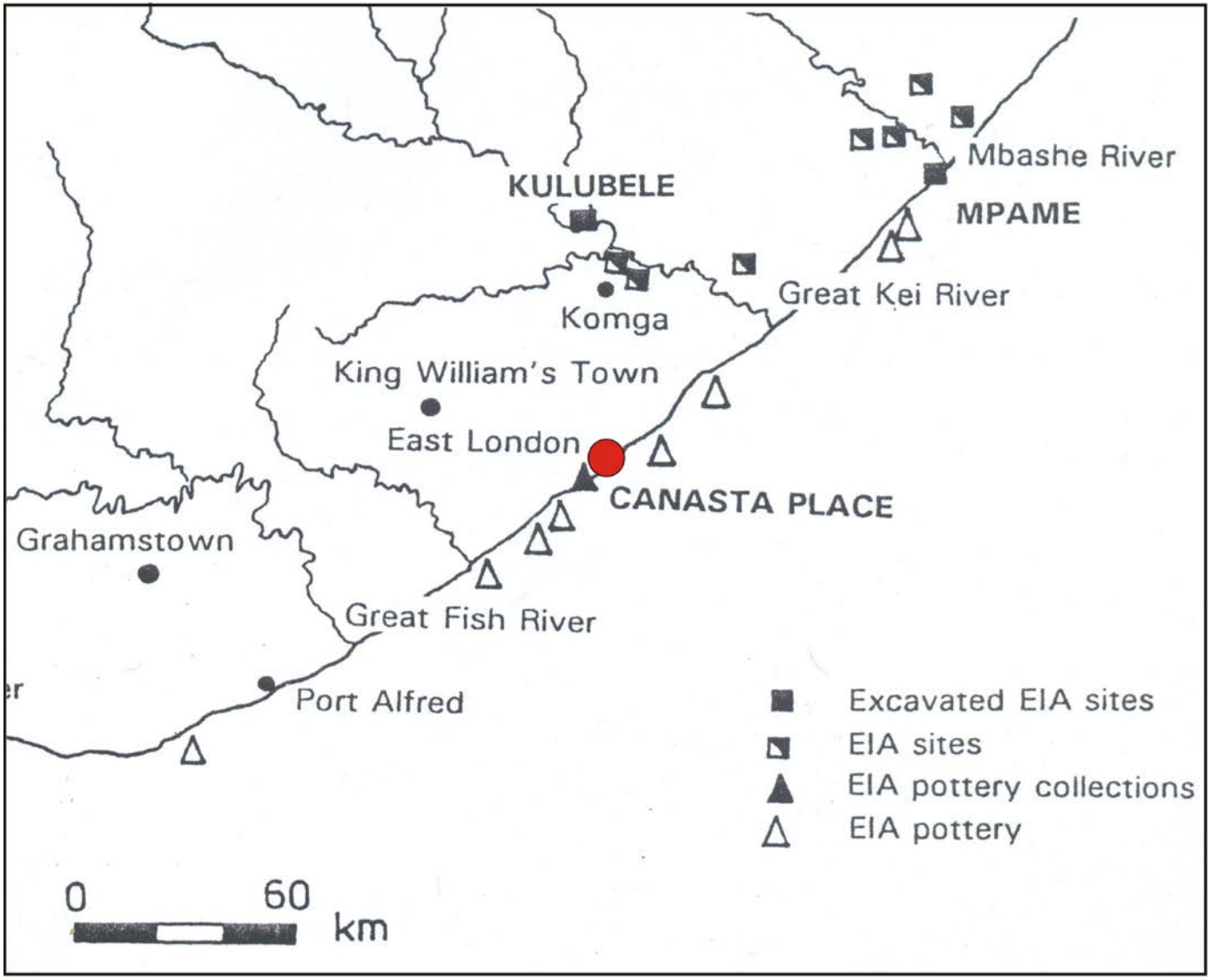

Figure 12. Map of EIA localities near East London between Port Alfred and the Mbashe River (map from Binneman 1996.)