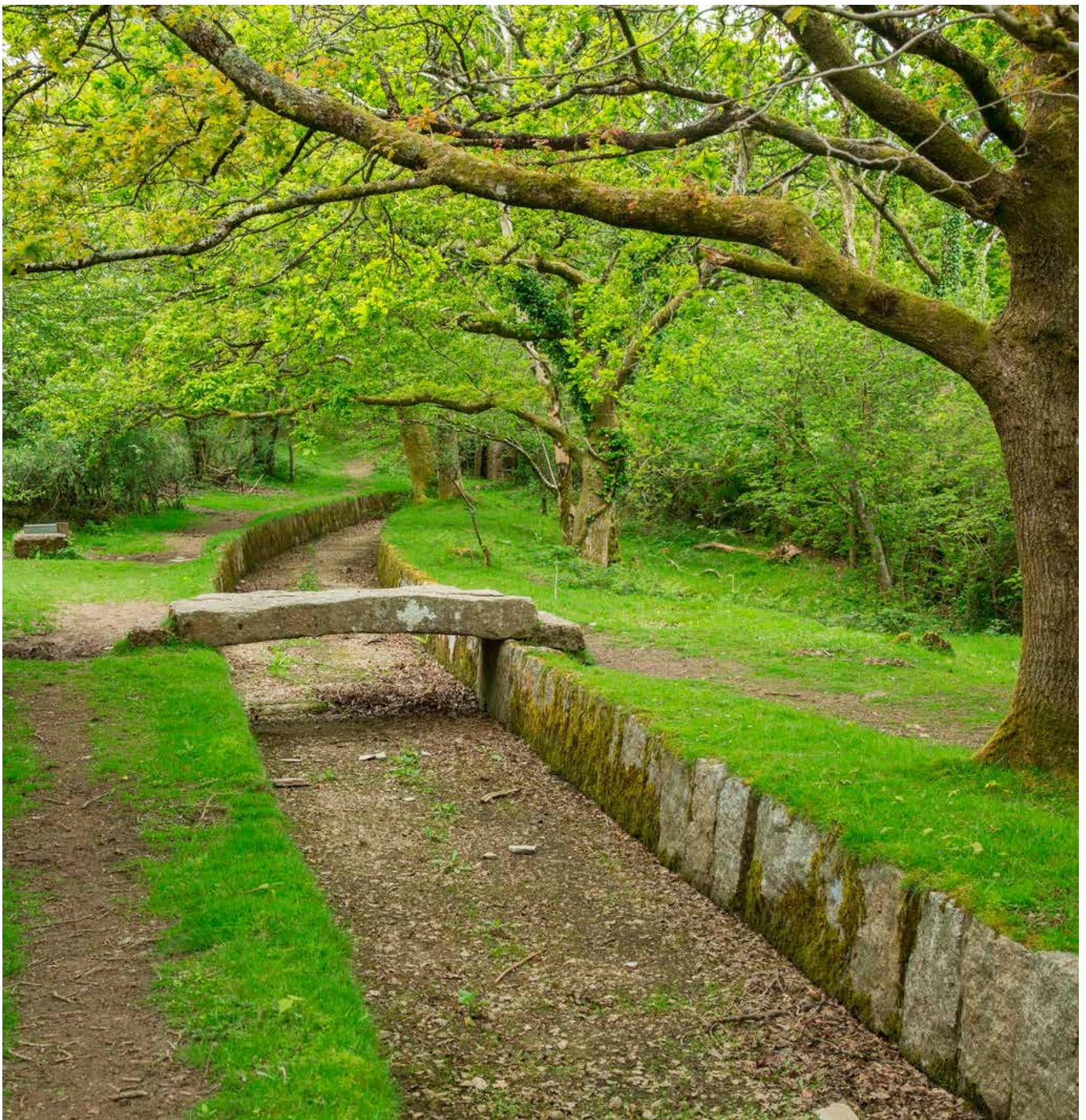




Historic England

# Utilities

Scheduling Selection Guide



# Summary

Historic England’s scheduling selection guides help to define which archaeological sites are likely to meet the relevant tests for national designation and be included on the National Heritage List for England. For archaeological sites and monuments, they are divided into categories ranging from Agriculture to Utilities and complement the [listing selection guides](#) for buildings. Scheduling is applied only to sites of national importance, and even then only if it is the best means of protection. Only deliberately created structures, features and remains can be scheduled. The scheduling selection guides are supplemented by the [Introductions to Heritage Assets](#) which provide more detailed considerations of specific archaeological sites and monuments.

This selection guide offers an overview of the sorts of archaeological monument or site associated with utilities which are likely to be deemed to have national importance, and for which of those scheduling may be appropriate. It aims to do two things: to set these within their historical context, and to give an introduction to the designation approaches employed.

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## Front cover

A section of Drake’s Leat, built 1591 to supply water to Plymouth (Devon).

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# Introduction

This selection guide offers an overview of the sorts of archaeological monument or site associated with utilities which are likely to be deemed to have national importance, and for which of those scheduling may be appropriate. It aims to do two things: to set these within their historical context, and to give an introduction to the designation approaches employed. There is inevitably some overlap with listing, which is covered in a parallel (but separate) [Infrastructure: Utilities and Communication](#) selection guide which considers the selection of buildings of these types for listing. This guide thus covers those utility sites and structures which can, and have been, accorded protection through scheduling; and it also sets out our current more integrated approach to the assessment of such sites.

Public utilities have been provided, intermittently, since Roman times; some have left physical evidence which is either visible or recoverable archaeologically. The period of greatest significance in the development of the utilities, arguably, was during the industrialisation of the nineteenth century: the spread of gas lighting nationally after 1813; the utilisation of electricity for power, principally for lighting, from the late 1870s; and the introduction of legislation such as

the Public Health Act of 1848 which established a legal and technical framework for the provision of a modern water and sewage industry. A significant proportion of the surviving physical evidence from this period is in the form of buildings and other structures and these are fully considered in the listing selection guide for [Infrastructure: Utilities and Communication](#). Items such as water pumps and drinking fountains are covered in the listing selection guide for [Street Furniture](#).

# 1 Historical Summary

## 1.1 Prehistoric

Settlements have always been sited with a view to natural water supply, but purpose-dug wells and waterholes became common during the Bronze Age, often associated with the construction of field systems. They presumably served people and their livestock. In some cases evidence for timber or wattle linings has survived, and several log-ladders have been found in wells in the Thames Valley. A complex of rather deep Late Bronze Age wells at Swalecliffe (Kent) had well-preserved wooden structural elements, including steps and revetments.

As with many aspects of prehistory, the distinction between ritual and functional structures is often moot and some shafts used for votive deposition could also have served as wells (for such see the scheduling selection guide on [Religion and Ritual pre-AD 410](#)). The 30 metre-deep Middle Bronze Age Wilsford shaft, in the centre of a pond barrow in Wiltshire, contained the remains of wooden buckets and ropes alongside other artefacts and palaeoenvironmental remains. Whether it was dug as a well is uncertain: it may have been a ritual shaft that hit water fortuitously. Later prehistoric wells often attracted votive deposits.

Evidence for water storage is far less common, although pits interpreted as cisterns (as at Gravelly Guy, Oxfordshire) have been found linked to eaves-gullies around Iron Age roundhouses. The unique large rectangular hollows between the ramparts at Old Oswestry hillfort (Shropshire) could have served as cisterns, though other interpretations have been suggested.

Drainage would have been important for any permanent settlement, as shown by the Neolithic drains and possible domestic latrines

at Skara Brae on Orkney. But most evidence for drainage features is associated with the enclosed settlements of the later Bronze Age and Iron Age. In low-lying areas enclosure and boundary ditches would also have served as drains: for instance at the Cat's Water settlement, Peterborough (Cambridgeshire), some roundhouse drip-gullies had extensions linking them to drainage ditches (forming a '?' shape in plan); two 'brush drains' (bundles of faggots laid in ditches), similar to those used in historic times until the introduction of ceramic pipes, were also found.

## 1.2 Roman

The provision of clean water has periodically been seen as a public responsibility since early times; the earliest organised supply networks for water distribution in Britain were built during the Roman period. Aqueducts were artificial channels used to carry water, which was needed for domestic purposes, including bathing and drainage, and also for some industrial processes. Approximately 60 have been identified; most have military origins, with many associated with forts north of the Humber. Seven are scheduled. The earliest examples date from the period immediately following the Roman Conquest and are associated almost exclusively with military activity, providing water to forts (see too the [Pre-1500 Military Sites](#) scheduling selection guide). However, by the end of the second century AD, the majority of major towns had aqueducts (for example Fig 1), as did a number of minor towns, the need for water being driven by the construction of bath houses (treated in the [Culture, Entertainment and Sport](#) scheduling selection guide) and the developing fashion of bathing as a social activity amongst both the military and civilian populations.



**Figure 1**  
Roman aqueduct, Corbridge Roman town, Northumberland. An unusually well-preserved Roman aqueduct terminus, built by the XX Legion. It supplied water to a fountain house and water tank at the town centre.

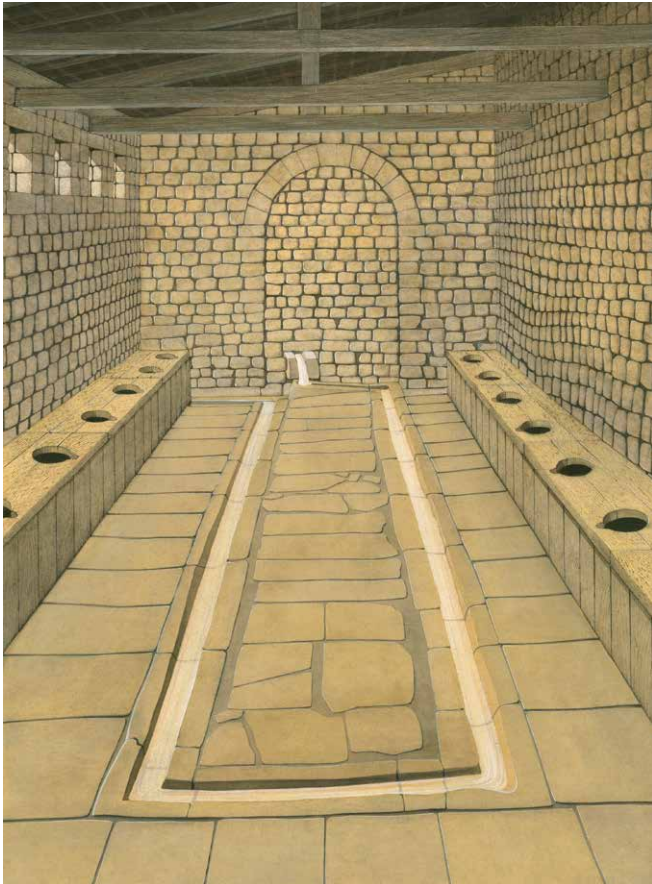
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All known Roman aqueducts functioned on a gravity flow principle, whereby a water source was impounded at a higher level than the place to which it flowed via gravity. Pipeline aqueducts are the most common type. The most sophisticated known system supplied the *colonia* (chartered town) of Lincoln: a spring was tapped approximately half a mile away, and the water was pumped on an uphill course through a pipeline sealed in concrete to withstand pressure; a large reservoir just inside the town wall, and partly supported by it, has been identified as a distributing tank (*castellum aquae*). However there is doubt about how well, or how long the Lincoln supply system functioned.

Channel aqueducts were either open or covered, usually with wooden boards or flag stones, although stone channels are known from several forts including Rochester in Kent and Chester le Street in County Durham. The least sophisticated type of aqueduct was the leat, with a channel dug directly into the ground, though sometimes lined with clay. The nine-mile long aqueduct, constructed in AD 80 to supply water to the newly-built settlement of *Durnovaria* (Dorchester, in Dorset) is preserved in places as a timber-lined channel and elsewhere as an earthwork; the site of the associated reservoir, of which a section of the dam survives, has also been identified.

Evidence for the provision of water supplies has also been found at Romano-British villa sites which were situated within easy reach of running water or located on the local spring-line. Bath suites were commonplace and tend to exhibit the best evidence for an integrated domestic water supply system. At Halstock (Dorset) for example, it consisted of a storage tank or cistern, a rectangular reservoir and a stone-lined conduit, while at Winterton (Lincolnshire) the water passed downhill through wooden pipes to the bath suites. Jointed wooden pipes were also found serving the fort at Carlisle. Wells were also commonplace, and were usually stone- or timber-lined, varying in size and depth according to the geological conditions. It should also be remembered that, as in both earlier and later periods, water played an important part in religious and ritual behaviour.

Latrines found in Roman forts, villas and towns were an early attempt to organise what had previously been a function leaving little trace in the archaeological record. Underground drains were built in towns and forts to take away dirty water and sewage. Roman sewerage systems are known from excavation, and piped surplus water was often used to flush drains. Systems varied considerably in elaboration and efficiency from the complex underground sewers of York and Lincoln into which drains from every street emptied, to the simpler wood-lined street drains of Silchester (Hampshire) and Cirencester (Gloucestershire) which emptied into pits. At



**Figure 2**  
Reconstruction drawing of Roman latrines at Housesteads Fort, Hadrian's Wall, Northumberland. The surviving structure includes water channels (to wash the sponges used in place of lavatory paper) and joist holes for wooden seat supports over the sewer channel.

Wroxeter (Shropshire) an overflow duct running along the edge of the main street provided water to flush the house drains along its course, each of which was provided with a sluice. Excavation at *Verulamium* (St Albans) in Hertfordshire has uncovered a large sewer that ran from the rear of the forum to the river, taking subsidiary drainage from a public latrine and private houses on its way; the latrine itself being permanently flushed by two overflow ducts from elsewhere. Communal latrines were also built, often at bath houses, and water from the baths or aqueduct systems flowed continuously in troughs beneath the latrine seats. A well-preserved latrine block survives at Housesteads Fort on Hadrian's Wall, in Northumberland (Fig 2).

### 1.3 Anglo-Saxon

Roman water supply systems are thought to have continued in use in some urban areas such as York and London. In *wics* and late Saxon towns excavations have located large numbers of wells, apparently private rather than communal ventures. On rural sites archaeology evidences the digging of wells and cisterns on sites of many types, sometimes with wooden frames or structural elements. The most ambitious well structures have been found at the high-status sites at North Elmham (Norfolk), Portchester Castle (Hampshire) and Steyning (West Sussex).

Evidence for sewage disposal typically takes the form of latrine or cess pits, sometimes lined with planks or stone, and occasionally surrounded by walls of wattle. At Bishopstone (East Sussex) excavation found a free-standing timber latrine structure dating to the ninth century; the report discusses eighth- to tenth-century parallels from North Elmham, Facombe Netherton (Hampshire), and Eynsham Abbey (Oxfordshire). Gabor Thomas, Bishopstone's excavator, infers that an ambitious boghouse was a status symbol in later Anglo-Saxon England.

### 1.4 Medieval

Some of the earliest, and most ambitious, endeavours to supply fresh water to communities other than via on-site wells were at monasteries, and in post-Conquest houses they were generally planned in such a way that water was brought from upstream to supply clean water to the kitchen, infirmary and brewhouse, before leaving the complex via the *necessarium* (latrines).

Pipes, made from lead or hollowed tree trunks, were often used to carry water underground, and at Waltham Abbey (Essex) pipes were bedded in clay. Sometimes pipe-systems incorporated settling tanks, which allowed sediment to settle out. Before final distribution, water was sometimes stored in a conduit house. The best-known system is that at Canterbury cathedral



**Figure 3**  
Conduit house, Canterbury, Kent. Part of the water supply for the Abbey of St Augustine, it comprises a mid-twelfth-century collecting and settling tank, now divided by an eighteenth-century wall. Four tunnelled

openings and three smaller ducts, which collect water from springs, lead into the tank. Water was delivered from here to the abbey by lead pipes.

priory, which was in existence by at least 1160 and for which remarkable documentation survives. That brought water from a spring-fed pond to a conduit house or tower, and thence to the priory via pipes and channels set along which were five settling tanks (Fig 3), each with a drain-cock for cleaning. Within the priory, water was distributed to the various buildings and locations where it was required, including the first-floor infirmary. This system, protected by Act of Parliament in 1545, still runs.

While rivers and streams were the primary sources of water in urban areas, many towns supplemented these by bringing water from natural springs or by digging wells. Conduit systems, similar to monastic ones, were sometimes provided either by town corporations or by private benefactors. One of the earliest, built in 1236, was that from

the Tyburn River in London to the Great Conduit of West Cheap, and by the fourteenth century there were also public supplies of water brought by pipe or open conduit at Southampton, Bristol and Exeter – this incorporating stone-lined passages so that the pipes could be inspected and, if necessary, repaired – and at Gloucester and Hull by the fifteenth.

Well houses (sometimes known as conduit heads) were sometimes constructed over the water supply to safeguard drinking water supplies. They are small, typically stone-built, structures placed over a spring or near several water sources and often include a tank, cistern or reservoir, which may take a variety of forms; its purpose was to gather the water and make it accessible. Partial excavation at the thirteenth-century Chalice Well at Glastonbury Abbey in Somerset uncovered a





square, medieval, well-shaft which may have been part of a free-standing well house. Occasionally, larger buildings were constructed over wells, decorated in the prevailing architectural style and facilitating access with features such as steps to the water source and open areas with benching where visitors might rest. Some retained or attracted religious or ritual activities, typified by well-dressing.

In monasteries the water supply typically left the complex after flushing the *reredorter* (literally meaning behind the dorter or dormitory) drain. The communal lavatory structure above, often termed the *necessarium*, was generally of two storeys, and was sometimes detached from the other monastic buildings although the precise location depended on where running water was available (Fig 4). Similar arrangements prevailed at many great royal and aristocratic houses: the ‘Great House of Ease’, built at Hampton Court Palace in 1534, was a two-storey block which could seat up to 13 people on each floor. However, in castles and great houses the well-to-do generally enjoyed individual lavatories off their private chambers from early in the Middle Ages, and perhaps before, evidenced by *garderobes* and *garderobe chutes* (originally a *garderobe* being the wardrobe or small chamber wherein lavatory facilities were located; Fig 5). Private facilities may have become more commonplace in the later Middle Ages; each of the lodgings at Dartington Hall in Devon, for example, had its own latrine by the late fourteenth century.



In the larger urban settlements including London, Leicester, Winchester, Kingston upon Hull, Southampton and Exeter, there were public latrines by the late Middle Ages. Private facilities became increasingly well-constructed in towns as

**Figure 4 (top)**

Reredorter (latrine block), Castle Acre Priory, Norfolk. A watercourse was diverted beneath the two-storey reredorter at this Cluniac monastery (founded 1090) to flush away the waste from the latrines. Within the building are the remains of chutes to the drain below, some of which retain the brackets which supported seats.

**Figure 5 (bottom)**

Outfall for the latrines, Orford Castle, Suffolk. Henry II’s twelfth-century keep was well supplied with *garderobes*; the associated chutes issue externally via two adjacent pairs of arched openings at the base of the keep wall below.

they developed, and as stone became more widely used in building. In Southampton, for instance, excavation has shown the larger burgess houses had stone-built cesspits from the thirteenth century, while more widely fourteenth-century and later building contracts specify the provision of adequate cesspits for town houses, often around three metres deep. Evidence of town-house *garderobe* provision can sometimes be seen in standing fabric; a section of mid-sixteenth-century stone-lined sewer and two associated chute openings that served *garderobes* in an adjacent house survive in Catherine Street, Exeter.

## 1.5 Post-Medieval

Following the Dissolution, many corporations took over and maintained monastic water

systems. Further towns, larger villages and estates gained supplies during the following centuries (Figs 6-7). The general scale of water schemes in the sixteenth and seventeenth centuries was small but there were exceptions. Especially notable was the New River, built between 1609 and 1613, a conduit system over 40 miles in length bringing water to north London from Hertfordshire. Despite its success, nothing comparable in scale was constructed until the impounding schemes of the late eighteenth and nineteenth centuries.

Other larger-scale, long-distance water supply systems included that for Plymouth (Devon), where the granite-lined Drake's Leat (or Plymouth Leat), was built under the direction of Sir Francis Drake in 1591 (see cover). The substantial remains of Cambridge's important early seventeenth-century water supply scheme is an important



**Figure 6**  
St Rumbold's Well, Buckingham. The remains of a former conduit house of 1623 on the site of a medieval holy well, restored in 2002. The earlier well house and

an associated overflow leat are depicted on a map of 1610. A substantial length of the leat, which supplied Castle House, survives as a slight earthwork.

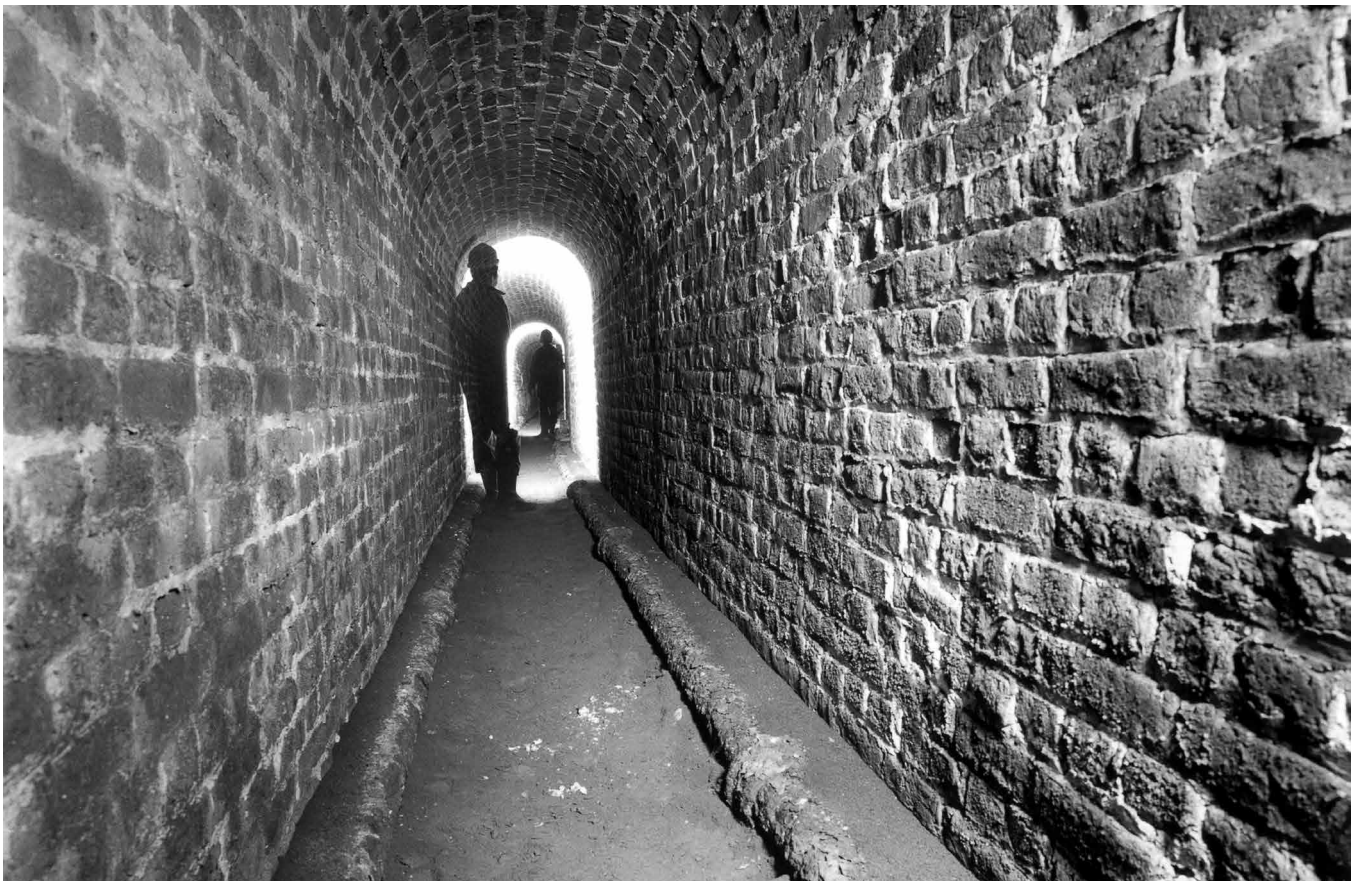
historic landscape feature; the conduit (known as Hobson's Conduit; conduit head of 1614) runs as an open channel through agricultural land and into the historic city centre. Conduits gradually fell into disuse during the nineteenth century, typically due to concerns over public health.

From the nineteenth century urban water distribution and disposal schemes were created based on upland reservoirs or the steam pumping of river water. Sites are often inter-related through the movement of water and waste. In simplified form, they involve the raising, distribution and treatment of water, and the removal and treatment of waste water.

Early sewers were intended largely for removing excess rain and waste water rather than foul water; these gradually became culverted and

covered through the eighteenth and nineteenth centuries. For human waste most private households used an earth closet, or what is known as a conservancy system, that is a large brick- or stone-lined cesspit. The water closet with a trap – invented 1596, and improved by Joseph Bramah in 1778 – was not widely in use until the mid-nineteenth century. Brick sewers for water-borne sewage systems were introduced from the 1850s; the greatest of all was London's, constructed by Joseph Bazalgette in the years after the Great Stink of 1858.

Gas and electric power generation in particular are pre-eminently industries of the modern period, transforming manufacturing and daily life from the nineteenth century and especially in the twentieth. Gas lighting, pioneered by William Murdock in 1792, took



**Figure 7**  
Post-medieval conduit, Hyde Vale, Greenwich, Greater London. One of a system of underground conduits, built between 1695 and 1710 to bring water from

Blackheath to the buildings of the Royal Hospital for Seamen at Greenwich. It ceased to be used as a water supply in 1891.

off from 1812 with the establishment of the London Gas Light and Coke Company: its Fulham Gasworks includes the world's oldest gas holder, from 1830. Such installations became a feature of the Victorian city and were marked by the erection of large gasholders which form some of the most prominent of all structures associated with utilities.

Electrical power generation, led by Michael Faraday who first demonstrated its practical application in 1831, resulted in the mid-nineteenth-century emergence of the electricity generator. These were initially operated on a private domestic scale: R.E.B. Crompton founded the earliest public electricity power station in 1887, in Kensington, in west London. Public lighting systems had begun to be powered electronically from the early 1880s. Much larger power systems were developed by Sebastian de Ferranti, whose Deptford Power Station (London Borough of Greenwich), first generated in 1889.

Power generation was nationalised in 1947 under The British Electricity Authority (from 1957, the Central Electricity Generating Board). Calder Hall, Cumbria (subsequently known as Sellafield) was the world's first nuclear powered, commercial-scale power station, opened in 1956.

Electricity pylons became one of the distinguishing features of the twentieth-century landscape, along with giant cooling towers for former stations. Developments in lighting, water supply and power transformed all aspects of modern domestic and commercial life. Five electric power generation sites are currently designated as Scheduled Monuments. These are all power halls for sites that are primarily of interest for industrial or other activities: collieries, a lighthouse, a gun battery and a water pumping station. From the gas industry, there are three scheduled sites: two of which are town gasworks, and a third forms part of a mid-nineteenth century mill complex.

# 2 Overarching Considerations

## 2.1 Scheduling and protection

Archaeological sites and monuments vary greatly in character, and can be protected in many ways: through positive management by owners, through policy, and through designation. In terms of our designation system, this consists of several separate approaches which operate alongside each other, and our aim is to recommend the most appropriate sort of protection for each asset. Our approach towards designation will vary, depending on the asset in question: our selection guides aim to indicate our broad approaches, but are subordinate to [Department for Digital, Culture, Media and Sport \(DCMS\)](#) policy.

Scheduling, through triggering careful control and the involvement of Historic England, ensures that the long-term interests of a site are placed first. It is warranted for sites with real claims to national importance which are the most significant remains in terms of their key place in telling our national story, and the need for close management of their archaeological potential. Scheduled monuments possess a high order of significance: they derive this from their archaeological and historic interest. Our selection guides aim to indicate some of the grounds of importance which may be relevant. Unlike listed buildings, scheduled sites are not generally suited to adaptive re-use.

Scheduling is discretionary: the Secretary of State has a choice as to whether to add a site to the Schedule or not. Scheduling is deliberately selective: given the ever-increasing numbers of archaeological remains which continue to be identified and interpreted, this is unavoidable. The Schedule aims to capture a representative sample of nationally important sites, rather than be an inclusive compendium of all such assets.

Given that archaeological sensitivity is all around us, it is important that all means of protecting archaeological remains are recognised. Other designations such as listing can play an important part here. Other sites may be identified as being of national importance, but not scheduled. Government policy affords them protection through the [planning system](#), and local authorities play a key part in managing them through their archaeological services and Historic Environment Records (HERs).

The Schedule has evolved since it began in 1882, and some entries fall far short of modern standards. We are striving to upgrade these older records as part of our programme of upgrading the National Heritage List for England. Historic England continues to revise and upgrade these entries, which can be consulted on the [Historic England website](#).

## 2.2 Heritage assets and national importance

Paragraph 194 and footnote 63 of the [National Planning Policy Framework](#) (July 2018) states that any harm to, or loss of, the significance of a designated heritage asset should require clear and convincing justification and for assets of the highest significance should be wholly exceptional; ‘non-designated heritage assets of archaeological interest that are demonstrably of equivalent significance to scheduled monuments, should be considered subject to the policies for designated heritage assets’. These assets are defined as having National Importance (NI). This is the latest articulation of a principle first raised in PPG16 (1990-2010) and later in PPS5 (2010-2012).

## 2.3 Selection criteria

The particular considerations used by the Secretary of State when determining whether sites of all types are suitable for statutory designation through scheduling are set out in their [Scheduled Monuments Policy Statement](#).

# 3 Specific Considerations

## 3.1 Underground and linear works

The designation of extensive underground utilities complexes whether sewers, pipes, gas installations, or tunnels, has not been pursued in the past. This has been largely for practical reasons, in that such components lie outside of the main planning system and are subject to regular works. Scheduling will not be recommended for such features. Exceptionally early and pioneering examples may occasionally warrant one-off considerations on a limited

scale, but as a general rule such hidden aspects of utilities will be preserved through record. The same principle will apply with lengthy overground works such as leats and conduits.

While underground remains may have considerable evidential value, most substantial surviving physical evidence for utilities from later periods is in the form of buildings; these are fully considered in the listing selection guide for [Infrastructure: Utilities and Communication](#).

# 4 Considerations by Period

## 4.1 Roman

It is reasonable to expect that every major Romano-British settlement and military installation will have had structures relating to the supply of water and the disposal of sewage. As noted, approximately 60 examples of aqueducts have been identified nationally, and seven are scheduled in their own right; their remains provide an important insight into Roman engineering skills and both military and civilian life. In addition, elements of aqueducts may be incorporated within other scheduled monuments. Consideration should be given to the form in which they survive, but in general the better-preserved examples appear in the form of earthworks or fragmentary structures, usually below ground, while examples exhibiting poorer survival remain in the form of cropmarks or soilmarks. Additional factors for consideration when assessing aqueducts for scheduling include any sources of historical documentation, for example, inscriptions; extremes of size; and materials employed.

The remains of Roman latrines and associated sewerage systems are also typically associated with, and located within the boundaries of, another monument such as forts, towns and villas and should thus be considered as a component of the principal site.

## 4.2 Medieval

With monasteries, above- and below-ground structures relating to water supply and sewage disposal will typically lie within the principal scheduled site, and/or be covered by listing. Conduit or well heads some distance away from this may already be separately designated, or merit it. With towns which have early water supplies, designation through listing has a considerable role to play in the statutory protection of individual well houses, conduit heads and similar structures of significance.

The number of surviving well houses is not known. Some early examples underwent restoration or re-building in the post-medieval period, effectively destroying much of the original structure. Examples representing a range of early medieval and medieval structural types that survive largely intact and unmodified may be worthy of designation generally through listing. Some sites have additional significance by reason of their historical associations such as patronage, for example with early Christian saints in the case of holy wells. Listing may be appropriate for such sites.

Medieval conduits and sewers are of a similar form to water supply systems of a later date; historical sources and associated artefactual and structural remains may be used to distinguish these. However, the number of known sites is very few, with only between 20 and 30 recorded examples from archaeological and documentary



sources, only around half of which have any archaeological evidence. Individual monuments tend to be located in towns, and usually associated with a religious house or palace such as the conduit system at Hampton Court Palace. Medieval conduits survive in various states of preservation depending on the subsequent use of the site; some have above-ground standing structures, typically in the form of conduit heads and others are represented by short lengths of lead piping or conduit channels. Such structures have been both listed and scheduled: where particularly significant in archaeological terms, the latter course should be pursued.

### 4.3 Post-Medieval

Very few post-medieval utilities sites have been scheduled in the past and our approach is not to recommend further sites for such protection unless they take the form of nationally important earthwork or buried remains. Listing, with its greater flexibility when it comes to change, is generally the more appropriate designation for the protection of utilities-related assets such as pumping stations, water towers, electricity generating stations and gasworks buildings which are considered worthy of designation. This is especially true of structures which are in active use.

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# 6 Where to Get Advice

If you would like to contact the Listing Team in one of our regional offices, please email: [customers@HistoricEngland.org.uk](mailto:customers@HistoricEngland.org.uk) noting the subject of your query, or call or write to the local team at:

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