

How do you lose a river?

In this paper I explore the concept of the lost river and the implications this term has for our understanding of the history of changing urban environments.

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In taking a voyage down one of the London 2012 Olympic Park's now-filled waterways, the Pudding Mill River, charting it and the surrounding area's diverse history, I explore how rivers end up becoming losable. Drawing on diverse methodologies from archaeology and geography and with a particular emphasis on mapping, I argue that a literal and metaphorical exploration of such a rapidly changing environment reveals a multitude of buried narratives and fluid histories. This research suggests that the labeling of a river as lost is not a politically neutral act and that, with its romantic connotations, the term may actually serve to legitimise insensitive and contentious changes to our environment.

Much has been written about London's numerous lost watercourses over the years, most notably Nicholas Barton's seminal volume *The Lost Rivers of London* [1] and more, recently Paul Talling's *London's Lost Rivers* [2] and Tom Bolton's *London's Lost Rivers: A Walker's Guide* [3]. In addition to these works a large range of blogs and websites devoted to the lost rivers are continually created and updated, for example, Diamond Geezer 2015 [4]. The subject is one that seems to inspire intense interest amongst a wide range of people and would suggest that city-dwellers are curiously attracted to such forgotten or lost spaces, and in particular, the unusual juxtaposition of the natural and the urban these watercourses seem to present.

The attraction of lost rivers seems to be related to their duality; seemingly both present and absent simultaneously. For example, they are rarely entirely filled-in but, rather, culverted beneath roads, railways and buildings, and thus seem to have the potential to re-emerge and return London to an earlier, more watery era. They hint at something primordial and indeterminate lingering beneath a city we tend to see as fixed, mappable and knowable, and act as a frequent source of inspiration and study for those who delve beneath, literally and figuratively [5]. This is most spectacularly illustrated by the voyages of urban explorers who crawl through often filthy, cramped spaces, usually illegally, and re-map their courses, sharing photographs and stories online [6]. Simultaneously, official schemes for the *daylighting* of buried rivers, the reinstatement, or rehabilitation of urban watercourses, is also increasingly being discussed as a means of making cities more pleasant places to live [7].

But whilst the study of lost rivers can be considered fairly mature in terms of their location or exploration, little discussion seems to have taken place about what makes them *lost* in the first place. I am interested then, not only in finding such rivers, but also to reconsider their histories. Why are these rivers considered *losable* in the first place? How did they shape their surroundings in the past, and continue to do so? I also wish to discuss how the word *lost* in this context may be misleading and indeed a dangerously neutralising term, rendering these streams dead and buried when they may yet be important to our present and future.

In this paper I aim to consider some of these questions through a remapping or charting of one lost river, Pudding Mill River, a stream that effectively disappeared in the space of several weeks in the construction of

the 2012 Olympic Park in Stratford, east London (Fig. 1). My approach demonstrates that maps and other visual materials can provide a form of conceptual ‘day-lighting’ that returns these rivers to our imagination, if not to the landscape, and in doing so provides an opportunity to reconsider why they and their surroundings were so utterly transformed.

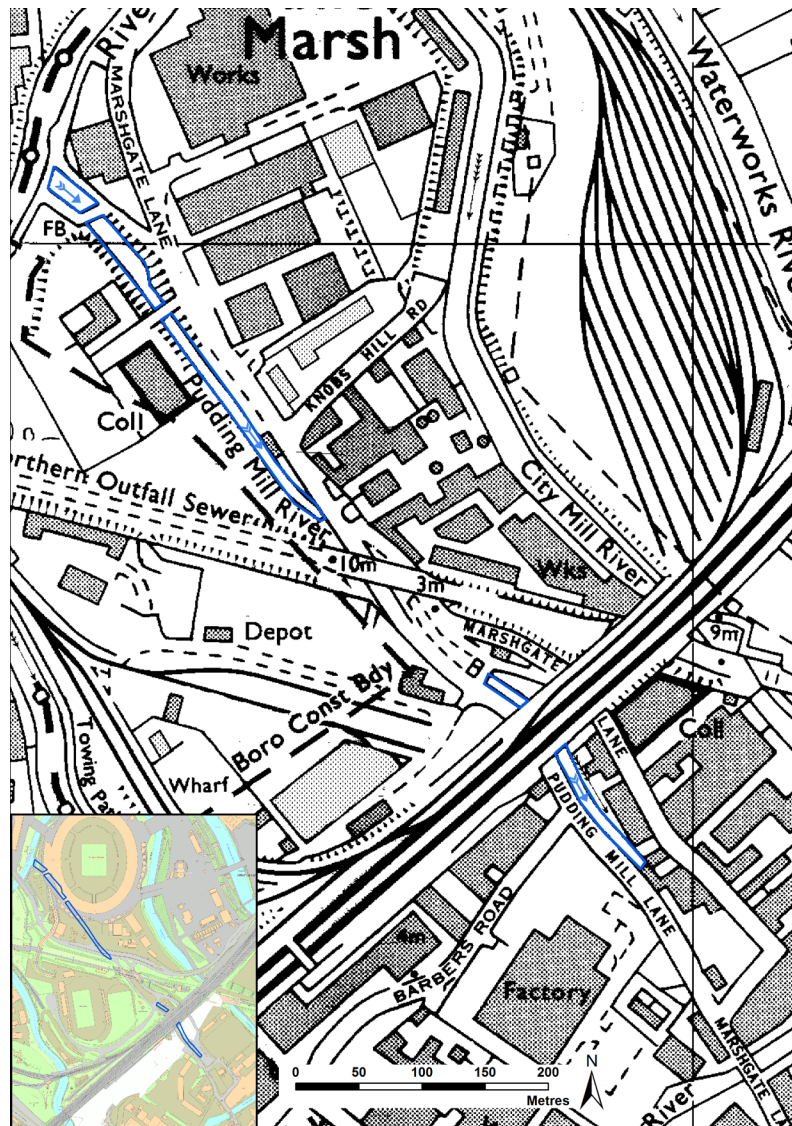


Figure 1.

The location of the Pudding Mill river (indicated in blue) in the last available (1: 10,000) OS map prior to its removal for the main Olympic stadium and its location on the current map (inset). © Crown Copyright and Landmark Information Group Limited (2015). All rights reserved. (1995)/ © Crown Copyright/database right (2015). An Ordnance Survey/Edina supplied resource. Used with permission.

Lost or hidden?

To begin this process, it is helpful first to try and define just what a lost river is - we stand a better chance of finding one if we know what it is that we have supposedly lost.

In London there are over twenty rivers and streams listed by Talling (and likely many more), but as he discusses, these watercourses are “not as lost as they seem” [8]. Indeed Barton in his earlier book seems to define them very much as rivers that continue to flow beneath us. The streams discussed in such publications have therefore rarely completely vanished, but more often have been converted into sewers for a variety of reasons

including becoming underused, silted up, polluted or as a result of nearby land raising and reclamation [9]. As we will see, Pudding Mill River is the exception rather than the rule and, in most cases, the term lost seems to act as a synonym for hidden or hard to see.

Strict definitions aside, the concept of *lost* is in itself curious here, and I will discuss the implications of this label in political discourses in greater detail below. I propose that the category is one that is inherently subjective and based around particularly romantic and nostalgic narratives. Whilst the semantic categorisation of anything as lost appears to have been rarely debated, it may be that, in a similar sense to the idea of disposal, losing something is not necessarily terminal; it may be recovered either physically or representationally, although not necessarily in an intact or original form [10]. It is unfortunately outside the scope of this paper to fully discuss these more theoretical issues, so whilst bearing them in mind, I instead focus on how such rivers physical states of absence are created as a result of practical, political processes.

The idea of the lost river is fascinating, enticing even, but like the current fascination for ruins (in its most over-enthusiastic form sometimes called *ruin porn*) we risk ignoring the real and existing social and political factors that created this loss. For example, London's River Fleet was not lost but culverted in the late 19th century as a result of a combination of gross environmental pollution and subsequent human actions to mitigate its effects: it smelt so bad it had to be hidden. Just as with any large infrastructure project, *losing rivers* (or a woodland, beach, or marsh) is seen as a means to an end; for example, to generate power or to build a dam [11]. Thus we must bear in mind that this lostness is not as unproblematic as it might first appear, and indeed is the result of historical processes which are ongoing and intimately connected to the wider management and development of cities, as well as the agency of non-human environmental factors such as flooding.

Related to the nostalgic light in which we have tended to view lost rivers, we must also be aware of our tendency to artificially divide nature and culture. Generally this may be either for purposes of the subjugation or fetishisation of the environment: rivers simply as sources of power or capital-generation to be exploited, or conversely, rivers that are (or were) pristine wilderness, the embodiment of that which is *natural* that *we have ruined* [12] [13]. Instead of these overly-simplistic determinations, we must instead chart a middle course and understand that few rivers have (or indeed the majority of the so-called 'natural world') remained unaltered by human societies even in the centuries prior to the Industrial Revolution [14]. In realising this, we can productively move on to consider rivers as features that cannot be untangled from human lives and experience, and that as we affect rivers' courses and habitats, their characteristics equally affect our actions and behaviour. Thus rivers exploitation and pollution by us may be viewed as much a part of their lives as their wildlife, sediments or currents.

More often than not in the case of urban rivers, it is also frequently impossible to be sure if a seemingly natural stream was not actually created by humans in the past; Edgeworth aptly describes them as *wild artefacts* for this reason. The Olympic Park archaeologists, for example, struggled to determine which of the many streams there (collectively known as the Bow Back Rivers (Fig. 2) were natural, or the age of the still extant streams even with deep geo-archaeological borings and extensive excavation [15]. Despite these considerations I don't want to abandon the term lost river, rather I want to understand it in the context of a specific watercourse and in doing so, determine not only its former contours and features, but chart the process of its disappearance from day-to-day life.

Charting lost rivers

The analogy of maritime or riverine voyaging is useful not only for its punning opportunities here - the idea of 'charting', the making of a map to enable the navigation of a river or ocean, is a powerful one, with connotations of creating safe passage or making navigable that which was treacherous. In practical terms this charting can be physical, for example, hydro/topographic surveying and archaeological excavation, or archi-

val using historic maps or plans and photographic analysis. In this paper the latter approach will form my main emphasis, but given the right resources we can also excavate the courses of lost or filled streams, something which occurred on several sites within the Olympic archaeological project for example [16].

Obviously, like all mapping, such a process is not without its negative associations in terms of imposing proprietorial boundaries, or establishing an artificial order over a landscape feature, which by its very nature, is (or was) the hybrid, ever-changing result of human and environmental interaction [17]. Never the less, I would argue that such a mapping process is a step towards bearing witness to radical changes in our environment that may have otherwise gone unquestioned: charting a lost river in this way demonstrates its absence, almost forensically, and enables us to question the circumstances of its loss.

Comparison of different sources in mapping the rivers reveals a broad spectrum of competing interests and a set of shifting discourses which we must navigate, not to reach some singular, true history but rather to muddy the waters of received narratives of how a river was lost. In the case of Pudding Mill River, the narratives that created its disposability were strongly linked to a belief that its surroundings were a wasteland again, like lost, this term is incredibly powerful and pervasive.

London's Olympic Wasteland

The 2012 Olympic Park (officially called the Queen Elizabeth Olympic Park) covers an area of approximately 560 acres of what was predominantly open space and industrial buildings, interspersed with housing, railway lands, allotments and most importantly for our purposes, several channels of the river Lea (also sometimes spelt 'Lee'), collectively known as the Bow Back Rivers.

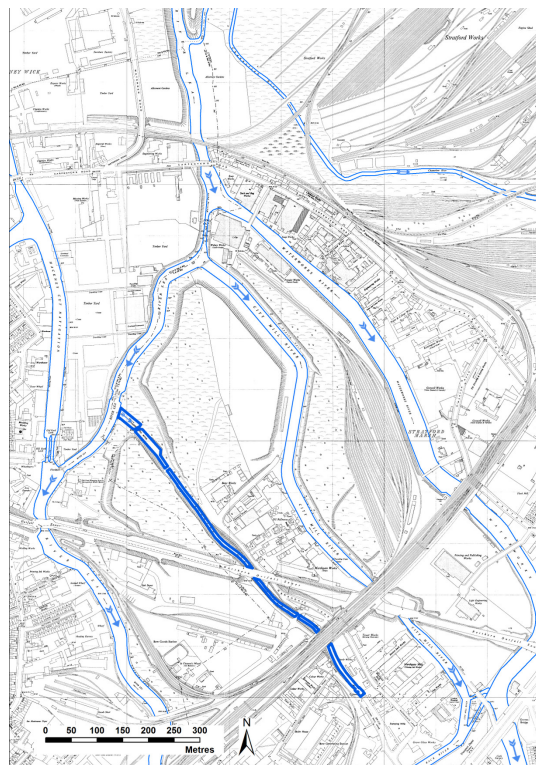


Figure 2.

The location of Pudding Mill River (bold) with the other Bow Back Rivers indicated on the first national Grid OS map c.1951. The majority of these watercourses remained in this form up until 2007 (excluding the Channelsea River which was partially buried by the Freight terminal - now Westfield - in the 1960s). © Crown Copyright and Landmark Information Group Limited (2015). All rights reserved. (1948-1951).

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Since at least the early-medieval period these channels have been reconfigured and altered many times, with large areas of land reclaimed, most recently following the Second World War with the dumping of large quantities of Blitz rubble. Home to a succession of mills since at least the 13th century and subsequently many industries reliant on water power, the whole area's prosperity was until recently, reliant on its riverine setting [18] [19] [20]. Though the area's later usage saw a massive expansion in railway workshops and lines, and thus less usage of the rivers, even today in its post-Olympic form it is a landscape characterised by its many channels and canals.

During preparations for the Olympics extensive archaeological excavations were carried out across the future Park from 2006 to 2009, along with an extensive standing buildings and waterways survey. Surprisingly little of the heritage and history of the pre-Park was publicly discussed in activities during the Games itself or even now in the legacy period, though the results of this work have now been published [21] [22]. Rather, the area before the Park was built was, and still is, commonly described by the media and Games organisers as industrial wasteland, scarred, or derelict [23]. Thus in this wasteland narrative, like the term lost river, we have a convenient catch-all with serious connotations: a wasteland is wasted, unproductive, a non-place without a past. This narrative was promoted by those who championed the Games despite it being demonstrably untrue to a large degree; though suffering from years of neglect, under investment and industrial pollution, this area was *no tabula rasa* but a site of employment for many hundreds of people and indeed home to several hundred more, as well as being a place for allotments, sports facilities, a rich variety of wildlife and much else besides (for exact business/housing figures see Davis 2009) [24].

This myth of wasteland endures to this day with previous lives in this place all but buried literally and metaphorically by the new landscape and buildings we experience today. This is not to be overly nostalgic for the prehistory of the Park; the area was undoubtedly in need of decontamination and investment, but rather to reiterate that we need to be wary of accepting singular versions of how the past was in any context. In investigating something as seemingly minor as Pudding Mill River, something the Olympics project needed to be lost, we might be able to challenge the idea of the wider wasteland narrative and the somewhat idealised, seemingly a-historical landscape of the Park today.

Pudding Mill River

Pudding Mill River was located in the southern half of the present-day Olympic Park, its full length originally running roughly southwards from the Old River Lea under the western edge of what is now the Main Stadium, under the Northern Outfall Sewer (today's Greenway) and railway lines to the Bow Back River, slightly north of Stratford High Street (Fig. 1). This course has been continually altered and its southern half was gradually partially filled from the mid-19th century onwards, with last of the stream completely buried and blocked in late 2007 as part of the Olympic project [25].

The River's exact origins are unclear, though the lower of its two original mills, St Thomas' (or Fotes Mill), is first mentioned in a document from 1200, though there is some doubt as to whether, like many of the myriad of streams in this area, the stream was ever a natural watercourse or simply dug to feed the lower mill (the upper was wind powered), or indeed, if the medieval St Thomas Mill stream followed the same course as the modern Pudding Mill River [26].

To understand how Pudding Mill River came to be lost, we can trace its history through a series of maps and other visual representations. The planners of the myriad of changes to the area in the last 100 or so years would have begun with OS maps to understand this stream in its broader setting, and it is with these I will begin. Obviously such planners would have also used finer resolution, local plans or sketches to understand how the river functioned and thus, some of these will also be discussed. Though potentially older maps of the river exist, I will only focus on the last hundred and fifty or so years for sake of brevity.

The map in figure 3 shows the river circa 1869 as represented by the first edition of the Ordnance Survey. We can gradually see how the river changes if we follow the OS map revisions up until the present day (Fig. 4), finishing up with the pre-Olympic period and lastly, the new Park with Pudding Mill River absent (Fig. 5).

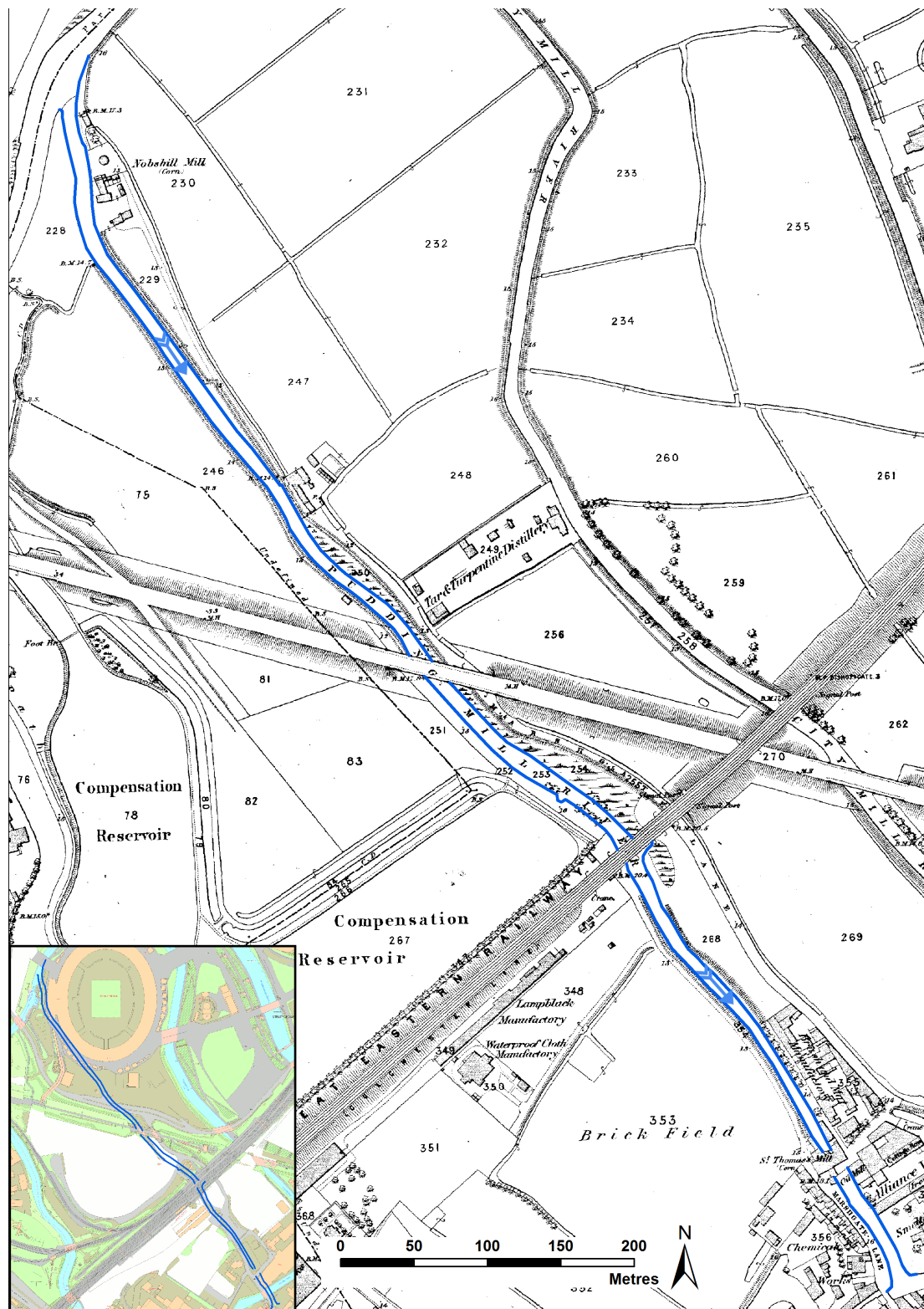


Figure 3.

Pudding Mill River in 1869. © Crown Copyright and Landmark Information Group Limited (2015). All rights reserved. (1869)/ © Crown Copyright/database right (2015). An Ordnance Survey/Edina supplied resource. Used with permission.

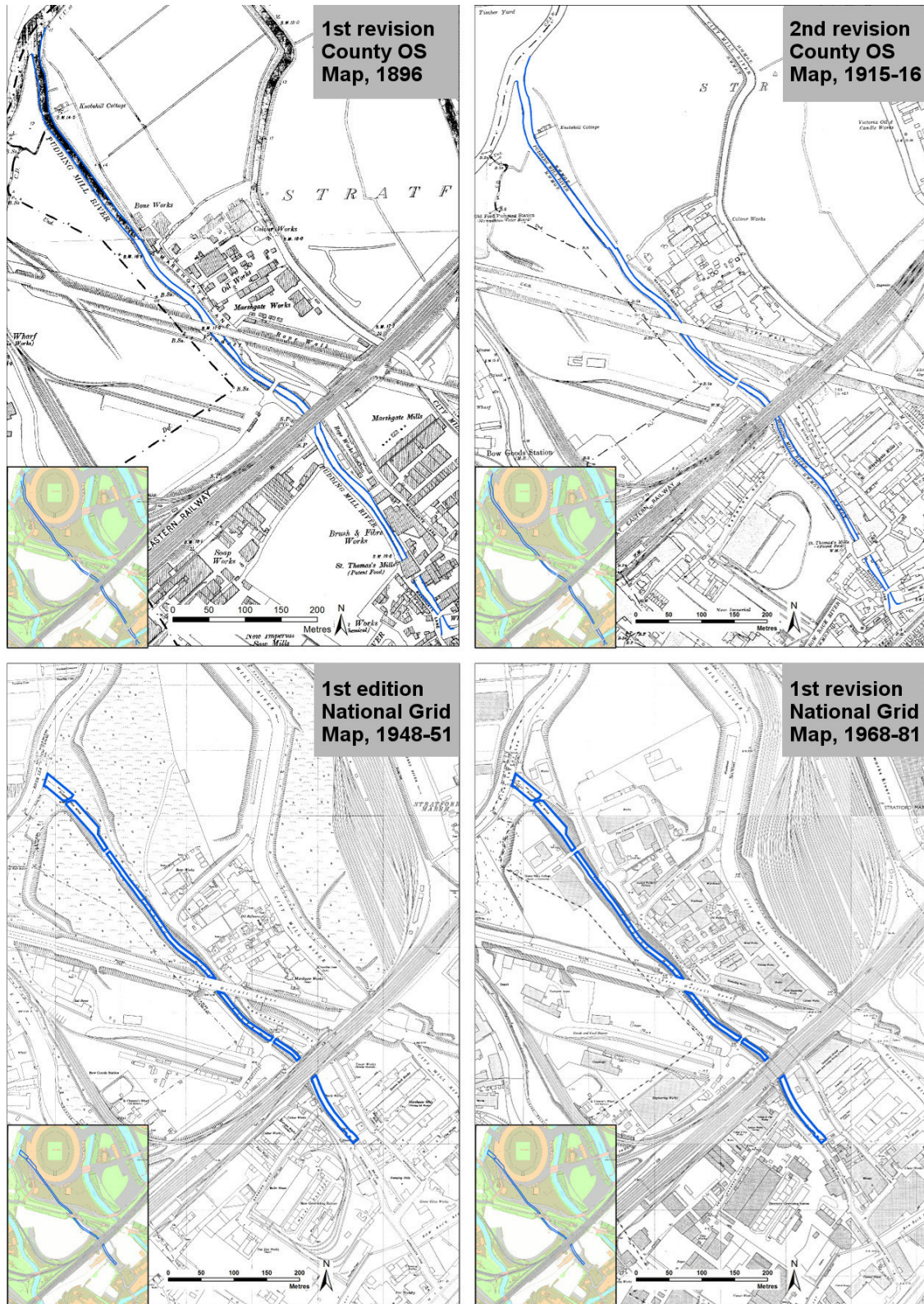


Figure 4.

The gradual development of industry and the modification of Pudding Mill River from the late 19th century to 1970s (see figure 1 for the latest pre Olympic OS map). Note the change in course of the River between the 2nd revision of the County OS map (1915-16) to the first National Grid based map (1948-51) due to the alterations made by the 1930's Lea Flood Prevention scheme). © Crown Copyright and Landmark Information Group Limited (2015). All rights reserved. (1896, 1915-16, 1948-51, 1968-1981)/ © Crown Copyright/database right (2015). An Ordnance Survey/Edina supplied resource. Used with permission.

As is obvious from these maps, the main changes in the River's existence have often been for the sake of convenience or due to its declining usage for industry. For example, we see a gradual infilling of what had previously been marshy ground, home to landfill, waterworks, or railway sidings. The Knobshill Corn Mill at the River's mouth was demolished in 1894 and is absent from the second revision of the map, but its cottage remains until the 1940s. Today the earliest surviving features that still remain on site related to the river in this mid-19th century period, are the Northern Outfall Sewer and the Eastern Counties mainline railway.

One of the largest changes visible between the last edition of the County OS map (1915-16) and the first edition of the National Grid-based map (1948-51) is the realignment of the mouth of the stream and its new river wall, and in the south, the River's severance from St Thomas Creek (or Bow Back River). In both cases this was due to extensive construction work for the 1930s Lea Flood Prevention scheme. By the late 1980s documentary sources and the OS maps indicate that more of the lower reaches of the River between the location of the Bow Generating Station and what is now Pudding Mill DLR station, were already filled – though this seems to be more ad hoc and not necessarily authorised [27].

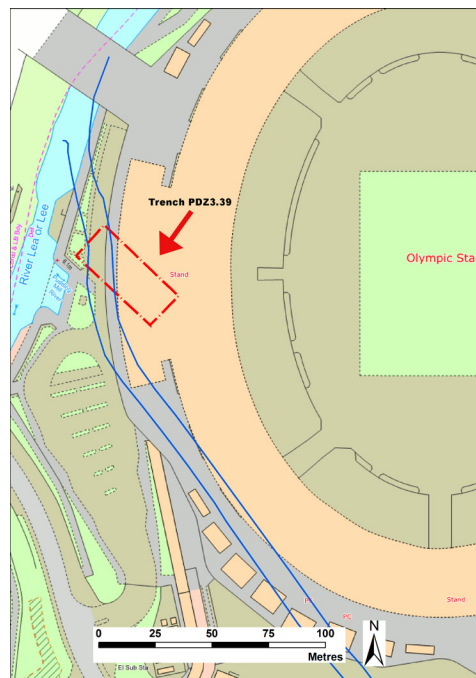


Figure 5.

The main stadium and location of the original River's course and archaeological trench. © Crown Copyright/database right (2015) An Ordnance Survey/Edina supplied resource. Trench location data © Museum of London 2015. Used with permission.

After 1934 when the last mill, St Thomas', was demolished for the Lea Flood Prevention scheme, the dead end river fed only the Bow Generating Station which opened in 1902 and closed finally in 1968, after surviving a direct hit in WWII [28].

In the later OS maps we also see a gradual colonisation of seemingly empty spaces around the mouth and east of the river and the consolidation of Knobshill, the future site of the Olympic Stadium. The major usage for this area initially was as a refuse tip (discussed below) though this is not indicated on these maps. Across the river to the west in the 1960s, Queen Mary University constructed a test nuclear reactor, which though decommissioned in 1983, its building remained on site up until 2007 [29]. The last major change on the eastern side of the river on the former dump was the building of the Marshgate Lane trading estate constructed from the 1970s onwards and the construction of a new road linking this area to the rest of the future park across the City Mill River.

This comparison of the overall OS mapping helps us chart the gradual decline of the river at least in terms of size or its *wildness*. After the 1930s with the exception of the power station, it appears to have been underutilised and subject to gradual infilling, presaging its ultimate demise in 2007. Our voyage down the absent river takes us through a gamut of an industrial history, which is now almost completely absent in the new park. To try and reveal more information on such industry around the River that is only hinted at by the OS maps, I now focus specifically on the area around the mouth of the River itself and a few closer scale maps and plans.

Knobshill

At the mouth of the River in 2007 the Knobshill boat, an early 19th century gun punt, possibly used to hunt waterfowl on the River Lea, was excavated from the silted up base of the original Pudding Mill channel (Fig. 5). I participated in this excavation as part of the Olympic archaeology works and this is where my interest in the river began; in a trench 6m beneath what had been the yard of Parkes Galvanising, a factory built here in the 1950s.

To enable the Olympic Stadium to be built, Pudding Mill River and its environs had to be partially decontaminated and re-landscaped and we were tasked with removing anything of archaeological significance in this small area of the stadium. Part of our work involved extensive planning and survey of a trench, named PDZ3.39 (Fig. 5). To plan and record the boat in-situ, we drew measured 1:10 scale plans on drawing film, which were then tied into a trench grid system and ultimately georeferenced to the National Grid. Using these relatively old-fashioned methods we produced detailed plans along with many pages of written recording sheets describing the vessel, its construction and surroundings with environmental and geoarchaeological specialists studying the old river channel itself.

The completion of archaeological plans, like those produced in PDZ3.39, is similar to producing a map; we survey the features, tie them into a grid, make decisions about where to draw lines, which parts of the feature to record and which to exclude. Archaeologist Helen Wickstead [30] has pointed out that this planning is not some objective observation; much like mapping, we select where we think the significant features are, at times leaving uncertain edges or projecting lines beyond the edge of the trench for example. It is, like mapping, also a collaborative process. In this trench one of us would be drawing, my colleague would be holding the tape or vice versa, and then in the office our drawing was digitised, with our joint-authorship subsumed into a wider report. It was then used to inform a narrative about the nature of this part of the Park in the past, which ultimately led to its discussion in the final report [31]. Unlike a map, such plans and the narratives we write based-upon them are not useful for navigating existing terrain, but rather, exploring layers which are the results of past activities in the present, and as a result, I would argue that they act as evidence of not only an ancient past but the process of recording, and the removal of said traces; that is the role of human activity in the transformation of the environs of Pudding Mill River and indeed its loss.

Following this excavation the trench was backfilled and then became the location of foundations for the Main Stadium. This recording process led me to question the purposes of our archaeological works around the River. For example, our work contributed to the physical destruction of the evidence of the River's past in the present, and ultimately helped to facilitate its removal by fulfilling the project's obligations to conduct archaeological investigations. Thus, one could argue that we, as any other contractor on the site, helped to facilitate the ultimate removal of a whole landscape, wiping it literally and figuratively off the map.

Yet, at the same time, the record the archaeologists produced, also kept the past 'present' in one sense, producing an, albeit less tangible, resource which can still be used [32]. Though not a flawless mirror image or replica of what once here, such interpretation of the past in the present and its preservation by record reminds us that this place was not always just the back of the stadium, but a place with a varied and long history.

Landfill

As I discussed earlier, the River was not isolated from its environment and, even when its function as a source of power ceased, it was clearly still a major feature in the landscape, and thus influenced the type of activities that occurred in the area. Once again many of these activities are visible through map evidence. For example, in the early 20th century around Knobshill Cottage and the mouth of the River there was a landfill site known as Lloyds Shoot. This was mostly wiped out by the Stadium landscaping, although its sealed remains surround the foundations, and a portion of it (9,500m³) was used for a substantial part of the filling of Pudding Mill itself [33]. This landfill can still be seen marked on an Environment Agency map of historic landfill sites (Fig. 6) and was begun around 1900 by a Mr French, with Knobshill Cottage owned by the Metropolitan Water Board from around 1852 (visible in a hand drawn map from the period) [34].

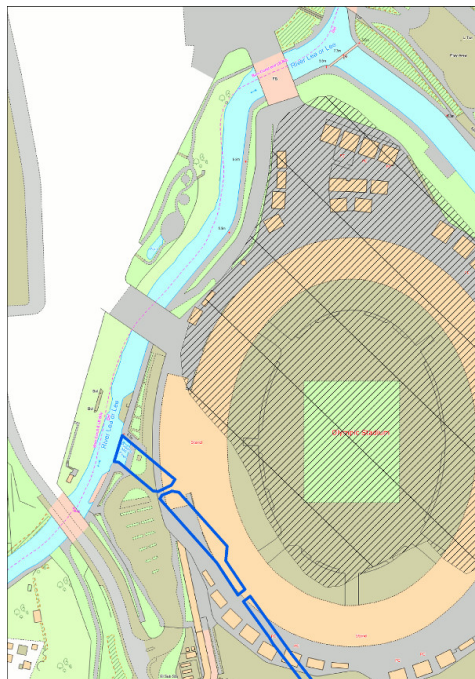


Figure 6.

Environment Agency overlay showing historic landfill at Knobshill (hatched area). © Crown Copyright/database right (2015) An Ordnance Survey/Edina supplied resource/ Historic Landfill data © Environment Agency 2012.

Later a Mr Lloyd seems to have become the main proprietor of the dump and in a letter of 1912 was said to be upsetting the tenant of the cottage, Mr Cull, by dumping rubbish into Pudding Mill and poisoning his water supply, though there seems to have a multitude of contractors on the same site until at least the 1920s [35]. The ill-fated cottage itself is seen in 1940s aerial photographs [36] and may have disappeared with the building of Parkes Galvanising. Ultimately the whole dump was buried beneath the Marshgate Lane trading estate in the 1970s and 80s. Though perhaps somewhat anecdotal, I would argue the stories such archival materials tell act as evidence of a long-term history of the changing fortunes of the river and its surroundings, shifting ownership and conflict, a pattern that was continually repeated until the Olympic Games. The maps of this place and other sources illustrate that the now lost river was a place of contestation and changing use long before today.

The Olympic Games

Before concluding I want to consider what is happening to the location of the river now. This study is part of my wider PhD research project that considers the traces of the effects of mega events like the Olympic Games and the Great Exhibition across long time scales, asking, what were these sites used for before their event, what was destroyed to create the spectacle, what was created for it, and what remains as legacy?

In this spirit then we may enquire as to what traces of the river remain on site today. The current OS map and the Queen Elizabeth Olympic Park maps give very little sign of where Pudding Mill was once located. Hence we are required to produce our own map, charting its course on the ground of the new Olympic Park. Beginning at its former mouth on the River Lea, a stub of the stream is preserved in the Park, memorial-like (Fig. 5). Somewhat more prosaically some of the many drains in the area connect to a new outfall which discharges into the River Lea here, flowing over the course of the filled river, albeit in the opposite direction from its original flow. We can also look to the planning maps of the Olympic Games site for the process of how the river was actually filled and how its wildlife was evacuated [37] [38].

This area of the Park, and thus the route of the River, is currently inaccessible due to the refurbishment of the Stadium, so the next trace of the River is found away to the southeast.

Under the Greenway (The Northern Outfall Sewer), the course of the river is hinted at the by the large apertures (Fig. 7, left) still extant under the sewer's pipes, which would have originally allowed the River to flow underneath (though filled long since before the Games). Now a pedestrian walkway, workers pass to and from work at the stadium and somewhat miraculously, a sign has survive recording the level by which the Pudding Mill once was set (Fig. 7, right).



Figure 7.

*Left - The former course of the Pudding Mill under the Greenway, now a pedestrian footway.
Right - An extant original sign of the Essex Court of Sewers from the 1860s setting the 'Standard Level' of land next to Pudding Mill River located under the Greenway. (Photographs by the author).*

Further south still, under the railway lines by the new Crossrail tunnel portal we pass close to the original course, over the semi-legally in-filled stubs of the river discussed above. One of these railway arches allowed the River to pass underneath before it headed south to the Bow Back River, where there appears to be no trace of the river visible, presumably given its reconfiguration in the 1930s [39].

Conclusion

After this brief voyage along the course of Pudding Mill River and through its history, can we say then that it is truly lost? Obviously it has been in-filled, its flow interrupted, and therefore, in a physical sense, it is no more (though potentially, future archaeologists could find its filled banks beneath the protective membrane of the Park's landscaping). Despite it being considered lost by the likes of Talling, I believe that in this case such a label may contribute to a sense that the past of this place is safely buried or remediated, that no historical flood waters will rise over the stadia and the utopian terrain of Queen Elizabeth Olympic Park.

A romanticised concept of the lost river, I would argue is similar to the trope of the ruin – we gaze and perhaps even mourn for the past but in this fetishisation, do not always consider the full context of the act of ruination; for example, the designation of the pre-Olympic site as wasteland or brownfield and thus, as disposable. Do we accept this nostalgic lostness unproblematically, or can we use the physical absences of rivers like Pudding Mill as a means to question our present terrain and by extension, the narratives we inscribe upon places?

In the new Park, Pudding Mill River gives its name to a, as yet unbuilt, post-Olympic housing development: “A quirky, hidden new neighbourhood along the Greenway south of the Stadium, Pudding Mill will be the Park’s most varied new community” [40]. Whilst such a name is appropriate, I would argue it risks encouraging further forgetting of what was once here and how the river, once at the centre of a whole neighbourhood, was purposefully made absent.

My charting of the Pudding Mill River has sought to demonstrate that though buried, it is only lost if we allow it to be a mere subject of nostalgic curiosity; instead, by recovering its history through its representation in maps, plans and archaeological excavation, we can question the wider impact of such large-scale development and how such events are reliant on a particularised view of their sites previous uses that tend to deny the complexity and contestations of the past in favour of a homogenous present and future.

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