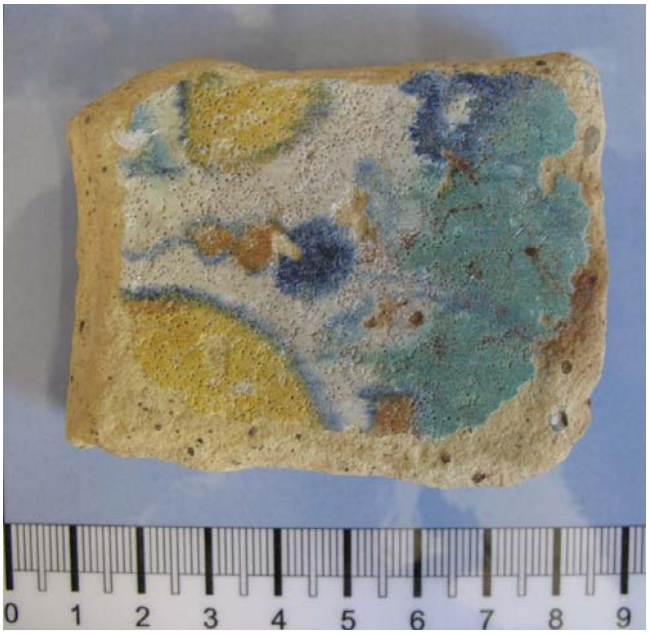
WA_1001: Coloured Tile



This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was shown to Wessex Archaeology's find specialist, Lorraine Mepham who identified it as glazed floor tile.

The design looks blurred as though the glaze has run during firing, it could therefore be a 'waster' or 'second' from a tile manufacturing centre. There were several of these places along the south bank of the Thames, in Lambeth and Southwark, from the end of the 16th century.

Glazed Tile (131x130x15-17mm)
Photo: A Chopping, MoLAS, MoL

The closest parallel for this example is of a tile with a 'star and tulip' design (pictured left), similarly blurred, which has been linked to the earliest production of tiles at Aldgate (from about 1570 into the first decade of the 17th century), but this phase of tile production in London is not very well understood as yet.

The Pickleherring (1618-1723) & Rotherhithe pothouses (1638-84) were also making polychrome tiles, but there aren't any parallels with this fragment in any of the known designs from those places.

WA_1002: Animal Bone

This animal bone was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was shown to Wessex Archaeology's Zooarchaeologist, Lorrain Higbee who identified it as a cattle vertebra.

The cattle vertebra shows butchery marks, which suggest a date of medieval to post-medieval (1066-1800). The Saxo-Norman period saw the advent of commercial butchers and this led to a change in butchery techniques. One of the key changes to occur is the way in which carcasses were split into sides by chopping through the midline of the vertebral column (i.e. dorso-ventrally or to split carcass into left and right sides). Evidence for this technique becomes more common through the medieval and post-medieval periods and had been noted by many zooarchaeologists particularly those working on urban assemblages.

WA_1003: Glazed Ceramic

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was shown to Wessex Archaeology's find specialist Lorraine Mepham.

The artefact is glazed ceramic and initial thoughts that it might be a bowl was dismissed as it seems too heavy and thick (15-35mm).

From this fragment the exact purpose of this item in unknown however it is suggested to be an item of roof furniture such as part of a chimney pot or roof finial and could have perhaps been used with the ridge on top (as the image to the left shows).

Alternatively it could have been used for horticultural purposes

Although Redwares such as this piece are notoriously difficult to date it appears to be broadly post-medieval although the date stamp indicated a date of 19th or 20th century.

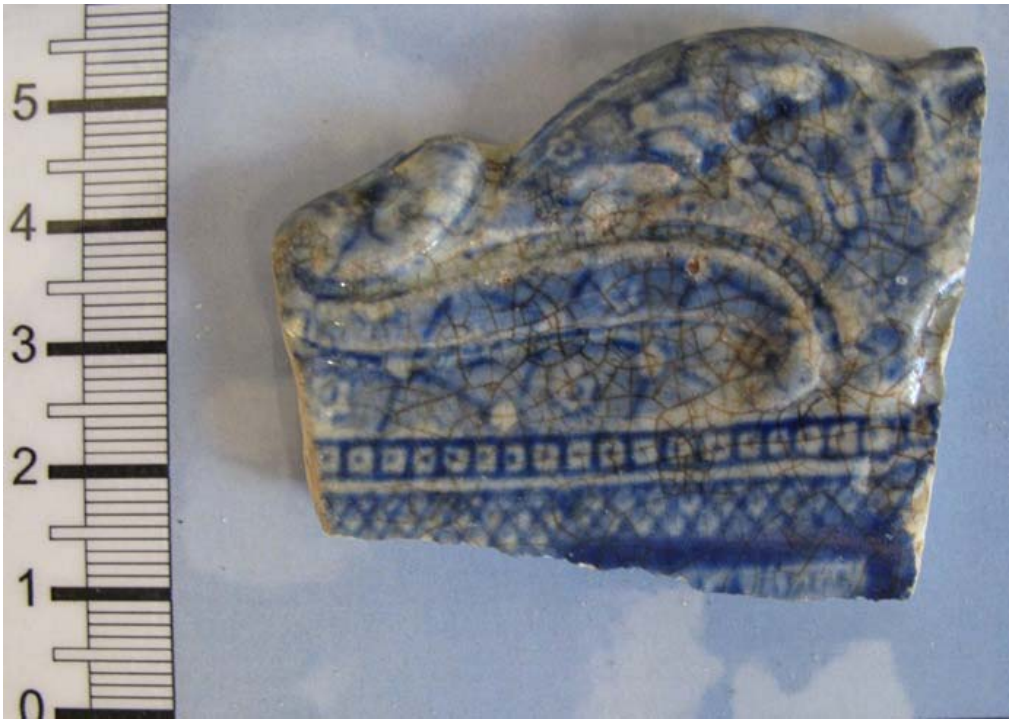
WA_1004: Clay Pipe

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was shown to Wessex Archaeology's find specialist, Lorraine Mepham who identified it as a clay pipe dated to around 1820-40.

Clay pipes were an important part of everyday life in London and can be identified and dated by the shape of the pipe bowl.

Many pipe makers would mark pipes with their name or initial. This particular pipe has the maker's initials WW stamped as a single letters either side of the heel (highlighted in the image to the left). Unfortunately, given the number of manufacturers at the time, trying to identify the maker would be like looking for a needle in a haystack.

WA_1005: Blue Pottery



This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was shown to Wessex Archaeology's find specialist, Lorraine Mepham.

The blue and white patterned fragment comes from the moulded edge of a platter or serving dish. It is broadly dated to the 19th – 20th Century as it shows blue and white transfer-printing, which began at the end of the 18th century. This piece looks like one of the classic Victorian designs.

WA_1006: Iron Screw Propeller

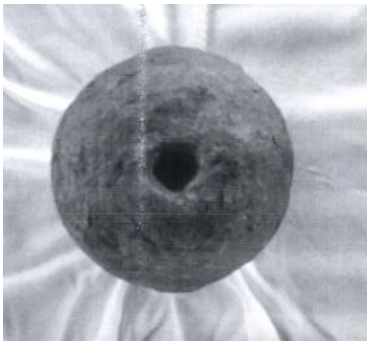
An iron screw propeller has been recovered from within the dredged material from the channel deepening in Zones 30 and 31.

The overall dimension of the propeller is 0.95m long and 0.82m wide with three blades, the blades are approximately 0.5m long and 0.35m wide. There is considerable damage to the screw, firstly two of the blades are broken at 0.25m length and the third has a small section of the tip broken at 0.35m. The prop shaft has broken, disconnecting the propeller from the vessel. The entire propeller is heavily corroded suggesting that it must have been under water for some time, however not enough time for concretion to begin to form.

The first practicable screw propeller was patented in 1827 by Josef Ressel. However it wasn't until 1848 when the British Admiralty held a tug of war between a propeller driven vessel and a paddle wheel steamer, which the propeller driven vessel won, that the use of the propeller started to become widespread. There was much experimentation in the design of the screw propeller until the 1880s when a regular design became established. It was from this period on that screw driven vessels became the dominant form of steamship.

Without further research it is not possible to ascertain an exact date for the propeller; however it is likely to post-date the 1880s. It is also unclear as to whether or not this came from a wreck or if it is a piece of debris. The broken prop shaft may indicate that this propeller was broken following an impact on a wreck, perhaps due to dredging. However, this is considered to be the least likely explanation, given the lack of associated material. It appears more probable that the propeller represents an isolated find; it may have sheared off a vessel in use or may represent scrap that was jettisoned in the area.

WA_1007: Explosive Shell



An explosive shell was recovered within dredged material from the channel deepening scheme in Dredging Zones 30 and 31.

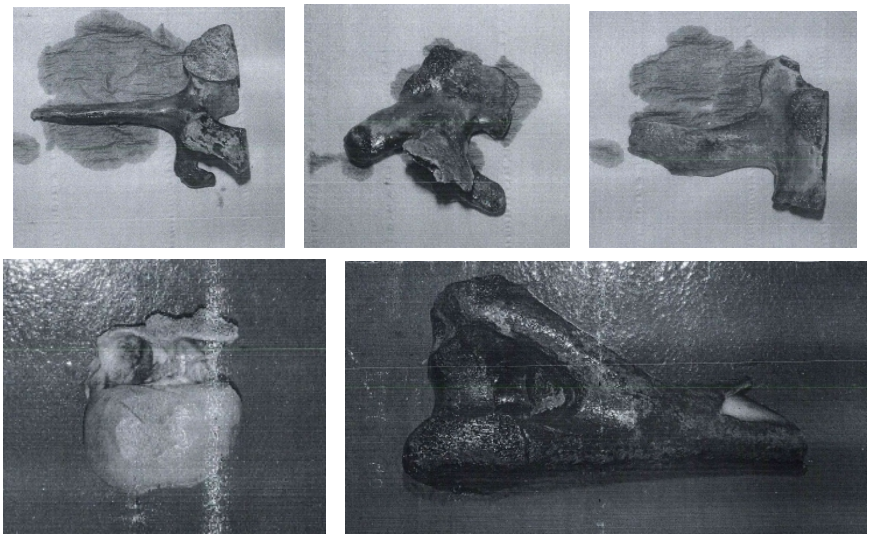
It was originally recorded as being a cannon ball, however as it was hollow and filled with approximately 0.3kg (0.66lbs) of explosives it would be more accurately described as being an explosive shell. Its diameter was recorded as 0.095m (3.75") and it was reported to weigh 3.35kg (7.4lbs).

Explosive shells have been used for centuries, the earliest record for which is the Venetian use of shells in the 14th century. In later centuries large shells were fired from mortars both on land and aboard ships. The size of this shell however, corresponds with the calibre of a smaller gun (9 or 6-pounder) and it is therefore unlikely to have been used prior to the late 18th century. The French conducted the first comprehensive testing of shells fired from long naval guns in 1789 and shells came into general use in the early 19th century. They proved particularly effective in the bombardment of land-based targets such as earthworks and buildings but were used against a variety of targets, including other vessels.

There were numerous developments in the design of the shell during the 19th century, consideration of which may allow the date range for this shell to be refined. Unfortunately many of the design variations were concerned with the type of fuse used in the shell and this particular shell's fuse does not appear to be present. One area that may warrant further inspection is the neck of the shell surrounding the fuse hole. Late 18th century shells were approximately spherical but had either rings or a projecting neck or collar around the fuse hole to allow for easier lifting. Later designs featured small recesses beside the fuse hole which served the same purpose. It is unclear from the photograph of this shell whether these features are present but further inspection may provide additional information regarding this find.

As it was found out of context, it is difficult to speculate on the origin of this shell. There are no known armed wrecks of 18th or 19th century date recorded within Dredging Zones 30 or 31 and this shell does not necessarily represent evidence of a wreck in the area. The shell could have been fired from a vessel engaged in battle or artillery testing while sailing through the area or may have been lost overboard from such a vessel. Even though the dredging area is a considerable distance from land, it is also possible that this shell relates to land-based artillery units, such as the testing and practice station established at Shoeburyness in the mid-19th century.

WA_1008: Animal Bone



A collection of 8 pieces of animal bone have been recovered within dredged material from the channel deepening and land reclamation scheme in Zones 30 and 31. These are additional to animal bone previously reported from dredging operations in Zones 32, 33 and 34 **(WA_1002)**.

Following inspection by Wessex Archaeology's zooarchaeologist it was determined that all of the eight bone fragments were cattle bones. The three images on the top line depict vertebrae, most likely from the lumbar section of the spine and exhibit butchery marks, having been chopped down the midline of the bone. The bottom left image is the proximal end of a humerus and there is a butchery mark on the head of the bone which is a result of its disarticulation. The bottom right image is the distal end of a humerus from a relatively young animal of approximately 12 to 18 months age. In addition to the bones pictured, this assemblage also included the proximal end of a cow's tibia and another proximal humerus as well as a final bone fragment which could not be identified from the photograph.

The cattle vertebrae shows butchery marks indicative of a butchery technique which developed with the advent of commercial butchers in the Saxo-Norman period. Beginning in this period, carcasses were split into sides by chopping through the midline of the vertebral column (i.e. dorso-ventrally or to split carcass into left and right sides). Evidence for this technique becomes more common through the medieval and post-medieval periods and had been noted by many zooarchaeologists particularly those working on urban assemblages. This would suggest a medieval to post-medieval date for these remains (1066-1800).

It is likely that these animal bones were dumped overboard from a vessel passing through the area. There is a history of using areas of the Thames Estuary as dumping grounds from the surrounding abattoirs following slaughter and butchery.

WA_1009: Artillery Shell

This artillery shell was recovered within dredged material from the channel deepening scheme in Dredging Zone 30.

The shell was described as a 155mm solid shot shell with a copper driving band. The shell was originally certified as being free from explosives but was later destroyed in a controlled explosion.

Wessex Archaeology consulted an expert in unexploded ordnance who suggested that the shell was likely to be a 6 inch naval shell and may have been an armour-piercing projectile. The shell's driving band was clearly engraved which indicates that it had been fired and the position of the driving band, relatively far back on the shell, suggests that it is one of the early variants of this type of shell.

Many naval shells were semi armour-piercing and had a small but highly explosive charge at the rear of the projectile designed to explode after penetrating the target ship's armour. Projectiles such as these had base fuses which were covered by metal plates in earlier designs. Unfortunately, as this shell has been destroyed and there appears not to be any photographic evidence showing the base of the shell it is not possible to suggest whether this shell was one of this type.

Armour-piercing shells were introduced in the 1860s, when the development of the ironclad warship rendered the traditional cast-iron round shot virtually obsolete. The dating of this shell is unclear, however based on its general form it is unlikely to pre-date the First World War and may date to the Second World War. Without further information on the dating of the shell it is difficult to suggest anything about its origin or the circumstances in which it would have been fired.

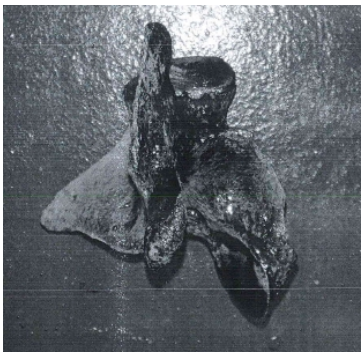
WA_1010: Leather Shoe Soles

Two fragments of leather shoe soles have been recovered within dredged material from the channel deepening scheme in Dredging Zones 34 and 35. These are additional to a further three fragments of leather shoes found during the archaeological watching brief in Dredging Zones 32, 33 and 34.

The shoe on the left above is a left shoe with evidence for stitching all of the way around the inside of the sole. The shoe on the right is also a left shoe; small metal tacks are still in place in the sole indicating that the sole was tacked to the upper, which was not found. As each sole appears to represent a different mode of manufacture it is unlikely that these represent a pair. The dimensions of the shoes range from 280mm to 300mm long and 90mm to 100mm wide.

The shoe soles were shown to a Wessex Archaeology specialist. The soles are likely to be modern in date as the rounded shape of the toes suggests a 19th or 20th century date. As the location of the material is not known, it is not possible to conclude whether this is part of a wreck assemblage or if they represent material that has been jettisoned from a passing vessel or debris that had been washed into the dredging area.

WA_1011: Animal bone



Two pieces of animal bone were recovered within dredged material from the channel deepening scheme in Dredging Zones 34, 35 and 36. These are additional to animal bone previously recovered in Zones 32, 33 and 34 **(WA_1002)** and bone reported from Zones 30 and 31 **(WA_1008)**.

The photographs of the bones were shown to Wessex Archaeology's zooarchaeologist who determined that the bone pictured on the left was the humerus of a pig and the bone on the right was a cattle vertebra from the cervical section of the spinal column. The cattle vertebra shows evidence of the butchery practice of splitting the animal down the midline to divide the carcass into two halves or sides. This technique was introduced in the Saxo-Norman period when butchery began to be undertaken on a commercial scale. The cattle vertebra could therefore date to any point between the medieval and post-medieval periods (1066-1800).

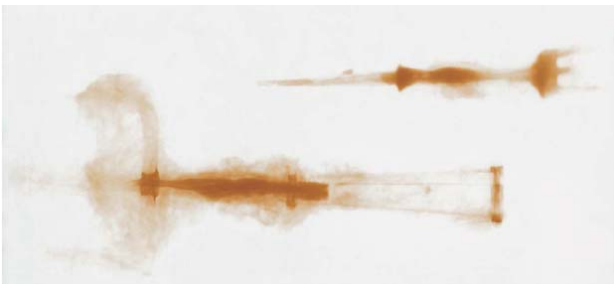
The pig humerus is also likely to have come from a butchered animal; however it is difficult to ascertain this from the photograph. The likelihood is that both bones represent the refuse of a commercial butcher or abattoir and were dumped in the Thames Estuary as was common practice during these periods.

WA_1012: Concretion

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zones 30 and 31 and found on board the vessel *Uilenspiegel*.

It is very difficult to determine what this artefact is due to the large amount of concretion surrounding it. Concretions are dense masses of hard material that form on the surface of corroding iron or other ferrous material. As the iron corrodes and concretions form, other materials from the seabed such as gravel and even boulders can become stuck to it. Within the concretion the object gradually corrodes away sometimes leaving only a hollow space.

Concretions can easily obscure the shape of an object, often making them almost impossible to identify. However, analysis using an X-ray can sometimes reveal the true nature of a concretion (see image to right).



This X-ray shows 2 forks that had become covered in concretion

As this find was recovered out of context, it is not possible to associate it with any of the other archaeological material recovered from the area. Therefore, it is not clear whether this find would have formed part of a shipwreck or whether it represents material lost or dumped in the area.

WA_1013: London Taxi Licence Plate

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zones 30 or 31 and found on board the vessel *Uilenspiegel*.

A photograph of this find was shown to Wessex Archaeology's finds specialists, Lorraine Mepham and Bob Davis, who identified it as a London taxi licence plate.

London cabs are identified by a licence plate like this one shown here. It would have been issued annually and bears a unique licence number as well as the number of passengers the vehicle was licensed to carry, in this case 4. The Metropolitan Police governed the taxi licence trade, hence their name on the plate, from 1843 until 2000 when control passed to Transport for London, a part of the Greater London Authority. Bob Davis suggested that it may date to between the wars, around 1920-1935, due to the art deco style decoration around the border.

It is uncertain how this licence plate ended up in the Thames Estuary; it seems most likely to be general debris or refuse dumped in the river.

WA_1014: Gear section

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zones 30 or 31 and found on board the vessel *Uilenspiegel*.

A photograph of this find was shown to Wessex Archaeology's finds specialist, Bob Davis, who identified it as a section of broken gear. The large width of teeth suggests a crude gear transfer mechanism such as those used on a crane or winch where these types of gears possibly relate to weight transfer i.e. size relate to strength.

The gear pictured here appears to be a spur or straight-cut gear, which is the simplest type of gear. There are many uses for gears and due to lack of context of the find it is very difficult to ascertain exactly what this gear section would have been used for. If the gear was from a winch or crane it may have been used to load and unload cargo from a vessel either from a dockside or on board a vessel.

It is uncertain how this gear wheel ended up in the Thames Estuary, it is likely to be general debris or refuse dumped in the river, however it could indicate the site of a shipwreck and staff working in this area should remain vigilant for additional finds.

WA_1015: Cannonball

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zone 35 and aboard HAM 310.

The cannonball measures approximately 8 inches in diameter and appears to be a solid shot – some cannonballs were shells, i.e. were filled with gunpowder or shrapnel and designed to explode on impact. This cannonball, a solid round shot, could have been used to damage enemy ship hulls as well as attacking forts on land.

Photographs of this cannonball were shown to Phil McGrath who identified it as coming from either the 68-punder cast-iron smooth-bore gun or the 8-inch cast-iron smooth bore. The 68-pounder was designed and used by the British Armed Forces from 1846 until 1921. The reliability of the gun meant it remained in service even though newer rifled and breech-loading guns were being installed, vessels such as HMS Warrior (picture right) continued to use cannon.

It is uncertain how cannonball ended up in the Thames Estuary. Since it is an isolated find it is likely to have been lost or fired from a vessel but it could also indicate the presence of a shipwreck. There appears to be a slightly flattened edge to the cannonball, which may indicate that it has been fired. Cannonballs are an important find and can be useful in tracing the location of battles and enemy encounters during British Naval history.

WA_1016: Projectile

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered during operations on board the vessel *Ham 310* in Dredging Zones 29-31.

This projectile was examined by a qualified Explosive Ordnance Disposal (EOD) Engineer who determined that it had been fired and was free from explosive content or explosive components and posed no risk of detonation.

It is a 12 inch Naval Projectile that was likely to have been fired from the BL 12 inch gun. There were several different versions of this gun; however it has not been possible to match the projectile to a specific version of the gun. Therefore it can be considered to have a broader date range from 1882 to the 1920s. The BL or breech loading guns were installed on early British battleships such as HMS *Colossus* (pictured right) as their primary armament and were also used for coastal defence.

HMS *Colossus* (1882-1908)

These guns were also in active service in World War I, although they were considered obsolete in terms of battleship armaments and were remounted on *Lord Clive*-class monitors used for shoreline bombardment. In August 1915, the HMS *Lord Clive* (pictured right), *Sir John Moore* and *Prince Rupert* carried out practice shoreline bombardments in the Thames Estuary. This would appear to be the most likely explanation for the presence of this projectile in the dredging area as there were no naval engagements in the Thames in the late 19th century.


HMS *Lord Clive* (1915-1918)

WA_1017

This large metal object was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered during operations on board the vessel *Lange Wapper* in Dredging Zones 31-37.

This object was deposited on the stern deck with a number of timber fragments, netting and metal wire at around 1400 hours on the 31st of January 2011. It was approximately 0.9 x 0.9m and 10cm thick in dimensions. The object was too heavy to lift without mechanical assistance, and deemed a solid block or plate of metal. The object has some thin, irregular concretion on its surface. Central to the object there appeared to be two possible bolt heads that may have held the plate in position or fastened it to a larger structure. However, due to the weight of the object it was not possible to view the underside and assess if the bolts passed through the metal plate. Although the object as a whole seemed relatively clear of rust, a thin layer of iron staining did surround the possible bolt heads. It is probably steel, although this has not been confirmed.

Due to its unlikely association to the other finds deposited from that session of dredging and its seemingly modern structural appearance the on-site archaeologist at the time assessed the metal object as having very low archaeological potential. Although it cannot be ruled out that the object is associated with the wreck of the *Dovenby*, it is considered unlikely. It probably represents discrete debris and is therefore unlikely to be related to any of the known wrecks in the dredging areas of 31 to 37.

WA_1018: Cannonballs and projectile nose

These artefacts were discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zones 30, 31 and 33 aboard the *Uilenspiegel*.

The cannonballs measures approximately 8 inches (approx. 64 pounder) in diameter and 6 inches (approx. 28 pounder). They appear to be a solid shot – some cannonballs were shells, i.e. were filled with gunpowder or shrapnel and designed to explode on impact. These cannonballs, are solid round shot and could have been used to damage enemy ship's hulls as well as attacking fortifications on land.

It is uncertain how the cannonballs ended up in the Thames Estuary. Since they are an isolated find they are likely to have been lost or fired from a vessel but they could also indicate the presence of a shipwreck. There appears to be a slightly flattened edge to both of the cannonballs, which may indicate that they had been fired. Cannonballs are an important find and can be useful in tracing the location of battles and enemy encounters during British naval history.

The projectile nose is 8 inches in diameter. It is likely from a solid shot land based artillery weapon of unknown type. Images of this find were shown to experts at the Royal Armouries who were unable to identify a type of artillery. There was a land based artillery battery at Shoebury on the Essex coast which was used to protect the Thames against attack and to test new/existing weaponry. It is entirely possible that this projectile nose was fired from artillery at this site but this can not be proven beyond doubt from the evidence available.

WA_1019: Artillery Projectiles

These artefacts were discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. They were recovered from Dredging Zones 31 to 36 aboard *Lange Wapper*.

The four projectiles have been grouped together as they represent solid artillery projectiles from guns of various sizes and dates. There are two 6 inch solid projectiles (with only one picture in the LORDI report), one 9 inch studded solid projectile and one 12.5 inch studded solid projectile.

The two studded shells use grooves in the barrel which the studs align with, in order to impart spin on the projectile as it leaves the barrel, increasing distance and accuracy. The use of a grooved barrel is called rifling. This method of rifling was introduced by Armstrong who produced several thousand guns for the British Army and Navy. After the introduction of the ironclad to the French Navy it was decided that there was a need for a larger muzzle loading gun which could penetrate the iron hull of these vessels. Therefore after 1865 Armstrong began work on an old technology (muzzle loading guns) which could take a larger charge to propel the projectile further with more power to damage the ironclads from a greater distance. The development of the large muzzle loading Armstrong guns were subsequently provided to the British Army and Navy.

The studded projectiles recovered from the dredged areas are likely to originate from land based artillery batteries in the estuary area. The battery at Shoebury was a major location at the time as William Armstrong had close links with the site. The site was used for testing and weapons development and played a major role in the development of rifled barrels in particular, a hugely successful design by Armstrong. The driving band (obturating ring - gave its name to O-ring) on the 6 inch projectile suggests a date between the late 19th century and the first half of the 20th century.

It can not be said for sure if these projectiles were indeed fired from this site but it certainly shows that the area played a key part in the development and testing of these guns which could suggest why so many of these projectiles have been recovered.

WA_1020: Cannon Balls

These artefacts were discovered on the dredger as a result of dredging work for London Gateway in the Thames Estuary. They were recovered from Dredging Zones 31 to 36 aboard *Lange Wapper*.

The first cannon ball (pictured above left) is a 6 inch solid round shot, the second is a 4 inch solid round shot. A solid round shot, could have been used to damage enemy ship's hulls as well as attacking forts on land.

The 6 inch cannon ball is from a smooth bore gun firing either a 24, 28 or 32 pound weight of shot and maybe a Demi Cannon, depending on the accuracy of the measurement.

The 4 inch cannon ball is also from a smooth bore gun likely firing 9 pounds weight of shot and maybe for a Demi Culverin (a long, medium weight cannon).

All of these gun sizes would have been carried on vessels as well as on land artillery sites. It is not possible to ascertain which guns these cannon balls were intended for without further evidence and investigation.

It is uncertain how these cannonballs ended up in the Thames Estuary. Since they probably represent isolated finds it is likely to have been lost or fired from a vessel, but they could also indicate the presence of a shipwreck. Cannonballs are an important find and can be useful in tracing the location of battles and enemy encounters during British Naval history.

WA_1021: Timber

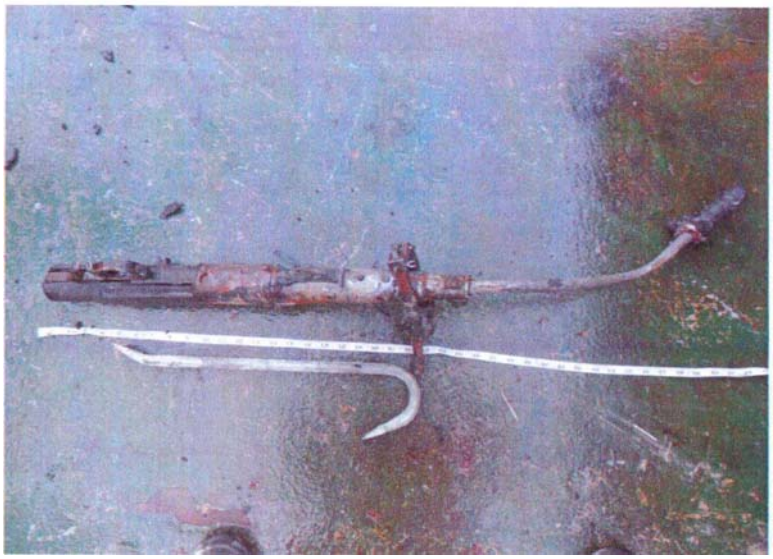
These Timbers were discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. They were recovered from Dredging Zones 33 to 36 aboard *Lange Wapper*.

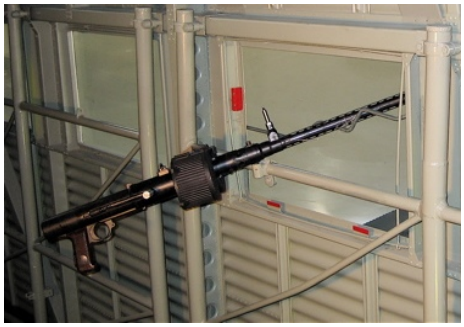
The image does not allow for a very conclusive report, however from the descriptions and previous visits to the site where timber has been found it can be said that a mix of ship's timbers and marine structure timbers have been recovered during the dredging process.

Each timber that is recovered from the dredging process normally undergoes individual recording by our timber expert. The collection as a whole is reported on once this has been finished for each group of timbers recovered. It is likely that some of these timbers make up the recent group of timbers that were collected from the site by Wessex Archaeology.

Due to the limited nature of the images provided it will not be possible to conclude anything from the images above. We can say that a number of the timbers collected have been identified as belonging to vessels of some interest, including some with design elements similar to known medieval examples.

WA_1022: Machine Gun





This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zones 31 to 33 aboard the *Uilenspiegel*.

The artefact is believed to be a German MG15 bomber aircraft machine gun. It was developed in the early 1930's for use as a mounted defence for German aircraft and was extensively used during WWII. It was fed by a double-drum magazine carrying 75 rounds of ammunition. Typically each weapon would have had 10 magazines at its disposal on the aircraft. With a firing rate of about 1000 rounds per minute, each magazine could have been fired off in as little as 4.5 seconds.

During the Second World War these machine guns were carried by many Luftwaffe aircraft up until 1941 when they were replaced by heavier weapons. After this many of the MG15's were modified for use by the infantry. Aircraft that used them include the Ju 52 transport, Fi 167 light bomber, Ha 140 torpedo bomber, and Do 217 medium bomber, among others.

It is likely that this machine gun came from a German aircraft that was lost or had to jettison equipment over the Thames during the Second World War. If the location of an aircraft wreck is discovered it will be automatically be protected under the PMRA 1986. Military archaeology has great public interest and national importance and as such any remains that are discovered, especially from rarely discovered aircraft crash sites, are very archaeologically sensitive.

WA_1023: Cannon

This artefact was discovered in the dredge head as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zones 29 to 36 aboard the *Uilenspiegel*.

This type of cannon is known as a carronade and is 89cm long, trunnion width is 46cm and the muzzle diameter is 20cm (about 8 inches). It has two important distinguishing features; firstly the side mounted trunnions which are rare for an admiralty carronade of this type; and secondly the location of the sight on the muzzle of the gun which is also an identifiable feature.

A carronade was a gun that fired heavy shot but in order to keep weight down it had a very short barrel, reducing range and accuracy. This said, at short range these guns were very effective and earned the nickname ‘smashers’. Carronades were produced from the 1770s to the 1850s

This carronade is of iron construction and is an admiralty gun as it carries the admiralty arrow on the upper surface of the gun between the truninons. Other markings on the gun include the number 33 on the chase of the gun (upper face towards the muzzle) and some partial marking on the two trunnions of ?38 and 177?. These are possible dates, sizes or weights and naval gun numbers.

The trunnions on an admiralty carronade are an early feature and probably mean that the gun was cast before 1782/3 which is among the earliest use of the carronade by the Navy for use on board vessels.

It may be difficult to assess whether this cannon came from a ship or smaller vessel as many of the carronades that were placed aboard naval vessels were not included in the gun lists. Carronades were also used aboard smaller vessels - such as schooners - due to the small crew needed to fire it and the smaller size of the gun compared to its power (weight of shot).

Images and descriptions of the carronade have been sent to an expert, we are awaiting the reply and will update the information as and when new details come in.

WA_1024: Pistols

These weapons were discovered in the dredge head as a result of dredging work for London Gateway in the Thames Estuary. They were recovered from Dredging Zones 29 to 36 aboard the *Lange Wapper*.

The Mauser C96 semi-automatic pistols were stored in their wooden cases which double up as stocks for the pistols. There are 13 pistols in all, which appear to be of identical design.

The Mauser C96 series of pistols were manufactured from 1896 to 1936. The C96 was designed by the Feederle brothers, Fidel, Friedrich and Josef Feederle and known then as the P-7.63 or 'Feederle Pistol'. It was later renamed by Paul Mauser as the 'Mauser Military Pistol' in the hope that the pistol would achieve large scale sales by its adoption as an official German military issued sidearm or for that matter, a sidearm officially issued to the military of any nation.

Within a year of its development the C96 had been sold to many governments and commercially to civilians around the World. It was however only ever officially used by the German army during World War I. There are records for 7,800 Mauser pistols being ordered and supplied to the Luftwaffe during World War 2. If these Mausers are those, it is possible they have come from an aircraft that was lost over the Thames. The fact that they were stored in their wooden stock and appear to have been clumped together would suggest they were in storage on transit at the time of loss.

Wehrmacht proof marks should be present if they were from the Luftwaffe contract batch, and putative aircraft wreck.

Further research is casting doubt that they have come from an aircraft, as their serial numbers look likely to be early (pre-WW1). This would suggest that it is more probable that they were part of an armoury carried by a merchant vessel, possibly during WW1 or the interwar period.

WA_1025 Anchor Part

This artefact was discovered in an area being reclaimed as a result of dredging working for London Gateway in the Thames Estuary. It was recovered from Dredging Zones 33, 34, 35 and 36 aboard *Lange Wapper*.

The artefact is the broken remains of an anchor. The fragment consists of the crown, arms and flukes of the anchor which has broken at the throat where the shank joins to the crown. The anchor fragment is made from wrought iron. The arms are 80mm thick by 60mm wide, the flukes are symmetrical, 150mm wide by 200m long and 40mm thick.

The fragment appears to be from a typical Admiralty type anchor which appeared in all sizes and was used on Admiralty as well as merchant vessels. Probably an 1841 pattern anchor, it was developed by Admiral Sir William Parker in 1840-41 and this type is considered to be the last development of the fixed-arm anchor.

After the mid nineteenth century, larger vessels increasingly moved to stockless or navy pattern anchors or anchors with movable arms that were less prone to breaking, slippage or fouling, making the fixed arm anchor obsolete.

WA_1026 Shackle; WA_1027 Fluke; WA_1028 Stock

These artefacts were discovered during dredging work for London Gateway in the Thames Estuary. They are all parts of, or fixtures relating to anchors. Whether they all relate to the same anchor is difficult to say, but they are probably roughly contemporary.

Artefact WA_1026 is a shackle possibly associated with a number of anchor fragments. The shackle could have been located and secured to the top of the shank connecting the anchor chain to the anchor. It was recovered from Dredging Zones 33-36 aboard *Lange Wapper*.

Artefact WA_1027 was recovered from Dredging Zones 27-36 aboard *Lange Wapper*. This artefact is a fragment from an iron anchor. This fragment is one of a pair of flukes. The fluke is 850mm long by 280mm wide by 155mm thick.

Artefact WA_1028 was recovered from Dredging Zones 33-36 aboard *Lange Wapper*. This artefact is a fragment from an iron anchor. This fragment is part of the iron stock - in this case a foldable one - that was located at the top of the shank, and it allowed the flukes to dig into the seabed when deployed, whilst allowing for easier stowage when folded. The stock would indicate a probable 19th century date of manufacture.

WA_1028 Propeller Hub

This propeller hub was discovered in an area being dredged for London Gateway Port in the Thames Estuary. It was recovered during operations on board the vessel *Lange Wapper* in Dredging Zones 31-36.

This artefact is the remains of a propeller head, possibly from a German World War II Messerschmitt Bf 109 fighter plane. It appears to have a pitch change mechanism for the three bladed variable pitch prop, manufactured by VDM circa 1939-41. Early variants of the Bf109 such as the Bf109E-3 were equipped with an engine mounted cannon firing through the hub. However, firing of the cannon caused vibration problems which made it unpopular for pilots, so the engine cannon was often removed when the aircraft reached front line units. The Messerschmitt Bf109 was the Luftwaffe's primary fighter plane which saw action during the Battle of Britain and throughout the war.

This find is very likely to be indicative of a German WWII aircraft crash site. The aircraft was probably lost during a mission over the Thames during the Second World War. If the location of an aircraft wreck is confirmed it will be automatically be protected under the PMRA 1986. Military archaeology has great public interest and national importance and as such any remains that are discovered, especially from rarely discovered aircraft crash sites, are likely to be very archaeologically sensitive.

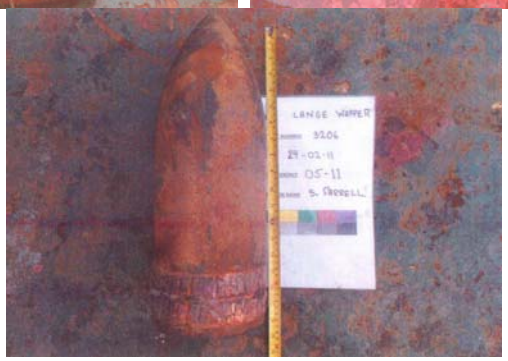
WA_1052 Sounding Leads

This group of artefacts was discovered in an area of the shipping channel being dredged for the London Gateway Port in the Thames Estuary. It was recovered from Dredging Zones 9-10 aboard the *Uilenspiegel*.

The artefacts are a set of solid lead sounding weights or leads. These were: 'An instrument for discovering the depth of water; it is a tapered cylinder of lead, of 7, 14 or 28 lbs. weight, and attached, by means of a strop, to the lead-line, which is marked at certain distances to ascertain the fathoms' (from Admiral W. H. Smyth's *The Sailor's Word-book*, 1867). They would have been a critical part of a ship's navigational tools.

These sounding leads do not have any admiralty marks on them so probably come from a merchant vessel. A number of them have voids in the bases for tallow or wax, which would have allowed the seabed sediments to be noted as an aid to navigation. They are well used, and the largest has a stamp - possibly a maker's mark - near the base. It is difficult to determine the age of these items, but from the type they could possibly be from the 17th or 18th century, or maybe earlier. How they came to be in the Thames is unclear, but they may be part of wreck debris. The fact that they have been discovered as a group is unusual and of interest.

WA_1030 Projectiles



This group of artefacts was discovered in an area of the shipping channel being dredged for the London Gateway Port in the Thames Estuary. It was recovered from Dredging Zones 27-36 aboard the *Lange Wapper*.

This collection includes three six inch solid shot projectiles and one nine inch solid shot projectile. These were know as Palliser shot and were designed to overcome the armour being employed on warships in the late 19th century. Of the three six inch projectiles one has a double driving band, one has a single driving band and there is no photograph available at this time for the third projectile. The nine inch projectile also has a single driving band at the base.

These projectiles are likely from the artillery testing grounds based at Shoeburyness. This was a land based artillery testing range where new and existing artillery pieces where tested. The driving bands (or obturating ring, which gave its name to O-ring) and form of the projectiles suggest a date between the late 19th century and the first quarter or half of the 20th century. The soft copper driving bands would deform during firing to create a gas check with the rifling of the barrel, imparting spin and increasing range as well as accuracy.

It can not be said for sure if these projectiles were indeed fired from the Shoebury site, but it certainly shows that the area played a key part in the development and testing of the artillery which could suggest why so many of these projectiles have been recovered during the dredging operations.

WA_1031 Blue and white ceramic fragment

This ceramic fragment was recovered from within dredged material from the channel deepening and land reclamation scheme, by D. Brown from Berth 2 aboard the *Brado*, on 28th April 2011. A fragment of a blue and white ceramic vessel has been recovered to date. An image of the discovery was shown to the Wessex Archaeology ceramic specialist for interpretation.

The image above represents a piece of blue and white ceramic, the printed pattern indicating a possible 19th or 20th century date. It measures 3.5cm in length and 1.5cm in width. This piece appears to be similar with another fragment of blue and white decorated ceramic (Lordi number 1377, found by K. Stratford) from the Dredging Zones 32 to 34 aboard the *Uilenspiegel*, between the 4th and 7th September 2010, which has been identified as a fragment of mid 19th century china with a blue sponge decoration.

This reproduction technique for decoration is a way to print two dimensional designs on the surface of ceramics, giving a high quality finish and at a low cost per unit. As explained by the Victoria and Albert Museum, the "design is printed onto a sheet of tissue paper or a thin pliable layer of gelatine (animal glue) [especially during the 19th century, being used as kitchen ware], by means of which it is transferred onto the surface of the ware".

WA_1032: Artillery Projectiles

These artefacts were discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. They were recovered from Dredging Zone 102 aboard *Brabo* by S. Farrell, the 7th and the 20th of April 2011.

The two projectiles have been grouped together as they represent solid artillery projectiles from guns. Known as Palliser shot, these were designed in 1867 - by Major Palliser - to overcome the new armoured protection being used by many navies in the second half of the 19th century. The projectile on the right is 6 inches in diameter and 18 inches in length, and the other roughly 2.5 inches diameter and 10.3 inches in length. As a rough guide to weight of shot, generally a 6 inch diameter projectile would weight 50kg, whilst the 2 ½ shell would be 7 pounds in weight.

The two projectiles use a driving band system at the base. This system would allow a proper seal between the projectile and the barrel. The driving band (obturating ring - gave its name to the term O-ring) suggests a date between the late 19th century and the first quarter of the 20th century, or possibly up to World War II. The projectiles recovered from the dredged areas are likely to originate either from a ship or from a land based artillery batteries in the estuary area. The battery at Shoebury was a major location of this type at the time.

It can not be said for sure if these projectiles were indeed fired from this site but it certainly shows that the area played a key part in the development and testing of artillery weapon systems which could suggest why so many of these projectiles have been recovered.

WA_1033: Cannon Balls

These artefacts were discovered on the dredger as a result of dredging work for London Gateway in the Thames Estuary. They were recovered from Dredging Zones 27-35 and 44 aboard *Uilenspiegel*.

The first cannon ball (pictured above) is an 8 inch solid round shot, the second is a 6 inch solid round shot with no image provided by the dredging company. A solid round shot, could have been used to damage enemy ship's hulls as well as attacking forts on land.

The 6 inch cannon ball is from a smooth bore gun firing a 24, 28 or 32 pound weight of shot and may be a Demi Cannon, depending on the accuracy of the measurement. This was a fairly common size of ordnance from early uses of cannon through to the mid 19th century.

The 8 inch cannon ball is also from a smooth bore gun likely firing 68 pound weight of shot. This size of shot came into action in the UK during the mid 19th century with the advent of the 68 pounder cannon. Warships like the HMS *Warrior* were still using these size guns over the new rifled guns for some time. This continued beyond the use of smoothbore guns as many of these 68 pounders were converted to take the rifled projectiles right through to 1921 when these were declared obsolete.

Both of these gun sizes would have been carried on vessels as well as on land artillery sites. It is not possible to ascertain which guns these cannon balls were used by or intended for without further evidence and investigation.

It is uncertain how these cannonballs ended up in the Thames Estuary. Since they are isolated finds they are likely to have been lost or fired from a vessel but it could also indicate the presence of a shipwreck. Cannonballs are an important find and can be useful in tracing the location of battles and enemy encounters during British Naval history.

WA_1034: Iron/Steel Structure

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zone 35/36 aboard *Brabo* the 06th of April 2010.

The object is largely ferrous (with a layer of rust) of iron or steel and part of a mechanism, potentially a structural assemblage. This item appears to be formed of al least 5 sections linked together by some type of connector/flange system, with a pivot linkage at one end and a rotating bearing at a right angle at the other. This item has an approximate length of 38 inches and a maximum width of about 19 inches

It seems to have attached to something via the remains of a pivot fitting that would be used to hold the object into position and allow it to rotate. The period of use of this artefact is to be considered between the late 19th century and the first half of the 20th century. It cannot be said with certainty the provenance of the item but it could potentially be part of an aircraft or a vessel.

One possibility that is being explored is that it is part of the landing gear assemblage of an aircraft. The information has been sent to experts at the RAF museum, and we are hoping to be able to establish if it is, indeed, part of an aircraft and what make and model it is.

WA_1034: Aircraft Landing Gear

This artefact was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zone 35/36 aboard *Brabo* the 06th of April 2010.

The object is largely ferrous (with a layer of rust) of iron or steel and an approximate length of 38 inches and a maximum width of about 19 inches.

Following review by aviation experts it has been confirmed as being part of the landing gear assemblage of an aircraft. There is some uncertainty on the exact age and provenance of the item, but further work is being undertaken to establish the model of the aircraft.

During closer inspection of the object the head of three bolts, fastening different components of the landing gear, has an English inscription, with the word 'ASSOCIATES' and a centrally placed six pointed star. The object is therefore believed to come from a British, rather than a German aircraft.

Through correspondence with the resident aircraft technician from the RAF Museum at Hendon and his colleagues, the object has been tentatively interpreted as that of a 1950's jet aircraft such as a De Havilland Vampire or a Hunter Sea Hawk both of which were actively used by the RAF and Fleet Air Arm respectively. Some further documentary research may help to confirm or deny this interpretation.

WA_1035: Ceramic Tile

A ceramic tile fragment has been recovered from within dredged material from the channel deepening and land reclamation scheme, by D. Brown from the Dredging Zone Berth 2 aboard the *Brado*, the 28th of April 2011. This broken fragment displays light blue and white decoration, in a pattern lay out. The image of the remains was shown to the Wessex Archaeology ceramic specialist, Lorraine Mepham, for interpretation.

The image above represents a piece of light blue and white ceramic tile, is possibly from the Victorian period, which encompasses the second half of the 19th to the beginning of 20th century. However, the ceramic specialist mentioned that the particular pattern displayed an possible modern pattern, meaning it could be later. It measures 6cm in length and 5cm in width.

In the event that it is of Victorian origin, this fragment of tile would have been used for kitchen or bathroom floors and walls. Victorian tile making used a large cheap labour force, and there were many variations in tile decoration applied by hand, and they came into general use in the 1870's as explained by the Stoke-on-Trent Museum: "the skills involved in decoration were greater than those for making the tile body as the chemical [make-up] of glazes and colours was uncertain during firing".

WA_1036: Animal and Human Bones

Four sets of animal bones fragments including a human arm bone were recovered from within dredged material from the channel deepening and land reclamation scheme, by D. Woolmereos from Dredging Zones 33-36 aboard the *Lange Wapper*, between 8th and 12th of March 2011. The images of the remains were shown to Wessex Archaeology's osteologist, Jackie McKinley.

The images above represent the four sets of bones gathered by size. They range in size from 5-6cm to about 20 -25cm, and they have been identified as cattle bones, apart from one human arm bone. Without closer examination it is not possible to verify their origin, and determine their exact nature.

Animals and animal products were carried on board ships as cargo and as provisions and as such may end up on the seabed as a result of a shipwreck or through simple waste disposal. Animal remains may also end up in marine contexts having been washed from terrestrial deposits by rivers or eroded from cliffs or beaches. Alternatively they may date to a time when the seabed was dry land, for example at the height of the last ice age c.18,000 years ago, although this is considered unlikely in the case of these examples.

It is not feasible to confirm a date for the bone from a photograph, and we can only speculate how the bone, particularly that of human origin, ended up on the seabed.

The discovery of further material from this area, however, will aid identification and potentially help us to identify any unknown archaeological site on the seabed.

WA_1040: Shell/Cartridge Case

A brass cartridge case was recovered from the drag-head aboard the *HAM 310* dredging vessel after operating within Zone 28 to 34 on the 22nd of April 2011 by D. Woolmer.

This case appears to be for a 4 inch shell. From the photograph the cartridge appears to have been used within a light Quick-firing (QF) gun. QF guns were utilised in a number of ways, either as field artillery, anti-aircraft guns or on naval vessels. Following the early success of the light QF Hotchkiss and Nordenfelt guns in the 1880s, the Royal Navy implemented QF guns in all calibres up to 6 inch in the 1890s, and also converted various 4 inch (similar to this particular find) and 6 inch Breech Loading (BL) guns to QF under the designation QFC.

This all-QF era ended in 1901 with the BL 6 inch Mk VII gun and a swing back to BL guns. Since 1914 the trend was to use QF for naval guns below 6 inch and BL for guns 6 inches and over.

The 4 inch naval gun was used from about 1895 up until the end of WW2. The gun would have fired a shell weighing 25 pounds and had a range of up to 15km. Similar cartridges have been discovered though the LORDI Finds Protocol and they provide useful insights into how the surrounding Thames Estuary was used during the late 19th and early 20th century.

The image on the right shows Australian troops examining a 4 inch QF gun on a transport ship at the start of WW1.

WA_1041: 4 inch Cannon ball

This round shot cast iron cannon ball was recovered from the drag-head from the channel deepening and land reclamation scheme, by D. Woolmer after dredging in Zones 28 to 34 aboard the *Ham 310*, on 1st May 2011.

With a 4 inch diameter, the cannon ball weighs approximately 9lb. Originally, 9lb cast iron shot were utilised with *Demi-Culverin* cannon. However, with the standardisation of ordnance at the beginning of the 17th century, cannon were categorised by the weight of the maximum diameter of shot they could fire. The 9 pdrs, as they would come to be known by the Royal Navy, were used in a number of ways and manufactured to different lengths depending on their use. 'The Long Nine' was one such 9 pdr cannon, and quickly gained a certain amount of notoriety as a 'chase piece' on the bow of warships.

Although 9 pdr cannon were not to be come universally used, by 1761 the Ordnance Board saw fit to authorize the 9 pdr to be cast in 5 different lengths ranging from 7 feet for use as the main battery by sixth rates (frigates), mounting 24 or fewer guns, to 9 feet cannon for those used on the upper decks of larger 80-gun third rates.

How the cannon ball came to be in the Thames is unclear, although it does have a flattened side, which could be the result of impact with a hard object, possibly indicating it was fired in action. It may also have been fired as a practice shot from either a vessel or a land based artillery battery on the estuary.

WA_1042: 6 inch Cannon ball

This cannon ball was recovered from the drag-head of the dredging vessel *HAM 310* on the 7th of May 2011 by D. Woolmer after dredging within Zones 28-34. Since the beginning of September 2010, there have been 18 cannon balls of varying sizes reported from dredging vessels operating in the Thames, with all but one discovered in the same range of dredging Zones.

Although a solitary cannonball can not provide much in the way of archaeological knowledge it can be interpreted in a number of ways by looking for clues to its manufactured date, and relationship to the area it was found.

As it is a cast iron solid shot and of a size roughly 6 inch in diameter it could only have been manufactured from the beginning of the 16th century when the production of cast iron cannonballs coincided with that of cast iron cannon. As a regular continuous sphere of 6 inch diameter the weight of the shot is approximately 32lbs, which was a standard weight for a large *demi-cannon* of the 16th and 17th century, and used in key ways by a number of nations throughout this period.

After 1716 the British navy standardised cannon and the shot they fired. This was brought in by Albert Borgard, who reformed traditional names such as *culverin*, *saker and demi-cannon* and replaced them with cannon named only by the maximum shot in which they could fire. The 32lb shot retained its place as the standard for all English men-o'-war.

As technology advanced, 32 pdrs became shorter, lighter and more accurate and these became known as *carronades*. These deadly cannon were of a lower calibre which was believed to create more splinters on impact with a ships hull and were used on upper decks to provide greater surface area for crew activity and were adopted by the British Navy from 1779.

The hardened layers of corrosion products visible on this cast iron cannon ball, known as concretion, are formed around the object as it rusts in seawater. This is an electrochemical reaction that can help preserve artefacts especially in buried conditions, however when the artefact is removed, the rusting process can accelerate, and iron artefacts should be kept wet where possible.

WA_1043: Whiteware Pottery

A sherd of pottery was discovered at 1530 hours on the 19th of July 2011 by David Brown at Berth 2.

It is believed to be piece of tin-glazed porcelain from the United Kingdom that may have originally formed part of a small plate as it appears to have a flat underside. This type of ceramic was relative common during the 19th century. There is no contextual evidence available to determine whether this pottery is from a wreck or just a stray find deriving from discarded items.

Any further finds of this nature are still important however and should be reported through the LORDI Finds Protocol.

WA_1044: Clay Tobacco Pipe

On the 5th of July 2011 at approximately 9am a clay tobacco pipe was discovered at the eastern return of the reclamation whilst excavating guide wall by Chris Lang.

Tobacco smoking in Europe took off during the late 16th century, especially in England and Holland. The tobacco was first imported from the Americas during the second half of the 16th century, where Native peoples smoked the dried leaf of the tobacco plant in pipes of clay, wood and sometimes metal. The leaf was smoked similarly in Europe in pipes of moulded and fired clay, which were easily and cheaply manufactured and became popular with smokers of all classes.

The style of the pipe's manufacture can be an indication of date, with earlier pipes smaller with a bulbous bowl, and later pipes becoming larger and cleanly shaped. The diameter of the stem bore is also believed to be a good indication of date, as wider bores were from an earlier period around 1620 and thinner bores are observed on mid 17th century pipes.

Locally, Kentish towns had clay pipe-makers, with Rochester, Milton and Sittingbourne notable producers during the 18th century. Inscribed on the bowl is the word 'FORD', which is likely to be that of the makers name. One of the foremost producers between 1805 and 1860 with that name was John Ford of Stepney and his extended family based in Rotherhithe, who predominately inscribed pipes on the heal with the initials 'IF'. It is very possible this is a piece he made later in his career.

WA_1045: Projectile

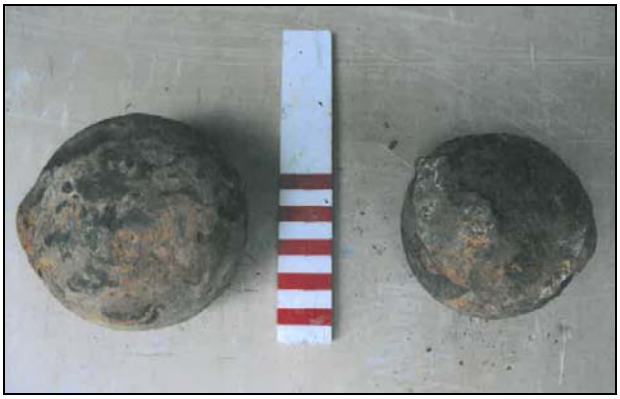
This artefact was discovered in an area of the shipping channel being dredged for the London Gateway Port in the Thames Estuary. It was recovered from Dredging Zones 107 aboard the *Congo River*.

The eight and half inch projectile has a single driving band at the base and is known as a Palliser shot and was designed to pierce the armour being employed on warships in the late 19th century.

Since dredging began in the Thames shipping channel 20 similar projectiles have been reported through the LORDI Finds Protocol and are likely to have been fired from the artillery testing grounds, based at Shoeburyness. This was a land based artillery testing range where new and existing artillery pieces where tested. The driving bands (or obturating ring, which gave its name to O-ring) and form of the projectiles suggest a date between the late 19th century and the first quarter or half of the 20th century. The soft copper driving bands would deform during firing to create a gas check with the rifling of the barrel, imparting spin and increasing range as well as accuracy.

It can not be said for sure if this particular projectile is indeed fired from the Shoeburyness site, but it certainly shows that the area played a key part in the development and testing of artillery which could suggest why so many of these projectiles have been recovered during the dredging operations.

WA_1046: 4 & 4 ½ inch cannon ball



A 4 inch round shot cast iron cannon ball was recovered from the drag-head from dredging Zone 108, by D. Woolmer on 17th July 2011, and a 4 ½ inch round shot cast iron cannon ball was recovered after dredging in Zone 103, by Vincent Pretorius.

With a 4 and 4 ½ inch diameter, the cannon balls weigh approximately 9lb to 12lbs. Originally cast iron shot of this size was utilised with variants of the *Demi-Culverin* cannon. However, with a greater emphasis toward standardisation of ordnance at the beginning of the 17th century, cannon were categorised by the weight of the maximum diameter of shot they could fire. The 9pdrs and 12pdrs were smaller guns and used in a number of ways and manufactured to different lengths depending on their use.

By the late 18th century 9pdrs were to be used on the upper decks of smaller naval vessels such as Sixth Rates (frigates). 12pdrs however, were selected for more prestigious usage due to their versatility. Throughout the service of HMS Victory, the vessel carried 30 12pdrs. They were used in many ways and came in different sizes by the time of the Battle of Trafalgar (1805), in short cannon situated on the quarter deck, medium on the forecastle and long 12pdrs on the upper gun decks.

How the cannon balls came to be in the Thames is unclear, it is possible that they were fired as a practice shot from either a vessel or possibly by a shore battery. They may be from a wreck site, but there is no contextual evidence to support this theory at present.

WA_1047: Rifle Stock

This wooden rifle part was discovered by Vincent Pretorius on the reclamation land within Zone 3 AR2 West at 1330 hours on the 27th July 2011. An almost exact position for the discovery was supplied, with an Easting of 571351.188 and Northing 181436.692. This part is sometimes referred to as a 'stock' and sometimes a 'butt', depending on custom.

The wood used does not appear to be oak, and generally rifle butts were produced using tight grained timber such as walnut, maple, or birch. There are five fastening holes evident on the stock; two that would have fastened the butt plate to the stock at one end, and three others situated at the grip cap. On both sides hand cut knurling represents the area of the grip. On the under side a 12mm rebate represents where the plate of the trigger guard would have sat. Basic measurements for the stock illustrate an approximate length of pull (LOP) - measured from the forward face of the trigger to the end of the butt plate - at somewhere in the region of 13 inches, without a butt plate. The LOP is considered a very important measurement since it dictates how well the rifle fires.

The style in which the stock is fashioned resembles American manufacturers such as Kimber and Ruger, or Springfield, from the early to middle 20th century, and the LOP is in keeping with a Kimber classic design if a ¾ inch plate was fixed to the butt end. It is certain that the rifle was not of Admiralty ownership as butt plates were forbidden because they could dent the deck. It would appear the wood used is not of overly good quality and the rifle may have in fact been used as a training piece or on a smaller calibre recreational rifle such as a .22.

WA_1048: 19th or 20th Century Ceramics

Three sherds of pottery were discovered on the 30th of July 2011 by David Brown at Berth 1 on reclamation land, amongst material that had been dredged up from an unknown dredging zone.

A pottery specialist at Wessex Archaeology believes all three pieces to be that of refined whitewares that date to the 19th or 20th century date. One piece is believed to be from the rim of a large serving dish, and has a dark green transfer print that indicates a date of 1825 or later.

A more decorated piece has a blue band, and is a pedestal base, perhaps from a bowl.

The final piece of pottery is that of a plate base and is plain (although the plate rim may have been transfer printed).

There is no contextual evidence to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1049: Green Pottery

Two adjoining sherds of pottery were discovered at 1800 hours on the 20th of August 2011 by David Brown at AR 1 on reclamation land.

A specialist at Wessex Archaeology has interpreted refined whiteware with a green transfer print and dating from 1825 onwards. It is possible it originally formed part of a cup or mug.

This type of ceramic was relative common during the 19th century. There is no contextual evidence available to determine whether this pottery is from a wreck or just a stray find deriving from discarded items.

WA_1050: Cannon

This artefact was discovered in an area of the shipping channel being dredged for the London Gateway Port in the Thames Estuary. It was recovered from Dredging Zones 27-33 aboard the *Lange Wapper* on 6th March 2011.

This small cannon is only about 32 inches long. Originally longer - maybe around 4 feet - its muzzle and part of the chase have been broken off, possibly as a result of an accident during firing, which may be why it was discarded into the Thames, despite its scrap value.

The small bore of the cannon (approx. 2.1 inches) indicates the cannon is probably a 1 or 1½ pounder, meaning it fired a 1 or 1½ pound round shot (cannon ball). These were light pieces, and may have been used on the upper deck of a ship as an anti-personnel weapon, firing grape or canister shot.

The unusual bore size indicates that it may not be an English piece. English cannon were standardised into set sizes in the early eighteenth century, and this particular piece does not seem to fit the pattern. It may also be earlier, possibly 17th century, and of a type known as a 'falconet'. Either way, cannon are notoriously difficult to date and assign an origin. This discovery will need to be examined by an expert in historic ordinance in order to get a good understanding of age and origin.

WA_1050: Various Ceramics

A number of finds were discovered by Leigh Patton at 1130 hours on 5th of September 2011, within AR 1 on the reclamation land. They include a fragment of clay pipe, four pieces of glass and four sherds of pottery.

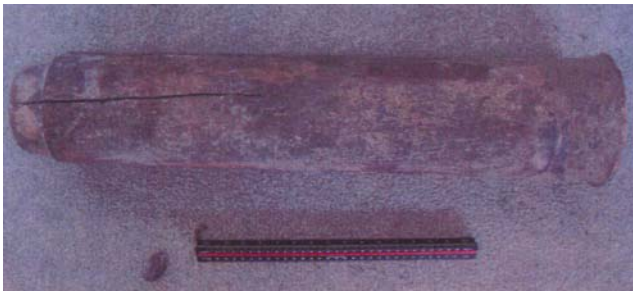
A specialist from Wessex Archaeology has identified and interpreted the fragments. The clay pipe is a plain stem fragment and bowl from around 1700 to 1770. The bowl is probably earlier rather than later within this date range, as the form is long and narrow, and both the bowl and stem (now missing) are quite thick.

The glass fragments were interpreted as a clear bottle stopper with 2 adjoining fragments, and embossed CANNINGTON SHAW & Co, ST HELENS, which is from the late 19th or early 20th century, until 1913, when they merged with another company. The rim and neck of a bottle in strong blue glass and probably that of a ribbed 'poison' (pharmaceutical) bottle of 19th or 20th century date. There is one further fragment of frosted brown bottle glass that is unidentifiable.

The pottery fragments contained a stoneware lid, a refined whiteware (with two adjoining fragments) from cup of mug with part of motto (just letter A remains) from the 19th or 20th century and two further transfer printed whitewares, 19th or 20th century.

There is no contextual evidence to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1051 Drill Round

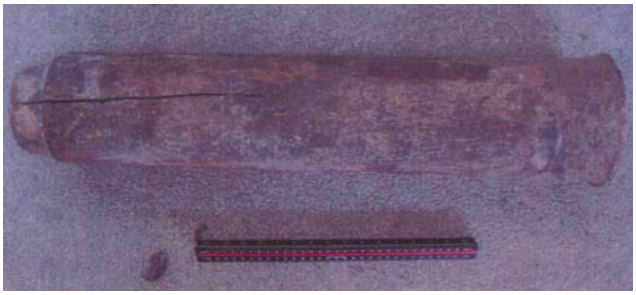


This find is the cartridge case section (shell section missing) of a 'drill' or practice round. These were inert versions of ammunition, used to drill (train) gun crews in 'dry' (no live ammunition) firing practices. From the dimensions, it is from a 12 pounder, which would have fired a 3 inch (diameter) shell. 12 pound guns were in use in various forms (in naval, field and anti-aircraft roles) between 1859 and the 1940s.

It was thought that further examination of the item would allow us to narrow this down, particularly the base plate may have had a date stamp and a 'cwt' rating – indicating the weight of the gun needed to 'fire' the round. Unfortunately the condition of the item has not allowed us to narrow the type to a specific model and no markings are discernable.

The image on the right shows a trawler's gun crew operating the 12-pounder 12 cwt Mk V gun on the fo'c'sle of their vessel during WWII. Trawlers were often requisitioned by the Royal Navy to undertake anti-submarine operations. A drill round being used during training on such a vessel could easily have fallen over board by accident.

WA_1051 Drill Round



This discovery was made on 8th March 2011 near the western intermediate cross-bund by Mario Boons, in reclamation Area 3B.

This find is the cartridge case section (shell section missing) of a 'drill' or practice round. These were inert versions of ammunition, used to drill (train) gun crews in 'dry' (no live ammunition) firing practices. From the dimensions, it is from a 4.5 inch gun, possibly naval, which would have fired a 55 pound (24.9 kg) shell. 4.5 inch guns were in use in various forms in (naval, and anti-aircraft roles) principally between 1938 and 1945.

It was thought that further examination of the item would allow us to narrow this down, particularly the base plate may have had a date stamp and a 'cwt' rating – indicating the weight of the gun needed to 'fire' the round. Unfortunately the condition of the item has not allowed us to narrow the type to a specific model and no markings are discernable.

The image on the right shows an AA crew in Kent operating the 4.5 inch anti-aircraft gun.

WA_1051: Reconnaissance Aircraft

These aircraft parts were discovered in the Thames Estuary in Dredging Zone 105 aboard the *Congo River* by Christopher Steen. 45 items were recovered from the vessel's drag-head as a result of dredging work for London Gateway Port.

The wreckage includes airframe, hydraulic system, fuselage parts, skin, wiring and other components including part of a camera system, most of which were of anodised aluminium. Analysis of the wreckage and markings illustrated different component elements of a reasonably heavily built aircraft of WW2 *Luftwaffe* origin.

The camera system was used exclusively in reconnaissance aircraft. A plate fastened to it identifies the German lens makers Carl Zeiss, and the binocular lens manufacturer Busch Rathenow. The letters Fk.30 identify it as a specific aerial photographic reconnaissance system use by the *Luftwaffe* during WW2, recording onto a 30 x 30cm film format. The model was the *Riehenbildner* RB 20/30, 50/30 or 75/30, Zeiss FK 30, using a lens with a focal length of 20, 50 or 75cm. This system was used on a number of aircraft including the Arado 234, Dornier Do 215B-4, Dornier Do 217, Dornier Do 17Z-3, and the Junkers Ju 88 D1-5. Ballistic puncture holes in some of the parts may indicate that the aircraft was shot down - either by 'AAA' or by another aircraft.

A number of experts in various institutions were consulted. The breakthrough was made as to the identity of the aircraft by analysis of the component numbering, an example of which had been recovered on part of the surviving framing. The numbers 88 - 513 - 0203 on the airframe referred to the aircraft type, the structural section, and the specific component part respectively. It could then be determined that the frame was from the wing of a Junkers Ju 88.

The Ju 88 was a versatile twin engined muti-role aircraft, suited to many tasks required of the *Luftwaffe* including bomber, night-fighter, heavy fighter, and reconnaissance. Thousands of them were built and saw action in every theatre of war. The reconnaissance variants (Ju 88 D1-5), of which 1,500 were built were used in all theatres, including north-west Europe.

WA_1052: Artillery Projectile

This artillery shell was discovered in an area being reclaimed as a result of dredging work for London Gateway in the Thames Estuary. It was recovered from Dredging Zone 108 aboard *Congo River* by Alan Hall, on 17th August 2011.

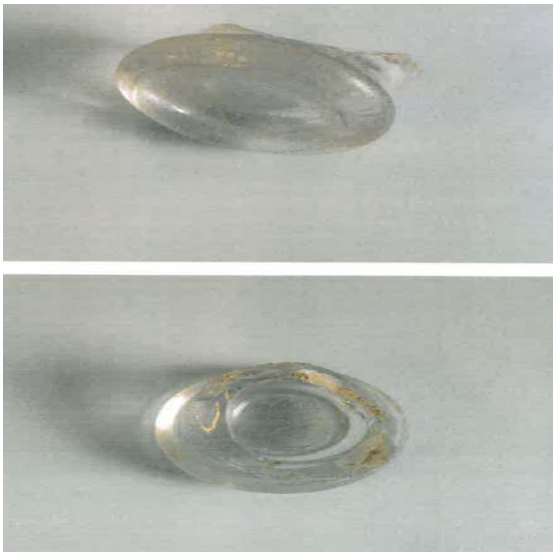
The projectile is a solid shot artillery shell fired by a gun. Known as Palliser shot, these were designed in 1867 - by Major Palliser - to overcome the new armoured protection being used by many navies in the second half of the 19th century. The projectile is 5 inches in diameter. As a rough guide to weight of shot, generally a 5 inch diameter projectile like this would weigh around 50 pounds (22.68 kg) or more.

The projectile uses a driving band system at the base. This system would allow an accurate seal between the projectile and the barrel of the gun. The driving band (or obturating ring - which gave its name to the term O-ring) suggests a date between the late 19th century and the first quarter of the 20th century. Around 20 of this projectile type have now been recovered during dredging operations. They are likely to originate either from a ship or from a land based artillery battery in the estuary area. The battery at Shoeburyness was a major location of this type at the time, and was a test site for artillery.

It can not be said for sure if this projectile was fired from Shoeburyness, but it certainly shows that the area played a key part in the development and testing of artillery weapon systems which could suggest why so many of these projectiles have been recovered.

The image above (right) shows seamen training with a starboard broadside 5-inch BL (Breech Loading) gun, on board the British corvette HMS *Calliope* (1884). This type of weapon may have fired the shell found in the Thames. The man at the right holds a case which contains a powder cartridge ready for loading.

WA_1053: Glass bottle stopper



A glass stopper was discovered by Leigh Patton at 09:00 hours on 26th of September 2011, within AR 3 on the reclamation land.

A specialist from Wessex Archaeology has identified and interpreted the fragment. It was interpreted as a clear bottle stopper which is from the late 19th or early 20th century.

There is no contextual evidence available to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1054: Coconut Shell

A fragment of skull or coconut shell was discovered by Leigh Patton at 1200 hours on 6th October 2011, within AR 2W on the reclamation land.

A specialist from Wessex Archaeology has identified and interpreted the fragment. The fragment was confirmed as a piece of coconut shell and not a fragment of a skull as previously thought possible.

There is no contextual evidence to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1055: Various Ceramics & Glass



A number of finds were discovered by Leigh Patton at 1000 hours on 7th October 2011, within AR 2W on the reclamation land. They include two fragments of glass including a bottle neck and three sherds of pottery.

A specialist from Wessex Archaeology has identified and interpreted the fragments:

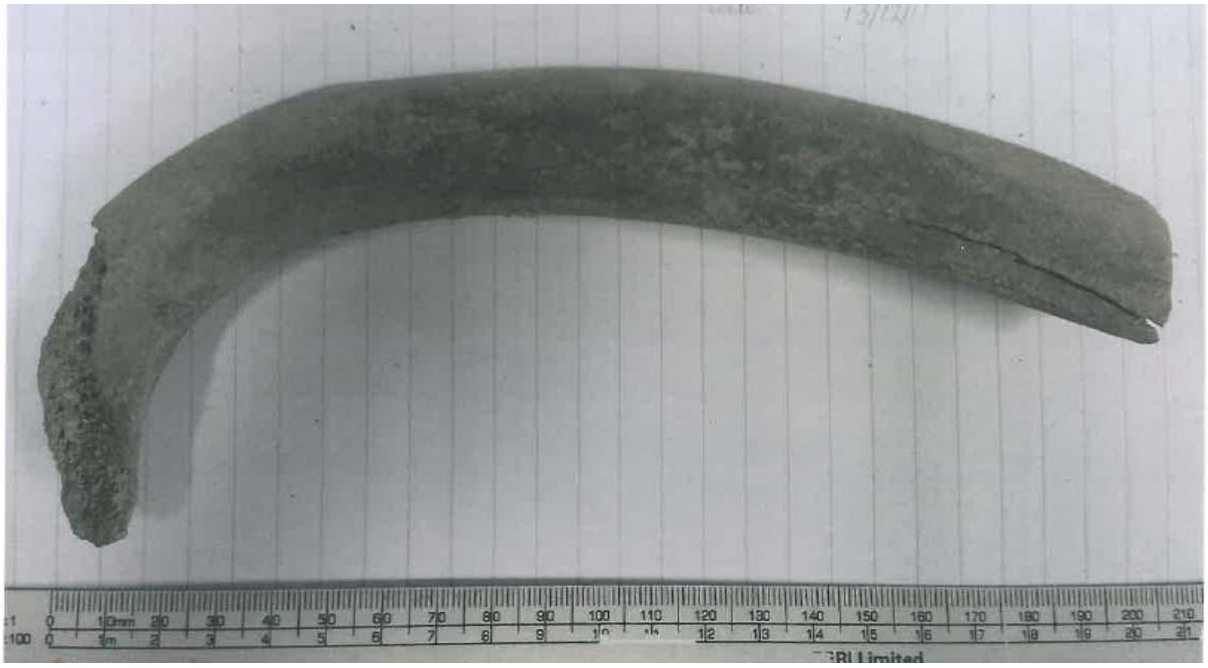
The bottleneck (left) is modern, the design of the rim makes it probably 20th century.

The other piece of moulded glass (centre) is modern, also 20th century.

The top sherd of the three (right) is modern stoneware with a 'Bristol' or feldspathic glaze *c*. 1830s onwards. The middle sherd is a refined whiteware from a period anywhere between the 19th – 20th centuries. Unfortunately, the image of the grey sherd at the bottom right is too dark to make out enough detail to identify.

There is no contextual evidence available to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1056: Animal bone



This fragment of bone was reported on the 13th December 2011. It was found on top of a fender on the Quay wall.

A specialist at Wessex Archaeology has identified the bone. It has been identified as a rib bone from either cattle or horse from a period anywhere between the post-medieval to modern.

There is no contextual evidence available to suggest where this item derived from, but it is probable that it is a randomly discarded item, from either ship or land.

WA_1057: Animal bone

This fragment of bone was discovered by Nick Cliff on the 6th December 2011 within Berth 1 a long the Main wall within the reclamation area.

A specialist at Wessex Archaeology has identified the bone. It has been identified as the distal end of a leg bone from cattle or a horse. It could date between the post-medieval up to the modern period.

There is no contextual evidence available to suggest where this item derived from, but it is probable that it is a randomly discarded item, from either ship or land.

WA_1058: Shovel

A metal object was discovered by Tim Yzewyn at 11:30 hours on 6th December 2011 within Birth 1 on the reclamation area.

A specialist from Wessex Archaeology has identified and interpreted the object as a heavily corroded remains of the shaft of a relatively modern (late 19th or 20th centuary) shovel.

There is no contextual evidence to suggest where these items derived from, but it is probable that it is a randomly discarded item, from either ship or land.

WA_1059: Stockless Anchor

This anchor was discovered by Karl Salter on the 31st October 2011 within Berth 2 of the reclamation area.

A specialist at Wessex Archaeology has identified the type of anchor. Stockless anchors were in use since the late 19th century and up to the present day on all types of shipping. From the condition of this anchor it was considered to be 20th century.

This assessment fits in with the inscription on its fluke. The Anchor bears the inscription CAMMELL LAIRD & Co (part of which has been damaged). Cammell Laird was one of the foremost shipping companies of the late 19th and early 20th centuries. It was formed by the merger of Laird Son & Co and Johnson Cammell & Co in 1903 - which gives an earliest date for the anchor.

The anchor was the sort that would have been used on merchant vessels such as tramp steamers that would have plied the sea's trade routes in the early 20th century, such as the one pictured above right (SS *Robin*).

There is no contextual evidence available to suggest precisely where this item derived from, but may have been a fouled anchor that was discarded, or it may have been used as a mooring once it had outlived its usefulness as an anchor, and subsequently lost.

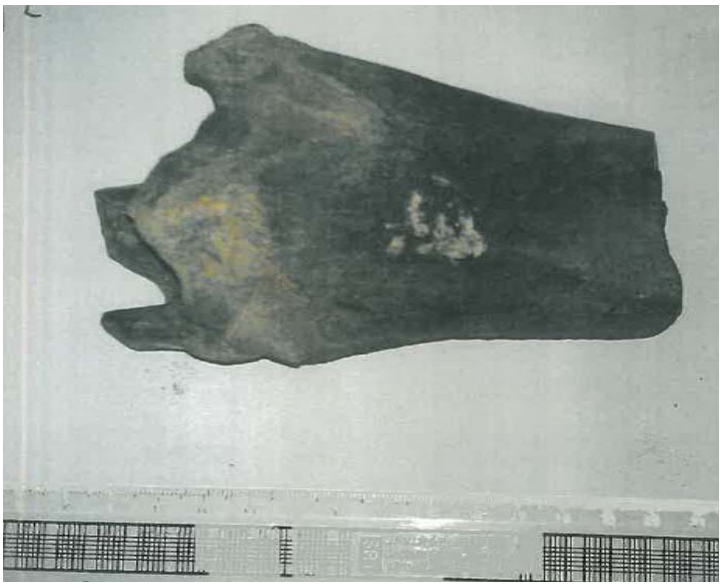
WA_1060: Animal bone

This fragment of bone was discovered by Orestes Adamou on the 11th January 2012 at Birth 1 of the Tie Rods Installation.

A specialist at Wessex Archaeology has identified the bone. This bone has been identified as a fragment of animal bone mostly likely from cattle or horse from the post-medieval to modern period.

There is no contextual evidence to suggest where this item derived from, but it is probable that it is a randomly discarded item, from either ship or land.

WA_1061: Animal bone



This fragment of bone was discovered by Orestes Adamou on the 20th December 2011 at Birth 1 of the Tie Rods Installation.

A specialist at Wessex Archaeology has identified the bone. It has been identified as a fragment of animal bone mostly likely from cattle or horse from the post-medieval to modern period.

There is no contextual evidence available to suggest where this item derived from, but it is probable that it is a randomly discarded item, from either ship or land.

WA_1062: Animal bone

This fragment of bone was discovered by Ricky Owe on the 5th January 2012 at Birth 1 of the reclamation area.

A specialist at Wessex Archaeology has identified the bone. It has been identified as a fragment of a butchered hip bone, mostly likely from cattle or horse from the post-medieval to modern period.

There is no contextual evidence to suggest where this item derived from, but it is probable that it is a randomly discarded item, from either ship or land.

WA_1063: Fragment of Stoneware Bottle

This ceramic sherd was discovered by David Brown on the 4th April 2012 at Eastern Return reclamation area, and was possibly from dredged gravel sediment areas between KP0 to KP14.

A specialist at Wessex Archaeology has identified the ceramic as a fragment of English stoneware with feldspathic or 'Bristol' glaze, from the shoulder of a bottle or flagon. The shoulder is impressed with the mark of the customer (*i.e*. the vendor of the contents, not the maker of the vessel). This is only partially legible, but the last line probably reads LONDON. The vessel must date later than *c.* 1830 (when feldspathic glaze was introduced), and is unlikely to be later than the early 20th century.

In one corner of the sherd a cream tone of glazing is evident, indicating a two tone vessel that could have had a loop handle on the opposite side of the customers mark. It is possible the original vessel was in the region of 12 inches tall and 6 inches wide. The vessel may have contained an alcoholic beverage.

There is no contextual evidence to suggest where this item derived from, but it is probable that it is a randomly discarded item, from either ship or land.

WA_1064: ceramic

A piece of ceramic material was found by Kenneth Engelen at 11:00 hours on 28th March 2012, on the vessel *Marieke* from Zone 46.

A specialist from Wessex Archaeology has identified and interpreted the fragment:

The image does not allow conclusive identification and a definitive origin cannot be attained without the actual fragment being viewed by a specialist. However, it is possibly a piece of Roman greyware storage jar or a medieval/post-medieval glazed brick. There are some other less likely possibilities for this sherd, but as mentioned previously further investigation of the object itself rather than a photograph is needed before a definitive origin can be ascribed.

There is no contextual evidence available to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1065: clay tobacco pipe

An incomplete clay pipe was found by Thomas Hoebeke at 1030 hours on 23rd May 2012 on the vessel *Lange Wapper* from Zone 105 or 35.

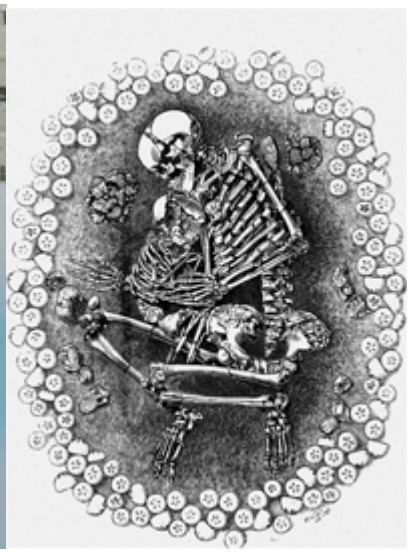
A specialist from Wessex Archaeology has identified and interpreted the fragment:

From the form of developed spur (the flat section below the bowl of the pipe) and the size of the head it is believed that this pipe would have been made and used during the late post medieval period, most likely the 17th Century.

Clay pipes were very common especially among sailors as tobacco formed part of the daily rations of a sailor in the British and other navies. They were seen as consumables and made in large numbers, and due to their fragile nature were discarded if broken.

There is no contextual evidence available to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1066: fossilised echinoid (sea urchin)



This fossilised sea urchin fossil was found by David Brown on 16th May 2012 from the vessel *Marieke* from KP0 – KP20.

It is a flint fossilised echinoid (sea urchin), Latin name: *Micraster.* It is a relatively common find and derives from the Upper Cretaceous Chalk (*c*. 100 to 65 million years old).

Fossilised echinoids are found fairly commonly in archaeological contexts although it is difficult to prove that they aren't on site co-incidentally, except where they occur in obvious situations including bronze age graves (such as the one above), where they were used to 'decorate' the burial.

There are references to them being known as "snake eggs" in the Iron Age period. During the medieval and post medieval period they were known as "fairy loaves" and kept in peoples larders.

Some have chalk on the inside and later were highly sought after by sailors as a cure for seasickness.

It is not known if this object is naturally occurring, or whether it was is part of an site assemblage, or perhaps lost by a sailor who was feeling a bit queasy.

WA_1067: Clay pipe

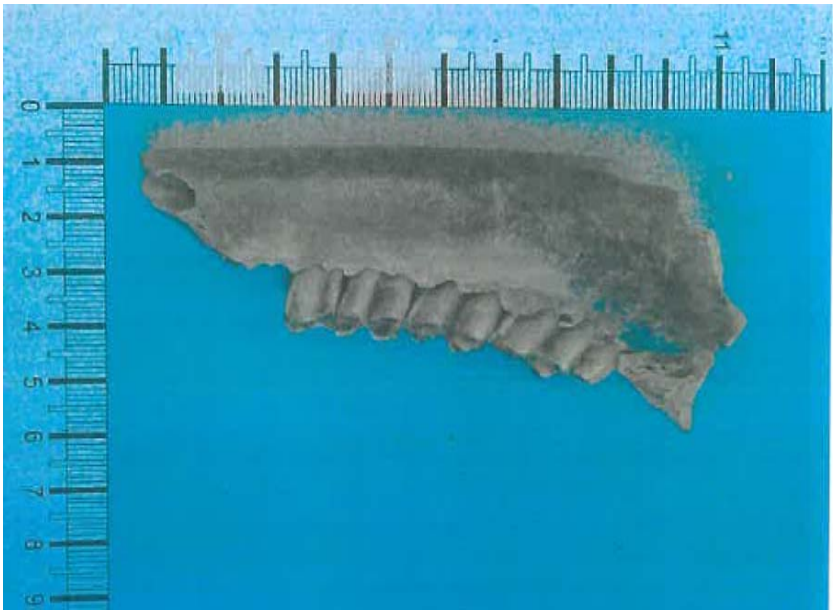
An incomplete clay pipe was found by Phil Everall on 14th May 2012 within dredged material at Berth 1, Panel 40.

The image of the pipe was shown to an in-house specialist who identified it as likely to originate before the 17th Century, based on the under developed spur (the flat bottom below the bowl of the pipe. Another indicator is the length of the head which is also prominent in those from prior to the 17th Century. This means the pipe is probably a very early example, the first recorded examples being from the 1570s.

Clay pipes were very common especially among sailors, and tobacco later formed part of the daily rations of a sailor in the British and other navies. They were seen as consumables and made in large quantities, and due to their fragile nature were discarded if they were damaged.

There is no contextual evidence available to suggest where these items derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1068: Animal Bone



A fragment of animal bone was found by Jon Wade on 11th July 2012 within dredged material at an unknown location.

The image of the animal bone was shown to an in house specialist in animal bone who identified it as a mandible from a sheep. It is unclear as to how old the bone is without further study.

There is no contextual evidence available to suggest where this item derived from, but it is probable that they are randomly discarded items, from either ship or land.

WA_1069: Concreted chain

A concreted mound of chain was found by Kurt Romelart on 31st May 2012 within dredged material on the *Lange Wapper* from dredge area KP 8.5-10.0.

The image shows a concreted mound of iron torus chain of uncertain age and origin. Chain was used as anchor cable and other miscellaneous tasks on vessels from the mid 1800's onwards.

There is no contextual evidence available to suggest where this item derived from, but it is probable that they are randomly discarded items, from either ship or land, but probably as part of a vessels' appurtenances. It may be connected with the numerous anchors that he been found in the past.

WA_1070: Metal Cap or Plate

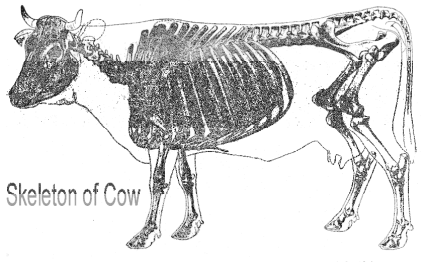
This metal cap or plate was discovered by Tony Payne within dredged material from the *Victor Horta* at Cliffe Wharf on 24 February 2012.

The plate is 21cm in diameter and has a raised ridge running around its inner edge 3.5cm from the outside. It is manufactured from iron or steel that has been galvanised or tinned to give it resistance to corrosion. This object was reported with several other finds, which it is not thought to be connected with.

It is unclear what this object's original function was, though the galvanization would suggest that it was designed to be exposed to water or weather. As such it may have come from a vehicle or a vessel and has been lost or deliberately dumped at sea. Presently it is being treated as an isolated find dating from no earlier than the 20th Century. As such it is of limited archaeological importance.

WA_1071: Animal Bone





This assemblage of five animal bones was recovered by Tony Payne on 21 December 2011 from material dredged by the *Charlemagne* and deposited at Cliffe Wharf.

The collection of bones includes (from L to R) the end of a limb bone with the joint still intact, one complete limb bone, two fragmented sections of flat bone and a fragmented, possibly butchered, piece of flat bone with a socket for a ball joint.

These were shown to an in house expert who identified the bones as being bovine (cow) in origin and of an unknown date. Whilst it is not possible to ascertain how these finds came to be on the seabed, it is plausible that these finds are representative of the victualing of naval or merchant ships. Salted meat was a staple food stuff for sailors during the post-medieval and early modern periods, with 2lbs of beef rationed per man on Tuesdays and Fridays in the 18th century.

These finds were reported with several other items though they are not thought to be related to each other or to a distinct site of archaeological significance. They are currently being treated as being of low archaeological significance.

WA_1072: Metal Blade

This metal object was discovered by Tony Payne on 24th February 2012 within material dredged by the *Victor Horta* and deposited at Cliffe Wharf.

Wessex Archaeology confirmed the identification of this find as a knife or dagger and also suggested that it may be a truncated bill hook or other tool commonly in use by sailors. Iron has been in use for many centuries though the form and relatively low level of degradation of this item would suggest that this is likely to have been manufactured in the late 19th or 20th century.

The aperture shown on the right in the image above would allow the blade to be hafted – possibly into a wooden or bone handle which has become detached or degraded post-deposition, or which became detached prior to the blade entering the water. Blades such as this one were commonly used on ships for a range of tasks including general repairs to wooden vessels or releasing snagged ropes.

Whilst this find was reported with several others, none are currently thought to be connected to each other or to a site of further archaeological significance. This find is currently being treated as an isolated discovery lost from a vessel or from the land.

WA_1073: Round Shot

The remains of two iron round shot (cannonballs) were recovered by Tony Payne within dredged material from the *Victor Horta* at Cliffe Wharf on 24 February 2012.

The two round shot are both in a poor condition. One has fragmented due to drying since its discovery, and the other is heavily pitted and corroded. The fragmented shot appears to have a diameter of 10cm or 4 inches and is likely to have been manufactured for use with a smooth bore gun of between 8 and 9 pounds. The heavily pitted shot has a diameter of 9cm or 3.5 inches would have been intended for use with a smooth bore gun of between 5 and 7 pounds.

Iron cannonballs were in use from the 1600's until the mid-18th Century and are commonly found in the marine context. The absence of ships timbers or other maritime objects amongst the cargo from which these were recovered would suggest that these are chance finds and not representative of a site of archaeological interest, such as a shipwreck. It is possible that they entered the water after firing, or that they were discarded overboard intentionally.

As there is no further contextual evidence associated with these finds, they will be treated as discrete finds.

WA_1074: Chisel

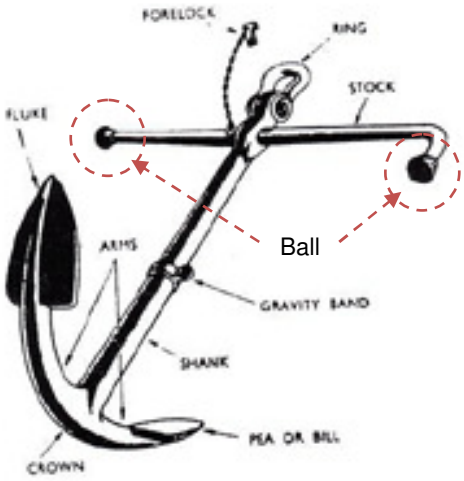
This object was recovered by Tony Payne at Cliffe Wharf on 24th February 2012, within material dredged by the *Victor Horta*.

The object, which is manufactured from iron, has been interpreted as a chisel. At 14.5cm long, it may be complete or it may have originally have had a bone or wooden handle attached to the end seen on the right in the image above. The flat end, seen on the left above, measures 2.4cm wide and would appear to have been designed for use as a chisel.

The origin and use of this item remains unclear; however, it is possibly a ship's tool designed for woodworking or caulking (sealing hull and deck planking to make it watertight). The reasonably small amount of corrosion seen on this object suggests that it is relatively modern (post-1800) in date. Despite having been reported with a series of other discoveries, this item is currently believed to be an isolated find of limited archaeological significance.

There is no contextual evidence available to suggest where this item derived from, but it is probable that it is randomly discarded, from either ship or land. Further finds from the same locality, however, could indicate the presence of something more substantial on the seabed.

WA_1075: Anchor 'Ball'



This iron object was recovered by Tony Payne from dredged material from the *Victor Horta* at Cliffe Wharf on 24 February 2012.

The object is concreted iron and has a diameter of 12cm (including the iron concretion). The object is the 'stop' on the end of a folding anchor stock known as a 'ball'. Admiralty pattern anchors with a folding stock, also known as Fisherman's Pattern anchors, were in use on naval and merchant vessels from the mid-19th century onwards. They remained in use on merchant vessels well into the 20th century. The folding stock saved space and made it easier to stow the anchor. It is unclear as to whether the cap was broken off the anchor arm prior to the dredger removing it from the seabed or during the dredging. The object itself may form part of a shipwreck assemblage and is of some archaeological interest. However this is currently unconfirmed and as an isolated find its archaeological potential is limited.

There is no contextual evidence available to suggest where this item derived from, but it is probable that it is wreck or loss related. Further finds from the same locality may indicate the presence of something more substantial on the seabed.

WA_1076: Decorated Fixture or Fitting

This decorated iron object was recovered by Tony Payne at Cliffe Wharf on 24th February 2012, amongst material dredged by the *Victor Horta*.

The object is a fragment of a decorative fixture or fitting manufactured from iron. The decoration, which is partly obscured by a concretion formed post-deposition, includes reeding (a series of raised parallel lines) and a Regency style circular design, which is visible on the left in the image above. It is most likely the corner piece from a decorative feature such as a fire surround and based on its stylistic details it is believed to date from the early to mid-nineteenth century.

There is no contextual evidence available to suggest where this item originated though it may have come from a wrecked vessel or may have been dumped with material from a terrestrial context. Given the paucity of contextual evidence associated with this find, it is currently being treated as a discrete find of limited archaeological significance. Further finds from the same locality may prompt a re-evaluation of this assessment at a future date.

WA_1077: Patterned Wheel

This patterned iron object was recovered by Tony Payne amongst dredged material delivered to Cliffe Wharf by the *Victor Horta* on 24 February 2012.

Vertical view

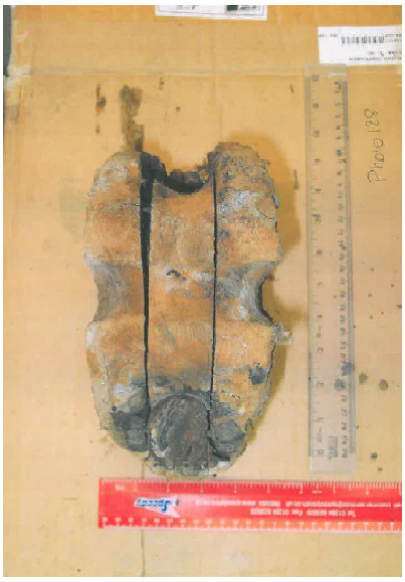
The 'wheel' is made of cast iron and is 20cm in diameter. It has a grid pattern on each of its two faces and a circular hole in the middle.

It is unclear what this disk or wheel was manufactured for but it is not unlike a pulley block sheave. The central hole means it could have been hung or mounted and a thin groove running around the diameter of the 'wheel' could have held a rope. The item shows no signs of rope wear though which may discount this hypothesis.

The grid patterns differ slightly on each side. Pitting in the iron has obscured some areas of the grid, but each side seems to be divided into 24 segments, making it possible that the wheel was used to measure time, with each rotation pertaining to a day.

There is no contextual evidence available to suggest where this item derived from, but it is probable that it is a randomly discarded item, or wreck material. Further finds from the same locality could indicate the presence of something more substantial on the seabed.

WA_1078: Wooden Pulley Block



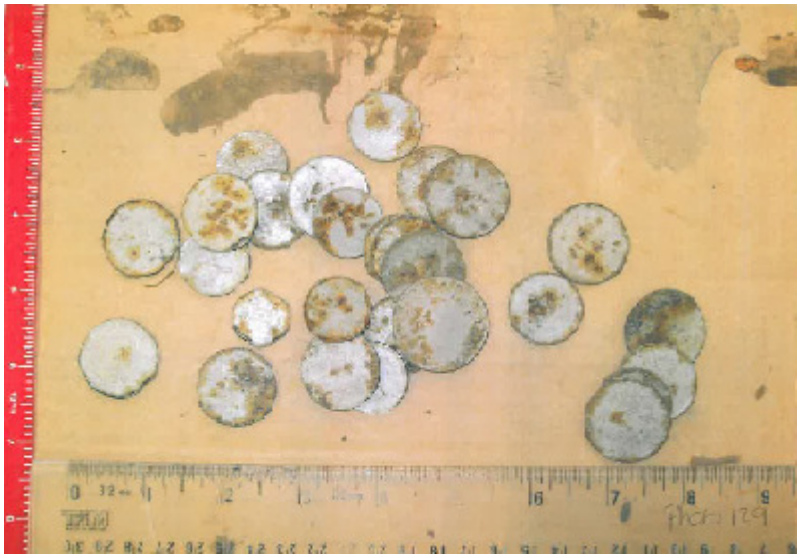
This wooden pulley block was found by Tony Payne on 16th August 2012 amongst material from the vessel *Victor Horta.*

A specialist from Wessex Archaeology has identified and interpreted the fragment.

This pulley block is a single-sheaved pulley likely to have come from the rigging of a sailing vessel. The rounded profile of the grooves seen on the sides of the find, and the material from which the block is made, would suggest that it was thread with rope, as opposed to wire or cable. Rope was used in rigging until it was superseded by wire or cable in the twentieth century, which suggests that this find dates from the post-medieval period (1500 – 1800 AD). Further analysis of the wood from which the block is made may further this interpretation.

There is no contextual evidence available to suggest where this item derived from, but it is probable that it is a randomly discarded item or wreck material from a sailing vessel of the post-medieval period. Further discoveries from the same location would enhance our understanding of this find, and of any site of archaeological significance that may lie on the seabed in that area.

WA_1079: Coins



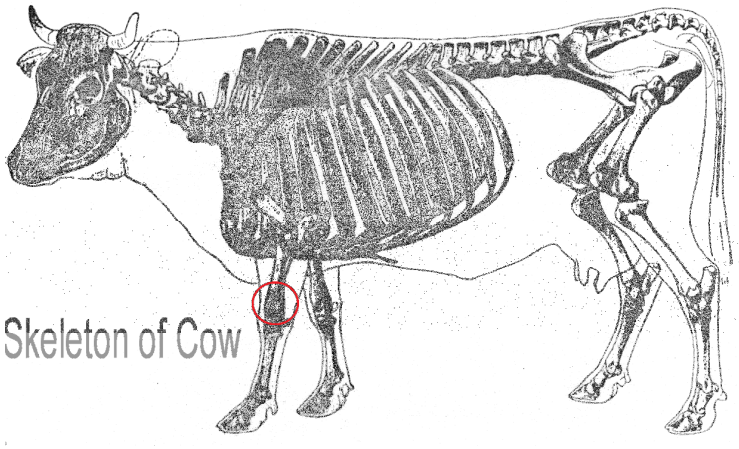
This selection of coins was found by Tony Payne on 16th August 2012 amongst material brought ashore by the *Victor Horta.*

Close examination of the worn coins by specialists from Wessex Archaeology revealed faint markings on some of them. These identify the marked coins as having originated in the African country of Malawi in 1996. The varying sizes of the currency suggest mixed denominations.

The date of minting excludes them from having an archaeological significance as they are relatively modern; however their presence amongst material from London Gateway is intriguing. Many ships use the estuary and whilst Malawi itself is landlocked, a sailor or tourist originating or travelling from the country may prove to be the source. Finding the coins together like this suggests that they were deposited on the seabed in a purse or bag which has since degraded, leaving the coins in a single location prior to dredging. How they came to be on the seabed is unknown. A ship wrecked as recently as 1996 or later would have been recorded, and in all likelihood salvaged, so these are more likely to be an isolated deposit – perhaps as the result of a misplaced throw or fumbled catch, or a deliberate act at the start of a new life.

No further research is necessary due to the modern date of manufacture and minting.

WA_1080: Bone



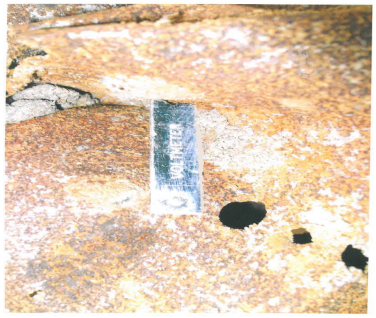
This fragment of bone was found by Tony Payne on 16th August 2012 amongst material brought ashore by either the *Victor Horta* or the *Deme Charlemagne.*

Specialists at Wessex Archaeology have identified the bone as having originated from the knee joint of a bovine. The heavily eroded fragment is broken close to the joint and has suffered considerable degradation, most likely post-deposition.

Whilst the bone was reported with a selection of other finds, it is not thought to be associated with them given the disparate nature of the assemblage. As such this is thought to be an isolated find not indicative of a site of further archaeological significance.

Animal bones like this one may have been lost from a vessel, washed from a terrestrial context or deposited at sea deliberately during refuse dumping. The absence of contextual evidence renders further investigation unnecessary.

WA_1081: Control Panel



A fragment of metal sheeting was found by Tony Payne on 16th August 2012 amongst material from the vessel *Victor Horta.*

A specialist from Wessex Archaeology has observed and interpreted the fragment:

The metal sheet has two plaques one saying 'VOLTMETER' the other saying 'RECTIFIER OUTPUT'. Rectifiers and voltmeters are commonly used in radio communication instruments which are commonly used by both ships and aircraft. This dates the manufacture of the find to within the past 100 years when radio became a primary tool for communication and navigation.

It is not possible to determine on current evidence whether this sheeting originated from a ship or from an aircraft but it would be plausible to find the wreck or wreckage from either in the vicinity in which this was found.

Given the nature and condition of this find it is likely to have come from a wreck site and so further discoveries from this area should be screened carefully in case this find denotes a previously un-investigated site of archaeological significance.

WA_1082: Anchor

A broken iron anchor was found by Tony Payne on 16th August 2012 amongst material from the vessel *Victor Horta.*

A specialist from Wessex Archaeology has observed and interpreted the object.

The anchor is highly degraded and corroded. It has a broken shank at the stock end and damage to both flukes. The absence of a pivot at the crown of the anchor reveals that this would have been a stocked anchor. The surviving width of the anchor arms (less than 50cm) would suggest that this was a small anchor from a small vessel or that it was a kedge anchor, used to enhance the turning capability of a vessel.

The degraded nature of this anchor, coupled with its design and size, suggests that it is from a sailing vessel dating from the post-medieval period (1500 – 1800). Whilst it is possible that this anchor is from a wrecking event, the absence of further finds from the same location suggests that this is a chance find, rather than evidence of a further site of archaeological significance. It may have been deliberately discarded or lost from a vessel.

WA_1083: Cannon Balls




A collection of four cannon balls was found by Tony Payne on 16th August 2012 amongst cargo from the vessel *Victor Horta.*

The cannon balls are all solid iron shot and would have been fired from a smooth bore gun. There are two 4 inch balls, one 3 inch ball and a 3.5 inch ball. The sizes indicate at least two, or maybe three, different sized cannons would have been used to fire these shot.

It is common for vessels to carry varying sizes of guns for use in different battle situations. The size of the cannon balls suggest that the guns used would have been relatively small, which could suggest that they are from a less well armed trading vessel or alternatively that they formed a small part of the armament of a larger ship.

Whilst it is difficult to determine exact dates for individual cannon balls, the use of round iron shot began in the late medieval period and continued through to the latter part of the 19th Century.

There are several situations which would account for the presence of these cannon balls on the seafloor including loss after firing, deliberate discard or loss with a vessel during a wrecking event. The absence of further finds from the same location may indicate that these were lost from a vessel, rather than with one.

WA_1084: Metal Fixture or Fitting

This blade-like metal object was found by Tony Payne on 16th August 2012 amongst material from the vessel *Victor Horta.*

The heavy corrosion seen on the item has made interpretation difficult but the size of the find, coupled with its construction, may indicate that rather than being a blade this piece of metal has been lost from a vessel.

It is difficult to determine exactly what function this item was designed to perform, given its broken nature and the level of corrosion seen on it. It is likely to have either been lost or deliberately discarded from a twentieth century vessel and as such is of limited archaeological significance.

Whilst the find was reported with several others, it is not currently thought to be related to them or to a site of further archaeological interest.

WA_1085: Clay Pipe Fragments

A selection of clay pipe fragments was found by Thomas Hoebeke on 18th October 2012 in the reclamation area stage 2, western cross bund.

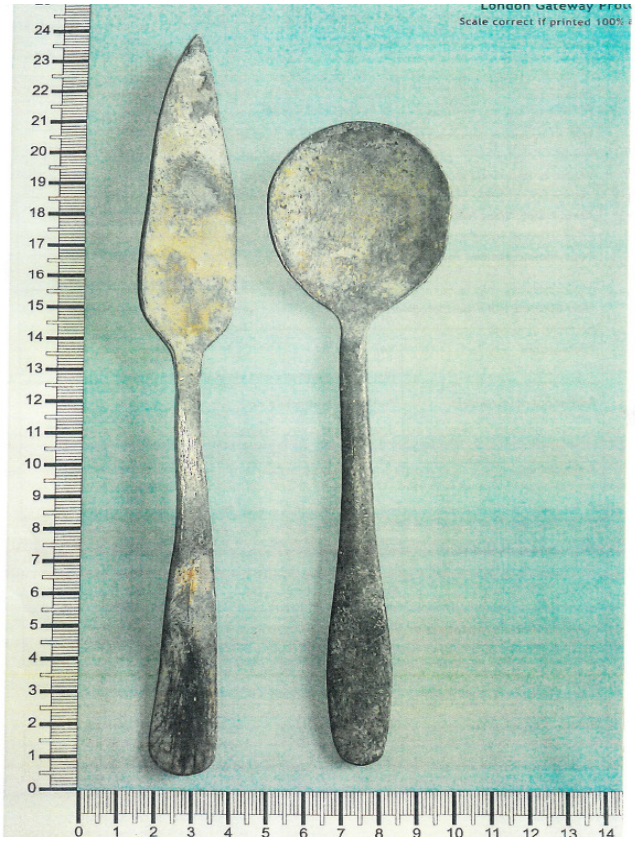
The objects were shown to specialists at Wessex Archaeology.

They are fragments of clay tobacco pipes, which were in use from approximately 1600 onwards. Clay pipes show a distinct typology in the construction of their bowls, which can allow relatively accurate dating. These examples consist only of the stems of the pipes and so further dating is not possible.

Clay pipes were very common especially among sailors, and tobacco later formed part of the daily rations of a sailor in the British and other navies. They were seen as consumables and made in large quantities but due to their fragile nature were frequently damaged and subsequently discarded.

There is no contextual evidence to suggest where these items originate, however it is likely that, as clay pipes are fragile and relatively cheap, they were discarded when broken. It is therefore highly likely that these pipe stems were discarded from passing vessels.

WA_1086: Cutlery



This cutlery was found by Phil Everall on 15th November 2012 in the reclamation Slab Area, Aisle 3, Berth 1.

The objects were shown to in house specialists at WA.

The spoon, with its broad bowl, is a soup spoon and the characteristic blade shape seen on the knife identifies this as a fish knife. The shape and construction of the finds suggests that they are from the late 19th or 20th century, though more likely from the latter.

There is currently no contextual evidence to suggest where these items, which are relatively high status items, derive from. It is possible that they were lost over the side of a vessel or during a wrecking event.

WA_1087: Clay Pipe Fragments

A selection of clay pipe fragments was found by Thomas Hoebeke on 13th October 2012 in the reclamation area Stage 2, western cross bund.

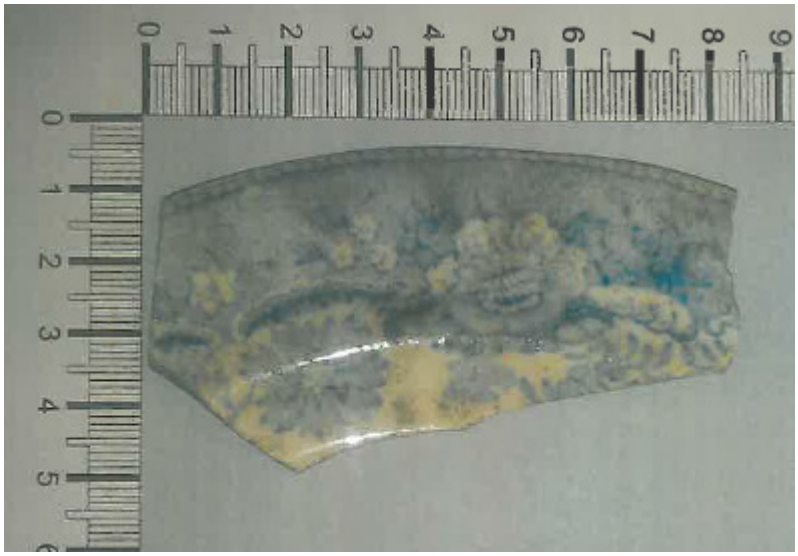
The objects were shown to specialists at WA.

The three fragments are probably from at least two different pipes as the size of the bore on the two stem pieces are of considerable difference. The two stem pieces are hard to date, however the larger bore on the longer example above would suggest a more recent date for this find.

Clay pipes were used from the 1600's until the early 1900's and display considerable typological differences in the construction of their bowls during this time. The pipe bowl shown above displays a spar on the base of the bowl and this, combined with the size and general shape of the find, would suggest that it was manufactured in the 18th Century.

There is no contextual evidence to suggest how these items came to be on the seafloor, however it is plausible that they were discarded or lost from a vessel, or alternatively that they make up part of a wreck assemblage.

WA_1088: Ceramic Plate



This fragment of ceramic was found by Mick Spencer on 8th November 2012 in the reclamation area Aisle 3.

The sherd is from a white glazed plate decorated with a floral pattern. The shallow profile and large diameter suggested by the available measurements indicate that this may have been a platter or serving dish, rather than a side or dinner plate. The characteristic white and blue design on the plate allowed specialists at Wessex Archaeology to date the fragment to the 19th or early 20th Century.

This period coincides with Britain becoming the global trading super-power which saw goods being exported globally by sea. It is therefore possible that the fragment was part of a ship's cargo, though it may also have been in the personal possession of a crewman or used on board to serve food.

There is no contextual evidence to suggest where this item originates, however it is probable that it was discarded or lost from a passing vessel. Alternatively it may have been lost in a wrecking event, though the absence of further associated finds from the same cargo does not suggest this at present.

WA_1089: Animal Bone

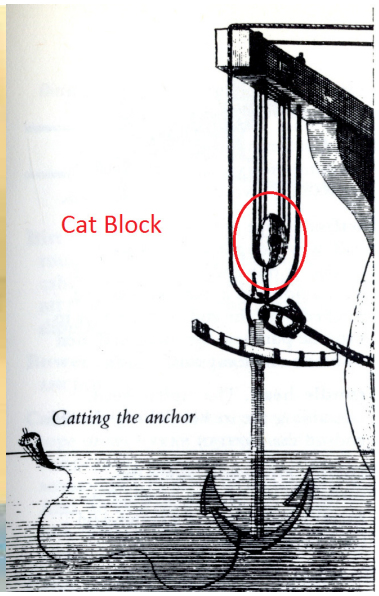
This fragment animal bone was found by Stuart Allison on 6th September 2012 in the Reclamation Area Stage 2, Western Cross Bund.

It is a broken section of bovine pelvis bone from the right hand side of the body. Some of the damage to the bone would suggest that it has been deliberately butchered prior to deposition, which points to it having had a role to play in provisioning a vessel.

Salted meat was a staple food stuff for sailors during the post-medieval and early modern periods, with 2lbs of beef per man being rationed on Tuesdays and Fridays in the 18th century, so it is possible that this find is representative of the victualing of naval or merchant ships.

There is no contextual evidence to suggest where this item derives from, however it is likely that it was either discarded or lost from a passing vessel, or alternatively that it makes up part of a wreck assemblage.

WA_1090: Cat Block



This pulley block was found by M. Stumpf on 5th November 2012 in dredge zone 2 on board the *Ham 316*.

The object was examined by specialists at Wessex Archaeology.

It is a heavily corroded pulley block with a metal strengthening band tightened around the outside. The strengthening would suggest that this pulley was used to lift heavy items, such as an anchor, identifying this discovery as part of a cat block.

To 'cat the anchor' means to have the anchor hanging over the side of the boat by the cat-head ready for deployment or recovery. Cat blocks such as this one were used to assist in the lifting process and would hang from the cat-head extending over the side of the boat.

Cat blocks have been in use for centuries, however from the design and the metal banding suggests that the cat block above dates from the 19th century. It is not known if this discovery originated from a wreck or if it was lost or discarded intentionally.

Image from The Country Life Book of Nautical Terms Under Sail (1978)

WA_1091: WCRL Bottle Stopper and Glass Fragment

The finds shown above were found by D. Leggett during work at the Stage 2 Western Cross Bund.

Examination of the bottle stopper, which fits the sherd of glass bottle neck found alongside it, reveals the letters 'WCRL'. Bottle stoppers similar to this one were in common use in the early twentieth century for bottles containing beer, water and soft drinks, such as ginger beer or soda. However, the initials seen on this example – WCRL – possibly pertain to Wellcome Chemical Research Laboratories, indicating that this bottle held medicinal drugs or serum.

The WCRL was established in 1896 by Henry Wellcome with the aim of furthering chemical research into drug production. Initially based on King Street, London, the WCRL operated alongside Wellcome's Physiological Research Laboratory established in 1894. The laboratories later moved to Beckenham in Kent where they still operate today as a research and development site for GlaxoSmithKline.

The Wellcome Trust is still very active today and was contacted to clarify an identification of this find. WA will forward the Wellcome Trust's comments when they are available.

This find is likely to be a chance find lost or dumped at sea.

WA_1092: Sounding Leads

These two leads were found onboard the *Breughel* amongst material dredged from zones 34-40 in October and November 2012.

Leads such as these were used to determine the depth of water and seabed geology below a vessel as an aid to navigation. They are one of the oldest known navigational instruments, having been in use for over 2000 years.

These examples weigh approximately 7 pounds each, indicating that they were used with hand held lines to measure coastal waters up to a depth of around 20 fathoms. The leads, attached to a line, would have been cast over the side of a vessel and rested on the seafloor. The depth of water would be measured when the line between the lead and the vessel was vertical and markers tied along the lead line allowed the linesman to read it swiftly as the vessel carried on moving.

Both leads display an indent in the base which would have held tallow or wax. This would return a sample of seafloor material to the linesman allowing him to examine seabed geology as a further aid to navigation.

It is difficult to accurately determine a date for these leads but it is likely that they date from the post-medieval period (1500-1800AD). Whilst there is a possibility that they come from a shipwreck site, they may also have been lost or discarded intentionally from a vessel.

WA_1093: Pottery Sherds

These two pieces of ceramic were found onboard the *Breughel* amongst material dredged from zones 34-40 in October and November 2012.

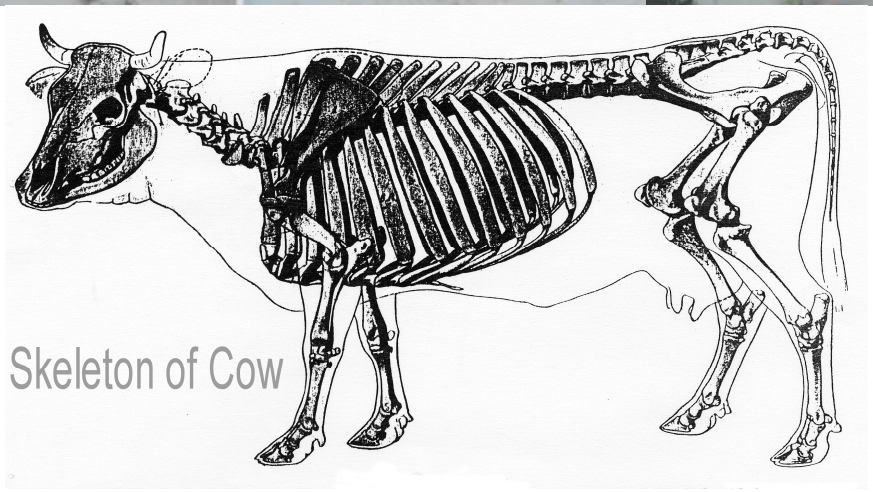
Ceramic Specialists at WA examined both sherds and have identified them.

The larger sherd, shown on the left above, is the broken base of a large bottle or jug. It is German Stoneware which dates from the 17th or 18th century. This type of vessel would have been used to serve or store liquids such as beer or ale as this type of ceramic is relatively robust.

The sherd on the right is later in date. It is made of refined whiteware and a fragment of a transfer-printed motif is visible on one side of the find. Sadly the decoration is too small to prove diagnostic, but it may be part of an institutional logo or design. This example is likely to date from the 19th or 20th century.

The sherds are not contemporary and it is not currently thought, given the disparate nature of the discoveries made alongside them, that they are indicative of a site of archaeological significance. It is likely that the sherds were lost or dumped at sea.

WA_1094: Cattle Bone

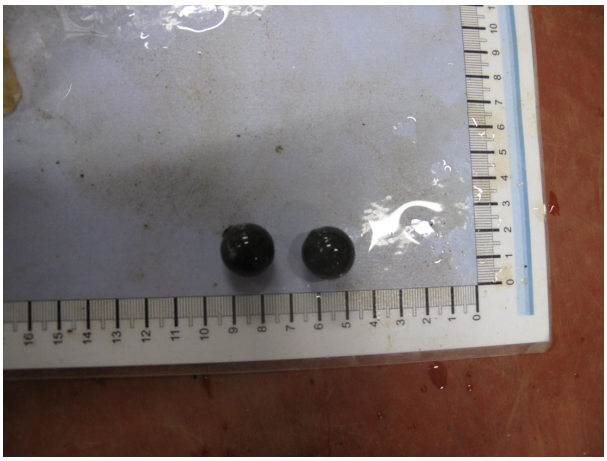


These fragments of bone was found were found onboard the *Breughel* amongst material dredged from zones 34-40 in October and November 2012.

Specialists at Wessex Archaeology studied the bone and believe them to have come from a Bovine. The two examples on the right in the image above are rib bones and the bone on the left is a limb bone. All three are heavily degraded, most likely post-deposition.

Whilst the bones were reported with a selection of other finds, they are not thought to be associated with them given the disparate nature of the assemblage. Animal bones like this one may have been lost from a vessel, washed from a terrestrial context or deposited at sea deliberately during refuse dumping. The absence of contextual evidence renders further investigation unnecessary at this stage.

WA_1095: Musket Balls



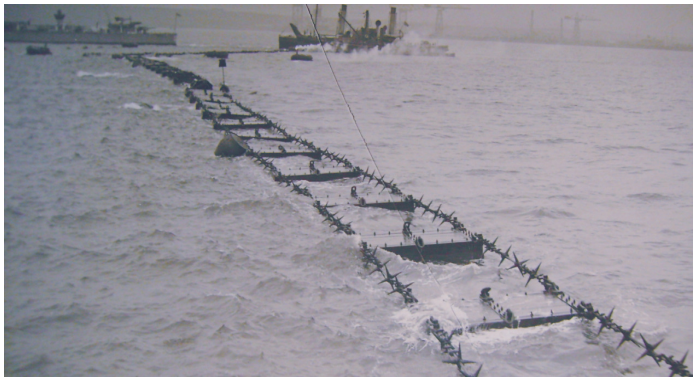
These two musket balls were found onboard the *Breughel* amongst material dredged from zones 34-40 in October and November 2012.

Both measure approximately 1.5 cm in diameter and both are made of iron. These shot are of the correct calibre to have been used with a sea service musket which became popular in the 18th century and dominated naval firearms well into the 19th century. This type of firearm was issued to all Royal naval ships between 1778 and 1854.

Musket balls such as these are common finds in British waters given the large number of battles and naval skirmishes that have occurred around our coastlines. They may have been lost with a vessel but it is more plausible that they were fired, either during a confrontation or as a practice round, before coming to rest upon the seabed.

A Sea Service Musket

WA_1096: Section of Anti-Submarine Boom



This iron object was found onboard the *Breughel* amongst material dredged from zones 34-40 in October and November 2012.

It has been identified as part of a Second World War anti-submarine defence boom that was constructed across the Thames Estuary between Shoeburyness in the north and Minster on the Isle of Sheppey in the south. Evidence relating to this boom has been found previously during the development of London Gateway, prompting the 2008 Wessex Archaeology Technical Report – Anti Submarine Defence Boom Further Documentary Research (WA Ref. 66893.01).

In shallow areas the boom consisted of fixed sections which were piled into the seabed, whilst in deeper waters a floating boom holding a steel net protected the Estuary. Gates were placed into this netting to allow access by friendly ships and submarines. The strength and effectiveness of the boom was tested by HMS *Seawolf* during the Seawolf Trials, shown on the right above.

Whilst the boom has been dismantled, elements of its structure survive at Shoeburyness and at other places across the width of the channel. It is protected by record due to research carried out by WA on behalf of the London Gateway Clearance Programme.

It is plausible that further evidence relating to the boom will be found during continuing work on the London Gateway Development.

WA_1097: Five Shoe Soles

Five leather shoe soles, the two most diagnostic of which are shown above, were found onboard the *Breughel* amongst material dredged from zones 34-40 in October and November 2012.

They are constructed predominantly of leather and evidence of machine stitching is visible on all five examples. The example on the right above also shows the strong cord used for this, as well as a line of brass tacks holding part of the sole in place.

Shoe soles started being manufactured separately (as opposed to being manufactured as part of the body of the shoe) around the 17th century and the earliest machines to stitch the uppers to the soles were invented in the mid-1850's.

The regular stitching on the five examples found amongst material from the *Breughel* indicates that these soles were machine manufactured. Whilst it is difficult to assign an exact date to them, the evidence of machine stitching alongside their relatively good level of preservation suggests that they were manufactured in the latter part of the 20th century.

The discovery of five shoe soles amongst one cargo is interesting as it suggests the loss of several pairs of shoes in a single event. This may have occurred due to deliberate discard, the loss of cargo from a vessel or it may be associated with the loss of a vessel or aircraft in the area.

As these finds may indicate a further site of archaeological significance, it is important that all further finds from this area are reported to WA through the Protocol.

WA_1098: Hand Held Air Raid Siren

This hand-cranked siren was discovered onboard the *Breughel* amongst material dredged from zones 34-40 in October and November 2012.

The find shows no markings which would indicate its age or nationality though, given the circumstances of its discovery, it is likely to be of British manufacture and may date to the Second World War. This type of siren was used extensively on the Home Front to warn of approaching danger from German air raids. Larger electric-powered versions were employed in towns and cities whilst smaller hand-cranked versions such as this one were predominantly used in rural areas where population numbers were fewer. Some examples were mounted on a frame for ease of use but there is no evidence that this example was mounted and its size and weight suggest that it was designed to be held and carried. It is likely to have been issued to and operated by a member of the Air Raid Warden Service, which was established in 1937.

The Imperial War Museum has been approached for further information on this find and WA will forward their response when it becomes available. It is not currently clear how this example came to submerged but it may have been deliberately dumped when it was no longer needed.

WA_1099: Mammoth Tooth and Tusk

These finds were discovered by Tony Payne at Cliffe Wharf. Staff at the wharf are well equipped to recognise and protect archaeological finds, having worked with Wessex Archaeology on the Marine Aggregates Protocol since 2005, and recognised them as a mammoth tooth and a mammoth's tusk when they were discovered.

Several species of mammoth have lived in and around Britain in previous ice ages and it is sometimes possible to determine which species of mammoth the teeth have come from. Images of WA_1186 were shown to experts at the Natural History Museum who identified it as a damaged upper molar of a woolly mammoth, *Mammuthus Primigenius*. Teeth such as these are some the oldest reported through the Protocol, being at least 10,000 years old.

Lorrain Higbee, animal bone specialist at WA, believes that the tusk has also come from a mammoth. Both finds are likely to date to the last ice age when parts of the estuary were dry land. At this time animals and people would have lived in the areas being dredged today and some of the best evidence to learn about Ice Age Britain now lies beneath the waves around our shoreline.

Find ref: WA_1186 and WA_1187

WA_1100: Collection of Cattle Bones

These three animal bones were found at Brett's Cliffe Wharf by Tony Payne. The finds were collected by Wessex Archaeology during an Awareness visit to the wharf and Lorrain Higbee was able to identify them after seeing them at WA HQ.

Clockwise from the top they are: a cattle metatarsal (bone from the back foot), the distal end of a bovine femur and part of the left side of a cow's pelvis. Interestingly, the bovine femur shows signs of butchery with a clean cut through the joint, visible at the bottom of the find in the image above. This bone comes from a young animal – the end of the bone has not completely fused onto the shaft indicating that this animal has not fully grown at the time of death.

Providing a date for these finds is difficult as a lot of archaeological dating is based on a typology of how an artefact type develops over time. As animal bones have changed very little over tens of thousands of years (with only minor variations seen in, for example, the size of an animal or changes in species variant based on climatic conditions or popularity) dating is not often possible. However, the butchery on the femur has left a fairly flat surface indicating that this bone may have been sawn. This, combined with the size of the bone (which is very large), suggests that this animal lived from the post-medieval period onwards (1500-present).

They may have come to rest in the estuary from a vessel where they may have been associated with provisioning crew, or they may have been washed from a terrestrial context. The evidence of butchery on one of the bones supports the idea that it was used in provisioning a vessel on this busy shipping route.

Find ref: WA_1183, WA_1184 and WA_1185

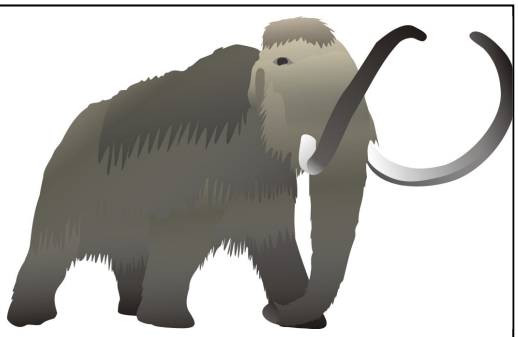
WA_1101: Slag

This find was discovered by Tony Payne at Cliffe wharf. With its moulded shape, tapered profile, dense nature and heavy weight it has been interpreted as slag – a waste material of the smelting process. This was confirmed by Bob Davis, an expert in industrial archaeology.

Slag is created during the smelting of ores to create usable metals. Consisting of a mixture of metal oxides (amongst other things) it is both a waste material, removing unwanted elements from the metal being manufactured and (through its production and removal from the furnace) can help with temperature control during firing.

When produced slag is a red-hot liquid. This example appears to have been poured or to have otherwise settled in a mould, creating the characteristic curved corner seen in the top left of the image above. How this find came to be lost in the Estuary is not known but, given the dense weight of the find and its size it may have been used to weight nets or lobster pots. Waste metals were often used for such purposes given their ready availability and cheap cost. It was reported alongside find ref: WA_1178.

WA_1102: Mammoth Teeth and Cattle Bone



Mammuthus Primigenius,
Woolly Mammoth

These three teeth were discovered by Tony Payne at Cliffe Wharf. They are all teeth from a woolly mammoth*, Mammuthus Primigenius*. Images of the finds were sent to the Natural History Museum where Dr Adrian Lister identified WA_1176 and WA_1177 (seen on the left above) as upper molars of a woolly mammoth, and WA_1175 as a damaged molar from the same species.

There are several species of mammoth that have lived in Britain and in the areas around our coastline when climatic conditions allowed it in the past. *Mammuthus primigenius*, the woolly mammoth (pictured), is one of the younger species, evolving around 200,000 years ago in Asia and disappearing from Britain around 14,000 years ago during the Pleistocene, though isolated populations are thought to have existed in remote locations until as recently as 4,000 years ago.

This type of material can help our understanding of climatic change, species movement and human development during the most distant archaeological periods.

The bone found and reported alongside them is part of a cow's pelvis. It is not thought to be connected with the mammoth teeth as it shows signs of having been butchered with a saw. The butchery mark on the back of the bone shows a clean cut suggesting that this was butchered sometime from 1500 onwards (post-medieval to present). This bone is likely to have played a role in provisioning the crew of a vessel, leading to its deposition in the estuary.

Find ref: WA_1174, WA_1175, WA_1176 and WA_1177

WA_1103: Butchered Animal Bone

This animal bone was found by Karl Salter in reclamation area berth 2 in March 2013. Lorrain Higbee, Wessex Archaeology's animal bone specialist, identified it as the humerus of a bovine.

The bone, which would have formed the shoulder of the animal, shows signs of butchery. The photograph on the left above shows clearly a cut mark where the bone has been carved – most likely for meat.

Whilst it is not possible to ascertain how these finds came to be on the seabed, it is plausible that it is representative of the victualing of naval or merchant ships. Salted meat was a staple food stuff for sailors during the post-medieval and early modern periods, with 2lbs of beef rationed per man on Tuesdays and Fridays in the 18th century.

Providing a date for these finds is not possible. A lot of archaeological dating is based on a typology of how an artefact type develops over time. As animal bones have changed very little over tens of thousands of years (with only minor variations seen in, for example, the size of an animal or changes in species variant based on climatic conditions or husbandry) these finds cannot be dated.

Find ref: WA_1180

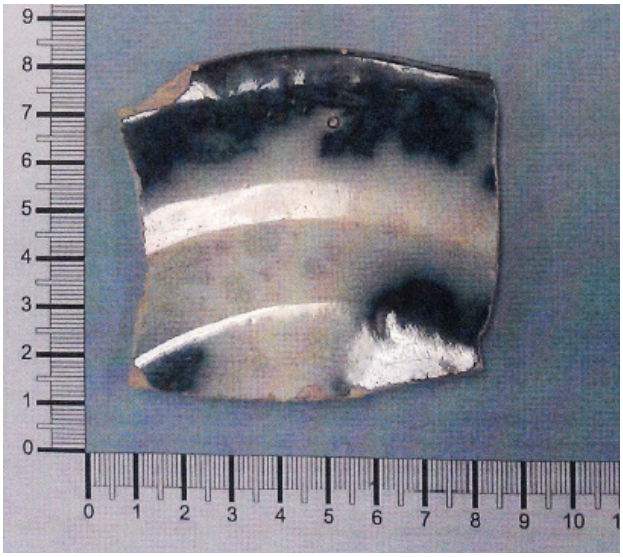
WA_1104: Decorated Item

This is an interim report for find WA_1187, shown above. The find was discovered by Steve Bobbins in berth 1.

It is elaborately decorated with a scrolling wave pattern which is an organic type of Greek key, sometimes called a 'running dog'. The pattern became popular during the 'Greek revival' of the early to mid-19th century, providing a potential date for this find. A slight green tinge combined with its excellent level of preservation suggests that this is made from copper or brass. Copper is commonly used in the marine context due to its resistance to corrosion but it is more commonly seen in use for functional fixtures and fittings on board vessels.

A parallel has been found for the decoration on this find. A fragment of scrollwork discovered on a frontier site dating to the late 18th century in America shows a very similar pattern. However, identification of the American item has not yet been published. (parallel - http://www.thehistoryblog.com/archives/25142). Given the potential for this find's American parallel to have an association with artillery, images were sent to Jonathan Ferguson, Curator of Artillery at the Royal Armouries Museum. Unfortunately he was not able to recognise it as having originated from a gun though did suggest that it may have had a role as the lid of a powder horn.

WA_1105: Glazed Ceramic



This was found by Steve Bobbins in Berth 1 in spring 2013.

The shallow profile of the find, combined with the gently undulating curve seen on the top of the item in the image above suggests that this find was part of a platter – a large serving dish – or a large plate. Images of the find were shown to Lorraine Mepham, finds expert at Wessex Archaeology. She identified the find as part of a glazed refined whiteware item of flatware with a transfer printed decoration (seen in black in the image above). The find is likely to date to the 19th or 20th century.

Glaze came into use in the medieval period in Britain revolutionising the way in which pottery was manufactured. Prior to this, ceramic vessels were porous allowing liquids to seep through them, unless smothered with animal fats. The first glazes were green in colour and being expensive to produce were only applied to the inside of each vessel. As pottery and glaze manufacture developed different colours were introduced and glazes became cheaper. By the late nineteenth century glazed pottery had become affordable and different techniques, such as transfer printing, were used to create a variety of patterns and designs.

This broken example may have been washed from a terrestrial context or, more likely, lost from a vessel using the Estuary. Whilst pottery can be found associated with shipwrecks, no evidence of a wrecked vessel was reported with this sherd.

Find ref: WA_1182

WA_1106: Anchor

Mathijs Blanken and the crew of the *Bever* found this anchor during operations in Quay Wall, Berth 3 on behalf of London Gateway. It was kept on board the *Bever* and landed.

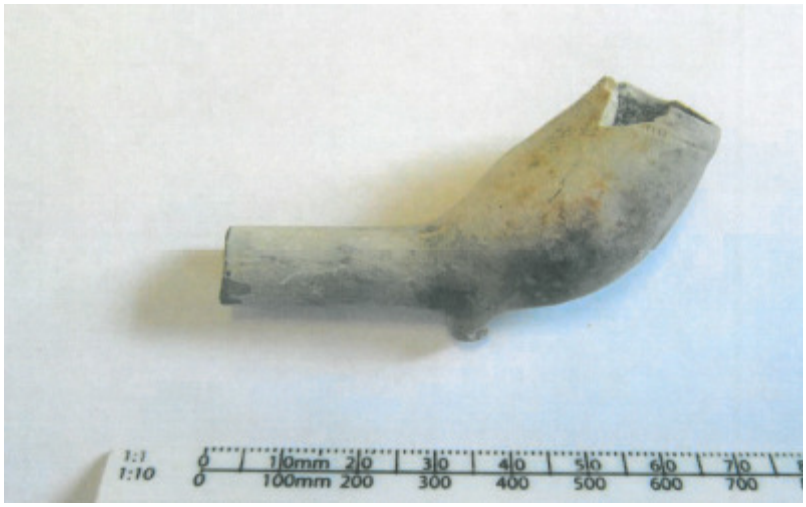
Toby Gane of Wessex Archaeology has identified the anchor as a Byers Stockless Anchor. W. L. Byers of Sunderland patented this style of anchor in 1887. This late 19th century invention marked the largest change in anchor manufacture and use in centuries, as removal of the stock made deploying and retrieving the anchor far easier. To compensate for the lack of stock, tripping palms seen here on the top of the anchor (on the left of the picture) were added to ensure the flukes 'dug in' to the seabed when in use.

This style of anchor was patented in 1887 and approved by Lloyds in 1904 revealing that the anchor pictured above was manufactured, used and lost within the last 126 years. It is not known where in that period this anchor dates and it is possible that it is a fairly recent example.

Finds such as this one which have originated from a vessel must legally be reported to the Receiver of Wreck under the Merchant Shipping Act (1995), and Wessex Archaeology will assist with this reporting for Protocol finds.

Find ref: WA_1188

WA_1107: Clay Pipe



This clay pipe fragment was found by David Brown in 2013 in the reclamation area stage 2. It is the bowl and part of the stem of a broken clay pipe. Images of the find were shown to Lorraine Mepham, finds specialist for Wessex Archaeology.

Lorraine identified that this broken pipe bowl has a short spur on the underside and a partial stem, seen on the left above. This type of clay tobacco pipe was in use from approximately 1600 onwards and clay pipes show a distinct typology in the construction of their bowls, allowing relatively accurate dating. This example, with a milled pattern visible around the top of the bowl, dates to between c.1640 to c. 1680 and was probably manufactured in the UK, as opposed to on the continent. Examples showing a parallel form have been found within the London typology (Reference: Atkinson, D. and Oswald, A., 1969, London clay tobacco pipes, *J. Brit. Archaeol. Assoc*. (3rd series) 32, 171-227).

Clay pipes were very common especially among sailors, and tobacco later formed part of the daily rations of a sailor in the British and other navies. The pipes were seen as consumables and made in large quantities but due to their fragile nature were frequently damaged and subsequently discarded.

There is no contextual evidence to suggest where this item originated, however it is likely that, as clay pipes are fragile and relatively cheap, it was discarded when broken. It is therefore highly likely that this pipe was discarded from a passing vessel.

Find ref: WA_1189

WA_1108: Artillery Projectiles & Case

These projectiles and shell case were discovered by the Breughel in zone 104 – the master on watch at the time was Ruben Prins. Explosive experts were alerted in line with DP World safety policy (which takes priority over archaeological reporting in every circumstance) and the finds were certified free from explosives.

Images of the finds were shown to Nicholas Hall, Keeper of Artillery at the Royal Armouries Museum based at Fort Nelson. He confirmed the interpretation given to them when reported. They are described as, from left to right, a 5" solid shot, a 4" cartridge case and a 6" Palliser shot.

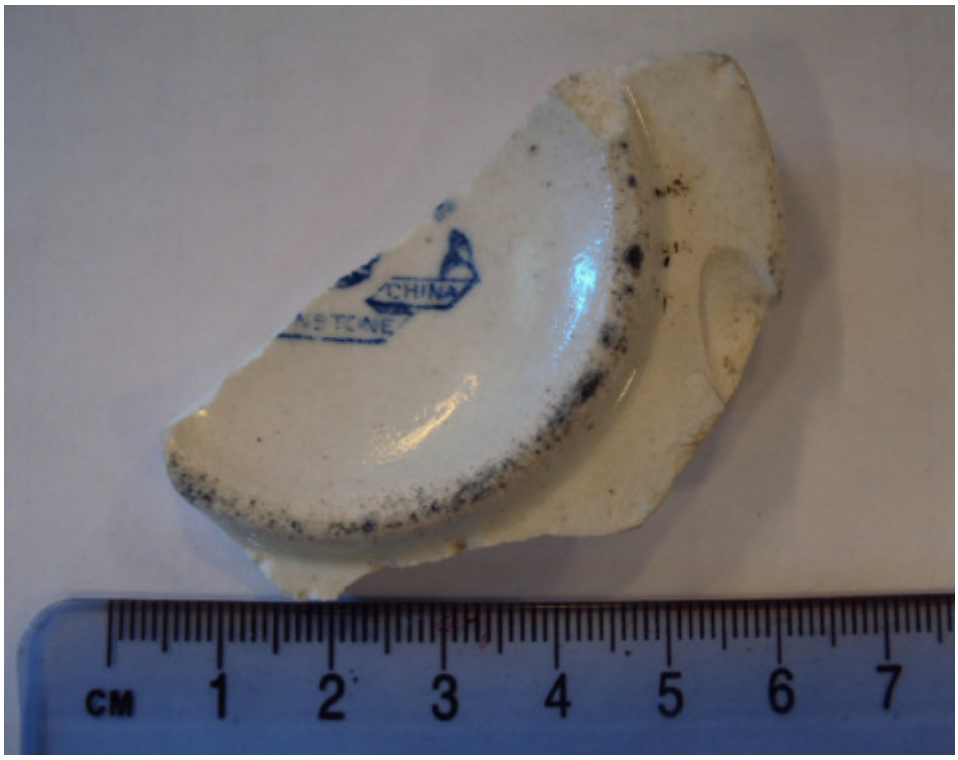
Wessex Archaeology's Toby Gane identified the projectile on the left above as a solid shot, probably dating to the late 19th century. Swaging (wear) on the obturating ring at the base of the find indicates that this example has been fired. 5 inch breech loading guns were used in Naval service from the 1870s to the 1880s before being replaced by quick firing 4.7 inch guns.

The object in the centre above is a brass shell casing which would have held the propellant that would have fired the projectile. The 4 inch gun in breech loading and quick fire formats were used between 1909 and WW2 in naval form.

The shot on the right hand side is more difficult to identify, but is probably a studless Palliser shell of the late 19th century. The Palliser shell was invented by Major Palliser in 1867, designed to defeat the armour of the new ironclad ships. It was phased out in 1909 on ships and it 1921 for land service.

Find ref: WA_1190, WA_1191 and WA_1192

WA_1109: Ceramic



This is a sherd of ironstone pottery manufactured by Ashworth Brothers Ltd. in the early 20th century. It was found by Stijn De Ridder on the *Breughel* during work in zone 5 and zone 46. The partial stamp seen on the find – which reads '…NSTONE CHINA' – is part of a larger stamp reading 'REAL IRONSTONE CHINA' usually printed by the company in a scroll (like that seen above) underneath a crown and the company name. Lorraine Mepham, pottery specialist for Wessex Archaeology, reveals that Ashworth Brothers Ltd. was founded in 1862 and traded until 1968, becoming a Ltd. company in 1914.

Ashworth Brothers Stamp

The Ashworth company brand went through several iterations and the example seen above was their 20th century printed mark (Godden 1964, 39, no. 148). This is the base of a vessel. Given the small size of the base (approx. 5cm diameter) this find is likely to be a sauce dish or very small plate.

Ashworth Brothers created their own ranges of pottery but were also commissioned to produce branded items for larger companies. Examples seen in the course of investigating this report include plates for the London Midland and Scottish Railway and a chamber pot made for the Union-Castle Shipping line. The piece above may have been manufactured for a corporate client though it would appear there is little space for a client company name above the Ashworth brand on this item, so this may have been a standard domestic piece. It is likely to have been lost from a vessel using the estuary in the late 19th or early 20th century.

Reference: Godden, G.A., 1964, Encyclopaedia of British Pottery and Porcelain Marks

WA_1110: Turnbuckle or Bottle Screw

This heavily corroded find was discovered by Ainhoa Simon in the Stage 2 reclamation area (Bird Bund) in 2013. It is not known which vessel dredged it from the estuary.

The finders describe this as a turnbuckle – an interpretation which Wessex Archaeology would agree with based on the image above. A turnbuckle is used to tension ropes and cables in a variety of contexts. Given the circumstances of its discovery, it is likely that this artefact came from a vessel operating on the Thames Estuary. Turnbuckles (called “bottle screws” on sailing ships) were used to tension a ship’s shrouds and stays. It is made of iron and has suffered the negative effects of salt water on ferrous metals, which has caused the corrosion seen above. Due to the degradation of the item, it has not been possible to provide a firm date for its use though it was plausibly manufactured within the last 200 years.

Find ref: WA_1194

WA_1116: Iron Tool

This iron tool was discovered by Tony Payne at Cliffe Wharf. It is the third iron find of this nature discovered from the estuary and reported by Cliffe in recent years.

As yet, WA has been unable to assign a firm ID to the finds, other than to identify them as tools. All three show some form of aperture allowing them to be hafted (seen on the right in the image above) and all three have been made of wrought iron. The construction and form suggests that they are of relatively recent construction – likely late nineteenth or early twentieth century. Wrought iron was popularly used to manufacture edged tools until being overtaken in favour by steel in the early twentieth century. The discovery of three similar finds (the other two are assigned find ref: WA_1024 and find ref: WA_1109) suggests that these were likely to have been common tools in use on or around the estuary and as such it seems plausible that they originated on a vessel.

It is hard to ascertain the true shape of the find given the level of degradation seen on all three items but the tapered nature of them, coupled with knowledge of common tool types, would suggest that this would originally have been a cutting blade. Blades were commonly used on ships for a range of tasks including general repairs to wooden vessels or releasing snagged ropes. WA will continue to investigate this find and will issue updated reports if a firm ID is found.

Find ref: WA_1178

WA_8205: Timbers

A range of timber items were discovered at 0630 hours on the 08th of August 2011 by Jan Admiral aboard the *Congo River* in Zone 108.

Initially, it was believed that the timbers could be from a wreck site. However, once the timbers had been examined it was found that they were mostly modern, and probably discarded recently. Only one timber, pictured above, was found to be potentially from a maritime origin. However, as an isolated find it was not considered worth pursuing the source of the discovery.

There is no contextual evidence available to suggest where this item derived from.

WA_1140 – WA_1151: Timbers

These twelve timbers were discovered by the *Breughel* during dredging of the Thames Estuary. They were dredged between 24th October and 23rd November 2012 in zones 34 – 40. The time over which they were discovered suggests they may not all be part of a coherent assemblage (and may represent more than one event) or a very widely dispersed site or sites.

WA_1140 (top row, left): This timber has only been examined in photographs taken on board the *Breughel*. The find measures approximately 30cm along its longest length but turns after a break in the item. It has clearly sustained some damage, likely to have occurred post-deposition or during recovery. The find's shape suggests that this is a plank but it cannot be confirmed.

WA_1141 (second row, right): This timber measures approximately 124 x 12cm and is broadly square in cross-section. This is likely to have been framing of a vessel. Two faces of the find display iron staining and the remnants of concreted iron indicating the attachment of a plate or fitting on two sides of the timber. The area with ferrous-staining measures approximately 45cm in length.

Five clear iron bolt or spike fastening holes are visible within the discoloured area (arranged two holes adjacent to each other at one end, one centrally located, and a further two adjacent to each other at the other end) and two further holes are visible outside of the stained area on the timber. All of the holes in this item contain metal pins or are discoloured indicating where metal pins would have been inserted. There are no indications of wooden treenail use which may suggest that this find is one of the more recent in this report.

WA_1142 (bottom row, right): This timber measures approximately 120 x 16cm and is interpreted as a plank. Three treenails are present, arranged in a single fastening fashion. Both terminals have been damaged. Interestingly, one of the flat surfaces of this timber has damage in the form of pits and abrasions (believed to be historic) which is absent from its opposite side. This potentially indicates that one surface of this plank was exposed to natural or human elements whilst in use, whereas the other side was protected. Alternatively, one side may have been buried whilst the other was exposed on the seabed.

WA_1143 (top row, right): This timber has only been examined in photographs taken on board the *Breughel*. It appears to be a fragment of a broken block, potentially a dead-eye.

WA_1144 (third row, left): This timber measures approximately 1.2m long. It has a square cross-section and is in fair condition, apart from being damaged at one end. The opposing end has been clearly bevelled forming a 'v-shape' which aided the abutment of the timber to another frame on a vessel. This timber is potentially a deadwood, although this cannot be confirmed. It displays three treenails set in an alternating or diagonal pattern and one hole for an iron fastening. The treenails' diameter measures 3cm. A curving 'cut' seen on the side of the find is interpreted as post-deposition or recovery damage.

WA_1145 (third row, right): This timber measures 60 x 10cm and has a broadly square cross-section. Four treenails are present set in an alternating pattern and extending through one axis of the timber, whilst two iron nails are present extending through the timber at a 90° angle to the treenails. One end displays a potential scarf join, although damage prevents confirmation of this. This is potentially a piece of frame.

WA_1146 (third row, centre): This timber measures 89 x 16cm and is interpreted as a frame. It is square in cross-section and four *in situ* treenails are present as well as one iron fastening. Whilst the timber is clearly worked no tool marks were noted on it. The timber is in fair condition apart from a post-recovery longitudinal split and damage to one end. The affected end also displays a chamfer which is part obscured by damage. This may have been a plain scarf join and a broken treenail hole is noted in the chamfered section.

WA_1147 (second row, left): This is potentially a fragment of plank with one *in situ* treenail and one treenail hole set in a vertical pattern. It is heavily abraded and appears lighter (in both colour and weight) than other timbers reported here. This timber has been affected by bio-infestation.

WA_1148 (right): This is one of the most diagnostic timbers reported here and is recognisable as a knee. It has one area of recovery damage and three 'grazes' that may represent tool marks from its manufacture, although this cannot be confirmed. No other potential tool marks were noted. Only one treenail hole is present which measures 2cm diameter. Wooden vessels can contain several types of knees which vary in shape and profile. It has not been possible to determine conclusively where in the vessel this piece may have fitted, although it is potentially a hanging knee. Comparable examples have been recorded from vessels of late post-medieval or early modern date.

WA_1148

WA_1149 (bottom row, left): Measuring 70 x 10cm this find is not clearly diagnostic. It is potentially a piece of degraded frame though damage to all four sides and both ends makes further interpretation difficult. One broken treenail hole was noted, measuring 3.5cm in diameter.

WA_1150 (top row, centre): This find has sustained heavy damage post-deposition or during recovery. Careful examination revealed one treenail hole and one hole with iron staining masked by the damage to the find. The 'L'-shape seen here is interpreted as having been formed by breakage and the find is thought to have originally been straight. The least damaged section of the timber is flat suggesting that this find was originally thin planking.

WA_1151 (bottom row, centre): This timber measures 106 x 15cm and is uncharacterised. It has the remains of two partial treenail holes and a clear area of post-depositional damage. Damage to the find prevents further interpretation, though it is potentially planking.

These timbers were reported together by the *Breughel* but they are recorded as having been dredged over several days and in several areas. Because of this they are not being considered as a distinct assemblage (though this cannot be entirely discounted) and they may represent several different deposition events. The most plausible origin for worked wood of this kind found offshore is from a vessel, potentially one wrecked and lying on the seabed. The planks and timbers reported here are likely, based on form and features, to have originated on a vessel.

Extensive work has been conducted in the estuary prior to the start of dredging and mitigation put in place to protect known or suspected sites of archaeological significance. However, it is possible that some archaeological remains may have been overlooked due to being masked by sediments or because any geophysical anomaly that represented these remains was difficult to interpret. These timbers have only a limited capacity to inform our archaeological knowledge of the vessel or vessels they originated from or of any sites of significance connected to them that may yet lie in the estuary.

Unreported Find: Piston Lining

This item was handed to archaeologists working with DP World to protect heritage in the Thames Estuary during deepening of the shipping channel. It is not known when or in which part of the estuary this item was found.

Steve Vizard of Airframe Assemblies Limited identified the item shown above during a visit to Wessex Archaeology's Salisbury office as the lining of a piston from an aircraft. This piece formed part of a Jumo 211 engine which was potentially fitted to a Heinkel 111. The production of the Heinkel 111 in the early 1930's directly contravened conditions imposed by the Treaty of Versailles. As such it was marketed as a transport plane, despite it having characteristics of a bomber, and eventually being used as such, after the outbreak of WW2. This find is German and dates to the Second World War.

The extensive damage on the find above, combined with its having been found offshore, suggests that this has come from an aircraft that was downed or damaged during action. Concentrated sites of aircraft remains from the estuary, such as the well publicised Junkers 88 T, produce significant amounts of material. The absence of any reports of aircraft material that could be associated with this find suggests that this is from a highly dispersed site or that this has moved into the shipping channel from elsewhere. In itself it does not suggest a significant site of further interest, especially given the lack of information about its original position, although it is possible that it has come from an as yet undiscovered site of interest.