Historic Timber-built Seacoast Piers of Eastern England: Technological, Environmental and Social Contexts

Volume 2 of 2

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Volume 2: Individual case study notes

Contents

Volume 2

Individual case study notes: scope and contents

All of the identified timber-built pier sites of the east coast were initially investigated as individual case studies. These investigations involved site inspections, archives, libraries, museums and gallery visits, consultations with HER's and online searches. The gathered research data exists in a variety of hard copy and digital media. Hard copy is stored in a series of site and theme specific ring binder folders, digital data in site and theme specific folders on a personal laptop backed up by copies on memory sticks. Within this gathered data, what was perceived to be the principal elements most pertinent to the questions of this research were also written up in 'word documents' as a series of case study notes. The purpose of the notes was to serve as a readily searchable, referenced, general aide memoire providing most of the essential basic information on each site. An additional function of the notes was to keep supervisors appraised of the direction of investigations and of the character and scope of the data collected. The case study notes provide far more detailed information on each individual site than can be conveyed within volume 1 of this thesis and their inclusion here is simply to provide ready access, on a site by site basis, to that core data utilised within it.

The structure and contents of the separate case study notes are of similar, but not uniform, format, with disparity largely being governed by the nature and volume of the data in each case. Broad themes covered within the notes are such matters as previous study, historical town backgrounds, environmental setting, technical data, social context – including ownership, control and funding, evidence for craftsmen, engineers, associated buildings and fortifications, etc. Where the data is particularly rich and from a variety of source types, then certain of these aspects may be considered under such separate source sub-headings as documentary, cartographic and pictorial.

Case study 1: Newbiggin by the Sea

Summary of previous work

The small town of Newbiggin by the Sea, Northumberland, has one work that has dealt with the settlement's port. The town's medieval pier also finds reference in a number of works dealing with the wider region. A short fifteen page booklet entitled 'The Ancient Port of Newbiggin by the Sea' by Mary Brown refers to the pier in four very brief paragraphs with most of this being derived from earlier publications. The use of the term 'port' in the title is arguably a slight misnomer as the booklet is essentially a history of the town, though historically speaking, the town has indeed served as a port (Brown 1962). John Hodgson's 'History of Northumberland (Part II, vol. II), recounts a handful of contemporary references to the pier and port whilst John Wallis's 'Natural History and Antiquities of Northumberland' (vol. II) briefly describes the pier's then vestigial remains (Hodgson 1832, 216 – 217; Wallis 1769, 340). Crawford Hodgson's 'History of Northumberland' (vol. VI) quotes one historical document referring to the pier whilst Richard Welford's 'History of Newcastle and Gateshead' (vol. I) makes passing reference to the port (Hodgson 1902, 74; Welford 1884, 19).

The Northumberland Historic Environment Record, English Heritage websites such as 'Pastscape' as well as the Archaeology Data Service hold data pertaining to the medieval pier of Newbiggin, though this is exclusively drawn from the above sources (www.pastscape.org.uk; http://archaeologydataservice.ac.uk)

Town background

Swathes of the far north of England, including the region in which Newbiggin lies, were not recorded in the Domesday Survey and it is consequently uncertain whether or not the medieval town had origins in the pre-conquest period. The first mention of the town is in 1187 where it is referred to as *'Niwebiginga'* (Mills 2011). The place-name *newbiggin* is overwhelmingly of northern English usage and occurs as both a settlement place-name

and a street name, there being at least ten such place-names and dozens of street-names (streetmap).

The manor of Newbiggin was early a possession of the Baliol family, future kings of Scotland (Hodgson 1832, 215). This holding was taken into the English king's hands in 1295, was passed to the Earl of Richmond in 1299 and subsequently fell to other families (History.ac.uk). Rights for a weekly market and annual fair of eight days were granted in 1204 (Letters 2005). Although the township formed part of the holdings of secular lords it seems reasonably clear that free burgage was held in Newbiggin and that it was in essence a borough, at least in the 14th century. The town appears as such in the handlist of boroughs published by Beresford and Finberg and these authors point out that in 1307 the settlement was taxed as a borough whilst a state paper of 1372 implies the same (Beresford and Finberg 1973, 144). Although fairly small the township was valued at £87 19d in the Lay Subsidy of 1334 and was considered significant enough for bailiff representatives to be summoned, along with those of several other towns, to attend a council at Warwick held under the Bishop of Lincoln and the Earl of Warwick (Letters 2005; Hodgson 1832, 217).

Whilst the town may have been of some importance within the 14th century its significance was not maintained in following centuries. The town did retain its market role and continued to be a base for fishermen and to function as a port, particularly for the export of corn, albeit without a pier. To a limited extent Newbiggin developed as a seaside watering place in the later post-medieval period though did not achieve any great renown as such beyond the north-east. In 1821 the town contained just 82 houses and a population of 434, the greater part of which were fishermen (Hodgson 1832, 213).

Environmental and topographical aspects

Some 24km from the centre of Newcastle Upon Tyne Newbiggin lies on the East Northumbrian coastal plain and nestles adjacent to the northern end of a small bay formed by two rocky promontories that provide a well sheltered haven measuring around 0.85km in length (south-west – north-east). Particular shelter within the bay is provided from the prevailing elements from the north and north-east. Much of the shoreline is of sand whilst between the shore and the land is a modern seawall of concrete together with

other modern anti-erosion structures. These defences have became necessary within the 20th century due to greatly increased rates of erosion that are believed to be resultant primarily upon subsidence produced by post-medieval coal mining that has lowered the level of the seabed (Atkins 2004, 12-13). The land behind the seawall on which the town is situated is, for the most part, very low lying, this ranging from little over 4m OD in the north to a maximum of just over 13m OD in the south. Solid geology in the locality is principally of Carboniferrous sandstones, within which some mudstone and siltstone is also present (BGS). The superficial geology of the area is of glacial till with some blown sand being recorded in the northern part of the town.

The scant medieval documentation regarding the pier does not specify its location though observations were made in the 18th century of *"stones and some of the piles of wood"*, by John Wallis *"on the northern point of the bay"* (Wallis 1769, 340). Wallis, probably correctly, identified these remains as *"the vestiges of an old pier"* which were visible at low water. The remains have not been seen since Wallis's time and it has been assumed that they have been lost to coastal erosion (www.pastscape.org.uk). The proportions and orientation of this pier were not stated but in all probability it headed out to sea in a southerly or south-westerly direction thereby providing added security to the northern part of the bay. A modern mole of stone lies in what may have been the area of the historic pier.

Figure 1, Aerial view of Newbiggin by the Sea and its sheltered bay. The town of Ashington lies immediately to the west (inland) of Newbiggin. The medieval pier is believed to have been located in the area of the northern headland and probably extended into the sea in a south or south-westerly direction – perhaps in the same location as the modern stone mole. Probable pier site shown in red.

Technology

Documentary evidence

Newbiggin's maritime aspect is evidenced in state papers prior to the first recording of a pier. An order from the king in 1310, for example, required Newbiggin to supply a ship for service against the Scots (Welford 1884, 19).

A pier is likely to have been present by 1316 when a grant of quayage, upon all wares brought by water into the port of the town, was made to the bailiffs and good men of neubyigging for six years (Cal. Pat. Rolls 1316). The grant was made by the king at the request of his kinsman, the Earl of Richmond who was lord of the manor. The port, and not specifically the pier, is mentioned in a number state documents including circular letters sent to English ports. One of these, of 1326, required searches to be made for letters prejudicial to the crown and for any carriers to be arrested (Cal. Pat. Rolls 1326). This included the port of *"Neubygging"* where the addressees were John de Wangeford and John le Clerk. It is probable that these individuals were the bailiffs of the borough.

The first reference to unambiguously indicate the presence of a pier at Newbiggin is within an inquisition held in 1335. This recorded that a considerable amount of timber had earlier been felled in the woodlands of Bywell, some 37km to the south-west of Newbiggin (Hodgson 1902, 74). A 'greater hundred' (i.e. one hundred and twenty) oaks are reported to have been taken by the ministers of Mary, Countess of Pembroke, to repair amongst other things, the *"pera' of 'Newebynging"*. Further mention of the pier is made in 1352 when Thomas Hatfield, the Bishop of Durham, granted an indulgence of forty days to all within his diocese *"who, by will or otherwise, would contribute assistance to the repair and maintenance of the pier of Newbigging, for the security of*

shipping resorting thither" (Hatfield's Register, Durham Cathedral Archive, transcribed by Hodgson 1832, 216, 219).

Hatfield's indulgence forms the last reference to the pier. The lack of later reference suggests that it may have ceased to exist within the 14th century. That the pier may well have been short-lived and was seemingly in the possession of the townsmen of a fairly small township suggests the likelihood that it was of relatively small-scale and quite probably tidal, i.e. dry at low water.

Cartographic and pictorial evidence

There is no known cartographic or pictorial evidence relating to the medieval pier at Newbiggin.

Material remains

As has been noted John Wallis recorded the presence of *"stones and some of the piles of wood"*, *"on the northern point of the bay"* (Wallis 1769, 340). This description almost certainly relates to a timber-built pier and quite probably the one described in 14th century documentary sources. The remains have not been seen since Wallis's time and it has been assumed that they have been lost to coastal erosion (www.pastscape.org.uk).

The form of the pier

There are only two pieces of information that provide clues to the form of the 14th century pier. The first of these is the use of oak timber in the repair of the pier (Hodgson 1902, 74). The second is the mid 18th century observation of material remains by Wallis which are described as *"stones and some of the piles of wood"*, *"on the northern point of the bay"* (Wallis 1769, 340). Taken together the documentary and observational sources strongly suggest a timber-built pier with an internal fill of stone, as occurs elsewhere along the east coast. The precise form of the pier, e.g. with walls of close piling or of earth-fast frame is uncertain though the early date may point towards the former.

Specialists and workers

There are no known records relating to the construction of the pier, nor to the persons who built it or the contractual arrangements by which such workers were engaged.

Ownership/control/funding

The existence of Newbiggin's medieval pier rests on a three documentary sources, of 1316, 1335 and 1352 respectively, that collectively span a mere 36 years. Whilst the pier may well pre-date 1316 and post-date 1352 the tight clustering of these dates and the lack of earlier and later references may suggest that any such extended life was not of considerable duration. The township of Newbiggin appears as a mixture of free borough within a manorial holding in which the market and fair were grants that were held by the lords of the manor. The pier however, seems not to have been a manorial appurtenance but to have belonged to the burgesses. This may be implied from the grant of quayage that was addressed to the bailiffs and good men of neubyigging for six years (Cal. Pat. Rolls 1316). That this grant was issued by the king at the request of his kinsman, the Earl of Richmond, who was also the lord of the manor suggests a good and co-operative relationship between the townsfolk and lord – an arrangement that was presumably seen as advantageous to both parties. The use of timber in repairing the pier in 1335 was by the ministers of the Countess of Pembroke who, under licence from the crown, had been granted the manor for her lifetime by the Earl of Richmond (Cal. Pat. Rolls 1331). Again, we can perhaps see this as evidence of a co-operative working relationship between lordly authority and the townsmen rather than as an indication of manorial ownership of the pier. Such probable gift of timber for the repair of Newbiggin's pier mirrors a number of cases in which timber was granted to communities by the crown for the repair of piers elsewhere along the east coast. The final reference to the pier, the indulgence of Bishop Hatfield for those contributing to the repair and maintenance of the pier, may again point towards ownership by financially struggling townsmen. It is perhaps difficult to perceive of 'hoped for acts of charity' being directed towards lordly assets though this would sit comfortably within the context of the well-being of an item of community infrastructure.

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Case study 2: Hartlepool

Summary of previous work

There are three principal and original works associated with the history of Hartlepool. The earliest of these, 'The History of Hartlepool' was written by Sir Cuthbert Sharp in 1816 and subsequently re-printed with additional, later, information to bring the book up to date (Sharp 1851). An astute antiquarian Sharp acted as mayor of Hartlepool in 1816 and was a collaborator with the historian Robert Surtees. Sharp considered Hartlepool's pier in his history and drew much of his information from the town records. This has proved to be a matter of some significance as few records of the town's administration are known to survive, with these reputedly 'disappearing' at the time of local government amalgamation of Hartlepool and West Hartlepool in 1967 (Wood 1967, ix). The history of the town, including its port was further detailed in volume 3 of the Victoria County History of the County of Durham (VCH 1828). The most recent work on the town is 'Hartlepool: An Archaeology of the Medieval Town' by Robin Daniels (Daniels 2010). This work is an extensive survey of the material remains of the town's past, drawing heavily on data from recent excavations, but also incorporating primary and secondary documentary sources.

A number of popular books dealing with various aspects of the town have been published in recent years. These are concerned almost exclusively within a more modern, 19th century and later, timeframe and as such are not of direct relevance to this study.

Background: the town and its governance

The first evidence for significant occupation at Hartlepool is provided by the Anglo-Saxon monastery on the headland (Daniels 2007). Archaeological and documentary evidence indicate a foundation in the first half of the 7th century with activity seemingly extending into the 10th century at least (H.E., 184, 246). Hartlepool is not recorded in the Domesday Survey, though there is evidence of 10th century agricultural activity on the town headland and the location is recorded in a mid 11th century saga (Daniels 2010, 22;

Sturluson 1964, 754). It is probable that occupation during the later pre-conquest period was small scale. The origins of the medieval and modern settlement lie in its foundation as a new town, with some evidence for a grid plan-form, by the third quarter of the 12th century (Daniels 2010, 258). The de Brus family held lands in the area from the early 12th century and at some point between 1160-80 granted Hartlepool a borough charter. Similar charters were also granted by King John and the Bishop of Durham in 1200-1 and 1230 respectively, (VCH 1928). The town effectively developed as a free and relatively independent island within the de Brus estates though the de Brus' did retain certain rights within the settlement. One of these was control of the market and fair. Influence within the town was also wielded by the Bishop of Durham and the crown.

Within the town there is reference to a mayor and bailiffs in 1307 with further references at later dates (Cal. Pat. Rolls 1307). By the mid 16th century the bailiffs were replaced by aldermen. A merchant's guild was established by the Bishop's charter and this body appears to have held considerable sway within the town, in the 16th century apparently being synonymous with its governance (Daniels 2010, 35). A new charter from the crown in the later 16th century constituted the town a free borough with the mayor and burgesses being formed into a body corporate with a common seal. They had a court-house to hold assembly and draw up statutes for the governance of the town (VCH 1928).

The town progressively developed in the 13th and 14th centuries, partly by serving as an entrepot to Durham. It was surrounded by a productive hinterland, hosted a substantial Friary and benefitted from increasing levels of trade. A range of crafts and trades are recorded within the town which was also a centre for fishing. As a northern English port Hartlepool served as a major maritime and transport centre throughout the Scottish wars of the 14th century. It was largely as a consequence of these wars that the town was progressively defended and parts of the town walls still survive. The benefit Hartlepool derived from the transport and supply activities associated with the Scottish wars came to an end with the peace. From as early as the 15th century the town went into decline. Some reason for this may also lie in the competition the town faced with the emergent port towns of Stockton and Yarm. The town did not fully recover until the development of local coalfields and the introduction of the railways.

Figure 1, Location of Hartlepool. North is to top.

Technology

It is likely that during the pre-conquest period of monastic, and possibly some secular, occupation, of the headland that the site served a maritime role of some sort. The first reference to ships at Hartlepool occurs in the mid 11th century whilst it is referred to specifically as a port in the town's first charter of the mid 12th century (Sturluson 1964, 754; Daniels 2010, 144). The earliest focus of post-conquest maritime activity seems to have been in the Southgate area of the inner harbour and did not involve the construction of a pier (Figure 2).

Figure 2, Headland and historic core of Hartlepool. Location of historic and existing pier indicated. Also shown is location of former inner harbour (lost to land reclamation and 19th century docks) bounded by Southgate spit to the south. North is to the top.

The inner harbour

A series of medieval docks and sea defence walls were constructed within a small natural inlet, sheltered at its southern side by the Southgate sand-spit, that came to be known as the inner harbour. This area was subsequently enclosed by the circuit of town walls in the 14th century. However, a gap in the circuit, as well as a smaller Watergate, permitted continued access for shipping (Figures 3 and 4). Sharp records a number of antiquarian observations *"At various parts of the margins of the harbour the remains of quays have been traced, and stones have been found with iron rings, evidently for the purpose of mooring vessels; so that in all probability the quays were extended entirely round the land side of the harbour"*. (Sharp 1851, 150). Modern excavation has also taken place within parts of the inner harbour area (Figure 3). During these works the earliest excavated parts of the docks dated from the beginning of the 13th century, if not before, whilst there were also various episodes of development continuing into the 14th – 15th centuries (Daniels 1987; Daniels 1988; Daniels 2010, 144-167). The development of

docks in this area were intertwined with those of land reclamation. Daniels states *"Reclamation on the low sand-spit that became Southgate seems to have been driven by the construction of quayside walls and docks which then became the mechanism for reclamation as they were replaced by structures set further out into the harbour or by structures to the west further along the sand-spit"*. (Daniels 2010, 69). These excavated docks were comprised of a series of walls that effectively lined the northern and eastern sides of the sand-spit, together with a number of other walls. The majority of the walls were of magnesian limestone bonded with clay, though parts of the Period 1, Phase 2 walls in Area B at Southgate were of timber box construction with stone infill (Young 1987, 20-1, 27). This box work was comprised of a series of uprights with horizontal planking to the sides and was dated to 12th - 13th centuries. This arrangement of walls, standing up to 1.4m in height above the harbour bottom, served to create a series of partially enclosed docks and sea defences.

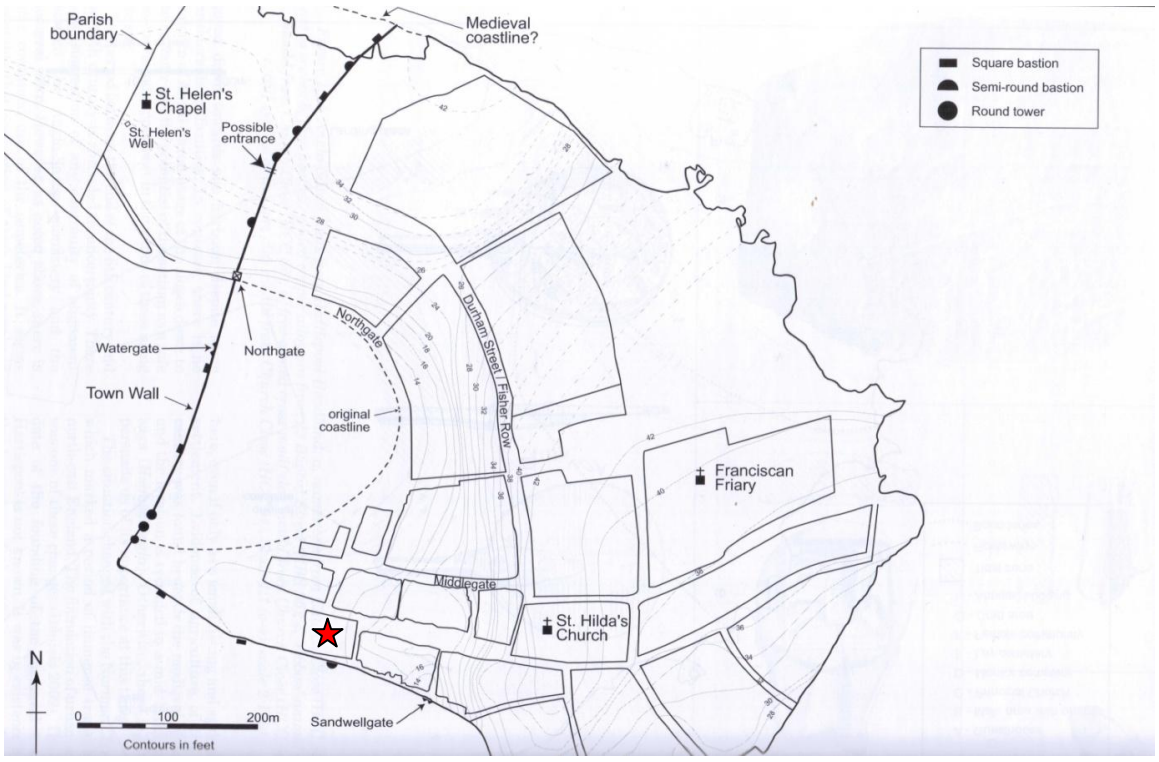

Figure 3, Location of the inner harbour of Hartlepool. Original coastline of harbour shown as broken line, bounded to the south by the Southgate sand-spit and neck of the headland to the north. Red star = location of docks excavated in modern times. (from Daniels 2010)

Figure 4, Picture map of Hartlepool as depicted by Robert Dromeslawer c 1540-9. Note the docks of the inner harbour enclosed by defences to centre left and the pier to lower right.

None of the docks were excavated in their entirety and it has not proved possible to determine the maximum size of vessel that could have been catered for. However, using height data for the excavated remains in conjunction with that of the modern tidal range it has been suggested that there would have been c. 0.8m of water in the docks at mean spring high tide, while at spring mean low tide they would have been dry. Assuming this to be correct there are two very important implications to be drawn. Firstly, the low draught, even at high tide, must have served to severely restrict the size and type of vessel using the docks. Secondly, the opportunity of entering the docks must have been within tight time constraints to either side of the high tide. If correct these observations make one wonder whether the docks at this time could have been utilised by vessels much larger than those used for inshore fishing. This situation had almost certainly changed by the mid 16th century as the mid 16th century depiction by Robert Dromeslawer shows the

vessels within the chained-off open inner harbour to be of some size. It appears that the inner harbour of the 16th century was in deeper water to the west of the reclaimed lands occupied by earlier docks. Further, as late as c. 1800 Sharp records the inner harbour as containing 6 – 10 feet of water at high tide.

The inner harbour inlet/docks survived until the earliest years of the 19th century when the partly silted-up harbour was enclosed and the reclaimed land converted for cultivation (Daniels 1988, 50; Sharp 1851, 151). This also resulted in the loss of much of the town walls and towers around the inner harbour area.

The outer harbour

The outer harbour encompasses that area south of the headland between the site of the historic pier and the end of the Southgate spit. The available evidence, particularly cartographic, suggests that the historic pier lay on the site of the present stone pier.

The first mention of a pier at Hartlepool is in 1318. This occurs in a petition to the crown in which the community appeals for money with which to complete the building of their defensive walls in the face of threats from the Scots (Figure 5). This document refers to *'victuals bought on their pier by one Roberd de Musgrave'* (TNA SC 8/51/2537). The use of the term pier suggests the likelihood that this does indeed refer to a pier as defined in this study, rather than to a foreshore quay in the inner harbour. Whatever the case, given the supposed shallow depth of water within the early inner harbour of this time, the area of the outer harbour, even before the construction of a pier, is likely to have served as a deep water anchorage.

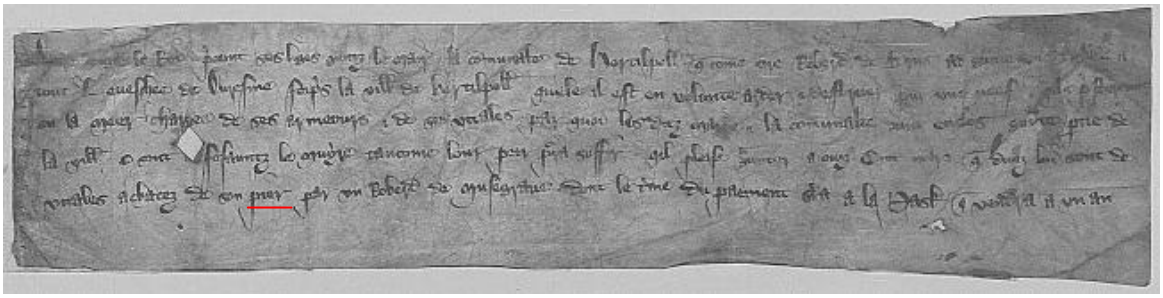

Figure 5, The first reference to the pier at Hartlepool in 1318 (underlined red) – also the earliest known use of the term pier. (TNA SC 8/51/2537)

The next reference to a pier is over 150 years later in 1473 when the Bishop of Durham addressed letters, within his see, appealing for contributions as the *"mayor, burgesses and commonality of Hartlepool"* intended to *"erect a certain pier near the walls on the south part of the town, for the safeguard of all ships and vessels arriving at the port, and which pier, when it shall be constructed and erected, will make a deep and convenient port to receive all ships of every port town within the realm of England; and that all ships, vessels, and mariners sailing upon the sea, when strong tempests shall arise, may be protected in the port, and fix their anchors and then moor..."* (Sharp 1851, translation p. 156, transcription Appendix p. ii-iii). The wording intimates that this was a complete build rather than a repair or restoration of an earlier pier. Perhaps it was a replacement for that detailed in 1318? The described location of the pier is clearly in the same area as that depicted by Dromslawer in the mid 15th century.

In chronological terms the next information we have on Hartlepool's pier is its depiction on Dromeslawer's picture map of the mid 16th century (Figure 4 and Figure 6 detail). This may have formed part of the series of similar maps drawn to illustrate the nature of the England's coasts, its towns and its defences for governmental security purposes. Piers, or rather a pier and associated island pier, are shown in the lee of a small projection to the headland. Both structures are vertically sided and, judging from the detail of their upper surfaces, appear to be stone filled. The sides are depicted in a lattice effect, containing a number of vertical members and at least two that are horizontal. The vertical elements project upwards beyond the level top of the structures. As only timber could so project, it can be argued that the lattice is entirely of timberwork. Whilst the vertical timbers could be interpreted as rubbing posts, this is unlikely to be the case with the horizontal members. It is likely therefore that this relates to an external timber framework that was in-filled with stone. Two crosses, that are probably navigational markers, are depicted on this picture map, one on the island and the other adjacent to it.

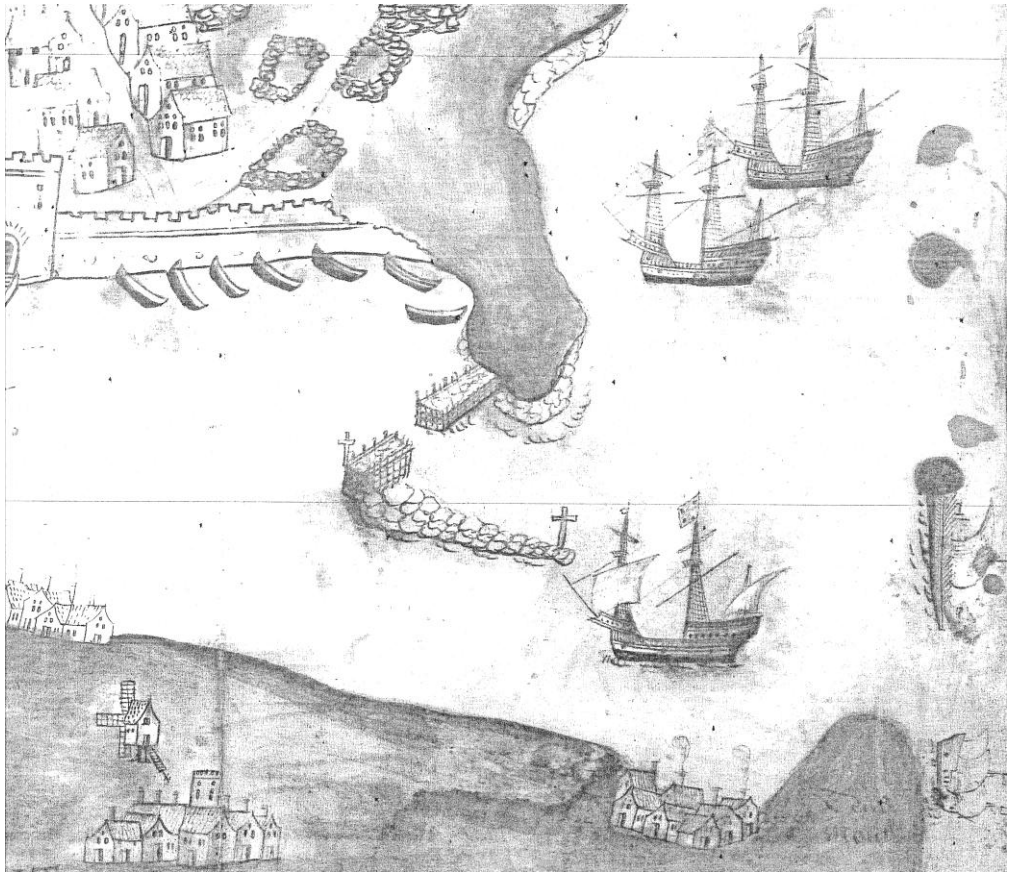

Figure 6, Detail from Dromeslawer's picture-map of Hartlepool, mid 16th century. (reproduced from Skelton and Summerson 1971)

The relationship of the pier and town walls is of some interest. Dromeslawer's map, later depictions and modern consideration of information pertaining to the defences indicate that the town walls extended fully across the western side of the headland and across the inner harbour before turning east across the Southgate spit and Sandgate. The circuit terminated just short of the landward end of the pier. Termination here appears to be owed to the presence of the cliff at this point which must have been deemed defensive enough in its own right. A gateway known as Sandwellgate provided access from land to foreshore at a point around 100m to the north-west of the pier. This gateway is shown in Dromeslawer's map and still survives. Although seemingly a later insertion, this gate is likely to be of later 14th century date (Daniels 2010, 62). The shore between the pier and gate was commonly used by fishermen whilst the area immediately to landward became the site of the market. The juxtaposition of pier and market surely highlights the economic significance of the pier.

There is brief reference to the pier in a survey of the ports, havens, etc. within the Bishopric of Durham in 1565 (Cal. S.P. Dom. 1565). This states *"The town has been a good haven, and is strongly walled, and many ships of 200 tons burden may lie within the town and pier, but the latter is in decay"*. It may have been as a consequence of this decay that in 1588 an Act (for repairing the pier of Hartlepool) was read three times in Parliament. (J.H.L. 2, 151-2). The provisions of this Act, and whether it accrued any benefits, are not known. Shortly after this date a John Lawson left *"40s to the repaire of Hartlepoole peer, to be paid to Mr Perceval Bell, for that use"* (Sharp 1851, 156). The identity of Mr Bell is uncertain though he may have been an official with some sort of responsibility towards the pier?

Sharp recorded an interesting statute of the town's corporation for the year 1599. This stated *"that whatsoever inhabytante of this town fyndethe nott a suffyceyent able man in his or theire watche, or to the peare, when and as often as they shall be commanded thereunto by the constables, or peare masters, shall pay for every time soe doeinge xiid."* (Sharp 1856, 157). The significance of this statute is twofold. Firstly it informs us of pier masters (plural), presumably officials responsible for most affairs pertaining to the pier and the equivalent of pier wardens and pier reeves recorded elsewhere along the east coast. Secondly, it refers to compulsory community activity at the pier. Precisely what this activity was is uncertain though it appears sometimes to have been labour as, seemingly referring to the now lost town records, Sharp states that *"Whenever the pier wanted repairs, the mayor issued his orders to the inhabitants, who brought what loose stones they could find"* (Sharp 1851, 157). Such loose stone is likely to have been for ballast within the timber shell of the pier.

Bleau's navigational chart of the earlier 17th century depicts the headland of Hartlepool almost as an Island, on the south side of which a single pier is shown (Figure 7). The small bay to the east of the pier bears an anchor symbol denoting safe anchorage. The text accompanying Bleau's chart states *"Hartlepool, upon a point that lyeth out almost like an Island. For to goe in there you must run into a bight to the south-wards of the towne, within a head* (pier) *until you come against the towne, there you shall ly dry at low water."* (Bleau 1643).

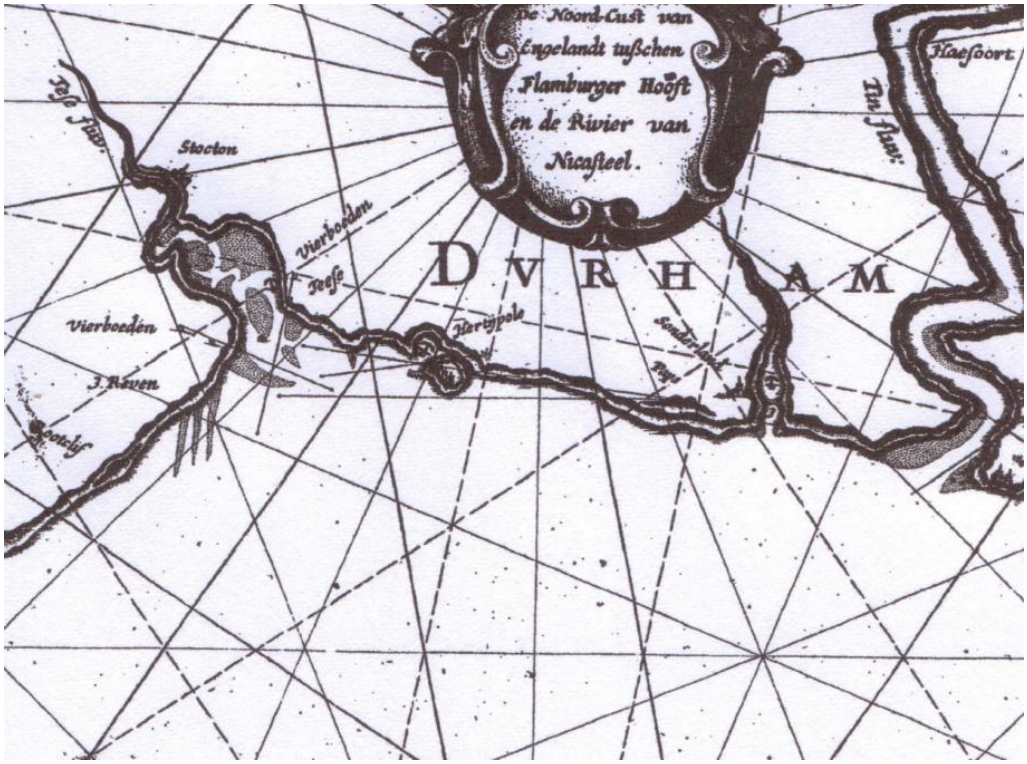

Figure 7, Extract of Bleau's chart of the early 17th century. Hartlepool is to the centre left. North is to the right.

During the Interregnum following the civil war the mayor and burgesses of the town sought from Parliament a brief for collection towards the building of their pier in 1657 (Cal. S.P. Dom. 1657). Shortly after the restoration of the monarchy, in 1662, a similar petition for a brief was drawn up and was referred to the Lord Chancellor (Cal. S. P. Dom. 1662). Both appeals appear to have failed. Undeterred, an attempt was made in 1665 to secure aid from Parliament for the repair of the pier but the Bill was defeated (JHC 1665, 602). This succession of appeals for aid indicates the poor state of the pier and the inability of the town to resolve this problem alone. It is uncertain precisely when and if the town replaced a pier of probable timber construction with one of stone, though this was clearly the situation by 1693 when Greenville Collins described the haven as *"Hartley Pool lyeth seven leagues from Whitby, where is a stone Peer, in which vessels lye very safe, but dry at low water. As you go into the peer there is a beacon."* (see Figure 8), (Greenville Collins 1693, 11).

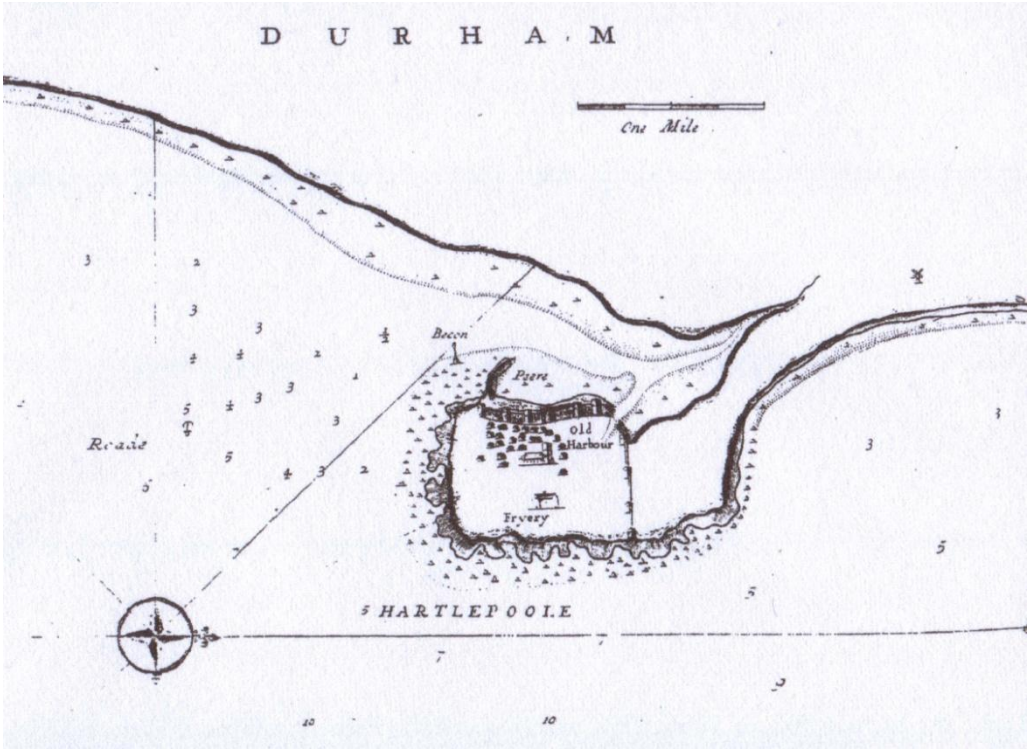

Figure 8, Greenville Collins' chart of 1693, North is to the right. This shows the area of the inner harbour titled as 'old harbour'.

Timber-built pier: summary

The evidence for the medieval pier at Hartlepool being timber-built rests on two counts. Firstly, Dromeslawer's mid 16th century depiction appears to show a vertically sided timber shell ballasted with an infill of stone. Secondly, the only description, albeit very brief, of repair to the pier, seemingly in the later 16th century, concerns the bringing of loose stones for the work; this probably being ballast material. Whilst this evidence in itself is not entirely conclusive we can ground these observations within the context of the tradition of timber pier building along the east coast.

Environmental context

The historic core of the town lies on a headland of magnesian limestone that juts into the North Sea. This headland has cliffs to the north and east sides whilst on the south-western side the ground slopes down towards the outer and inner harbour areas. The eastern side of the outer harbour is delimited by the site of the present/historic pier whilst to the west

of this lay the broad, shallow inlet of the inner harbour, this now being partly occupied by the eastern side of the 19th century docks. Much of the outer harbour, including that part immediately adjacent to the historic pier is known from documentary sources and from modern conditions, to have been dry at low water.

Land to both north and south of the headland is slightly lower than that of the headland itself which has always provided shelter for shipping from the prevailing elements from the north-east. Solid geology to the south of the headland is of Triassic sandstones overlain by glacial till. An arc of sandy beach extends from the south-western side of the historic town to the mouth of the River Tees. Many areas of submerged forest are known beyond the shoreline. These relate to a time between the end of the last glaciations and the subsequent rise in sea levels (Geology).

Some 6km south of the headland lies the mouth of the River Tees that provided maritime access to the historic riverine ports of Yarm and Stockton and in the later post-medieval period served the industrial complexes of Midlesborough close to the mouth of the Tees.

Social context

Although theoretically a free borough since around the late 12th century there were other competing interests within the town. One party was the lord of the manor whose estate surrounded the town. Although the documentary sources relating to the building and repair of the pier imply that both inner harbour and pier belonged to the town the lord of the manor controlled both market and fair as well as claiming tolls on vessels mooring within the port (Daniels 2010, 35; Hutchinson 1823, 25). The corporation of Hartlepool did come to receive harbour dues though precisely when this right was asserted is uncertain (VCH 1928). Above the manorial level lay disagreement between the crown and the Bishop of Durham as to who held suzerainty over the wapentake (Daniels 2010, 33). Perhaps because of this the town could seek favour and assistance from both parties; hence money from the crown for its defences in 1318 and written appeals to assist the townsmen in building their pier by the Bishop in 1473 (SC 8/51/2537; Sharp 1851, translation p. 156, transcription Appendix p. ii-iii).

Like all pier towns Hartlepool was required to seek external assistance in the maintenance and re-building of its pier. Hence the failed Act of Parliament of 1588 following an appeal to the state, and likewise the seeking of briefs for collection in 1657 and 1662 (J.H.L. 2, 151-2; (Cal. S. P. Dom. 1657; Cal. S. P. Dom. 1662). Looking internally to their own resources compulsory work at the pier by the community may lie at the core of the 1599 statute of the corporation (Sharp 1851, 157).

The only indication we have of officers responsible for the pier is the reference to pier masters (plural) in 1599 (Sharp 1851, 157).

Workforces and specialists

No information has been found regarding workforces or harbour specialists.

Material remains

There are no known material remains of medieval and earlier post-medieval timber-built piers at Hartlepool. However, if the existing Pier has been constructed on the site of earlier piers, as tradition has it, then it is possible that remains of these may lie within and under the present structure.

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Case study 3: Whitby

Summary of previous work

There are a number of histories of Whitby that have been written since the 18th century, most of which make at least passing reference to the port. The earliest, and one of the finest, is 'The History of Whitby and of Whitby Abbey' by Lionel Charlton (Charlton 1779). Much of this lengthy work is dedicated to transcriptions of medieval documents, particularly charters, and as such inevitably leans heavily towards the monastic aspects of the town. The Reverend George Young's 'A History of Whitby and Streoneshalh Abbey' of 1817 is another lengthy work examining many historic aspects of the town and its surroundings up to the then modern times (Young 1817). It does include a small section covering some aspects of the port and includes a partial transcription of a Henrician document relating to the pier. This is a document of direct relevance to this study and its inclusion by Young is of some importance given that it has not proved possible to locate the original, which may in fact be lost. Young's work of 1817 was followed up by his 'A Picture of Whitby and its environs' (Young 1824). In many ways an abridgement of his earlier history this later work does include some additional information, though little of any direct relevance to this study. Robert Holt's 'Whitby Past and Present' of 1897 covers aspects of the post-medieval port, but nothing of direct relevance to this study (Holt 1897). Much the same applies to Richard Weatherill's 'The Ancient Port of Whitby and its Shipping' of 1908 (Weatherill 1908). Although this latter work is entirely centred around the town's maritime affairs its content all post-dates that of the timber-built pier.' The Old Seaport of Whitby' by Robert Gaskin mostly incorporates existing knowledge though a number of points and observations contained therein are pertinent to this study (Gaskin 1909).

Some new and well referenced background data was provided by the North Riding Victoria County History (VCH 1923). Other 20th century works on the town, such as Jeffrey's 'Whitby Lore and Legend' (Jeffrey 1923, 2nd ed.), draw very heavily on earlier studies. There are however, a number of short, original, scholarly works, for example East's historical geography and Stephanie Jones unpublished D.Phil. thesis on the maritime history of the port between 1700 – 1914 (East 1932; Jones 1982). Two of the

most up to date works on Whitby are 'Whitby North Yorkshire, an Extraordinary Town' and 'The Rise of an early Modern Shipping Industry', all by Rosalin Barker (Barker 2007; 2011). By far the most useful previous study of the harbour, in terms of its development, is a lengthy unpublished paper by David Pybus entitled 'The Piers at Whitby' (Pybus 2009). The present writer has benefitted enormously from reading this text, expresses his gratitude for highly informative direct communication with the author and acknowledges his consent to reproduce Figure 5.

There has been a distinct tendency in those works of the 19th and 20th centuries concerning the maritime aspects of the town to focus on Whitby's glory days of shipping, ship-building and whaling during the 17th to earlier 19th centuries. Whilst this seems in part to be owed to an interest in Whitby at its most recent zenith, the depth and detail of the writing about this period is also owed to the copious volume of data available for its study. Conversely, the relative absence of study given to the port at the time of the timber-built pier at Whitby would appear to be owed not so much to a lack of interest but rather to the relatively smaller volume of data available.

Background: the town and its governance

The pre conquest foundation of the monastery. at Streanaeshalch (by general consensus equated to Whitby), in AD 657 is the first documentary reference to settlement in the area (H.E., 184). Said to have been laid waste by the Danes in successive raids between 867-870 the abbey was re-founded between 1072-1078 (Atkinson 1879). The place-name Prestebi is associated with the entry for Whitby in the Domesday Survey of 1086 and has been held to suggest some sort of ecclesiastical presence at the site subsequent to the sacking by the Danes (Domesday Survey). The Survey indicated that the settlement of Whitby had been worth the sum of £112 before the conquest which suggests a settlement of some size and prosperity. In the pre, and post, conquest periods monastic settlement was situated on the high ground of the eastern headland. Below this, and adjacent to the River Esk, a settlement developed on the eastern and western sides of the river. A bridge connecting both sides of the town is first recorded in 1351 (VCH 1923, 506-28). The medieval and existing street pattern of the town suggests an element of post-conquest planning, perhaps the result of the granting of 'burgage' to the abbey by 1128 (Barker

2011, 18). There is a distinct tendency for the principal streets to follow the curve of the River Esk and for narrow lanes to extend from these to the waterfront, these latter seemingly highlighting the importance of the port and of access to it. Many of the early endowments of the re-founded monastery were donated by the Percy family and amongst these was the 'sea-port of Whitby' which is specifically mentioned in a charter of the early years of the 12th century, and which was apparently donated by the Percy's before 1096 (Charlton 1779, 67; VCH 1923, 506-28).

Whilst burgage in Whitby was granted to the abbey in, or before 1128, in the latter part of the 1180s free burgage was given to the burgesses by the then abbot (Barker 2007, 16). This enabled the burgesses to hold their own courts, gave them exemption from customs dues and manorial duties and effectively gave the town borough status. This would seem to imply recognition of the growing importance of the town, at least by the abbot. This charter was confirmed by King John, but was subsequently opposed by succeeding abbots, owing to the decrease in the abbey's income. In 1199 the then abbot gave the crown 100*l* to have the case tried. The outcome, in 1201, was that the king refused to confirm the charter. The drawn out struggle of interests continued for many years but an agreement of 1351 shows that the abbot ultimately prevailed against the burgesses, who conceded the claims of the abbey to all franchises in the vill (VCH 1923, 506-28). One of the few survivals of their former freedoms was a burgess court which apparently retained certain rights in the harbour (Barker 2011, 19). After the dissolution of the abbey in 1539, the inhabitants made a great effort to obtain self-government, though ownership of the town was ultimately purchased by the Cholmley family who continued to exercise considerable influence for some generations.

The market in Whitby was held in that part of the town on the western side of the river where the three principal streets of Baxtergate, Flowergate and Haggersgate meet, adjacent to the waterfront and bridge. Since 1425-6 the weekly was held on Saturdays, prior to that on Sundays. Two annual fairs, each of three days, were held on the eastern side of the town (VCH 1923, 506-28).

Whitby's hinterland is comprised very largely of relatively unproductive moorland whilst the River Esk is only navigable as far upstream as nearby Ruswarp (East 1932, 484). Historically, the site's geographical advantage has been its natural harbourage, a signal asset along what was once a busy sea route. These factors combined have served to make

the port look seawards for its economic opportunities. Whitby had an extensive fishing fleet in the 13th century and throughout the medieval period was engaged in seaborne trade, both nationally and internationally, whilst before the end of the 14th century Whitby ships were engaged in carrying coal from Newcastle to London. Subsequent to the closure of the abbey, on which the town was largely dependent, Whitby underwent a decline for nearly a century. The 17th century witnessed an expansion of the town's fortunes. The lucrative alum industry was developed, the town became renowned for its shipbuilding prowess, a large Whitby-based mercantile fleet was established and the town became the centre of England's whaling industry. This boom lasted until the 19th century when the whaling, shipping, ship-building and alum industries all declined. To a certain extent these losses were offset by the development of the town as a watering place during the 19th century (Barker 2007; Barker 2011).

Figure 1, Location of Whitby. To the south of the town were the timber-built pier sites of Scarborough, Filey, Flamborough, Bridlington and Hornsea whilst to the north, that of Hartlepool

Technology

Whilst Whitby is frequently referred to as a seaport from the 12th century onwards, there is good reason for thinking that it acted as such for some centuries prior to this date. There had been a monastic presence on the headland from the mid 7th century (re-founded in the 11th century after a two hundred year hiatus) whilst the settlement recorded in Domesday was clearly of more than village proportions and worth. Furthermore, the broad, steep sided inlet through which the River Esk flows into the sea provides one of the few areas of natural secure shelter along this stretch of the east coast and it seems certain that such an advantageous setting would have been utilised since early times.

A grant of quayage, to the Abbot of Whitby, was first made in 1307 (Cal. Pat. Rolls 1307). This was for a *"quay"*, *"newly to be constructed"*, *"for the security of ships there henceforth arriving"* and with the quayage to be charged for three years. We cannot be absolutely certain that this relates to a pier rather than a waterfront quayside, though clearly a projecting pier has a greater ability to provide shelter and 'security' than does a waterfront mooring. A second grant for quayage was made in 1341, this time, during the brief period of borough status, *"to the bailiffs and good men of the town of Whiteby"* (Cal. Pat. Rolls 1341). This grant was for seven years and was specifically to repair and amend the quay which was *"decayed and broken down by the force of the sea"*. With the town again largely under the control of the abbey the next quayage grant of 1411 was *"to the abbot and proved men of Whiteby"* and for a period of ten years (Cal. Pat. Rolls 1411). This was to enable the repair and maintenance of the quay which was said to be *"much decayed and broken down, to the great peril and damage as well of alien merchants as of denizens wishing to arrive and rest in that port with their ships"*. The final grant of quayage, for two years, was made in 1424 (Cal. Pat. Roll, 1424). This was again addressed *"to the abbot and proved men of Whitby"* as *"the key of the port of the town"* was again *"decayed and broken down"*.

What is seemingly the first reference specifically mentioning the term pier at Whitby is in a lease of 1520, from the abbot, permitting the collection of stone from the foreshore (Whitby Lit. & Phil. Soc. PB2172 – transcription in Pybus 2009). This states "*All the stones between the Byker Stone and Saltwyke that be abull to make Gryndestones or Maysone Stones for 20 years" "And the forsaid John schall not hurte ye pere nor the Clyfe*" The concern expressed for the cliff and pier may, at least in part, relate to the need for the landward end of the pier to maintain a secure connection with the land, this point of physical connection often becoming vulnerable with piers.

The antiquary John Leland commented on the port at Whitby in the early-mid 16th century thus *"Whiteby, wher is an havenet holp with a peere and a great fischar toun"* and *"Whitby, wher a new key and port is yn making of stone faullen down yn the rokkes thereby : and al this is cliffy shore"* (Toulmin Smith 1907, 51, 61). Whilst Leland clearly indicates that a pier (singular) was present at Whitby, it is not stated on which side of the estuary this was located. Again, whilst it is clear that stone formed an element of this pier there is no reference to timber being employed in its construction.

Shortly after Leland's comments, around 1545 it was stated that *"it is verye necessarye that all the Woods within the Parishe of Whitbye or elce where nere thereunto be reservyde for the mayntenaunce of the Kyyngs Tenements and cottages in Whitbye and at Robynhood baye, and of the Peyr against the Sea at Whitbye where the Kyngs Majestie hath adredye imployed great somes of Money."* (Young 1817, ii, 530). The crown investment in the pier described above almost certainly relates to the ongoing works that Leland observed whilst for the first time there is unambiguous reference to the use of timber at the pier. This investment by Henry VIII is linked directly to the dissolution of Whitby Abbey in 1539 and its assets being seized by the crown. Such investment by this monarch in pier infrastructure on the Yorkshire coast finds direct parallel at Flamborough, Bridlington and Hornsea. Detailed exchequer accounts exist for the work at the former two sites and it is unfortunate that no such records detailing the pier works at Whitby of c. 1540 are known.

Such investment in the harbour would appear to have been necessary as it appears to have been in a parlous state by 1544 when representatives of the town stated that "*ships have been sold, owing to the decay of the harbour, but divers of the inhabitants would provide good ships if the harbour were amended, the decay whereof will be a hindrance to all that country. If amended, there is no such place for the safeguard of ships from Humber to the Frithe."* (L. & P. Henry VIII, 1544). However, a similar situation applied not that long after the crown's works when, around 1565, an inquiry recorded that *"The pear of whytby is decaid And therby the Queens custom worth little or nothing"* (S.P. online). Much the same can be gleaned from a proposed Bill for 're-edifying of Whitby-Haven' that was rejected by Parliament in 1597 (JHC 1597, 567).

The next known reference to a pier at Whitby is in 1621 when Sir Richard Cholmley, recently returned as Member of Parliament for Scarborough unsuccessfully approached the Corporation of Scarborough for support for the erection of a new pier at Whitby (Hist. Parl. 1). Sir Richard's son, Sir Hugh Colmley, who also sat in Parliament as member for Scarborough made a similar request to the bailiffs of Scarborough in 1626; again to no avail (Hist. Parl. 2; Binns 2000, 188-9). Clearly Scarborough was unwilling to support a neighbouring, and potential rival, port in the provision of a new pier. A form of support was received from Trinity House who prepared a certificate stating *"that if the piers and jetties of the harbour and town ... were repaired the harbour would be convenient for shipping"* (HMC 1881, 241). Binn's believes that the younger Sir Hugh's appeal to Scarborough was somewhat duplicitous. In his letter to Scarborough Sir Hugh stated that his intention to petition parliament was for relief for repairing the pier which he says was lately much decayed and likely to be ruined in a short time. However, the pier that was built as a result of this appeal was not the existing pier on the east side of the town, but a new pier on the west side, at the site known as 'Scotch Head'. The significance of this is that a resulting twin pier arrangement would greatly enhance the port, not maintain the status quo, whilst Cholmley would also have much to personally gain from a western pier as he was the principal landowner in that part of the town. Although the younger Sir Hugh did not receive the support of Scarborough in this venture he did, in 1632, eventually succeed in having a brief for collection issued nationally owing to his close friendship with Sir Thomas Wentworth who came to be appointed a Privy Councillor (Binns 2000, 11-2, 190). Scarborough's quiet opposition was almost matched by the inactivity of the townsfolk of Whitby. Only with difficulty did Sir Hugh persuade the townsmen to petition the Privy Council and he had to rely upon two of his neighbours to undertake the collection. Sir Hugh bemoans this lack of 'public spirit' in his memoirs (Cholmley memoirs). This may be a case of the victor writing the history as Binn's believes the antipathy of the townsfolk was fuelled by their commercial interests lying primarily on the opposite side of the harbour whilst the principal beneficiary of the new pier was Cholmley himself (Binns 2000, 11-12).

This west pier was built in the 1630s though it was essentially a stone pier with timber bracing rather than a timber-built pier as defined in this study. Aspects of its construction were described by Sir Hugh's son thus *"all the stone was carried by land, drawn by oxen and horses; and in building this pier, was experienced several inventions to make it*

secure; for, being exposed to a violent sea, which beat upon the side all the length, for about two hundred yards, it could not stand after the common way of building, merely with loose rocks, heaped the one upon the other; nor yet, when the same was repaired, and strongly bound with great pieces of wood, let into the foundation, and cross bound with others, let into the stone, and bolted with iron, so that the whole seemed one entire work"(Cholmley 1787, 48). It is thought that part of the pier head of this structure may have been exposed by dredging around a century ago (Jeffrey 1923, 68).

Within the southern part of the lower harbour itself a place for lading and unlading goods, in essence a 'legal quay' was appointed by the customs authorities in 1559 (TNA E178/3274). This was known as *"Saynt Annes Staythe"* and was located on the western bank of the Esk close to the bridge and formed part of the port infrastructure, additional to, but contemporary with, the later life of the timber-built pier. Gaskin recounts an earlier observation that remains of an old quay lay eight feet below the then St Anne's Quay (Gaskin 1909, 356).

Pictorial/cartographic evidence

There is no known pictorial or cartographic evidence relating to any timber-built pier at Whitby. Waghenaer's chart of 1588 (Figure 2) does show beacons, or markers at the mouth of the estuary, as does Bleau's chart of the earlier 17th century, which additionally bears an anchor symbol in the estuary denoting safe anchorage (Waghenaer 1588; Bleau 1643). The text accompanying Bleau's chart states *"Whidby is a tidehaven, which falleth drie at low water, at the east side of the haven runneth a riffe of rocks, whereof you must take heed. For to sail in there you must run in betwixt two beakons, untill that you come in betwixt the two lands, and ancker there"*. In spite of the cartographic depictions it is clear from the documentary evidence that a pier was present at this time. The reason for this omission may relate to the pier being within the estuary rather than at its juncture with the open sea.

Figure 2, Extract of Waghenaers chart of 1588. North is towards the lower right.

Timber-built pier: summary

The available evidence suggests that the pier mentioned in the documentary source of c. 1545, which was probably the same pier as that explicitly recorded in 1520, was a timber-built pier, probably with an internal ballast of stone, though 'proof absolute' for this is lacking. Similarly, the 14th and 15th century grants of quayage seem more likely to relate to a pier than to a riverside waterfront, but again this cannot be conclusively proven. The pier built in the 1630s on the western side of the river was essentially of stone and it appears that all successive pier building programmes at the town have likewise been in stone. The Henrician timber pier was almost certainly on the east side of the river whilst historical consensus suggests that it was on the site of the existing Tate Hill pier at the north end of Church Street. This may well be correct and the fact that this pier was formerly known as 'Burgess Pier' appears to lend extra weight to this argument. Tate Hill pier, which is stone-built and has been extended at least once, is itself of some interest owing to its use of large vertically set stones and unusual broadening towards its head. This current structure may originate in the 17th century and could conceivably be the

direct replacement of the ‘decayed’, and almost certainly timber-built, pier of the 1630s (RCZAS).

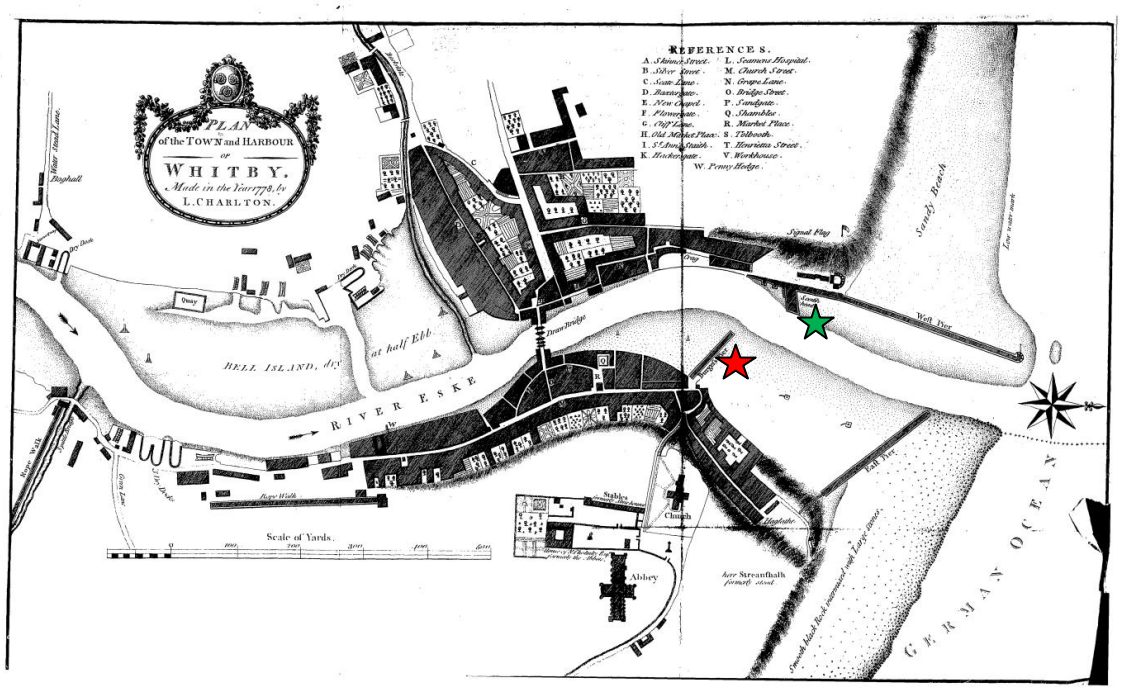

Figure 3, Lionel Charlton’s map of Whitby, 1778. The red star lies adjacent to Tate Hill Pier (formerly Burgess pier), the blue star adjacent to the pier at Scotch Head. North is to the right.

Environmental context

The town of Whitby lies at the mouth of the River Esk which rises as a series of small streams in the north part of the North York Moors. The mouth of the Esk flows between two cliffs, the east cliff and the west cliff which rise to around 60m (Rawson and Wright 1992, 31-34). This narrow inlet, which is a product of geological faulting and repeated occupation by river channels, provides the only natural estuarine harbour between the Rivers Tees and Humber. Largely as a result of this faulting the coastal foreshore to the east of the estuary is of exposed scarrs of Jurassic rock whilst to the west it is of sands. The harbour is divided into two parts, the upper harbour between the sea and the bridge, and the lower harbour which extends from the bridge upstream. The width of the harbour is generally around 100m at full tide. Bisected by the estuary, the harbour defines the

townscape. Principal roads run along the narrow strip of flat ground adjacent to the river providing maximum access to the harbour whilst above this the rest of the town is built into steeply sloping ground.

Historically, as Bleau the Dutch cartographer states, the harbour was a tide haven, not accessible by larger vessels at low tides. It has been suggested that the harbour has never drawn more than 16 feet (4.88m) (Barker 2011, 8).

The building of the stone pier in the 1620s is said to have partly remedied the problem of large quantities of sand and shingle being swept round the west cliff and to have made the river better navigable (Jeffrey 1923, 68). It must be envisaged that this was also a problem during the time of the probable single timber-built pier likely to have been located on the site of Tate Hill/Burgess Pier. This pier must nonetheless have accrued some benefit to the port, presumably by providing moorings and perhaps more importantly, shelter to the eastern waterfront upstream of this point. This is especially likely to have been the case with inclement conditions from the north and north-east.

Coastal erosion has impacted on Whitby though the rates of loss have been subject to divergent opinions. It has also been widely acknowledged that post-medieval pier improvements and extensions have in all likelihood exacerbated and accelerated these problems (Pybus 2009, 1, 38-46). Some reclamation of ground within both upper and lower harbours has taken place, particularly on the western side of the Esk. The vast majority of this reclamation has occurred since the 18th century and post-dates the era of the timber-built pier.

Figure 4, Aerial view of central Whitby and its port. The monastic institutions lay on the east cliff to the right. The Upper Harbour lies upstream from the bridge, the Lower Harbour seaward of the bridge. Tate Hill/Burgess Pier lies immediately below the red star. Looking N.

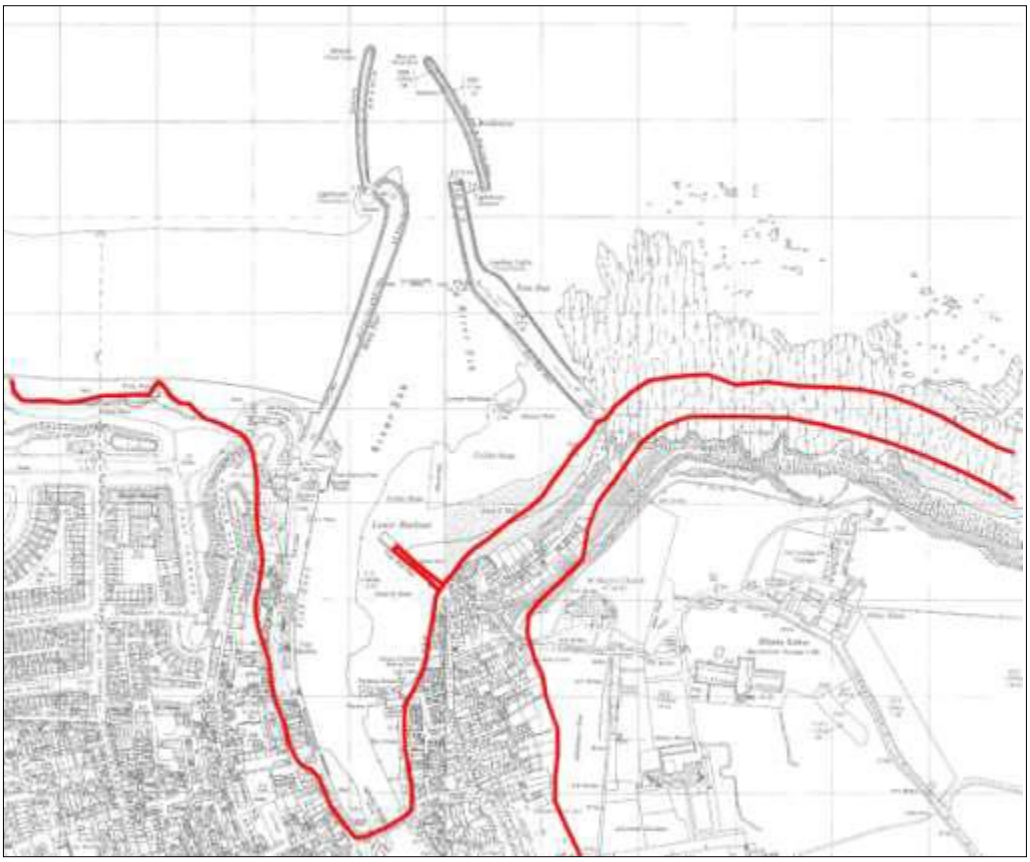

Figure 5, Projected outline of the port and coast of Whitby up to c.1630, superimposed on modern Ordnance Survey data. Burgess Pier is depicted. The scale of post-medieval encroachment to the western side of the lower harbour can be seen. (from Pybus 2009)

Social context

The Patent Rolls record four instances of grants of quayage, each specifically for the repair of the quay. The first of these was in 1307 when the three year grant was made to *"the abbot of Whiteby of quayage in aid of the quay of the town of Whiteby"* (Cal. Pat. Rolls 1307). In 1341 the grant was made to *"the bailiffs and good men of the town of Whiteby, of quayage for seven years for the repair of their quay"* (Cal. Pat. Rolls 1341). By 1411 the grant was to *"the Abbot and proved men of Whitby of quayage for ten years"* (Cal. Pat. Rolls 1411). The fourth grant was of 1424 and was again addressed to *"the abbot and proved men of Whitby of quayage for two years"* (Cal. Pat. Rolls 1424). The discrepancies of addressed recipients relates to changing authority over the port, being early on in the hands of the abbey, later briefly in those of the burgesses before reverting again to the abbey. Even in this later period of monastic control, the inclusion within the

grants, after the abbot, of proved men of Whitby hints at some sort of retained or vestigial interest and influence at the port by the townsmen.

At the dissolution of Whitby Abbey the port of fell into the hands of the crown, much as happened at Hornsea, Bridlington and Flamborough during the course of the reformation. The known Henrician investment in the piers at these other Yorkshire ports was, according to the document of 1545, (see Technology above) matched at Whitby by the *"imployed great somes of Money."*at the *"peyr"*, and would appear to form part of a wider national pattern. The bulk of the local monastic assets eventually ended up in the hands of the Cholmley family and it is known that this was the case with the port. It is less certain whether the burgesses managed to maintain or increase their 'certain rights' at the port.

Other than quayage charges little is known of other direct means of funding. A Bill for the 're-edifying of Whitby Haven' is known to have been presented to Parliament in 1597 (JHC 1597, 567). This Bill was rejected and it is uncertain from precisely where any funding would have been obtained. However, it is known that in the 17th century 'pier cess' (assessment) was collected from shipowners and it is probable that the origins of this lie much further back in time (VCH 1923, 506-28). Sir Hugh Cholmley gained consent for a public collection in the 1630s, though this relates to a later and essentially stone-built pier. Little is likewise known of those most involved in the control and funding of the pier though by analogy with pier sites elsewhere this is likely to have been by appointed 'collectors/wardens/reeves.

There are two known wills that benefitted the pier at Whitby. Amongst numerous other bequests in his will of 1530 John Ledum, a wealthy local merchant, left: *"Also to the peir, if it go furthwardes, xl s"* (Test. Ebor. 1884, 300-301). An interesting aspect of this particular reference is that it implies intended works at the pier and that payment was only to go ahead were this to happen. Shortly after that date John Skelton left *"vi s viii d to the peyre or haven"* (Gaskin 1909, 87). That these bequests were by townsmen again reinforces the notion of their having rights, as well as interests, at the pier during the period of monastic control.

Workforces and specialists

No information has been found regarding workforces or harbour specialists.

Material remains

There are no known material remains of medieval and earlier post-medieval timber-built piers at Whitby. However, if the existing Tate Hill Pier has indeed been constructed on the site of earlier piers then it is possible that remains of these may lie within and under the present structure.

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Case study 4: Scarborough

Summary of previous work

Scarborough has been the subject of a number of written histories since the 18th century and a handful of these stand out as exceptional works, or as studies directly pertinent to a consideration of the town's timber-built harbour. What may be described as the first major history of Scarborough was written by Thomas Hinderwell in 1798 (Hinderwell 1798). Subsequent editions expanded greatly on the 360 plus pages of the first edition. Hinderwell was a historian of some renown and although his consideration of the harbour was somewhat brief it was characterised by utilisation of a number of governmental sources, particularly Patent Rolls, State Papers Domestic and Acts of Parliament. I. H. Jeayes 'Description of Documents contained in the White Vellum Book of the Corporation of Scarborough' was published in 1914 (Jeayes 1914). This work provides abstracts of various of the town's records dating from the 13th – 17th centuries, including a number that are of relevance to the study of the harbour. A further milestone was reached in 1931 with the publication of 'The History of Scarborough' edited by the historian Arthur Rowntree and including amongst its contributors such luminaries as Mortimer Wheeler and R. G. Collingwod (Rowntree 1931). This book is of considerable scope and contains a chapter on 'The Port and Harbour'.

Scarborough is fortunate in having an extremely active archaeological and historical society. Founded in 1947, the society has conducted historical investigations and carried out numerous excavations. The results of much of this work has been published in the society's 'Transactions' journal as well as in a number of books of academic status. These works have included information that relates directly to the medieval and post-medieval harbour as well as more indirect studies relating to the shipping, trade, local economy, industry, markets, etc. In particular, much useful information on the harbour can be found in works and articles by Trevor Pearson (Pearson 1982; Pearson, 1987; Crouch and Pearson 2001; Pearson 2005). This present study has drawn heavily upon all the above mentioned sources.

Background: the town and its governance

Scarborough is not recorded in the Domesday Survey and the origins of the town have long been subject to speculation based on scant historical, and no firm archaeological, evidence. One element of this has been woven around a fragment of a 13th century Icelandic saga which says that the settlement was destroyed by Harald Hardrada of Norway and his English ally Tostig Godwinson. Paul Dalton suggests, on the basis of 13th century legal testimony, that the real reason why Scarborough does not occur in Domesday is that at the time of the survey it formed a part of the royal manor of nearby Falsgrave approximately 1.5km inland (Dalton 2001, 1-6). As such it is possible to see Scarborough developing as a satellite settlement to the manor, presumably to carry out certain maritime related roles such as a port and base for fishermen. Such small maritime satellite settlements administratively subservient to larger inland centres are known at a number of early coastal port sites of which a close, and classic, example would be the settlements of Bridlington and Bridlington Quay.

Scarborough's rise as a settlement of some substance is primarily owed to a series of rapid developments in the 12th century. A castle was built on the headland by William, Count of Aumale which was subsequently recovered to the crown by Henry II and substantially rebuilt. Henry also established the settlement as a borough in 1155-1163, granting the burgesses the same customs, liberties and aquittances enjoyed by the citizens of York (EYC 1914, 364). These privileges were later reaffirmed to Scarborough in charters of Henry III. It has been argued that the relatively high fee farm of the settlement, at £20, suggests that the town was already a settlement of some size and success and may therefore have been reasonably well developed at the time of the Count of Aumale's influence. It has also been suggested that the location of St Mary's Church adjacent to the castle and a nearby market, both of which lay some distance from the commercial core of the medieval town, may also be indicators of the development of a small centre by the Count of Aumale (Pearson 2001, 86). By 1174-75 the fee farm stood at £34 and the area known as the new borough was already established immediately to the west of the walled old borough. The regular street patterns of both parts of the historic town indicate planned layouts, with the reversed 'S' alignment of the north-south aligned streets of the new borough suggesting their laying out over fields of former ridge and furrow systems (Pearson 2001, 90). By the mid 12th century the focus of economic and political power

had completely shifted from Falsgrave to Scarborough and in 1256 the crown gifted the manor to the town (Pearson 2001b, 80).

Frequent reference to merchants in the town, local and foreign, and growing international trade through the port all attest to Scarborough's rapid rise in the 12th century and its continuing development in the 13th century and beyond. By the late 13th century the town was sending Members to Parliament whilst its mercantile trade and important fishing industry continued to expand (Childs 2001, 15-31; Heath 1968; Vasey 1978). Some indication of the far flung networks of trade enjoyed by Scarborough are demonstrated by the town's distinctive medieval pottery industry whose products have been recovered at numerous sites along the eastern coasts of England and Scotland as well as along those of mainland Europe (Normandale 2001). Scarborough enjoyed extensive market privileges from the 12th century and at various dates successfully opposed other markets in nearby centres (Daniell and Bould 2001, 38). Of great importance was the town's annual fair, held on the 'sandes' and which lasted for the unusually long period of forty five days and attracted merchants from a very wide area, including Europe (VCH 1923).

The governance of Scarborough has recently been studied by David Crouch and the following text is drawn almost exclusively from his work (Crouch 2001, 41-47). Information concerning the early form of governance within the town is scant though there is mid 12th century reference to the borough's *'gild merchant'*. This is seemingly a term for the body of burgesses that assembled to administer the town and regulate its trade. By the end of the 13th century this term had been replaced by *'communitas'*. The chief officers of the communitas of burgesses were the bailiffs who are first recorded as early as 1219. Normally there were two or three bailiffs, though very occasionally just one whilst there is also some reference to other townsmen described as *'servientes'* or serjeants. These appear to have held some responsibility in maintaining public order. The borough had a common council which by the mid 14th century was divided into three benches of councillors of different status, though precisely how this status was assessed is uncertain. The town held its own civil and criminal courts, the principal of which, the court of pleas, sat in the Common Hall under the presidency of the bailiffs. Officers of the council included coroner/s, principally responsible for justice and chamberlains who acted as the borough's principal financial officers and who rendered weekly accounts at the Common Hall. Whilst most of the council's officers were elected from the ranks of the

burgesses one officer, the Clerk of the Commonality, who was most likely trained in law, was appointed.

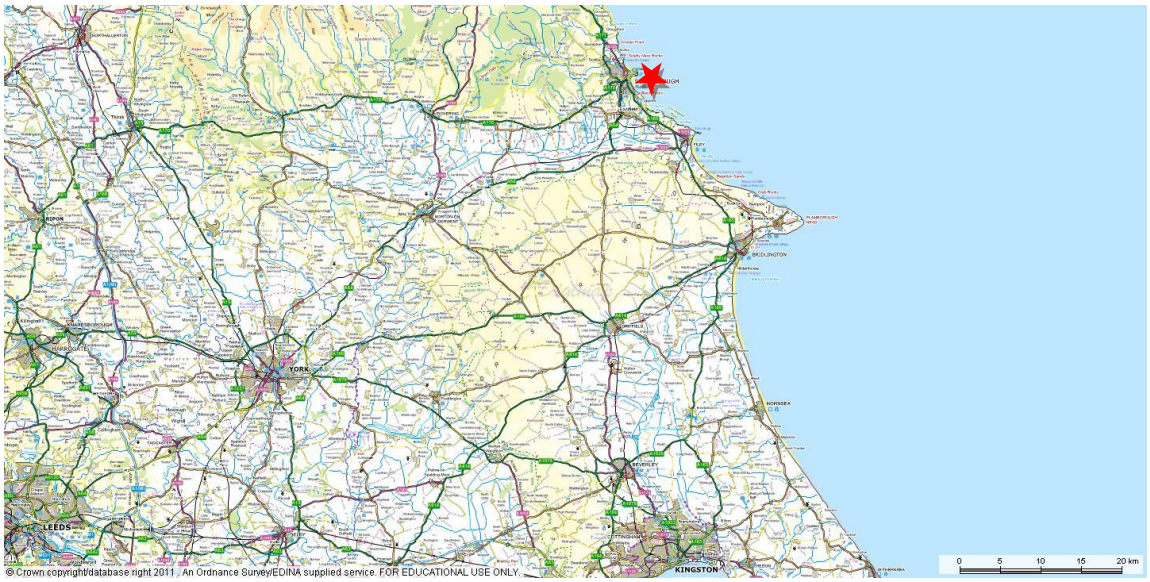

Figure 1, Location of Scarborough. To the south of the town there were timber-built pier sites at Filey, Flamborough, Bridlington and Hornsea

Technology

Scarborough is referred to as a port from the middle of the 12th century though its use as such may date back considerably further (Pearson 2001, 91). The right to levy tolls on ships in the harbour for the defence of the town was granted in 1225 (Cal. Pat. Rolls 1225).

The earliest secure reference to infrastructure at the port is in 1252 when a grant was made to *"the bailiffs and burgesses and good men of Scarborough* ...(that)... *they may take to strengthen a new port with stones and timbers against the sea where all ships may enter and leave without danger, as well at the beginning of the flood of the seas as at full flood"* (Cal. Pat. Rolls 1252). It is known from a number of documentary sources that by the 14th century at least Scarborough's port was comprised of both a pier and an adjoining waterfront that followed the curve of the bay eastwards of the pier (see Figure 4). Both will have functioned as an integrated entity and as such both must be included within this

study. What is less certain is if one of these elements developed as a formal structure before the other. To some extent this is hampered by terminology as until the 16th century the single term quay often appears to have been applied to both pier and waterfront with little differentiation. The wording of the grant of 1252 implies a clear intention to construct a deep water port accessible at all states of the tide. This is unlikely to have been achieveable by the construction of a waterfront hugging the line of the shore, but could by the construction of a pier projecting from the land out into the sea. The construction of this, *"with stones and timbers"* implies the likelihood of a braced timber walled structure with an internal ballast of stone, much as is documented at a later date at Scarborough, as well as at other medieval pier sites along the east coast.

The reference to "a new port" also leaves open the question as to whether or not formal port infrastructure existed at Scarborough prior to this date. The earliest use of Scarborough as a port may well have involved little more than utilisation of the open beach. In regard to such an informal port, excavation at 24-26 The Bolts revealed a setting of stones directly over the natural ground surface that has been interpreted as a rudimentary slipway and may relate to such a period of informal usage (Pearson 2005, 60).

An account, made by Robert Waweyn the collector of quayage, for just over six months of work at the harbour around 1320 indicate that timber with an infill of stone were the primary elements in the quay at this time (TNA E101/482/3). These accounts show that there were normally two carpenters at work, together with up to twelve labourers. Only for six weeks were masons employed, and this was in the repairing of walling *"under the foot of the castle"*. For much of the time the carpenters and labourers were engaged in the *"removal and repositioning of stones and timber"*. The works were clearly a major repair and replacement exercise. Frustratingly, it is not possible to be entirely certain whether the repairs relate to a shoreline waterfront or pier, though sentences such as *"repair of the quay between The Outegote and the house upon The Aylande"* suggest that much, if not all, was at the foreshore. According to the OED a 'gote' can be a channel for water, a watercourse or stream; a sluice; or a narrow opening or slip from a street to the shore (OED online). However, the presence of a pier does seem attested by this document as reference is made towards the end of the document to *"the mending of the quay by The Peereende"* (Figure 2).

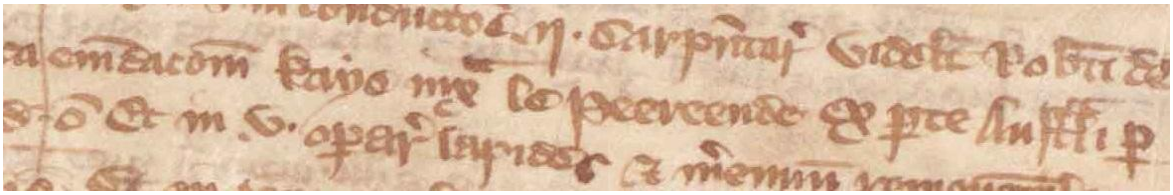

Figure 2, Reference to the 'peereende' in E101/482/3 of c.1320 (centre of middle line).

Around 1320 then, it seems reasonably clear that the waterfront quayside and a pier were both in existence. The reading of the documentary sources favoured here is that port infrastructure, probably involving a waterfront quayside, was in existence prior to 1252. The grant of 1252 enabling the construction of a new, deep water port of stone and timber is interpreted as involving the construction of a pier, namely the one referred to around 1320. It was probably only the provision of a pier projecting out into the sea that could provide access to deep water.

Further reference to a pier at the town is provided by a mid 14th century entry in the Patent Rolls for 1362 that records *"that the quay jutting out into the sea and forming a refuge from the sea for ships passing in times of peril is so damaged that ships will find no refuge there..."* (Cal. Pat Rolls 1362). It is probable that the medieval pier was in the same location as that depicted in a map of 1538-9, this being in the same approximate position and alignment as the north-eastern end of the present Vincent's Pier. This effectively extends the line of the castle headland out into the bay. As such the medieval pier was founded on a natural rocky scar known as The Naval. The founding of the pier on bedrock almost certainly had technical implications with regard to the method of construction of the pier; a matter that will be considered at the end of this section.

The first known reference that unambiguously and specifically refers to both the pier and foreshore waterfront is in a grant, of 1489, of 300 trees of oak from the royal forest of Pickering *"called scrobbes and stobbes"* to repair the *"Getye and Key"* jetty (pier) and quay of Scarborough, which was said to be in *"grete ruyn"*, (Turton 1894, 122). This pier and quay arrangement was presumably similar to that depicted in the map of 1538-9 (Figure 4).

Prior to this date there are a number of 14th century references, within the 'White Vellum Book' of Scarborough Corporation, to the quay (see 10B, 16C, 55A, 21B, 26D in Jeayes

(1914)). Topographic detail within a considerable number of these references makes it clear that in many instances the reference to 'quay' is not to a pier but to that stretch of foreshore waterfront to the west of the pier. One of these references, in 1343, is to a new quay, suggesting recent reconstruction of at least a part of the waterfront, whilst another, of 1485, refers to *"pay the workmen at the quay"*. Pearson suggests that the earliest waterfront development, probably of 12th century date, is likely to have been focussed on a 100m stretch of shoreline between East and West Sandgate, these being the two main routes from the foreshore into the Old Borough (see Figure 9). This location lies on a narrow strip of foreshore a little over 50m outside of the speculated southern course of the town's southern defences and just beyond the base of a steep slope that represents a former natural cliff-line. The route-way of Quay Street together with that of The Bolts, which collectively lie sandwiched between the base of the boulder clay cliff and the old foreshore, are likely to have developed as an access road for the early harbour that extended from the pier right up to West Sandgate. A number of lanes extending from Quay Street southwards to the foreshore are attested in 14th century documentary sources as well as surviving as part of the extant street pattern (see for example 24B, 34C, 40D in Jeayes 1914). These lanes can be seen as providing access from Quay Street to the waterfront itself.

The extension of the line of the waterfront further to the west, as depicted in the map of 1538-9 is likely to have developed later in the medieval period though there was a route along the base of the cliff in this area by at least the 13th century (Pearson 2001, 92). A medieval timber and stone waterfront was excavated at Blands Cliff in 1975, a little over 50m from the existing foreshore (Farmer 1976, 97-10) (Figures 3 and 4). This is likely to have been part of the westernmost area of waterfront. Farmer examined two elements of what he believed, perhaps correctly, to form a single waterfront structure located at the base of the boulder clay cliff. The rear, landward, part of this was comprised of vertically driven roughly squared oak posts around 0.30m square, with slight points and spaced at intervals of 1m to 1.70m. Oak boarding some 0.25m deep and 0.05m thick was secured to the fronts of the posts by squared wooden pegs driven into pre-drilled circular holes. Horizontal gaps between the boards were present. Around 1m to the seaward side of the post and plank construction a wall foundation of roughly hewn sandstone blocks and glacial erratics bonded with lime mortar and clay was built. This stood up to 0.90m tall, averaged 1.20m wide and had a splayed front. Directly on top of this footing was a

walling of better dressed stone. This walling was fronted by near vertically set posts of oak some 0.20m wide by 0.17m thick and spaced at roughly 1m intervals. The lower parts of these posts were set into the joints of the footings and were secured to the wall by long, angle driven, squared pegs. The posts were braced to each other by two rows of horizontal oak planking, each some 0.25m deep. The fill between the two structural elements was of compacted clay, small stones, soil and pottery, this being capped off by a layer of cobbles set on a bedding of sand.

Farmer sees both structural elements forming a single waterfront entity, with the rear all timber element forming a cliff revetment, the stone and timber structure in front of this forming the quay wall and the cobbles between forming a pathway. Whilst this interpretation forms a perfectly cogent argument, it is stratigraphically possible that the timber element froms an early waterfront and the stone and timber one a later replacement. Against such reinterpretation, it is acknowledged that the horizontal planking of the rearward timber element does not appear to extend below the cobble surfacing, and this is likely to strengthen the case for the two being contemporary. The reporting does not present dating evidence for this waterfront structure though it is intimated that it represents *"the 1256 quay"* of the documentary sources. The only relevant dating within the report is of pottery attributed to the first half of the 16th century within the thick deposit overlaying both structural elements. Farmer states that the structure at Blands Cliff was of similar construction to a very fragmentary, and wider, example found in 1970 at Quay Street, some distance to the east. No detailed record of this particular Quay Street site has been located.

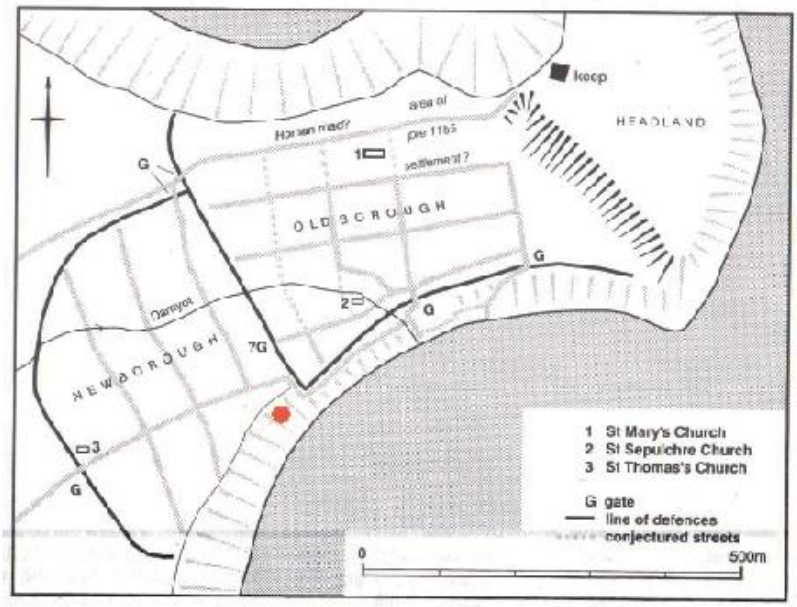

Figure 3, Location of Blands Cliff site (red) (map source Crouch and Pearson 2001)

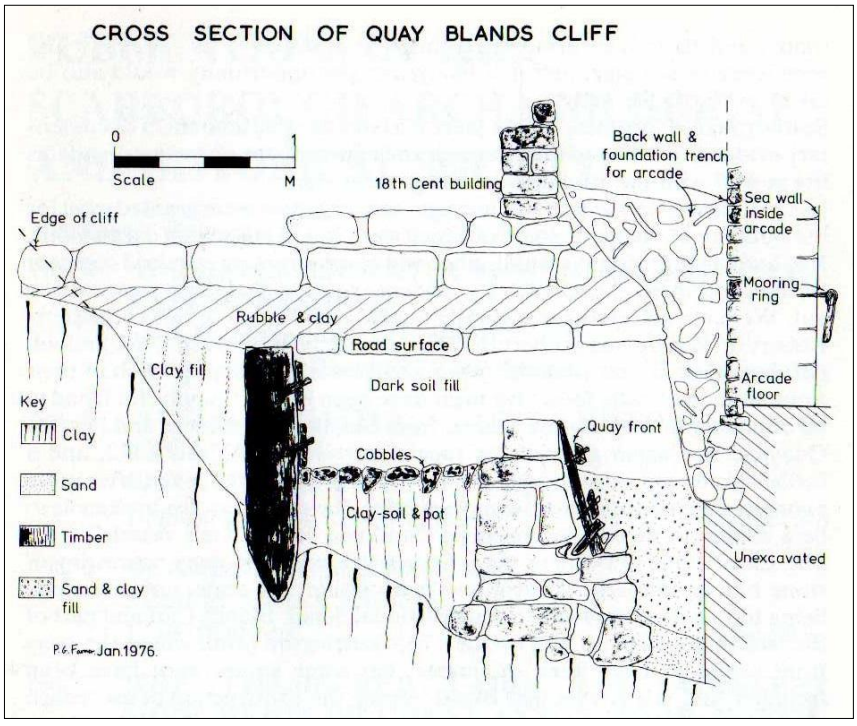

Figure 4, Section through the Blands Cliff excavation site of 1975. The thick deposit marked 'Dark soil fill', which overlays the waterfront structures, produced pottery of the first half of the 16th century. A later roadway overlies this. What is interpreted as a later sea-wall, complete with mooring ring, is located to the upper right, whilst to the rear of this lie the remains of an 18th century building. (source: Farmer 1976)

On several grounds it is clear that the foreshore waterfronts came to be progressively extended southwards, i.e. encroaching into the area of the harbour, from its original location. For one thing, the cliff and Quay Street are now set back as much as 70m from the present waterfront, whilst a series of grants of *"waste"*, typically *"between the town and the key"* are noted by Jeayes in the 14th century (Jeayes 1914); such areas of waste seemingly being created by processes of reclamation. Further, the informed study and observations of individuals in the 18th and early 19th centuries detail environmental processes at the harbour that suggest the likelihood of deposit accretion within this area. Finally, excavation at a number of sites in the harbour area have produced evidence of sands and dumps of refuse which could conceivably form part of organised efforts of reclamation. Such advancement of waterfronts is common at many riverine medieval ports. Discussion of this issue at Scarborough is considered in greater detail in the section: Environmental Context, below.

One other component of the waterfront at Scarborough needs consideration, that of 'stadia' (plural). These are recorded in several 14th century entries in the White Vellum Book (26D, 21B, 29B, 31A, 39D in Jeayes 1914). Although the stadia are only mentioned in passing, the descriptions indicate them to be located in the area of the quay and sands. Jeayes translates the term 'stadium' as meaning '?standing' whilst Pearson suggests they were probably jetties or else stands for boat-building. In at least two instances such stadia are recorded as being privately owned. It is entirely probable that these stadia were indeed small jetty-like structures projecting from the waterfront into the harbour that acted as private moorings. Whilst such privately owned stretches of waterfront and jetties are well known at medieval riverine ports the occurrence of such private harbour infrastructure at a coastal pier site appears to be very unusual.

John Leland's description of Scarborough is given in his 'Itinery' of 1535-1543 (Toulmin Smith 1907, 59-61). His brief description of the harbour merely states that *"The peere whereby socour is made for shippes is now sore decayid, and that almost yn the middle of it"*. It was around the time of Leland's visit that in a petition addressed to the Privy Council, the men of Scarborough *"sued to the gyfte of certayne woode for the buyldynge and repayrynge of the havin, and the peerye thear"* (L and P Henry VIII, 1541). It is likely that the separate mention of 'haven' and 'pier' may relate to waterfront and pier. In an ambiguous answer the council stated that *"one should be sent to view both the haven and woods"*.

The first detailed description of the pier at Scarborough is in a petition of 1565 from the bailiffs and burgesses to the crown requesting funds for the construction of a new pier (Cal. S. P. Dom. 1565, transcribed in Rowntree 1931, 204-7). In this document the existing pier is described as *"all the owte sides made of Tymber framed like two house sides filled within with stones and stondithe upright as brode at the top as at the bothome so that when the Tymber faylythe which longe cannot contynewe agaynste the ragynge of the sea then the stones fallithe doune on bothe sides and so the breake is made"*. This was clearly a timber structure of some proportions as *"The lengthe of the peare is eight hundred foote and the girth thereof is twentie foot or thereabowts"*. Although the structure described is unambiguously a timber-built pier its precise method of construction is less clear (though see below: Consideration of the technical form of the timber-built pier and waterfront). In 1565-6 the pier was so ruinous in that the queen granted £500, 100 tons of timber and 6 tons of iron for the pier (VCH 1923). It is not entirely clear whether this gift from the queen was for the repair of the old timber-built pier or towards the construction of a new pier of stone.

Scarborough's first stone pier was built in the second half of the 16th century and was one of the first non-timber piers to be constructed along the east coast. In 1584 the bailiff's, and others of the town, wrote that *"we say that yt ys bene that we first proved wth planked woodworks to make the said peere, and by experience found that course and cost altogether vayne, and this of stone to be much better"* (SP 12/170 f.122).

Pictorial/cartographic evidence

There is but one image that unambiguously relates to the timber-built pier at Scarborough, an ink and watercolour birds eye view of the town, castle and port as viewed from the south (Figure 5, detail Figure 6). In the possession of the British Library, this drawing is believed to date to 1538 or 1539 (Binns 1983). The drawing forms one of a series, of similar date, that principally relate to the crown's military sites and it has been claimed that the one of Scarborough is by the same hand as one for Hull (De Boer 1973, 80). Although the map is known to contain some inaccuracies, many of these are resultant from the lack of perspective and scale, and there is, apparently, overall agreement with the only contemporary textual description of the town in 'Leland's Itinery' (Binns 1983).

Figure 5, Scarborough 1538/9 (British Library, Cotton Augustus l.i. f.1

The infrastructure of the port can be seen to be comprised of three principal elements, a single pier that extends from the headland, an arc of waterfront lining the bay that extends seamlessly to the pier and an island pier situated between the former two. Finer detail of these can be seen in Figure 6. The clearest structural members are a series of regularly spaced vertically set timbers that are present to all three elements. The only other structural members that can be identified with any certainty are a number of horizontals visible in the upper surface of the pier. These are almost certainly tie-beams extending between the inner and outer walls of the pier, whilst between these horizontals are what

may be an internal ballast of stones or other infill. The cannon and building on the pier are considered elsewhere in these notes.

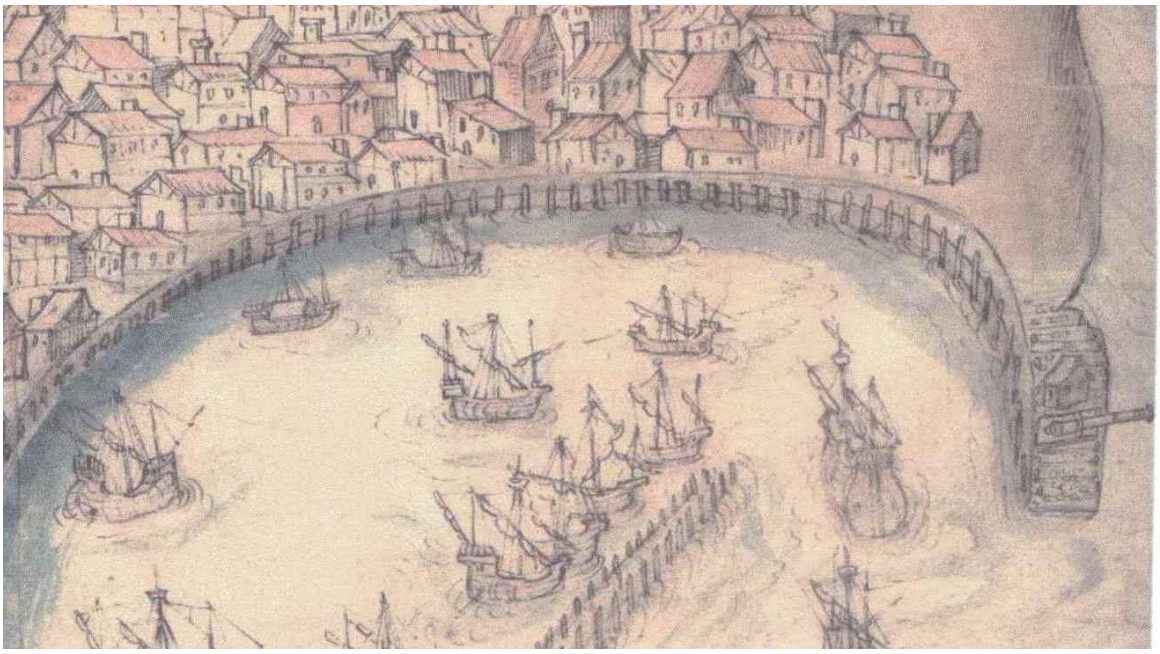

Figure 6, Detail of Figure 5

The manuscript map of the seacoast between the Humber and Scarborough, commonly known as the Burghley map, depicts a single pier at Scarborough extending from the southern side of the headland (Figure 7). This map has traditionally been ascribed a date of around 1595. However, given that a twin stone pier system is depicted on another map ascribed the same date it could be suggested that the Burghley map either depicted out of date information or is of somewhat earlier date and depicts the timber-built pier shortly before its demise and replacement in stone.

Figure 7, Detail of Scarborough on map/chart of c. 1595 (British Library, Royal. MS. 18. D. 111, f.63)

Figure 8 is a depiction of the harbour at Scarborough dated to 1595 and this shows an entirely different pier configuration to that of Figures 5-7, namely one of a stone-built twin pier system.

Figure 8, Twin pier system of stone, c.1595 (British Library, Royal MS. 18. D.lll. f.65)

Brief comment has already been made on the 'switch to stone' at Scarborough and how the townsmen much preferred that of stone. It is worthwhile briefly considering the new technology at Scarborough. The petition of 1565 not only described the extant timber pier system at Scarborough but went on to describe their proposals for its replacement:

"Nowe it is thought good to make the pere much broder in the bothome as twenty yards brode on the grounde and at any course to be narrower until it come to the height and there to be at the top at the leaste foure or five yards brode and so to make it with stone upon stone to the height muche like the fashion of the rouffe of a house and beynge so well layde with great stones at the owte sides thereof and welle filled with stones in the middeste, it is thought that it can never be moved nor much impaired by any Rage of water for the one side will beare so agaynste the other that it will hardlie be removed".

These proposals (that were indeed put into effect) describe an entirely stone built pier constructed with an outer casing of large stone and an internal core of smaller stones. This pier was much broader in its lower parts than its upper, having angled sides, and it was recognised that in such form greater stability would be achieved. A total absence of timber is explicitly stated as is the interesting method for putting the stones in place: *"it must be in other sorte made than it nowe is and wythowte any tymbre but onelie of great stone to be carried with tonnes. Theare is stone sufficient verie nigh to be carried with tonnes at eny full water"*. These 'tonnes' were used for transporting the large stones to the pier by sea, from which they were then lowered into place, and appear to have been some kind of float (tonne presumably derived from 'tun' a barrel-like vessel built of wooden staves and iron hoops). At a later date chains for suspending the largest stones beneath boats are also detailed, as are 'floats' – these latter perhaps alternative terminology for tonnes? (Chapman 1800, 17).

Parts of the old timber-built pier seem likely to have survived this programme of works by being encased "*In such place of the peere as yet stondethe maye stand still and have on both sides stones layde thereonto of slope which will cause it stand still"*.

It is likely that this method of construction was originally devised at Dover in the earlier 16th century and adopted at Scarborough (Lyon 1813, 155-6). However, the men engaged in building and maintaining the new pier at Scarborough were considered worthy of being employed in using the same technology at part of the large state sponsored harbour works at Dover (Cal. S. P., 1584; SP 12/170 f.122).

Consideration of the technical form of the timber-built pier and waterfront

The documentary and pictorial sources for the harbour at Scarborough up to the mid 16th century detail what was essentially a combination of a timber-built pier, waterfront and island pier. The pier is described as having vertical walls of timber with an internal ballast of stone whilst the depiction of 1538-9 suggests the presence of a series of lateral horizontal members, almost certainly tie-beams, close to the top of the structure. That the historic depiction shows the vertical timbers of the pier as being regularly spaced, rather than as a continuous line of edge to edge timbers, suggests that the construction of the pier at this date was one of earth-fast frame type, or freestanding frame type. In the former, a timber framework of regularly spaced vertical timbers will have been seated in the bedrock and secured side to side by tie-beams, perhaps with other bracing members. The external spaces between the timber frame will have been filled with lesser timbers, probably thick, broad planks, set either vertically or horizontally. Whilst unambiguous evidence exists for earth-fast framed piers, free-standing framed piers, which it is speculated were utilised at sites located where bedrock lies at or close to the surface, presently remain a theoretical construct only. However, in the case of these latter, the vertical members will have been seated within base-plates or beams, though the remainder of the structure will have been similar in other regards.

The depicted island pier is again likely to be of either earth-fast or free-standing form.

Excavation of part of the western end of the waterfront quay shows that, for at least part of its existence, it was probably comprised of a post and plank cliff revetment fronted by a wall of stone and timber. The building accounts of c. 1320 again detail a timber structure with stone infill. A close parallel for the arrangement timber-built pier with conjoined waterfront quay at Scarborough can be found in an early 18th century depiction of Margate.

Environmental context

"Few things are more uncertain in their result, than the effect of works constructed for the improvement of harbours, or more expensive in their formation, than those attempts often are" (William Chapman, Engineer to Scarborough Harbour, 1800).

The headland of Scarborough is an elevated promontory forming a natural fortress that has long been utilised in antiquity. On three sides it has steep sea cliffs, generally a little under 100m tall, whilst on the fourth, western and inland side, there is a steep scarp. Access to the headland is via a narrow neck of land which slopes very steeply to the north whilst sloping gently southwards to Scarborough Bay. The historic core of Scarborough nestles on this southern slope immediately to the west of the headland. The historic timber-built pier at Scarborough extended from the base of the headland, probably in line with the present Vincent's Pier, whilst the timber-built waterfront quay extended from the pier westwards, following the arc of the northern part of the bay. The small stream, the Damyet, flowed into the bay at the western side of the harbour.

Figure 9, Aerial view of Scarborough, looking North

It was detailed above (Technology) that the waterfront quay at Scarborough has advanced seawards up to 70m during the course of the medieval and post-medieval periods. This is evidenced by the presence of a natural, gently sloping former cliff-line, the topography of the street pattern, the historic granting of 'waste' in the area, knowledge of post-medieval observations of environmental processes in relation to the harbour and by the results of

excavation. Of these, the former cliff-line, the street pattern and granting of waste have already been discussed. This section will consider the likely causes and processes of the coastal advancement through discussion of local environmental processes and historical and archaeological evidence.

The dominant direction of wave and current in the area of the harbour is from the north-east. As the harbour area lies in the lee of the headland this location would naturally accumulate some sediment. However, the imposition of a pier extending south-west from the headland promontory serves to create calmer water in the harbour area and exacerbates the problem of sediment deposition. This has been recognised by a number of harbour engineers since the 18th century. (see the opinions of Smeaton and others as detailed in: (Hinderwell 1798, 162-166) and also (Chapman 1800)). Chapman summarised the results of these processes and the human response to them as they occurred in the post-medieval period *"it appears that the shallowness of Harbour always followed the completion of works, which occasioned the necessity of their further extension; which was again succeeded by the sand following these additional works"* (Chapman 1800, 11). The low volume flow of the Damyet stream appears to have had little significant impact on these processes and no record has been found suggesting it was ever utilised in the struggle against sedimentation. There is some documentary evidence that alludes to the processes of excessive sediment deposition clogging up the medieval harbour. As early as 1298 it was stated that *"The quay and Port of Scardeburgh require repairs and cleansing to the amount of 300l. and 400 marks"* (Cal. Inq. Misc., I, # 1773). The 'cleansing' almost certainly refers to the need to be rid of excessive sediment. In the post-medieval period there was occasional employment of gangs of people to dig out excessive sediment as well as the use of dredgers. Additionally, methods devised to prevent sediment build-up ranged from different configurations of the pier heads to the use of low set apertures in the pier wall that admitted the inflow of water additional to that through the pier heads. This lessened the calmness of the water and increased sediment suspension some of this then flowing out of the harbour on the ebb tide.

We cannot be entirely certain of the full range of responses to this problem of sedimentation in the medieval and earlier post-medieval periods. However, the use of the term 'cleansing' may suggest that there were attempts to remove sediment manually. The known progressive advancement of the waterfront quay is likely to have formed the principal response to the shallowing caused by sedimentation and to the ensuring of

sufficiently deep water at the quay. The precise details of how this advancement was carried out is uncertain. It may be that as a new waterfront was constructed accumulated sediment was dug out and deposited on its landward side. Some evidence for this may be provided by 14th century dumps of sand encountered during an excavation in East Sandgate (Pearson 1987, 32). Further sands, some containing medieval pottery, have also been found at the Three Mariners site, 33 Sandside and at 23 Quay Street (Scarb. Arch. Gazetteer). There is also archaeological evidence to suggest that some deposition of refuse may also have been involved, see for example 13 Sandside (Scarb. Arch. Gazetteer) and it has even been speculated that the small number of domestic refuse pits encountered during excavations in the town may be owed to a regular pattern of dumping adjacent to the foreshore (Pearson 2001, 91). The suggestion has also been made that spoil generated from the digging of the town ditch could even have been utilised as infill behind a new waterfront. Whilst environmental factors may have been the driving force behind the processes of waterfront quay advancement, a desire to 'reclaim' additional land could also have been a spurring incentive.

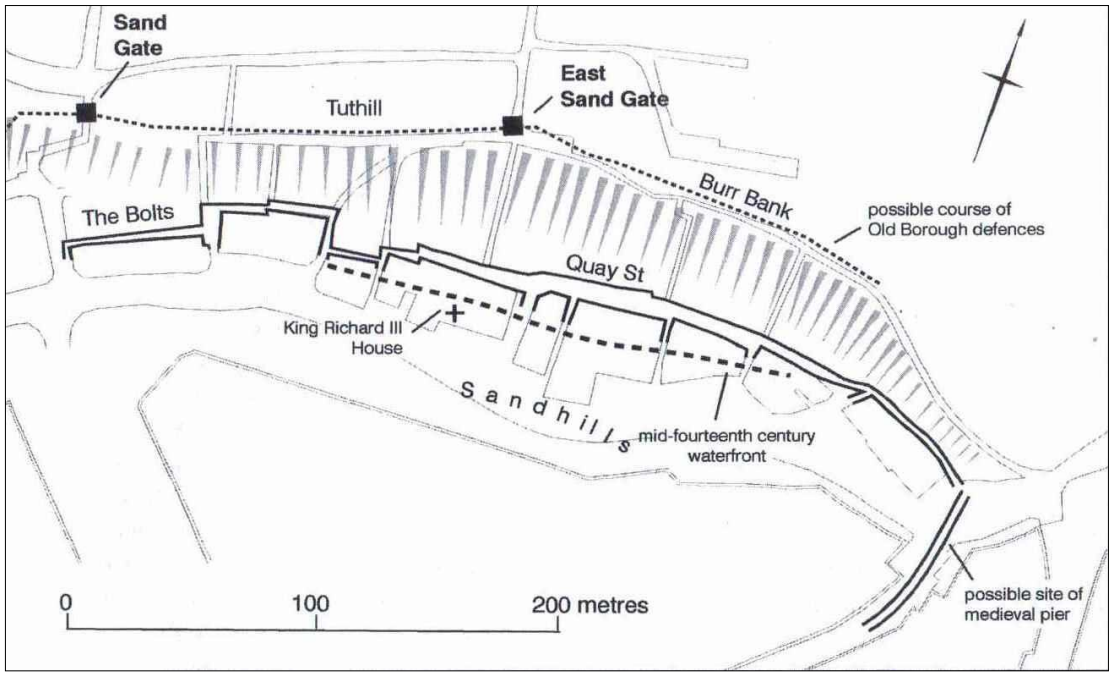

Figure 10, Plan of the historic harbour area. The natural former cliff line is depicted with hachures. The approximate position of the 14th century waterfront is shown in dotted line. Note the lanes linking Quay Street to the advancing waterfront. (source: Pearson 2005)

In addition to the problem of accreting deposits, the harbour could also be subject to damage by sea tempest. The pier, positioned as it was within the sea, was perhaps more liable to such damage than the quay situated at the foreshore. There are many recorded instances of such damage and decay at the port (see Social Context below) and although many of these do not clearly differentiate between the waterfront quay and the pier there are a number that do specifically refer to the pier alone. The waterfront quay will have been most vulnerable during storm surges. In 1275 it is recorded that *"the said quay has entirely fallen into decay, and many of the said houses have in consequence been destroyed by the sea"* (Cal. Pat. Rolls 1275). Although it is not clear from this source if it was the pier or waterfront quay that was being referred to, the proximity of buildings to the waterfront may suggest that it was the latter. A similar case occurred in 1357 when it was claimed that *"the quay of the town is so decayed that the town is likely to be laid waste and destroyed by the sea in brief space"* and appeal was made *"in aid of the repair of the quay"* (Cal. Pat. Rolls 1357). In this regard we can also postulate a further role for the waterfront quayside, namely that of a defensive barrier against the sea in a manner similar to that at, for example, Margate.

Social context

It is clear from the first reference we have to infrastructure at the port in 1252 that the new harbour was in the keeping and control of "*the bailiffs and burgesses and good men of Scarborough"*, in other words of the town community (Cal. Pat. Rolls 1252). These rights and responsibilities are believed to have extended to the pier and waterfront quayside, but seemingly not to those 'stadia' abutting the quayside (recorded in the 14th century) which, as has been seen (see Technology), were privately owned. Effective communal ownership of the harbour continued throughout the life of the timber-built infrastructure.

Significantly, the grant of 1252 also provided a means of funding the repair and maintenance of the harbour, namely through the imposition of tolls known as 'quayage'. The original grant of quayage was specified for a five year period, though this right continued to be granted on a regular basis throughout the medieval period and around twenty entries related to this are recorded in the Patent Rolls. Most commonly the grants

of quayage were for periods of three or five years, occasionally for ten years and at the upper extreme grants for twenty and twenty two are recorded. In one exceptional case a grant was made for life to a named individual (Daniell and Bould 2001, 33). Normally the grants were addressed to the Bailiff and named burgesses though occasionally to specified individuals. It is clear from a number of entries that accounts of receipt and expenditure were expected of the collectors. The collectors also had some role in the organisation and management of works at the harbour. The granting of quayage was itself apparently not without cost as we read that in 1312 *"Aquittance for the burgesses of the town of Scardeburgh for 100 marks paid by them into the Wardrobe to Ingelard de Warle, king's clerk, Keeper of the Wardrobe, for a fine which they made with the king for confirmation of their charters, and for a grant of quayage"* (Cal. Pat. Rolls 1312).

On a number of occasions the collectors of quayage were accused of embezzlement. In 1316 the Patent Rolls record that commissioners were sent to make enquiries as:

"large sums were levied from merchants, mariners and others coming to the town with wares for sale, but the collectors converting the receipts to their own use have applied little or nothing to the repair of the quay as the king has learned. The commissioners are to enquire who were the collectors of the custom, how much each collector received and applied to the work, how much he still retains in his hands, to audit the final account of each collector of his receipts and expenditure, and to collect for the king's use all moneys which they shall find to have been levied above the costs and expenses of the work" (Cal. Pat. Roll 1316).

Commissioners were again appointed in 1325 to:

"audit the account of the quayage of the town of Scardeburgh, as the king is informed that those whom he has appointed to collect the quayage from the twelfth year of his reign have kept it for their own purposes, applying little or none to the repair of the quay; and any money they find retained in the hands of such collectors they are to apply to said repairs" (Cal. Pat. Rolls 1325).

This case relates to complaints by the burgesses that the quay and harbour were in a poor state as a consequence of the king assigning guardians and bailiffs to collect quayage. These people were not distrainable to the commonality and it was therefore requested that quayage be put in the hands of the community, as had been done before, so that they can

assign persons and oversee the correct usage of money at the harbour (Cal. Pat. Rolls 1324; Rowntree 1931, 168).

Other sources of income for the harbour included returns on investments made by the community. In 1275 for example a complaint was made that during an episode of the town being taken into the king's custody the Sheriff of York had taken these incomes, as well as the fee farm, into the king's hands (Cal. Pat. Rolls 1275). The Rolls state that:

"whereas they (the men of Scarborough) had built there with their own money certain houses and a mill, from which great part of the issues and of other issues from the drying of their nets in their own ground and common pasture were received by them and employed at their will in the support of the quay of their port by the assent of the whole commonality".

Such fiscal prudence highlights the significance attached by the community to their harbour.

High favour, usually from the crown, could also serve to benefit Scarborough. Accordingly, one part of a host of privileges granted to the burgesses of Scarborough in 1312 stated that *"no port or quay shall be made by the king or by any other between the said borough and Ravenser"* (Spurn, East Yorkshire), (Cal. Charter Rolls 1312). It seems reasonable to assume that this particular stipulation was one sought by the burgesses and aimed at stifling port development to the south of the town. Such may have served to prevent the development of Bridlington, other than as a port of minor consequence, until the reformation. Such crown favour could also, as we have seen in the case of the 300 oaks of 1489, extend to the granting of materials for the repair of the port's infrastructure (Turton 1894, 122). The granting of the 'cocket seal' in 1320 enabling the export of wool from the port could also be construed as favour given the benefits to trade that this could bring (Daniell and Bould 2001, 34). Whilst it was to the benefit of the crown for the town to be commercially successful, not least in terms of the fee farm, it was also a place of some strategic significance, being the site of a major royal castle and a place from which ships and supplies could be commandeered, particularly during the various Scottish wars. Crown patronage therefore can be seen as having a distinctly self-interested aspect.

Given Scarborough's eminence as a successful medieval port, the income generated by tolls at the haven is likely, more often than not, to have been sufficient for its

maintenance. Real difficulties probably occurred during times of economic hardship, emergency and of serious damage or dilapidation of the infrastructure. In 1357 for example, the Patent Rolls record that *"the quay of the town is so decayed that the town is likely to be laid waste and destroyed by the sea in brief space and they on account of their need cannot repair it"* (Cal. Pat. Rolls 1357). As a result of a petition to the crown by the burgesses the king agreed that the fines owed to him by the town be spent *"in aid of the repair of the quay"*. The secondary plague event of 1361-1362, which is thought to have killed around 20% of the population of England, finds reference in the Patent Rolls of 1362. Again, the town sought excusement from fines when it was said that those governing the town had died in the pestilences and some of the poor had been sent away whilst *"the quay jutting out into the sea and forming a refuge from the sea for ships passing in time of peril is so damaged that ships will find no refuge there, whereby the town will be destroyed if he do not find a remedy"* (Cal. Pat. Rolls 1362). In this instance the crown responded *"without delay"* and this issue is again referred to in the Rolls of 1363 when commission was given to two individuals:

"to survey the works at the quay of Scardeburgh, towards the repair of which quay the king has granted the good men of that town 246l., and audit the account of the money spent in such repair; also to find by inquisition how much money has been applied by men of the town and others for the work and how much remains to be applied and whether the quay can be sufficiently repaired by the money given by the king and others" (Cal. Pat. Rolls 1363).

"a supplication from the burgesses of the decay of their pier" was made in 1538 (L. & P. Henry VIII, 1538). This appeal may still have been active in 1541 when the Privy Council stated that *"Men of Scarborough who sued for certain wood to repair their haven and pier had answer that one should be sent to view both haven and woods"* (L. & P. Henry VIII, 1541). A significant development, perhaps originating with this supplication, was an Act of Parliament of 1545 (Act of Parliament 1545). The first part of the Act states that the port is accessible at all states of the tide, that *"the flood and rage of the sea ... and insurging over and upon the saide Key or Peere in times of tempest, hath freated and broken downe and mvaylously worne away the said Key or Peere"*. This, it was claimed, had led to the impoverishment of the town.

The preamble of the 1545 Act of Parliament neatly summarises certain administrative aspects. It was stated that:

"There shall be a Corporation or Body Politick of two Persons, to be called for ever the Masters or Keepers of the Pier or Key of Scarborough in the County of York , who shall have Authority to govern the Works of the same Key or Pier, to hire Workmen, buy Stuff, and make Provision for every Thing thereunto belonging, which shall receive yearly of every Owner of any Messuages, Lands, Tenements and Hereditaments, or Rents, within the Liberties of Scarborough *, the fifth Part of the yearly Value of the same towards the reparation of the said Pier: For the which the said Masters or Keepers may distrain".*

This Act was clearly intended to secure the future of the harbour by putting its administration and funding on a firm, and legally watertight, basis. It is known that Henry VIII invested heavily in the pier infrastructure at the other Yorkshire seaports of Hornsea, Bridlington, Flamborough and Whitby when, following the dissolution, these sites ended up in the hands of the crown. This can be seen as part of a wider Henrician policy regarding maritime and defence matters. Although the pier at Scarborough was not taken into the custody of the crown, the Act of 1545 would seem to represent a clear attempt by the state to ensure its survival.

Under the terms of the Act the Bailiffs, Coroners and Searchers were empowered to elect two honest local inhabitants as the Masters or Keepers of the harbour for a term of three years. Refusal to hold office was punishable by a fine of 40s, this to be used for the repair and maintenance of the harbour. One duty of the office was the levying of a rate on property within the town, its liberties and jurisdiction, this being a $1/5^{th}$ part of its annual rental value and failure to pay could be punishable by distraining of goods. The payment of such a proportion must be regarded as a demonstrating the significance that was attached to the harbour. Another role of office was to order, oversee and govern works at the harbour. This included the hiring of workmen and the purchase of materials. At the end of their term of office the Masters were required to account for the receipt and expenditure of the rates, these being scrutinised by the bailiffs, Coroners and Searchers.

The reformation provided some new sources of financing the harbour. Lead from two steeples of the church was sold in 1555 whilst lead was stripped from the chapels of St Thomas and St Sepulchre in 1564 (Rushton 2008, 252). One of the bailiffs who signed the order for the lead stripping was Tristram Cooke (Binns 2001, 48). As a result of earlier

petitioning by the town Cooke had received a warrant from the Privy Council in 1551 to collect £200 towards the repair of the pier and harbour, though apparently this money was never received (Hist. Parl; Binns 2001, 48). Cooke represented the town in parliament in 1554.

Another, albeit erratic, source of income for the repair and maintenance of the harbour were bequests in the wills of local people, a number of which have been recorded for the 15th and 16th centuries. The overwhelming majority of these are by individuals described as burgesses or merchants, presumably as they and their families had a vested interest in the port. Rowntree lists seven such wills in the 15th century and six in the 16th century (Rowntree 1931, 379, 384). The value of the 15th century bequests ranged from 10s to 10li, whilst one individual, Peter Shilbotell, a burgess, left *"xxs, or else in timber"*. The 16th century bequests tended to be on a smaller scale, ranging from 4d to 20s and again included the gifting of *"one great tree lying in Raynclif"*. However, one individual left *"my greate House" to the key*.

Despite the Act of 1545 the pier was in a sore state by 1564 when the town once again made lengthy appeals to the crown and to the Archbishop of York and Council of the North (ACP, 1564; Cal. S. P. Dom. 1565). The appeal to the Council of the North prompted the response that they would *"consider some meanes by devising some contribucion in the cuntrey joined unto yt"*. One result was apparently the authorisation of an appeal to the Lord Mayor of York for the well disposed of the city to help towards the repair of the harbour (Rushton 2008, 252). The appeal to the crown begins by pointing out the merits of the harbour as a haven of refuge and as a port for trade and fishing and how its decay had reduced both trade and fishing. It is further stated that the inhabitants of the town could no longer afford to repair and maintain the harbour. An interesting parallel is drawn between the differential funding of types of infrastructure. One part of the document states that the country here is already much charged with the building and repairing of a bridge lately taken away and broken by raging waters and that they are bound by law to do this. Conversely, they pointed out, there is no law that binds the country to repair the pier. The intentions of the town in relation to the pier are set out *"it must be in other sorte made than it nowe is and withowte any tymbre but onelie of great stone"*. Finally, a request was also made for money to go towards the construction of the proposed new pier of stone and for the parsonages of Scarborough and Filey to be used

for its maintenance. Shortly after this date the timber-built pier was indeed replaced by one of stone.

Miscellaneous technical aspects relating to the piers

Workforces and equipment/materials

Carpenters and labourers, together with a 'page' shaping treenails are recorded at the harbour together with masons working on the wall at the foot of the castle cliff (TNA E101/482/3). No specialists appear in the examined documentation and the only reference to those commissioning and managing repairs and maintenance are those of local Collectors and Masters/Keepers. The accounts of works around 1320 detail some of the equipment used during these repairs. This included gavelocks (crowbars), shovels, windlasses (and grease for these), a sled for hauling stones, drills and *'levenours'* – levers? Materials referred to included treenails, iron nails called *'scharpinges'* and converted timber referred to as *'bemes'* (beams), *'boctem'* (boss?), *'bemetre'* (beam-tree), and *'scheldebemes'* (shield-beams) (TNA E101/482/3).

Material stores

No references to a stores building relating to the pier and waterfront quay have been located though such almost certainly existed, both for materials and equipment. The building on the pier depicted in the drawing of 1538-9 may have formed a residence/store for the gunner/s responsible for the artillery mounted on the pier rather than a harbour store.

Timber used at Scarborough pier and its sources

The Royal Forest of Pickering supplied three hundred oaks granted in1489. Some of the timbers used during the pier repairs in 1320 are again specifically referred to as oak. The timber used in the 1320 repairs was purchased from a number of individuals whose home locales are stated. Those within 15km are 'Snaynton' (Snainton), 'Hakenesse' (Hackness), 'Hunmanbi' (Hunmanby). Slightly further away is 'Helperthorp'

(Helperthorpe) and 'Newton' (perhaps Newtondale near Pickering?). 'Gaynesburgh' (Gainsborough) and 'Blythe' are also recorded. The nearest settlements of these latter two names are in the area of North Lincolnshire and South Yorkshire, though it is possible that the home of the seller and source of the timber are not necessarily the same. Another name 'Bautre' may equate to Bawtry which lies close to both Blythe and Gainsborough – perhaps too close to be coincidental?

In the 15th century will of Peter Shilbotell, a burgess, he left to the harbour *"xxs, or else in timber"*, whilst in the 16th century one individual left *"one great tree lying in Raynclif"* (Raincliff, approximately 5km to the west of Scarborough).

Related fortifications

The castle and walled town had made Scarborough a heavily defended port town from as early as the 12th century. The castle, set on the raised headland, dominated both the town and port immediately below. The 1538-9 depiction of the town illustrates the defended state of Scarborough at that time. Regarding the port this is highlighted by the showing of a cannon on the pier. Adjacent to the cannon a building is also shown. It is possible that the cannon and building are related, the latter perhaps acting as a store for shot and powder as well as a residence for the gunner/s. Further munitions and arms are known to have been stockpiled in the castle in 1547-48 (Kenyon 1982, 205).

At various times after the replacement of the timber-built pier with one of stone, artillery was again placed in proximity to the pier, this within a fort in an elevated location immediately to the pier's landward end.

Material remains

Given the evidence for land reclamation within areas of former harbour it is possible that some remains of early waterfront quays may survive, some of which may lie in waterlogged environments. However, Pearson's study of deposits in this area indicates that dry deposits are likely to predominate in some of this area, especially those furthest from the shoreline and mouth of the Damyet stream (Pearson 1987, 34). The site of the timber-built pier is believed to lie under the landward part of the present Vincent's Pier. It

is uncertain whether or not any remains of the earlier piers will survive below this later work.

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Case study 5: Filey

Summary of previous work

The earliest history of Filey was written by John Cole in 1828 (Cole 1928). Cole's work is typical of many anecdotal local histories of the earlier 19th century. However, it is also marked by accurate topographic descriptions, a use of local information and some reference to earlier documentary sources. Cole knew that a pier had formerly been present at the town, that it was referred to in an early 17th century pilot book, and was aware of associated place-names. A later history of the town is Andrews' The Story of Filey (Andrews 1946). Written in a similar jaunty manner to that of Cole's history, Andrews' work adds little that is new or directly relevant to the story of Filey's pier.

The best background to the town, in terms of usage of original archival material, is undoubtedly that provided in volume 2 of the Victoria County History of the East Riding (VCH 1974). Although this makes no reference to the material remains of the pier it does include a consideration of a number of the documentary references to the structure.

More recent histories of the town have been written by Michael Fearon (Fearon, 1990; 2008). The bulk of these works have been concerned with the later post-medieval history of the town and reference to the historic pier is essentially a repetition of that within earlier histories.

With particular reference to the port of Filey we are fortunate that previous direct historical consideration has been given to this and the associated coastline by J.C. Ellis in two fully referenced unpublished essays (Ellis 1976; Ellis undated). Ellis carried out a thorough search of the various calendars of state papers, other published archival material and the two 16th and 17th century pilot books that refer to the pier. Ellis's works stand out as a paragon of local historical study and provide an excellent grounding for the present investigation.

The historic pier formed a subject of investigation in an article of 1998 (Johnson 1998). This study involved a stone by stone survey of the material remains at Old Quay Rocks together with an assessment of relevant documentary sources.

Town background

Filey has pre Norman conquest origins and was recorded in 1086 as soke of the royal manor of Falsgrave. Filey was subsequently vested in the De Gant family, who already held the manor of Hunmanby some 3.5km distant to the south-east. The township continued to be held as part of this manor throughout the Middle Ages. Although significant landholdings within Filey came to be held by a number of families during the course of the medieval period, the lords of the manor of Hunmanby continued to exercise considerable authority in the town and held courts throughout the 16th and 17th centuries. This manor still held rights over parts of the beach in the earlier 20th century. By 1377 there were 165 poll-tax payers recorded in Filey and in 1672 it contained a total of 77 households. Still only having a population of fractionally over five hundred in the early 19th century, the growth of the town owed much to the arrival of the railway in the 1840s. Powers of local self-governance were granted to the town in the 19th century (VCH 1974, 142-6; Fearon 2008, 18).

Fishing appears always to have formed a mainstay of the local economy and as early as the 12th century there are a number of references to Filey men landing catches in Whitby and Grimsby as well as at Filey itself (VCH 1974, 141). By the early 13th century documentary sources suggest that Filey vessels were active across large areas of the North Sea, including Dogger Bank (VCH 1974, 141). Owing to the gift of the rectory at Filey to Bridlington Priory in the early 12th century, fish tithes were payable to that institution (Lancaster 1912, 78). A Friday market was granted in 1221 and a two day annual fair in 1240 (VCH 1974, 142-3; Y.A.S. 1925).

Environmental and topographical aspects

The site of the historic pier at Old Quay Rocks lies sheltered from the prevailing elements from the north and north-east behind the promontory of Carr Naze and Filey Brigg. These topographic features are composed of Corallian rocks of oolite and calcareous grit, overlain at Carr Naze by glacial drift. Carr Naze and Filey Brigg form the northern limit of the gentle sweep of Filey Bay, the chalk cliffs of Speeton and Flamborough Head forming the bay's southern limits. The coastal ground between these two extremities is relatively low lying whilst the inter-tidal zone is one of a gently sloping sandy beach. The

physical remains of the pier have a north-east to south-west alignment, this serving to shield the area to the west and north-west, that is the landward, side of the structure, i.e. that side not protected by Carr Naze and the Brigg. The topographic setting of the pier at Filey, sheltered by a promontory to its northern side mirrors that at a number of the Yorkshire coast pier sites, the others being Scarborough, Flamborough and Bridlington. Such locations provide shelter from the prevailing north and north-easterly winds.

Figure 1, Location of Filey – the first promontory to the north of Flamborough Head

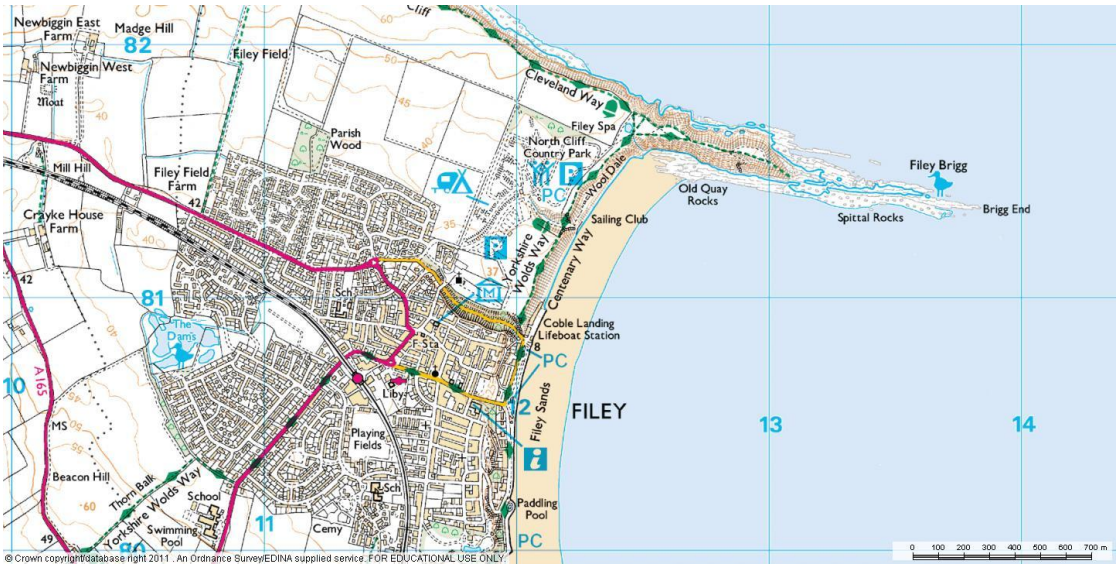

Figure 2, Site of Old Quay Rocks in relation to the adjacent topography

Material remains

(Figures 3, 4 and 5)

The mass of stone known as Old Quay Rocks is located some 70m south of the west central portion of the southern cliffs of Carr Naze at a height fractionally above that of mean low water. The remains consist of a slightly curvilinear concentration of boulders and stones aligned approximately north-east to south-west. These measure around 28m in length and have a core width of 4.5m – 6m, with a less concentrated spread a few metres to either side of this. At their north-east end the remains have a height above the immediate surroundings of approximately 1.3m, this height tailing off progressively towards the south-west end where the remains stand little above 0.5m. The boulders have a maximum size of 1.3m (in any direction) most being somewhat smaller than this and are of types local to Carr Naze and Filey Brigg together with a number of what are probably glacial erratics. Despite lying up to four stones deep at its core, no coursing or strictly ordered laying of the boulders is apparent and none of the stones bears evidence for tooling or hewing, though such could arguably have been lost to erosion. The north-eastern end of the remains lie directly over bedrock. The remainder of the remains lie on/within sand beneath which the bedrock extends.

Figure 3, Old Quay Rocks, between tides, looking south-west

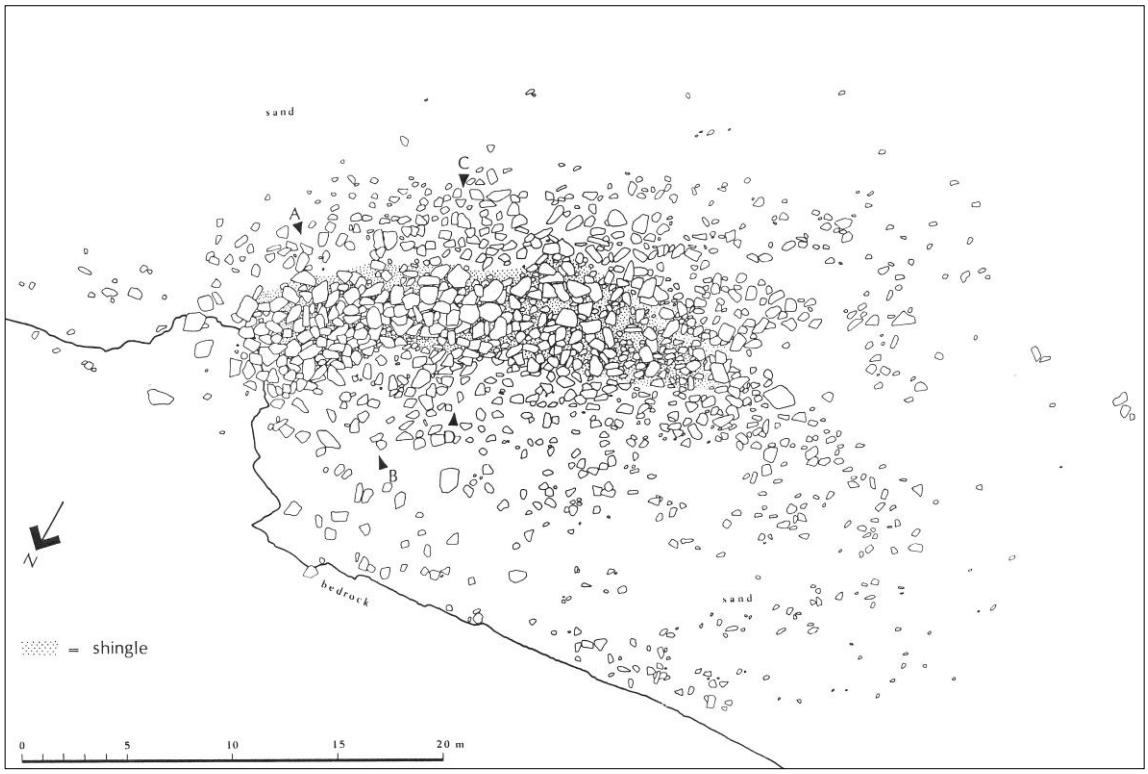

Figure 4, Plan of material remains, Old Quay Rocks, Filey (source Johnson 1998)

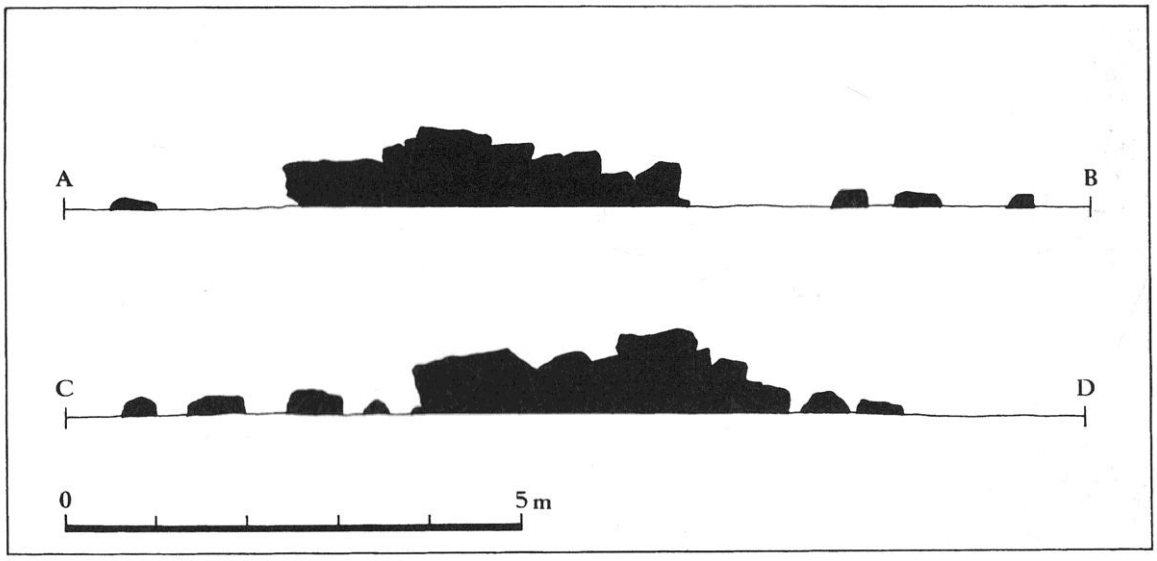

Figure 5, Profiles across Old Quay Rocks, Filey (source Johnson 1998)

Technology

Documentary evidence

Filey is mentioned as a port long before it is recorded as possessing a pier. The first documentary evidence we have for a port at Filey is provided by a legal dispute concerning the profits of the Friday market and yearly fair of Filey, the profits being *"as well on land as by sea"* (Y.A.S. 1925, 102). The earliest specific mention of the 'port of Filey' is in 1275/6 when seven men, amongst whom was the Prior of Bridlington, were accused of the illegal export of wool from the haven (Rotuli Hundredorum cited in VCH 1974, 142). There are a number of documentary references to the port throughout the 14th century, e.g. (Cal Pat. Rolls 1304; Cal. Pat. Rolls 1316). Three of these 14th century references are circular letters sent by the crown to the authorities of the port. These circular letters were concerned with matters likely to be prejudicial to the state such as enforcing certain travel restrictions and detaining suspected spies. Such letters were addressed to the port of Filey's 'keepers' in 1323, to its 'bailiffs' in 1342 and to two named individuals in 1364 (Cal. Close Rolls 1323; Cal. Close Rolls 1342; Cal. Pat. Rolls 1364).

The first specific reference to a pier at Filey is Lucas Waghenaer's pilot book which accompanies his chart of the same year (Figure 6), (Waghenaer 1588). This work notes the pier and goes on to say that shelter at anchor may be had *"between the pier and Filey bridge* (Brigg) *which lieth under water at Spring tide"*. A later work, Willem Bleau's pilot book of 1625 states:

"Three leagues by west of Flambrough head lieth Fyley, in a round bay to the southwards of a point that lieth out, which hath a pier or head, where you may ly within it, but it falleth there drie at low water" and *"Without the head of Fyley lieth a rock under water, called Fyley bridge, betwixt it and the pier you may well lie aflote with a shippe of an hundred lasts, in five fathome at low water, and have shelter for a north-east and east wind"* (Bleau 1625).

Whilst these references do not provide technical detail of the structure itself they do serve to confirm the location of the pier, inform us that it was a dry (tidal) harbour and that shipping could also find shelter outside of the pier within the lee of Carr Naze and Filey Brigg.

There is evidence to suggest that by the 1630s the pier at Filey was in a state of decay. In that year a member of the court petitioned for a collection towards the building of a harbour and light. In the preamble to this request it is stated that the *"ancient pier is defaced and ruined"* (Cal. S.P. Dom. 1637). By 1685/6 shipping rights at Filey are recorded only as *"groundage ffor shipps"* (ERRO DDHU/9/74). There is no mention of a pier at this date and it is likely that it had ceased to function. There is no further mention of a pier at Filey after 1637. Groundage charges continued to be paid throughout the 19th century to the lords of the manor of Filey but this was for groundage on a beach, not within a pier. Some idea of the volume of shipping in the later post-medieval period is provided by records for the 1830s which indicates that ships called up to 65 times a year, paying each time a groundage charge of four shillings (ERRO DDHU/17/5). By the late 19th century the number of ship visits was often down to single figures and groundage charges had been reduced to three pence (ERRO DDHU/3/28).

Cartographic and pictorial evidence

(Figures 6, 7 and 8)

The only known depictions of the pier at Filey are those shown in Lucas Waghenaer's chart and pilot book of 1588 (and other editions), a map of 1595 and the pilot book and charts of Willem Bleau of 1625 (and other editions) (Waghenaer 1588; British Library 1; Bleau 1625). Waghenaer was a pioneer in the development of Dutch nautical chart making whilst the polymath Bleau belonged to a slightly later generation of Dutch cartographers. The Dutch were pioneers in the development of both chart making and the production of pilot books and the works of both Waghenaer and Bleau were published in a number of English versions. Caution does need to be exercised however in considering the pier detail in all these maps. Both Dutch maps for example depict Bridlington with a single pier whilst it is known from a wealth of documentary material, as well as the English map of 1595, that it had a twin pier arrangement. Again, towns within the study area that are known to have had piers at some particular point in time are not necessarily depicted as having such in contemporary charts and maps. There are many reasons why this is so, the principal of which are probably the scale of depiction and the nature of the information that the cartographer was attempting to convey. It should also be borne in

mind that many of the early cartographers were obtaining information from earlier maps and from communication with mariners and others rather than by first hand inspection. Again, the scale of the depicted piers is commonly far greater than the actuality. Generally speaking it is safest to regard the depiction of piers as ‘map symbols’ rather than true or life-like representations, though their presence on a map can be held with a degree of certainty to genuinely indicate that a pier was present in the locality.

Figure 6, Extract of Lucas Waghenaer’s chart of part of the east coast of England of 1588. Filey and its pier are to the centre, piers are also depicted at Bridlington, Flamborough and Scarborough. What may be a navigation aid is depicted at the end of the Brigg. North is towards the top right. (National Maritime Museum,PBD8264(25))

Figure 7, Extract of manuscript map of 1595 depicting the seacoast from the Humber to Scarborough. Filey is shown as the headland above the bulbously depicted Flamborough Head. North is towards top. (British Library, Royal. MS. 18. D. 111, f.63)

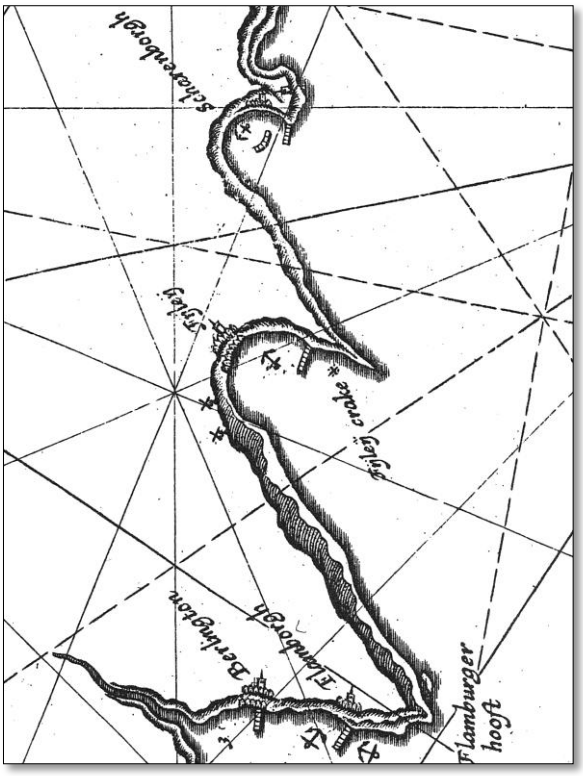

Figure 8, Extract of Bleau's chart of 1625. The pier at Filey is depicted in the central area. North is towards top.

The form of the pier

The first clear reference we have to a pier at Filey is in Waghenaer's pilot book and chart of 1588. By 1637 the pier is described as ruinous and there is no further reference to it. There are no documentary, cartographic or pictorial remains that inform us of the nature of the construction of the pier at Filey. The material remains at Quay Rocks are comprised simply of a spread of boulders and stones in a linear/slightly curvilinear arrangement and no posts, or postholes, have been observed. None of the boulders or stones display any signs of working and none are arranged in courses. Rather the distribution of this material within the spread appears random. It is known that the piers of the eastern coast of England were essentially timber-built until the 17th century and that within these piers an internal ballast of stone was employed. Given the tradition of timber pier building it is suggested here that the stone remains at Quay Rocks represent the internal ballast of a timber-built pier.

The construction of a pier with walls of close piling may have been very difficult to construct on a bedrock site such as this. Such would probably have required the cutting of deep, continuous post trenches to each side of the pier and these may never have provided the stability of driven piles. An earthfast frame may have been easier to construct but even this would have had similar attendant difficulties, both in construction and repair. Perhaps the most suitable method of constructing a small pier, with an internal ballast of stone, in such a location would have been one comprised of one or a series of connected timber boxes. Such boxes may be regarded as forming a freestanding frame. This form of construction, which must presently be considered speculative, is also suggested for the bedrock pier site at Flamborough. Technical parallels for such an arrangement may be found in structures such as the 12th – 13th century medieval dock at Southgate, Hartlepool (Young 1987).

At the present time Old Quay Rocks is physically separated from dry land at high water and it is possible that this may have been so when the pier was in use. Whilst such a notion may seem to deny the benefits of a pier, it should be noted that for much of its life, at least between the 16th and 18th centuries, the southern pier at Scarborough took on exactly such a form. In doing so the pier or 'mole' is still performing its major functions of providing a static mooring point and giving protection from the sea. We can also view the pier in an alternative perspective in which it is considered as a physical expression of the ownership of rights to tolls. As such, it may be that the pier was the place at which vessels were 'officially' obliged to moor and where the avoidance of paying tolls was not possible. In short, the provision of a pier may be seen as formalising and helping to regulate the trade of the port

Ownership/control/funding

The first indication we have of a port at Filey, and of ownership to its rights, is in the legal dispute concerning the profits of the Friday market and yearly fair of Filey. The profits are described as being *"as well on land as by sea"* (Y.A.S. 1925, 102). This may be indicative of a toll on ships, or goods therein, and illustrates that maritime rights and privileges were already under manorial control, at this point in time of the lords of the manors of Hunmanby and Filey. Further evidence for manorial rights on the shore at the

port are recorded in 1278 and 1447. The earlier reference concerns the entitlement to whales that came ashore, the later confirming rights to wreck of the sea (Quo Warranto; Cal. Chart. Rolls 1447). Relating to the administrative aspect of the port there are references in circular letters from the state to its *"keepers"* in 1323, to its *"bailiffs"* in 1342 and to two named individuals in 1364 (Cal. Close Rolls 1323; Cal. Close Rolls 1342; Cal. Pat. Rolls 1364). From a legalistic point of view at least these individuals had certain responsibilities at the port. A governmental initiative set up in 1565 for examining the maritime industry, partly for the repression of piracy, saw the appointment of commissioners and their deputies within individual ports (ACP 1565). One outcome of this appears to have been the naming in 1578 of three individuals at Filey as being involved in piracy (Cal. S.P. Dom. 1578). The references cited thus far relate to the use of Filey as a port, a function that required legal authority and administration but did not require the furbishment of specialist structures or equipment, including a pier.

Although a pier at Filey is first mentioned in 1588 it is not until 1600 that this is set within the administrative context of the manor. This document of 1600 states *"The groundage of every ship landed ffilowe peere, with for every ship vid and of every cole ship two bushel coles to the Bayliffe for finding of the bushel measures"* (ERRO DDHU/9/32). Conveyances of the manor in 1629 and 1648/9 note the pier and its profits and again indicate the ownership and control of the pier as being rooted in the context of the manor (ERRO DDHU/9/55; DDHU/9/60).

In a document of 1637 Endymion Porter, a Groom of the Bedchamber, petitioned the King for *"letters patent for a collection throughout England, Scotland, Ireland and Wales towards erecting a harbour at Filo and maintaining a light there and to grant the same to the petitioner for 31 years, ... and petitioner will pay into the exchequer the yearly sum of 20L"* (Cal. S.P. Dom. 1637). This request is of interest as the petitioner, who was an important long term royal servant with interests in a number of monopolies, does not appear to have had any direct connection to the manor yet appears to be attempting to muscle in, via the offices of the crown, to the rights and privileges still held by that manor.

Evidence has already been presented for the demise of the pier in the first half of the 17th century, shipping thereafter being grounded on the beach rather than within a pier. Charges for this groundage were paid to the manor of Filey in the 19th century (ERRO

DDHU/9/74; DDHU/17/5; DDHU/3/28). The story of the ownership of the port of Filey was always one of manorial ownership – before the pier was built, during the life of the pier, and after the demise of the pier.

Although only around 30m in length and subject to little documentary reference, the pier at Filey presents an interesting case study. This is due to the above factors combined with the nature of its ownership. It is also probable that the small size of the pier may be reflective of low levels of shipping and the relatively low significance of the manor to which it was attached. Unlike southern England the majority of the piers on the Yorkshire coast, including that at Filey, originated in manorial, or estate, contexts. Unfolding events during the reformation resulted in the transference of all these piers, bar Filey's, to the crown. After an initial spate of crown investment some of these seized piers were simply left to decline and eventually disappear, this as a direct result of a lack of preparedness to continue paying the enormous costs required in building and maintaining such structures. These events simply passed Filey by. It is assumed, that unlike the Constable family at Flamborough for example, here the lords of the manor kept the heads down during the turmoil of the reformation and so their possessions were left intact. This uninterrupted ownership, control and funding permitted the pier at Filey to survive to a date later than those other Yorkshire examples that would be lost during the mid - late 16th century. It is also probable that the very small scale of the pier at Filey aided its prolonged lifespan, it requiring less resources for its maintenance and repair than larger piers.

Sight must also be maintained on the suggestion presented above that the small pier at Filey can be considered as much a symbolic physical expression of the manorial ownership of rights to tolls as a workaday functional item of infrastructure. Accordingly, it was here that vessels were obliged to moor and where the payment of tolls could not be avoided. In this way the trade of the port was formalised and regulated.

Miscellaneous

Specialists and workers

There are no known records relating to the construction of the pier, nor to the persons who built it or the contractual arrangements by which such workers were employed. In

the case of certain timber-built piers of the east coast some 'free labour' at least was provided by local communities. In the case of communally owned piers, for example Great Yarmouth, Hastings, Folkestone, Bridlington, etc this was effectively a 'civil chore'. In the context of the manor, or estate, for example pre 17th century Bridlington, this was as a labour service owed by manorial tenants. We do not have the information that allows us to see whether manorial labour services played a role in the building and maintenance of the pier at Filey.

Place-names

There are two place-names associated with the pier site. Old Quay Rocks is the name attached to the pier remains themselves. Quay Hole is the name attached to a slight indentation in the cliff immediately to the north of the pier remains. These two place-names are first recorded in the earliest history of the town in 1828, though they may of course be considerably older (Cole 1828, 11). Note that the place-name 'Key Hole' is applied to an indentation in the cliff adjacent to the remains of the pier/s at Flamborough some 16km to the south-east.

Proposed harbour schemes

There were several schemes for building a harbour at Filey during the later post-medieval period. In 1638 and 1661 the Masters of Trinity House were asked to certify what the importance or convenience of a port at the town may be. On both occasions the Brethren responded in the affirmative, the certificate issued in 1661 stating that *"Filey was a suitable place for the building of a dry harbour pier for the safety of ships trading northward"* (YAS 1942, 153). There were reputed suggestions for a harbour in the 18th century and at least two proposals in the 19th century (VCH 1974, 142; Fearon 2008, 140; TNA PROS(Y)3/1/3). The motivations for these proposals were stated as being to provide a harbour of refuge, to encourage trade and to provide better facilities for fishermen.

Quarrying at the Brigg

There is documentary evidence and even material remains that testify to quarrying at Filey Brigg. The earliest documentary reference to this activity is a 12th century grant

made to the Canons of Bridlington for stone *"to be delved and taken at their charges, and a good free way over the cliff of the quarry for the length of the said cliff in the place called Le Hoke and elsewhere where they can find rock, and free entry and egress for their carts"* (Lancaster 1912, 80). The wording of this grant suggests the likelihood that this stone was being quarried in the area of Filey Brigg and Carr Naze. There are later references to quarrying in the area of the Brigg and the taking of gravel from the beach, this remaining a part of the manorial rights throughout the 19th century (Ellis 1976, 13-14). There still remain a number of very large partially dressed blocks on the southern side of the Brigg and others which bear the marks of long straight drill holes. Areas of quarrying are also evident to the cliffs on the south side of Carr Naze (Clark and Robinson 1997, 29). At least two sub-square postholes on the Brigg may be associated with this quarrying work (Johnson 1998, 79-81). Whilst it is known that coal was a commodity shipped through the harbour at Filey it is possible that stone, despite the 13th century reference to carts, may also have been shipped. It would seem certain that certain topographic change in the locality has been wrought by quarrying.

Spittal Rocks

Extending from the southern side of the central part of the Brigg is a submerged reef of stone and rounded boulders that extends in an east-south-easterly direction for some 520m and is generally well in excess of 20m wide. The land ward end only of this feature is exposed at the lowest spring tides. This unusual formation has much local myth attached to it, most suggesting that some time in the past, commonly the Roman past, it was a mole or harbour Clark and Robinson 1997, 7; cooper 1913, 12; Pearson 1936, 193). In the earlier 20th century a professor Gilligan suggested it to be a cranch or tidal accumulation (Kitson-Clark 1935, 82). Since then minor controversy has raged over its 'natural' or 'human-made' origins. A local group with some professional help, the Filey Brigg Research Group, has carried out surveys of the formation, including an entire bathymetric survey of the feature and surrounding seabed, and taken a number of geological samples. Alas, the reporting of this work was inconclusive (Clark and Robinson 1997).

Whilst the precise origins of this enigmatic feature await definitive resolution it seems clear that it does not relate to the documented medieval/early post-medieval pier. This can

be asserted on a number of grounds. Firstly, the shelter, topographic descriptions and dry state of the harbour at low water, described by Waghenaer's and Bleau's pilot books of 1588 and 1625, can be ably related to Old Quay Rocks but not Spittals Rock. Secondly there is the Old Quay Rocks place-name itself. Finally there is the problem of the huge scale of Spittals Rock. The township of Filey within the manor of Hunmanby was never of any great size or economic might, never holding more than a weekly market and a two day annual fair. Yet the reef of Spittals at 520m length is several times longer that the recorded piers at Bridlington and over twice that belonging to the great medieval and post-medieval town of Scarborough. Indeed present evidence would suggest that Spittals Rock is probably larger than any medieval – post-medieval pier in England. The resources needed to construct such a structure would have been enormous, well beyond that of a manorial unit. The construction of a pier a fraction of this size, at Bridlington for example, consumed thousands of pounds of crown money in the earlier 16th century. It is inconceivable that the largest medieval – post-medieval pier in the country would generate no more than a small handful of passing comments in the 16th and 17th centuries.

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Case study 6: Flamborough

Summary of previous work

An awareness of there having once being a later medieval - post-medieval pier at Flamborough may never have been totally lost to local consciousness. A late 19th century written history of the village referred to a mid 16th century documentary source mentioning the pier, whilst the same history went on to state that although the pier was *"since destroyed"* ... *"the foundations are there"* (Fisher et al 1894). The earliest comment on the precise location of remains of the pier was made in 1911 (Y.A.J. 1911, 175-177). Some additional medieval and post-medieval references to the pier were published by George Hardwick in 'The History of Flamborough' and Frank Brierly in his 'A History of Flamborough' (Hardwick, 1946; Brearley 1971). The bulk of this additional information appears to have been derived from published state papers.

The most thorough background to the pier and village, in the sense of use of original archival material, is undoubtedly that provided in volume 2 of the Victoria County History of the East Riding of Yorkshire (VCH 1974). Although this makes little reference to the material remains of the pier it does include a consideration of a number of the documentary references to the structure.

More recent histories have been concerned with the later post-medieval history of the village and are of little relevance to this study.

The historic pier formed a subject of investigation in an article of 1988 (Johnson 1988). This study involved a stone by stone survey of the material remains together with an assessment of relevant documentary sources. However, the recent identification of important additional documentary sources within the National Archives, together with a reinterpretation of the material remains themselves, renders this earlier contribution needful of considerable revision.

Village and manorial background

Pre Norman Conquest origins for the village of Flamborough are confirmed by its appearance as a small settlement within the Domesday Survey of 1086 (Domesday Survey). The majority of the place and feature names relating to Flamborough's coastline, as well as its local dialect words, are of Scandinavian origin.

Lordship of the manor of Flamborough throughout the medieval and post-medieval periods was in secular hands. Some time around the latter years of the 11th century or earlier years of the 12th century the manor came into the custody of what was to become the Flamborough branch of the Constable family. This branch also held other lands in Yorkshire including the manor of Holme on Spalding Moor. The Constables held the manor until 1537 when Sir Robert Constable sided with the rebels in the Pilgramage of Grace. Being on the wrong side cost the Constable's dearly. The family lost their estates whilst Sir Robert also lost his head. After the manor was escheated the crown carried out a series of repairs to elements of the structural fabric of the village, and significantly, to the quay. Large parts of the manor were subsequently leased by the crown to a named individual some time before 1551, and then in 1559 to another individual (VCH 1974, 154). In 1562 the crown leased the manor, including the pier to twelve inhabitants of Flamborough, much as happened at Bridlington (ERRO DX/131/h). In 1570 this lease to the inhabitants was renewed (Cal. Pat. Rolls 1570; TNA E/310/29/173). Parts of the manor were restored to Robert Constable, a servant of Lord Burghley and grandson of the unfortunate Sir Robert, in 1573, and more fully so in 1582 (ERRO DX/131/w; DX/131/ii; VCH 1974, 154). The Constables sold the manor in 1636. It remained in secular hands and its component parts were eventually sold off piecemeal.

Historically, the two principal economic mainstays of the village have been fishing and agriculture. Vessels of 30 and 40 tons are recorded at Flamborough in the mid 16th century whilst a number of individuals are described as 'shippers' and as trading from the port (L. & P. Henry VIII 1544a; VCH 1974, 158). The village appears always to have been of some size and between the 14th and 18th centuries slightly over 100 households were generally recorded.

Environmental and topographical aspects

The chalk-cliffed headland of Flamborough projects into the North Sea and forms one of the most distinctive and recognisable features of the east coast of England. This headland forms the easternmost extent of the chalk of the Yorkshire Wolds. To the south of the head the land is comprised mostly of glacial deposits and is flat and low lying. To the north of the headland the land again falls before rising up to the lesser promontory of Carr Naze and Filey Brigg. The lower and softer land to both north and south of the head has enabled the creation of gently sweeping bays with sandy beaches, the larger Bridlington Bay to the south and the smaller Filey Bay to the north. These bays have long formed sheltered locations for shipping in times of foul weather. The headland of Flamborough is separated from the 'mainland' by the large earthwork Known as Danes Dyke which runs north to south across the entire width of the promontory. On all other sides the headland is bounded by steep chalk cliffs. There are only two locations in close proximity to the village that permit easy access to the shore, South Landing, some 1.5km south of the village and North Landing, some 2.5km north-east of the settlement. South Landing lies in the lee of the head, has a beach of stone and sand and is accessed via a broad ravine. North Landing lies within a cove to the north of the head and again has a narrow beach of sand accessed partly through another natural ravine. Traditionally, and as a result of technological and environmental constraints, fishermen kept two small boats, one at each of the landings. In south winds they sailed from North Landing and in north winds from South Landing (Fisher et al 1894, 47-9). The historic piers at Flamborough were located at South Landing. This setting lies sheltered from the prevailing elements from the north and north-east and at the northern tip of the relatively sheltered waters of Bridlington Bay. This topographic setting of the piers at Flamborough, sheltered by a promontory to its northern side mirrors that at a number of the Yorkshire coast pier sites, the others being Scarborough, Filey and Bridlington.

Figure 1, Location of Flamborough and the promontory Flamborough Head

Place-names

There is a single place-name associated with the pier site. 'Key Hole' is the name attached to the angle in the cliff immediately north of the pier remains. The first known recording of this place-name is on the first edition Ordnance Survey mapping of the 1850s. Note that at Filey, some 16km to the north-west the place-name 'Quay Hole' is applied to a slight indentation in the cliff adjacent to the remains of the pier there whilst the name Old Quay Rocks is applied to the pier remains themselves.

Technology

Documentary evidence

Fishing was recorded at Flamborough as early as 1209 (VCH 1974, 158), whilst a port is first mentioned in 1323 when its keepers were ordered not to permit a named individual, or any of his men to cross the sea without the king's special consent (Cal. Close Rolls 1323). The port is again mentioned in 1342 when orders were sent from the king to the bailiffs of Flamborough (Cal. Close Rolls 1342). Whilst these references indicate the presence of a port, a function which required legal authority and administration, this in itself does not imply the provision of a pier or similar infrastructure.

The first mention of actual port facilities was in 1400-01 when Robert Constable, the Lord of Flamborough, bequeathed £40 for the maintenance of one 'kay' in the sea (Test. Ebor. 1836, 264-5). A pier is mentioned again in 1473 when a commission was sent ordering the arrest and imprisonment of the owners of a ship that within two miles of 'la peere' of Flamborough had entered a Scottish ship sailing to England under safe conduct (Cal. Pat. 1473). In 1531 there is further reference to the pier when Sir Robert Constable, Lord of the Manor, reaffirmed his accustomed right of way between his manors of Flamborough and Holme on Spalding Moor, in particular for carts carrying timber to repair the pier (YSCP III 1914, 25). Flamborough was compared favourably to nearby Bridlington in a memoranda attached to a letter sent by the Duke of Norfolk to Thomas Cromwell in May 1537. Norfolk stated that *"the haven of Bridlington is more dangerous than Flamborough"* – this was clearly a first hand observation as it was also said *"for my lord's Grace have viewed and seen both"* (L and P, 1537; Y.A.S. XLVIII, 47). It is worthy of note that, after the king, the two most powerful individuals in the land were associated with the haven and its rebuilding.

A series of documents and accounts dating from the later 1540s to 1570 provide important information regarding programmes of rebuilding of the pier as well as significant details concerning the wider, and changing, social context in which the pier works were set. The most informative of the Flamborough documents are a series of Exchequer accounts that detail works carried out at the site in the first half of the 1540's (TNA E/101/463/17; E/101/463/18; E/101/463/19; E/101/463/20).

The earliest of these documents TNA E101/463/17 dates to 1542, some five years after the manor of Flamborough had been seized from the attained Sir Robert Constable. This document is titled *"allowance for ye key"* and was drawn up by a Rychard Robynson who was the bailiff of the manor. It may however relate to two periods of work separated by a short amount of time as there are two totalling ups of the listed expenses, one part way through the document, the other at the end. The second listing is prefixed by a small heading titled *"Expenssys off ye key by R Pollards Commandment"*. Judging by the listed number of days worked by certain named individuals, the entire works were probably carried out over a few tens of days. At any one time there appear to have been only four *"carpenters"* at work, at a daily rate of 6d. There is reference to carriage to *"brydlyngton key for wod"* as well as to *"loydyng ye sayd waynes"* with this loading apparently done by carpenters rather than labourers. Certain named and un-named people appear to be

serving as labourers. Sometimes the precise tasks they are performing are not stated, though they are commonly recorded as *"karyng stones"*, no doubt as ballast within the shell of the timber pier or as rock armour. These workers were paid at the rate of 4d per day or 2d per tide. There is little in the way of detailed technical information of the structure they were working on though two carpenters and *"ye men"* did spend four and a half days *"emendyng the slot lockers and heyd"*. This particular task may refer to repairs to individual bay units and the pier head. Later parts of the same document relate to works carried out in the village and it is noteworthy that two of the named carpenters working at the pier were also paid for *"settyng up the wwod work off the court house"*.

A further pier related document is TNA E101/463/18 of 1543-4, entitled *"Repacyons done att the kay sen?* (since?) *Mertynned last past by Rychard Polard"*. This was again drawn up by the bailiff Rychard Robynson and lists works carried out at the key with later parts of the document dealing with 'land works' within the manor. On 21st November three carpenters were each paid 6d per day for working from between 14 – 26 days. Covering the same date five labourers were paid 2d per tide, and more occasionally 4d per day. On 8th January further payments are listed to three carpenters, each whom had worked ten days, and five labourers who had worked up to four days and two tides. There are two further listed payments shortly thereafter. The first is for three carpenters working between six and seven days, and for five labourers working between two and three days. The second is for three carpenters working between five and nine days and for five labourers working between three and five days. The payment for one of these labourers was *"ffor leyng xiiii lodds wodd ffrome the town to ye kay"*; given the cost per load the town may perhaps be more likely to have been Bridlington than Flamborough. No further technical details are provided by this document though again one of the carpenters working at the key, Thomas Haldore, is the subject of several payments further in the document for working on a land building.

Exchequer document TNA E101/463/19, titled *"The kay of fflamruogh"* details the payments made for workers in October and November of 1544. The accounts are again likely to be those of the bailiff whilst the hand of the document is certainly similar to that of TNA E101/463/18. In October two carpenters worked six and twelve days respectively and four labourers for a varied number of days and tides. In November three carpenters worked three days and four labourers three tides each. The scale of the October and

November works was clearly limited and may represent repair and maintenance in advance of winter weather.

Exchequer document TNA E101/463/20 is again titled *"the key of fflambrughe"* and relates to works done at the key in November 1545 and January 1546, whilst the final parts of the document are concerned with land-based works in the manor. In November four carpenters each worked four – five days whilst four labourers worked between one and four days. The only specific task described is *"karyng stones"*, presumably ballast or rock armour. In January two carpenters worked two and three days each whilst at least two labourers worked a similarly short time. The final part of this document is missing. Although TNA E101/463/20 provides little direct technical information the small scale of the works suggests that it was little more than repair and maintenance.

A lease of the manor and pier of 1570 makes reference to timber, walls and rommes? (bay divisions?) of a proposed new pier. This intended pier was to have eight feet of water at the pier head during a neap tide (presumably mean high water of a neap). As such this pier will have been dry at low water. Although the material remains and work accounts indicate a pier complex of fairly small scale it was capable of accommodating vessels of some size. During the 1540s there are records of ships of 30 and 40 tons at the port, as well as a listing of thirty one mariners, able to serve the king (VCH 1974, 158; L. & P. 1544 a & b).

Cartographic and pictorial evidence

(Figures 2, 3 and 4)

The only known depictions of the pier/s at Flamborough are those shown in Lucas Waghenaer's chart and pilot book of 1588 (and other editions), a map of 1595 and the pilot book and charts of Willem Bleau of 1625 (and other editions) (Waghenaer 1588; British Library 1; Bleau 1625). Waghenaer and Bleau were both Dutch cartographers of renown whose works were published in a number of English versions. It is necessary however to exercise some caution in considering the pier detail in these Dutch charts. Both, for example, depict Bridlington with a single pier whilst documentary material unambiguously describes a twin pier arrangement. Again, some towns that are known to

have had piers at some particular point in time are not necessarily depicted as such in contemporary charts and maps. There are a variety of reasons why this may be, including the scale of depiction and nature of information that the cartographer was attempting to convey. We should also remember that early cartographers were generally obtaining information from existing maps and from communication with mariners and others rather than by first hand inspection. Again, the scale of the depicted piers is commonly far greater than the actuality. It is perhaps safest to regard the depiction of piers as 'map symbols' rather than true to life representations, though this depiction can be held with a degree of certainty to genuinely indicate that a pier was present.

Figure 2, Extract of Lucas Waghenaer's chart of part of the east coast of England of 1588. Flamborough and its pier are to the left, piers are also depicted at Bridlington, Filey and Scarborough. North is towards top right. (National Maritime Museum,PBD8264(25))

Figure 3, Extract of manuscript map of 1595 depicting the seacoast from the Humber to Scarborough. Flamborough Head is bulbously depicted. Two piers are shown to the south of the head and to the north of Bridlington's piers. Although providing a wealth of information the topographic accuracy of this map compares poorly with Waghenaer's. North is towards top. (British Library, Royal. MS. 18. D. 111, f.63)

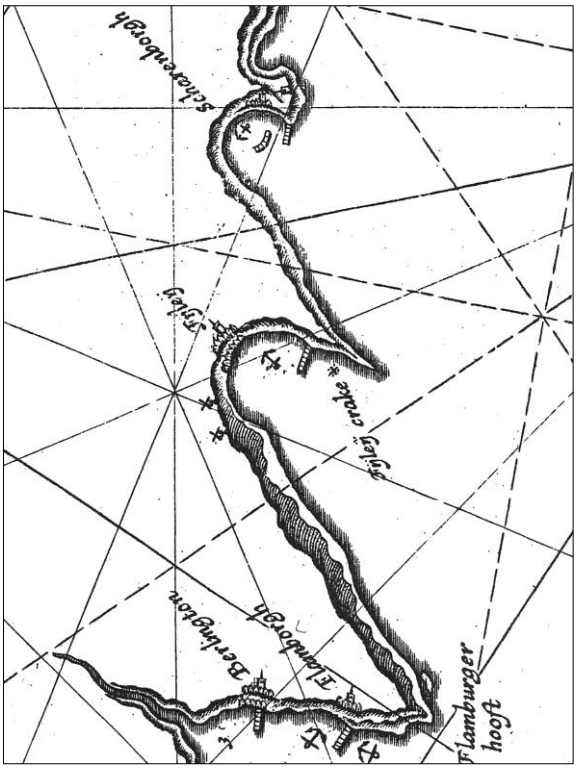

Figure 4, Extract of Bleau's chart of 1625. The pier at Flamborough is depicted in the southern area. North is towards top.

Material remains

The plan, Figures 5 shows the features that collectively form the remains of harbour structures at South Landing. These remains are located between the high and low water marks and lie on and partially in a ground surface made up of sand and shingle with an underlying chalk bedrock that in places breaks through to the surface. The remains consist of three clearly discernable features, numbered from north-east to south-west as F1 to F3. Each is made up of clusters of a large number of stones/boulders of varying concentrations. F1 is basically a loose scatter of boulders, whilst a certain amount of detectable spatial patterning is observable in the more concentrated cluster of F2 in the form of a deeply embedded circular shaped feature at its northern extremity, and particularly so in F3 where two almost parallel rows of large boulders predominantly set on their sides are evidenced (Figure 6). These stone arrangements can be denied a 'natural' origin. Such concentrations of boulders do not occur elsewhere along this coastline away from the base of the cliffs. Further, the traces of ordered spatial patterning,

as exemplified by the linear arrangements in F3, point strongly towards human construction. Finally, fractionally over 70% of the boulders used in these features are not of chalk but of harder non chalk boulders originating in the post-glacial boulder clay atop the chalk cliffs. The exceptions to this are the two linear arrangements of F3 which contain very few non chalk boulders. It is possible that there was a conscious selection of stone types for certain functions. No evidence for working or tooling has been located on any of the material. It is noted nonetheless that either a very careful selection, or a rough hewing of stones, may have been necessary in order to facilitate the compact close fitting relationships between many of the individual stones of F3's linear features. No exposed timber is evident at the site.

The form of the pier

The original reporting on the remains at Flamborough interpreted features F1, F2 and F3 as each forming stone in-fills to wooden pier systems (Johnson 1988). It is suggested here that F1 and F2 may in fact have formed three features, not two, and represent timber-built mooring points, not piers.

The spread of stone that forms F1 measures little over 20m across and yet has the appearance of being both thin and scattered. Could it be that this dispersed spread was once more concentrated and of smaller proportions? The same argument can also be posited for the southern part of F2, which although denser than that of F1, also appears to be spread. The scattered nature of the remains in both cases is suggested as being owed to initial collapse and slumping at the time of dereliction, subsequently followed by 'natural' action of the elements and human disturbance. The northern extremity of F2 is almost separated from that part to the south, contains a circular setting a little over 6m across and may well form an entirely separate entity. It is tentatively suggested that the remains of F1 and F2 at Flamborough may originally have formed small island type, mooring features, perhaps akin to dolphin posts.

Small circular features around 4m across and 5-6m tall known as dolphin posts, or dolphins, are depicted on a number of harbour plans from at least the earliest years of the 19th century. These consisted of a tall central post around which was a steeply sloping cladding of timber. The lower part of the void between the post and cladding was infilled

with stone. The function of these features was simply to provide mooring within the interior of harbours. Such dolphins were present within the new enlarged harbour of stone at Bridlington constructed in the early-mid 19th century and their vestigial remains were still present and in use, until the 1970's. The deeply embedded ring-like circular boulder setting forming the northern part of F2 is reminiscent of the linear settings of F3 and may represent toe rock armour designed to protect the lower part of the timber-work of a dolphin from wave, current and scour.

Whilst the original interpretation of the stone spreads of F3 as a pier is still broadly held, the two lines of embedded edge set boulders, set around 9.5m apart (outer edge to outer edge) and delimiting the sides of this feature are curious. It is perhaps the case that these stone alignments represent toe rock armour set at the lower exterior sides of the pier and affording vital protection to the vulnerable toe of the pier sides.

The construction of F3 as a pier with walls of close piling may have been very difficult to construct at this particular part of the site as it is located on bedrock. In such a bedrock setting close piled walls would probably have required the cutting of deep, continuous post trenches to each side of the pier that are unlikely to have provided the stability of driven piles. An earth-fast frame may have been easier to construct in these circumstances but even this would have had similar attendant difficulties, both in construction and repair. A suitable method of constructing a small pier, with an internal ballast of stone, in such a location may have been one comprised of one or a series of connected timber boxes. Such boxes could be regarded as forming a freestanding frame. This form of construction, which is entirely speculative, is also suggested for the bedrock pier site at Filey. A technical parallel for such an arrangement may be found in structures such as the 12th – 13th century medieval dock at Southgate, Hartlepool (Young 1987).

It is not readily possible to relate the observed material remains at Flamborough to specific phases of development, including those historically attested episodes of building. That said, it is probable, given the spatial closeness of certain elements combined with attested structures covering a span of over two hundred years, that the remains form a palimpsest rather than being entirely contemporary.

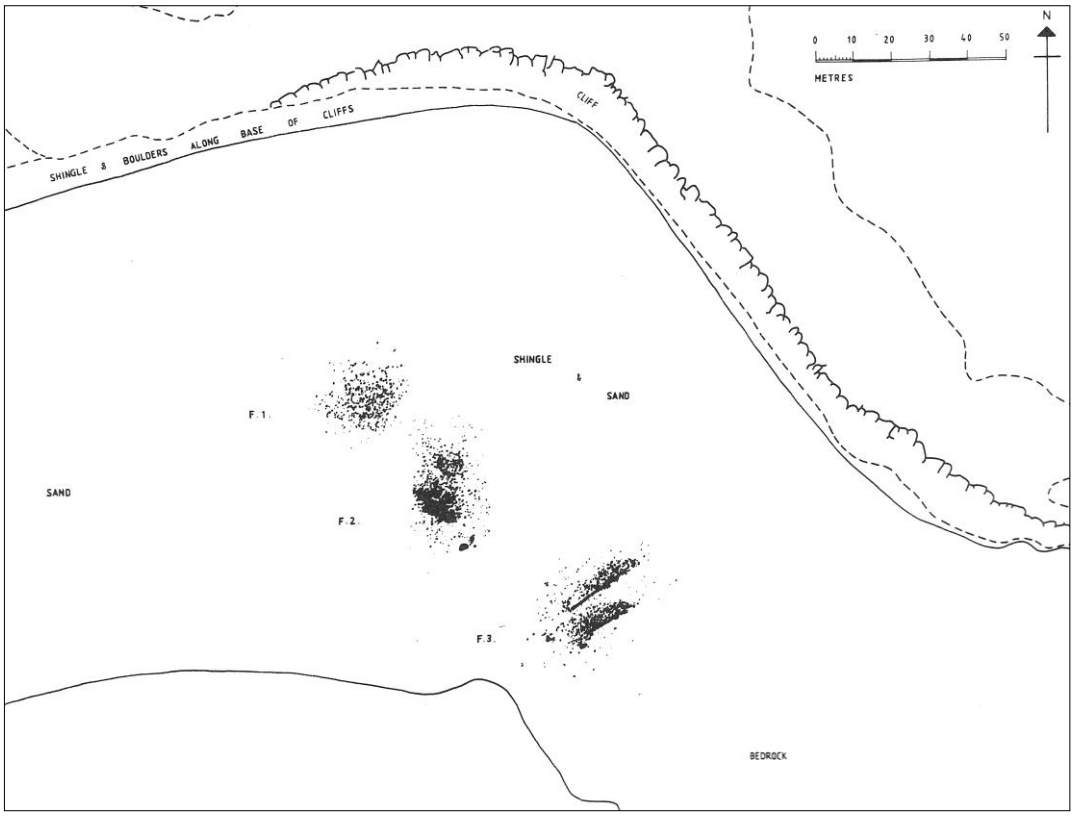

Figure 5, Plan of material remains at South Landing, Flamborough (Johnson 1988)

Figure 6, Part of the N.W. arm of Feature F3 at Flamborough – probable 'rock armour' for a pier toe. Remains of part of Feature F2 towards upper right.

Ownership/control/funding

Throughout its life the pier complex at Flamborough was an appurtenance of the manor, by which it was owned, controlled and funded. This was initially through the agency of the Constable family as Lords of the Manor, until Sir Robert Constable rebelled against the crown in 1537 and lost the lot. The estates were eventually returned to the family in the 1570s. The thirty odd years interleaved in the custody of the Constable's relates to periods of direct control by the crown, to individual crown lessees and eventually to a collective of local inhabitants and these form a particularly interesting series of events.

As we have seen, during the first period of Constable custody, Robert Constable bequeathed £40 for the maintenance of one 'kay' in the sea in 1400-01 (Test. Ebor. 1836, 264-5). In one sense this could be seen as a charitable legacy by a wealthy man intended to support an item of infrastructure that was perceived as being in the common good. Such acts were not uncommon and are well attested at a number of pier sites. What appears slightly unusual in this case is that as far as we know the pier was a component of the manor of which the Constables were lord's, certainly this was the case early in the next century (VCH 1974, 158). At first sight this appears a little like gift giving to one's self. An alternative reading may be that although the pier did indeed belong to the Constable's it was an important asset to the community, but like piers everywhere it was essentially a 'loss-maker'. Robert's legacy therefore can be seen as an expression of Constable concern and loyalty, a preparedness to leave a gift for the benefit of the tenantry, many of whom gained their livings through interaction with the sea.

Over a century later, in 1531 it is recorded that Sir Robert Constable reaffirmed his accustomed right of way between his manors of Flamborough and Holme on Spalding Moor, in particular for carts carrying timber to repair the pier (YSCP III 1914, 25). This indicates that the Constables transferred resources between their two East Riding manors. Whilst the pier complex may not have been of great direct profit to the Constable's it did generate some income, the anchorage of ships at the pier being part of the manorial revenue in the early 16th century (TNA E310/31/185 no21: quoted in VCH 1974, 158).

The reformation wrought considerable political, economic and social changes at the local level in East Yorkshire. The Constable's estates were escheated to the crown, as were the estates of Bridlington Priory, both of which contained piers. In both instances the crown,

for a time at least, held on to each group of assets. Furthermore, the crown invested in both pier sites, as was the case at Whitby and Dover also. This investment was particularly massive at Bridlington whilst as we have seen at Flamborough this was of more modest scale, seemingly relating to significant repairs followed by maintenance rather than to total rebuilding. In this slightly bigger picture we can detect a degree of 'joined up action' on the part of the crown. The former Constable lands at Holme of Spalding Moor contained significant woodlands and the crown exploited these for use at Bridlington's piers. In 1554, and in relation to the rebuilding of Bridlington's piers, is was said that *"The woods nerest metest and nyghest to have the tymbre we thinke to be Yathropp and Holme in Spaldyngmore"* (Holme on Spalding Moor – formerly of the Constable estates), (TNA E 101/459/7). Note also that *"Holm"*, presumably Holme on Spalding Moor is mentioned in a further Henrician pier account (TNA E 101/459/6). As was also noted above, timber for the use at Flamborough key was collected from Bridlington Key. Further, crown correspondence and documentation indicates that the two mighty political figures, Cromwell and Norfolk were both, albeit at a fairly superficial level, involved in the works at both sites. Further down the pecking order of crown officials we can see Richard Pollard involved in the works at both sites. Variously described as one of the 'Kings General Surveyors' and an 'Agent of Cromwell', Pollard appears to have shared his master's religious inclinations and as well as assisting in the surrender of monastic establishments was responsible for the destruction of Thomas Becket's tomb at Canterbury and that of St Swithen at Winchester (Hutchinson 2007, 183-4).

Before 1551 the manor house and demesne at Flamborough were leased by the crown to a named individual and in 1559 to another person (VCH 1974, 154). However, this need not have included the pier which probably remained, along with the tenanted lands, in the hands of the crown. In fact it appears that by 1551 the pier was in a parlous state, a rental document of the manor stating *"and now the peer is dyfaceyd and brokyn downe by the see"* (TNA SC11/732).

In 1562 the manor was leased to a group of twelve inhabitants of Flamborough, with Robert Puckering seemingly the lead figure (ERRO DX/131/h). This lease was in similar form to contemporary leases of the manor and piers at Bridlington. Significantly, the Flamborough lease included the farm of the anchorage of ships and small vessels *"in the port called the peare"*. Robert Puckering is listed as a tenant with extensive holdings in

the manor and in 1540-1 had served as the crown's bailiff (TNA SC11/732; VCH 1974, 154). The Puckering family of Flamborough appear to have been on the rise at this time. One member of the family, John Puckering, entered Lincoln's Inn in 1559, became a member of Parliament and Speaker of the House. He was knighted by Elizabeth in 1592 and buried in Westminster Abbey in 1596 (Fisher 1894, 88-90). Another member of the lessees was Thomas Waferer, presumably the same Thomas Waferer who became a crown lessee of the manor and piers at Bridlington. It is probably reasonable to assume that like the lessees at Bridlington the individual member lessees at Flamborough were men taking advantage of opportunities for advancement offered by the break-up of old orders during the reformation.

The lease of 1562 was renewed in 1570 and this document provides some details regarding the pier (TNA E310/29/173). The renewed lease required the lessees to *"matntayne a peare there, whiche peare beinge well and substancyally buylded was by force of vehement and outragiouse rage of the sea and storme of weather utterly overthrowne, broken, and spoyled sythence meichelmas last past"*. This is an interesting sentence as it tells us that the lessees were responsible for maintaining the pier and that prior to its destruction in 1569, it was substantially built – whether by the lessees, or the earlier work of the crown in the 1540s is uncertain. The lease of 1570, which was intended to be for twenty one years, states that the lessees meant "*to buylde another peare in a more convenyent place, than the other was"*. Further the lessees were hoping *"to have towards the same newe peare in consideracon of their greate losses and chardges some tymber trees by yor honors warraunte"*. This new pier was intended to have *"at the mouth therof viii fote of water in depth at the head of a neape tyde"* (presumably at mean high water of a neap) and *"the same to be done wthn the space of iiii years next"*. The terms of the lease specifically recognised *"that the charges of the said pere ys so uncertain that the same muste from tyme to tyme be assessed as need shall require"*. The final section of the lease states *"and bynding evy souche tenant to all repacons of the tente and closes in his holding and also bynding evy souche tenant to beare yerely and from tyme to tyme souche some and somes of money towarde the mayntenance of the said pere and sea walls and there appertenances as in forme aforesaid shall be assessed from tyme to tyme"*. It appears that this last section, which effectively relates to a rate levied for the maintenance of the pier, refers to the entirety of the manorial tenants, not just the lessees.

The lease of 1570 marks the latest documentary reference to the pier and by 1582 the manor had been fully returned to the Constable's. The pier is indicated on an English map of the region in 1595 and on a Dutch navigation chart of 1625 and it is likely that the pier finally ceased to exist some time in the early 17th century.

Specialists and workers

There is insufficient evidence to consider this aspect for Flamborough prior to the 16th century, save that the earlier attested use of timber will have required the services of carpenters. For the 16th century, the only people listed as working on the pier complex at Flamborough are carpenters and labourers, the carpenters being paid 6d per day, the labourers 4d per day, or 2d per tide. Such payments were made strictly on a 'worked day' basis - no work no pay. Certain of the carpenters working on the pier also appear on accounts dealing with land-based buildings, the significance of this observation being that the pier was not the work of some specialist branch of the carpentry trade. There are no records relating to pier work as a manorial labour service at Flamborough, as was the case at nearby Bridlington, and it is probable that such was not applied, at least in the 16th century. The names of some of those working at the key also appear in lists of tenants of the manor indicating that they are local. Indeed some of the surnames that regularly appear in the lists of workers at the key are still those of local families. At a more managerial level it is probable that the manorial bailiff was overseeing the works, certainly some, if not all, of the building accounts of the 1540s were written by, or on the instruction of, this official. At the highest level, albeit that considerably abstracted, we can detect the interest of Thomas Cromwell and the Duke of Norfolk, with this being represented of the ground by the inspections of the crown agent Richard Pollard.

Miscellaneous

An entry in a rental document of 1551 states *'Item – decay of two backhowsys (bakehouses) whyche was upholdyn by the shippys belonging the ?power? and now the peer is defacyed and brokyn downe by the see whereof allowange ----- xxxi s'* (TNA SC11/732). The bakehouses appear to be the common ovens mentioned by the VCH

(VCH 1974, 156). The implication seems to be that these two ovens were maintained from income generated by shipping, this presumably being a facet of the manorial economy?

Defensive ordnance is recorded at Flamborough in the mid 16th century. The first reference relates to 1547-48 and lists: *'Thordnance and other Munycions'* (Kenyon 1982, 205):

Fawcons of brasse	*oone*
Fowlers of yrone	*oone*
Demy slings of yrone	*oone*
Quarter slings of yrone	*oone*
Blake bills	*iiior*

It is probable that the ordnance had been sent to Flamborough, as it was to a number of other places, late in Henry VIII's reign owing to fears of continental invasion. At the slightly later date of 1558 there is mention that guns were removed from Hull for the defence of Bridlington and Flamborough (Howes and Foreman 1999, 16). Precisely where these armaments were stored is not entirely certain though it may have been either at the pier or the fortified manor house that was once a residence of the temporarily disgraced Constable family, though at these dates in the hands of the crown. However, invasion was generally recognised as being a coastal threat, which in the locality of Flamborough meant South Landing, and it is more likely than not that the envisaged scene of use of the guns will have been the cliff top above the harbour.

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Case study 7: Bridlington

"Through the whole story, the harbour appears as a burden to the community" (Purvis 1926, 164).

Summary of previous work

Bridlington has been fortunate in that three historians of note have published books on the town, each being based on primary sources. The earliest of these is 'Bridlington Charters, Court Rolls and Papers' by Canon J S Purvis, first director of the Borthwick Institute of Historical Research, York (Purvis 1926). This work considered the history of the town from the reformation to the 19th century and was principally based around an extensive series of town documents, supplemented with a number of records from the Public Record Office (now the National Archives). As a historian Purvis wrote extensively and elements of these works published through a variety of outlets, for example his 'A Selection of Monastic rentals and Dissolution Papers' provide further useful information on the town (Purvis 1931). 'The Manor of Bridlington' by M Edward Ingram is a work concerned mainly with the descent of the manor and is again largely based on town records (Ingram 1977). Providing a brief outline of the township in the medieval during its period of lordship by Bridlington Priory the principal focus of attention is with the descent of the manor through periods of control by the crown, by lessees, and by aristocratic lordship until its eventual purchase by the inhabitants themselves. A significant proportion of this work is taken up with the Lords Feoffees who played a significant role in the post-medieval governance of the town. More recent books on the history of the town are 'Port, Resort and Market Town, A History of Bridlington' by David Neave and 'Bridlington, an Introduction to its History and Buildings' by David and Susan Neave (Neave 2000; Neave and Neave 2000). Both books are thoroughly researched and whilst the former gives a broad and in depth history of the town and its families, the latter provides a focus around its early modern history. A thorough history in more compact form for Bridlington is provided by the Victoria County History (VCH 1974). Most of the above works provide original information on the piers at Bridlington and this was drawn on by an MA dissertation specifically concerned with the piers of the Yorkshire coast (Johnson 2008).

Background: the town and its governance

Bridlington was recorded in the Domesday Survey of 1086 and was in local terms a place of some significance, being the centre of the Hundred of Huntou and developing as a small market town in the Middle Ages. In the immediate post-conquest years the locality remained under the control of the area's principal landowners, Morcar and Karli Thorbrandson until they were implicated in rebellion and their estates confiscated. Consequently, the settlement became a royal manor (Neave 2000, 3-4). The manor was granted to Gilbert de Gant by William II whose heir William de Gant founded the Augustinian Priory c. 1113. Further grants to the Priory by the Gant family resulted in the Prior's of Bridlington becoming the de-facto lords of the manor. The town remained under the governance of the Priory until the reformation, the monastery being dissolved in 1537 and the manor seized by the crown. Although the town may already have functioned as a port for a considerable time the earliest known description as such is in the mid 12th century, though this need not of course imply the provision of such infrastructure as piers (Cronne and Davis 1968, 46). However, in 1446 grants to anchorage, quayage and groundage in the port were made (Cal. Chart. Rolls 1446). The town remained in the direct ownership of the crown until the reign of Elizabeth I when the manor, including the harbour, was leased out to a number of local inhabitants in 1566 and again in 1595. After reverting to the crown James I gave the manor and piers to a favourite, which after being inherited by his brother was sold to the local community as a body.

Bridlington developed as two distinct components, one part centred around the 'Old Town' of High Street which lay adjacent to, and was dominated by, the Priory. The other part developed close to the area where the local stream, the Gypsey Race, enters the sea and was known as Bridlington Quay. These two foci of settlement were separated by around 1.5km of open ground and this duality of settlement finds some parallel in arrangements at some of the Thanet ports. Of these two areas, that adjacent to the Priory was the larger until well into the post-medieval period and it was not until the later 19th century that expansion of the two areas resulted in the two becoming conjoined. The relative scale of the two settlements is evident in the Muster Roll of 1539 which records 118 men of an age to bear arms in the Old Town but only 22 at the Quay. Until the later 14th century however, Bridlington was ranked below nearby township of Kilham in tax lists. The Old Town settlement was largely an agricultural community and provider of

services to the monastery though there are references to a variety of trades including merchants (Neave 2000, 26). In 1200 the Prior was granted the right to hold a weekly market and an annual fair which must have encouraged trade (Neave 2000, 24). The right to hold three additional fairs was subsequently granted in 1446. At the time of the dissolution it was said that the greater part of the inhabitants of the Old Town had their living within the monastery. Little is known of the trade at the Quay prior to the reformation though it is recorded that the Prior owned ships and there is at least one reference to a Bridlington ship at Bordeaux.

A charter of 1253, granted for the benefit of Scarborough, states that neither the king nor anyone else was to make, or suffer to be made, any harbour or quay between Scarborough and Ravensrod (Spurn Point, mouth of the River Humber) (Neave 2000, 29). This charter has been held by some to explain why there are so few references to the harbour at Bridlington prior to the Reformation, it being supposed that this charter effectively stifled the development of the port at Bridlington (Neave 2000, 29). There is far more documentation regarding the port after the reformation. In the 16th century cloth is known to have been exported overseas whilst by the 17th century malt and corn were widely exported from the town. Coal from the north-east was regularly received in Bridlington whilst fishermen are recorded throughout the medieval and post-medieval periods.

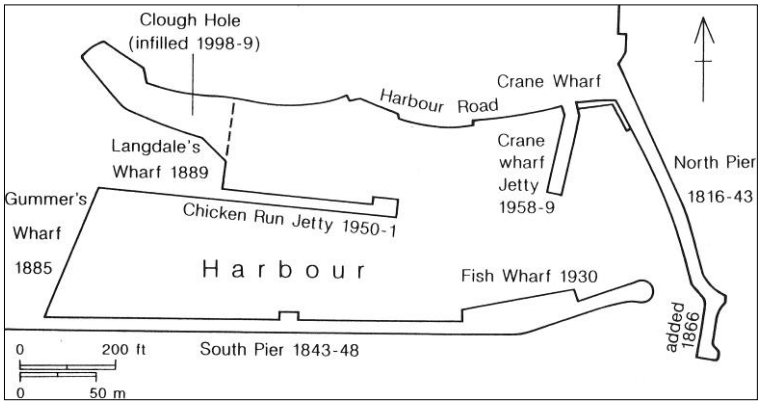

Figure 1, The existing layout of Bridlington harbour, with principal elements dated. (The latest timber south pier was located slightly to the north of the present day chicken run jetty and the north pier close to the northern end of the existing north pier. The local stream flows into the harbour through Clough Hole.). (reproduced from Neave and Neave 2000)

Environmental context

Bridlington lies on the Yorkshire coast at the northern tip of the Holderness flatlands, immediately south of Flamborough Head, (Figures 2 and 3). The topographical setting of the harbour is, and historically was, one of a north pier and a south pier that extend from the land on the north and west sides, (see Figure 1). A stream, the Gypsey Race, flows into the harbour from the Great Wold Valley which cuts through the chalk uplands of the eastern Wolds to the west.

Figure 2, Location of Bridlington immediately to the south of Flamborough Head

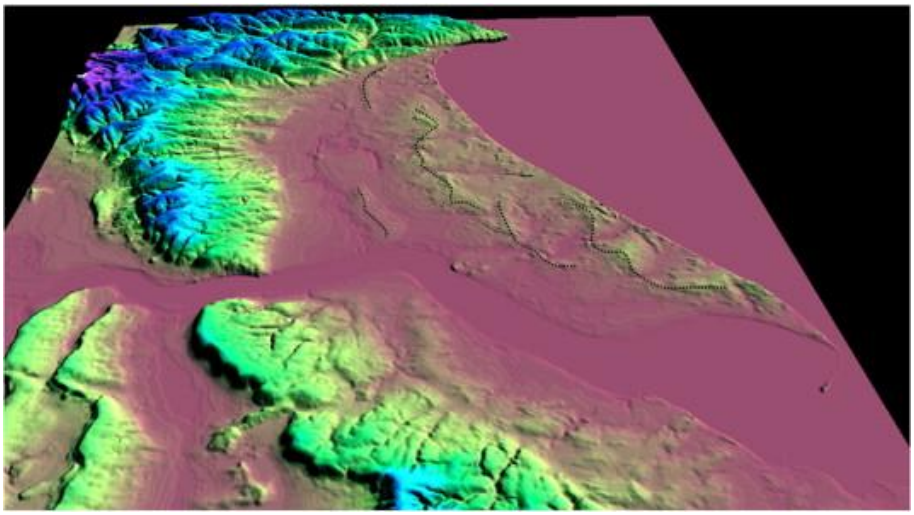

Figure 3, Image displaying the topography of the wider locality. Bridlington lies immediately south of Flamborough Head. The arc of the Wolds uplands is visible to the upper right, the sweep of the low-lying Holderness coast to the centre right, the Humber estuary to the centre and the Hull Valley sandwiched between.

Coastal erosion affects the entirety of the Yorkshire coast though by far the most rapid loss occurs along the coastline of Holderness between Bridlington and the mouth of the River Humber. The Holderness coast mainly consists of low cliffs of soft glacial drift (boulder clay), fronted by narrow beaches. The sea is continually able to reach the base of the cliffs and the majority of land-loss is due to the action of storm waves and tidal surges. This stretch of coastline is subjected to a strong tidal and wave-induced southerly littoral drift. The rates of loss in this area are generally considered to be around 2m per year which makes it one of the fastest receding coastlines in the world (Department of Geography, University of Hull 2002). North of Bridlington the tall chalk cliffs of Flamborough Head, which form the eastern limit of the Yorkshire Wolds, jut to the east and present a harder face to erosive elements. Concerns over the loss of land to the south of the Head have been voiced since at least the 14th century by local communities (Ostler, 2007). This matter has been the subject of occasional interest to historians (Poulson 1841, Sheppard 1912), with archaeological interest being altogether more recent. Geologists and geographers have been more active in their researches and have produced many reports on the rates and nature of erosion and continue to monitor the land loss (Eurosion 2008).

Large scale erosion along the entirety of the Holderness coast and the localised scour at the historic pier sites form two related processes. Whilst the former affects the entire coast the latter impacted directly on the piers and was caused by the placing of artificial structures, that is the piers themselves, within zones of active erosive processes. This intrusion frequently resulted in undermining of parts of the piers and especially in the erosion of the points of junction between land and pier. Countermeasures to this localised erosion included the employment of sunken jetties, breakwaters and toe armour.

As early as the mid 16th century documentary sources imply a connection between the decay of piers and the loss of land to coastal erosion. In a letter of 1562, for example, the Marquis of Winchester comments on the state of decay of the ports at Bridlington and Robin Hoods Bay, the consequent erosion of the coast and the costs of this burden to the

crown (Purvis 1926, 167-8). Purvis's examination of the documentary sources for Bridlington refers to coastal erosion eight times and in all but one of these cases reference is made in this context to the piers (Purvis 1926, 41, 93, 114, 167, 187-8, 190, 192, 207). Typical of such references is a petition of the 1660's which states *"That since the peere was broken downe the Sea hath washed away much of the maine Land and if it be not repaired will in short time wash away that part of the towne called the Keye"* (Purvis 1926, 188). At Bridlington the worst effects of storms and erosion appear to have often taken place at the junction of the piers with the land and any breach here led to the silting up of the basin.

There is today a sandbank, known as the Canch, which lies just beyond the mouth of the present harbour at Bridlington. However, the earliest reference to this feature is in an inquisition of 1590 when the piers occupied a position somewhat different to those of today. This early reference states that *"ye slues is in great decaie and doethe nott hold water to dryve ye kanshe awaie"* (TNA E 133/6/920). The document goes on to inform us of the difficulties in maintaining a channel between the Canch and the south pier. Clearly then the Canch has for centuries formed just outside the harbour mouth and in the past waters from the stream that flow into the harbour have been used to control the sandbank's accretion. The Canch forms in this location purely as a result of human intervention in the seascape (Wallingford 2009, 18). The formation of sandbanks near harbour mouths has been noted at a number of other pier sites.

Technology

The earlier form of the piers

The earliest reference to a pier at Bridlington dates to the time of the dissolution of Bridlington Priory in 1537 and occurs in a letter from Tristram Teshe *"receiver"* to Richard Pollard *"one of the Kings General Surveyors"* and a principal agent of Secretary Thomas Cromwell (L. & P. 1537a). In this letter Teshe informs us, that under instruction from Pollard, he inspected the *"key"* with *"the best mason and carpenter that be in these parts"* and also *"such stone and timber of the monastery there as was thought should be meet and convenient for the amending of the said key and haven"*. Before Mr Boynton, the Kings Steward of Bridlington, it was declared that the *"stones were too small to*

withstand and abide the surges and tempests of the sea". It was considered that even if the *"stones were laid and couched with rossell and pitch and also bound together with iron and lead"... "the stone be so little and soft that every high tide will burst them up and tear them asunder"*. In light of these opinions it was advised *"that it* (the pier) *should be made with timber and stone together as before"*. Further, it was stated that sufficient timber, estimated at *"six hundred loads or little more"* could be obtained from six woods of the king, including 'Leckenfield and Hawtenprice', together with *"such old timber as is left"* (presumably at the pier and monastery). As well as clearly describing a pier of timber and stone the fact that a decayed pier was already in existence suggests the likelihood that a pier was present here in the 15th century, if not earlier.

We are fortunate in that an extensive exchequer account dating to the latter months of 1539 and relating to the rebuilding of the 'key' provides some indication of the scale of these works (TNA E 101/622/29). The workforce consisted of five principal groups: carpenters, sawyers, labourers, tenants of crown (formerly monastic) holdings performing labour services and others providing miscellaneous services. This latter group were accounted for separately within the document. The carpenters and sawyers would have been engaged in timber-related works. The role of the labourers is not defined though probably involved much fetching and carrying. Where tasks are indicated to those performing manorial labour service this was described as *"ffylling of the key wt stones"* and occasionally using *"wayns that caryed stones to the key"*. The miscellaneous group included a number of local craftsmen who were supplying equipment and materials to the harbour works, much of which related to the *"rames"* (pile-drivers). Some individuals of this group were piling, others were using *"wains"* for the carriage of stone from the site of the former monastery for use as ballast infill. Other workers were involved in the felling and squaring of *"gret tymber trees"*. Yet more were involved in the carriage of timber, in works on the *"clowes"* (sluices controlling the flow of the local stream into the harbour) and in providing bread and ale to those performing labour services. The male sex of the carpenters sawyers and labourers is implied by their names. The sex of the other groups is not explicitly stated though at least one of the providers of food, *"Alan stakehowse wyf",* was female.

An almost identical picture detailing the payment of carpenters and labourers, local craftsmen and those performing manorial labour service is presented in two further exchequer accounts relating to the mid 1540s (TNA E 101/459/5; E 101/459/6). Amongst

the equipment being supplied by local men (and presumably fabricated by them) is equipment for the *"greate ramme"* (piledriver), including *"yron bolts with their coterells"* (washers), a *"grete clasping band and two brechys with nayls therto apperteynynge"*, *"forelocks"*, *"grese"*, *"rope"* and *"hoopes of both the rammes"*. Mention of a *"wyndelase"* (windlass) may also relate to one of the pile drivers. Other items equipment specifically referred to are "gevelocks" (crowbars), *"coks"*, *"sope"* and *"other gere"*.

"The State of the Kaie at Bridlington" was *"Surveied the xith of Decembre"* in 1554 (TNA E 101/459/7). This states that the north pier was *"rent* (broken) *of 10 rowmes cont 110 foote"* and that *"certein other roums of the same pere were sore shaken and brosed"*. *"Sonken Joties, which be moost necessary defences between the mayne pere and the sourge of the see"* are also mentioned in the survey. A rowme or roum was a bay division within the pier and these bays were seemingly of an 11 foot (3.35m) width. The north pier itself was clearly well in excess of 110 feet (33.52m) long. *"Sonken joties"* (sunken jetties) were a type of breakwater that appear to have been submerged at high tide. In addition to old timbers that had been saved, the repairs for the north pier were estimated by carpenters to require *"120 trees, so that every tree bene a foot square and 24 in length, and so after the rate"*. The fact that a 'north' pier is mentioned implies that it formed just one of the piers at Bridlington and it is probable that a twin pier system had been in existence for some time.

In 1566 the crown leased out the manor and piers of Bridlington. The harbour at this time was said to be in *"great decay"* and the lessees were required to rebuild and repair *"the walls, lez juttyes, sluces, sunken lockers and rowmes thereof"* as ordered by commissioners appointed by the Exchequer (Cal. Pat. R. 1566). By way of inducement to the lessees the crown offered *"all old timber, stones, iron and other things belonging to the old pere, with all old stones at the site of the monastery not yet sold, also 100l and 120 suitable oak or other timber trees in the adjacent woods"*.

There was a succession of groups of lessees at Bridlington, and whilst there is evidence that the lessees obtained substantial quantities of timber and made attempts to maintain the piers (Purvis, 1926, 176-7), this seems not to have been done satisfactorily. Inquisitions by the crown into these failings provide us with the first detailed descriptions of the piers and also reveal the crown's interest in maintaining them.

Exchequer documents TNA E 133/6/920 and TNA E 178/2714 are both inquisitions of 1590. Within TNA E 133/6/920 the harbour is described as consisting of a north and south pier with each pier being composed of a series of *"rooms or bayes"*, at least some of which were *"of 4 yards a roome"* (3.65m). The north pier was said to be *"but 27 rooms or bayes & by ye articles ther ought to be 29"*. Using the bay width stated above, this would give the north pier a length of 108 yards (98.75m) when it ought to have been 116 yards (106.07m). These are impressive statistics when it is considered that the gently sloping nature of the seabed is likely to have demanded a greater length for the south pier. On the south pier three rooms were said to be worn away at the landward end and this had prevented the channel, presumably the normal course of the stream, from *"wuarkinge"* (working/scouring the harbour basin). This latter point was exacerbated by the fact that *"The clowes* (sluices) *be in great decay"* and so *"they have not skow'red* (scoured the harbour basin) *yt as they ought, of long tyme as yt should seame for yt is full of great sand beds"*. A considerable number of the constituent bays were in a dilapidated state, as it was claimed that *"ye wood workes be in great decay, for ye ground work is worne away, ye stone falleth owt of them: & they want dv-* (diverse) *planks & cross barres"*. This is a particularly significant sentence. The 'planks and crosse barres' appear to refer to the walling or deck of the piers and to tie-beams respectively, with the tie-beams serving to connect one timber wall to the other. This and other passages in TNA E 133/6/920, give us unequivocal evidence for the *"bayes"* being filled with a ballast of stone. In referring to the timberwork this document also states that *"And yf it be not pvented & these repaired, ye water will still work undr them & in the end ov throw them"*. Additionally, numerous bays in both piers were said to require filling for heights of between 1 and 3 yards (0.91m-2.74m).

Inquisition TNA E 178/2714 confirms and reiterates the essential points highlighted by TNA E 133/6/920 whilst providing some additional information. It is stated, for example, that there were *"three Beer-heads, or crosse-pieces lackinge in the south peere"*. These items are the probable equivalents of the 'cross barres', or tie-beams mentioned in TNA E 133/6/920. An absent storehouse for the pier is mentioned and reference is also made to decayed bay units and their dimensions *"towe Rowmes of the Peere nedefull to be buylded conteyninge xxviii fote"* and elsewhere that *"ther are three Rowmes conteyninge by estymacon xl fote"*. These latter were missing from the landward end of the south pier and presumably were the same three rowmes of TNA E 133/6/920.

The bay measurements are a point of some interest as they provide evidence that the bay units at the piers were not of an 'exact' standard size. In 1554 we have mention of 10 bays measuring 110 feet giving an average of 11 feet (3.35m). In a document of 1580, (S.P. online 1; Purvis 1926, 168-9), there is a mention of *"fower roomes of the north pere con. in all a xlvi foote newlie maide"* which gives an average of 11 feet 6 inches (3.50m) per bay. TNA E 133/6/920 describes a bay of 12 feet (3.65m) whilst the widths of bays recorded in TNA E 178/2714 were of 14 feet (4.27m) and 13 feet 4 inches (4.06m). It is possible these differences may relate to separate building and repair programmes and, in the case of bays eroded adjacent to the shore, a requirement for these units to fill non-standard gaps. There is no evidence for exact heights of the piers. Given the known early 19th century and modern tidal range at Bridlington of around 6m at spring tides the height of the early piers is likely to have been around 7m plus at the harbour mouth. This height will have gradually decreased towards the shore, owing to the rising seabed.

There is little detailed documentary evidence relating to the form of the piers at Bridlington during the 17th century. Those records that do survive inform us only that the basic structural elements of timber and stones, continued to be transported to the quay (Purvis 1926, 177-8, 188). However, there are three known cartographic depictions of the early piers, two dating to the later 16th century and a third of the earlier 17th century Figures 4, 5 and 6). The earliest of these appears on one of the Dutch cartographer, Lucas Waghenaer's chart of 1588 (Figure 4). This schematically depicts a single pier.

Figure 4, Extract of Lucas Waghenaer's chart of part of the east coast of England of 1588. A pier at Bridlington is shown at the extreme left. North is to the right. (National Maritime Museum, PBD8264(25))

An English Chart of 1595, known as the Burghley Map, depicts a twin pier system at Bridlington (Figure 5) whilst the early 17th century charts of another Dutch cartographer, Jean Bleau show a single pier (Figure 6). The cartographic accuracy of the coastlines is greater in the Dutch charts though the level of local knowledge, in the form of named settlements, annotated comments and more exact depictions of pier configurations, is perhaps unsurprisingly greater in the English Chart. These differences almost certainly relate in great part to the intended purposes of the charts. Copies of the Dutch charts were printed in bulk and in widespread use for navigation at sea across Europe, hence their use of rhumb lines. By contrast, the Burghley map is a one-off manuscript drawn to commission and intended as a source of information for strategic use, and its place in the collection of documents and maps of Lord Burghley, Elizabeth I's foremost advisor, can be seen in this light. In terms of the piers at Bridlington, the importance of these maps is

that they were seen as significant enough in terms of both navigation and national importance to be depicted, even if not accurately so.

*Figure 5, Extract of manuscript map of 1595 depicting the seacoast from the Humber to Scarborough. The two piers at Bridlington are those to the west of the Smithick Sands sandbank. Although providing a wealth of information the cartographic accuracy of this map compares poorly with Waghenaer's. North is towards top. (*British Library, Royal. MS. 18. D. 111, f.63)*

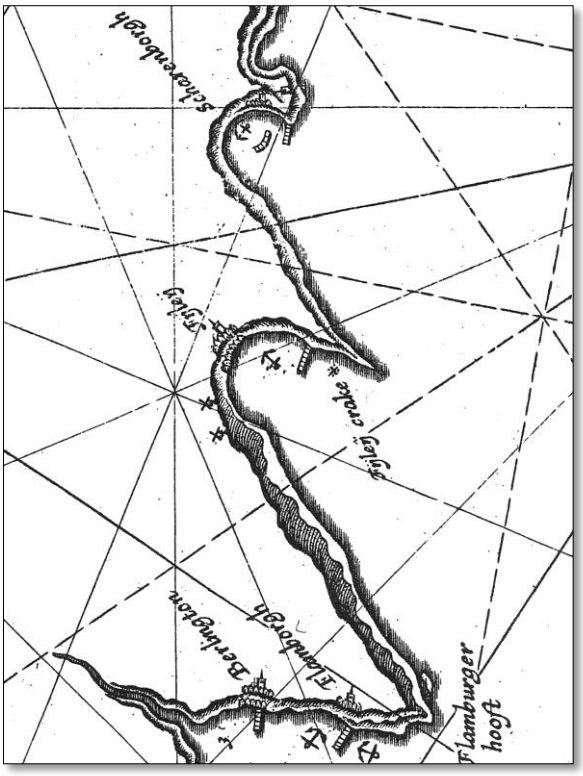

Figure 6, Extract of Bleau's chart of 1625. The pier at Bridlington is depicted in the southern area. North is towards top.

The only known non cartographic depiction of the old system of piers at Bridlington is an ink on paper sketch by the notable gentleman artist Francis Place (Figure 7). This drawing was made around 1700 shortly before a radically different system of piers was built at the town. Place is renowned for his landscapes, many real and some seemingly imaginary. His depiction of Bridlington Key and its topographic setting appear to fall in the former category. The view is looking north, with the south pier in the foreground and part of the north pier just visible above the eastern end of the south pier. Parts of the town of Bridlington Quay are shown atop the boulder clay cliffs. The inner and outer walls of the south pier are depicted as formed of vertically set timbers, probably piles, whilst an infill between the walls is also evident. A series of projections can be seen extending beyond the outer wall of the pier. These are arranged in two horizontal rows and are considered to represent tie-beams. What appear to be rails, or locking bars, run from tie-beam to tie-beam along the outer face of the pier. Despite the best part of 150 years separating the Bridlington sketch from that of a highly detailed one of a pier at Carrickfergus there is a

remarkable concordance in the form and arrangement of the various visible structural components at both sites.

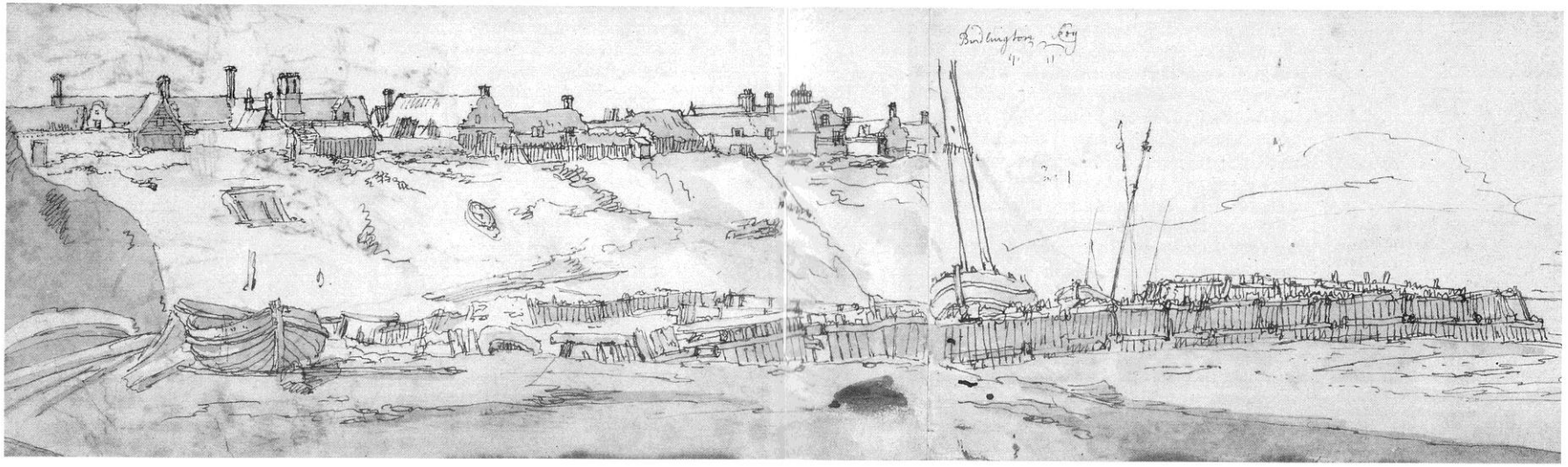

Figure 7, Francis Place's drawing of Bridlington Key c. 1700 (reproduced from Neave and Neave 2000)

Technical interpretation of the early pier form

Documents TNA E 101/459/7; E 133/6/920 and E 178/2714 describe a pier system comprised of a series of identical, or near identical, bays (*rooms* or *rowmes*). The known width of these bays ranged between 3.35m and 4.06m and each bay can be regarded as a modular unit within a larger entity. Constructed side by side, in whatever number required, the totality of these units formed a pier. The modular nature of these units is a significant factor as this permitted a flexibility of scale that allowed such a system to be adopted at a variety of sites. On the basis of Francis Place's drawing, externally the pier appeared as two parallel walls of vertically set timbers, these extending a little above walk-way level. At intervals that accord with the bay width, tie-beams (*cross barres*, *beer-heads* or *crosse-pieces*) extended from side to side, projecting a little way beyond the vertical faces of the walls. Mortises cut close to the end of the tie-beams held rails, or locking bars, that extended the full length of the sides of the pier. The tie-beam/locking bar arrangement served to stiffen the walls and prevent movement in an outward direction. The pictorial evidence indicates that, at least at certain points in time, the south pier at Bridlington had two rows of tie-beams per bay. Internally, the pier was filled with stones. This functioned as ballast providing weight and stability against the forces of wave, current and wind, and prevented any tendency for the plank walls to fall inwards.

Other than the tie-beams there is only limited evidence for the physical separation of one bay from the next. What limited evidence there is in support of bay separation comes solely from the tenor of the Elizabethan descriptions where frequent reference is made to certain bays that require varying amounts of in-filling. Only for the later system of timber piers at Bridlington is there further evidence of lateral separation.

The inner and outer walls of the piers appear almost certainly to have been of close-driven pile type. We know from the Henrician documentation that a number of pile-drivers (*rames*) were used during construction at any one time (TNA E 101/622/29). Further, the survey of 1554 lists the timber requirements for repairs to a stretch of the damaged north pier as being 120 timbers, each being a foot square and 24 feet in length. These timber sizes mirror the large edge to edge driven piles that formed the walls of the piers at Great Yarmouth.

There is little evidence for prefabrication of the early pier system at Bridlington. However, there is reason to believe that timber arrived at the Key in a converted or partially converted state, and this was a widespread contemporary practice for buildings generally (Salzman 1966, 237). An Exchequer account of 1539 provides a number of references to the squaring of trees within the woods where they were felled, as well as a reference to the selection of trees (TNA E 101/622/29). A number of accounts also refer to the re-use of timber from the pier (L. & P. Henry VIII 1537a; TNA E 101/459/7; Cal. Pat. R. 1566; Purvis 1926, 168). We can be certain that preparation of timber was taking place at the piers as sawyers were employed at the Key throughout the major Henrician construction campaigns, typically forming around a quarter of the total workforce (TNA E 101/622/29). If there was prefabrication then this must have been taking place on site. Given that the essential elements of the early pier system at Bridlington appear to have been comprised simply of walls of driven piles connected by tie-beams and locking rails one may wonder if it would even have been desirable, let alone necessary, in a relatively uncomplicated structure to fabricate, test-assemble and number and then dismantle, before finally assembling on site.

The Later pier form

Owing to the decayed state of both north and south piers a list of costings for a totally new south pier and for repairs and lengthening of the north pier were drawn up in 1717 and constructed shortly thereafter (ERRO QSV /1/2, 64-5). The core of this new system of piers survived, albeit with considerable piecemeal replacement, repair and alteration, through to the earlier part of the 19th century (Goodrick 1814, 9). Although the topographic setting of the piers and their spatial relationship may have been similar to what had gone before, the design details of the new works diverged considerably. A number of detailed pictures, engravings and sketches together with highly informative documentary evidence and a plan exist for the new piers and these provide a wealth of detail regarding the structural characteristics of this earth-fast frame method of construction. Given this level of clarity and an apparent absence of significant contradiction, the evidence of the different data sets are presented collectively and interpreted below. Figures 8 and 9 provide an overall impression of the appearance of the new piers.

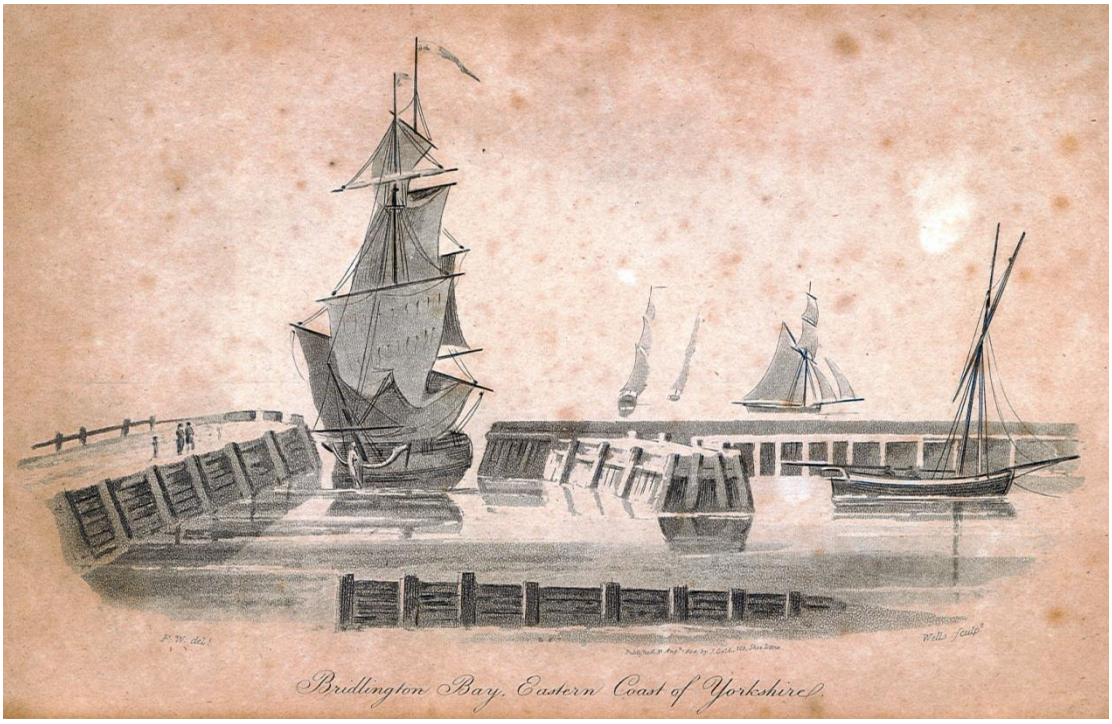

Figure 8, Harbour mouth of the new timber piers, looking south, early 19th century (East Riding Museums Service)

Figure 9, View of the south pier, looking west (East Riding Museums Service)

Although the terms ‘bay’ ‘room’ and ‘rowme’ are not apparent in the 18th and 19th century documentary sources it seems reasonable to infer from the pictorial evidence that bay division was present, at least in the sense in which the term ‘bay’ is defined in modern architectural dictionary’s i.e. *‘Regular structural division of a building’, ‘Part of a framed building between the main supporting timbers’* (Curl 2006, 73). The bay units were defined by opposed pairs of angle set piles, and, using the scaling on the engineer Goodrick’s plan of 1814, Figure 10, we can determine an average bay width of around 4.40 yards (4.02m) which is remarkably close to that of the old pier system (Goodrick 1814). Again like the older system of construction the bays can be considered as a series of modular units that, built side by side collectively formed a pier. Whilst there is no documentary reference for internal division within the piers, i.e. lateral division between bays, some evidence for this is apparent in Figure 11. This appears to show lateral planking within part of the inner side of the dilapidated north pier prior to its replacement in stone in the earlier 19th century.

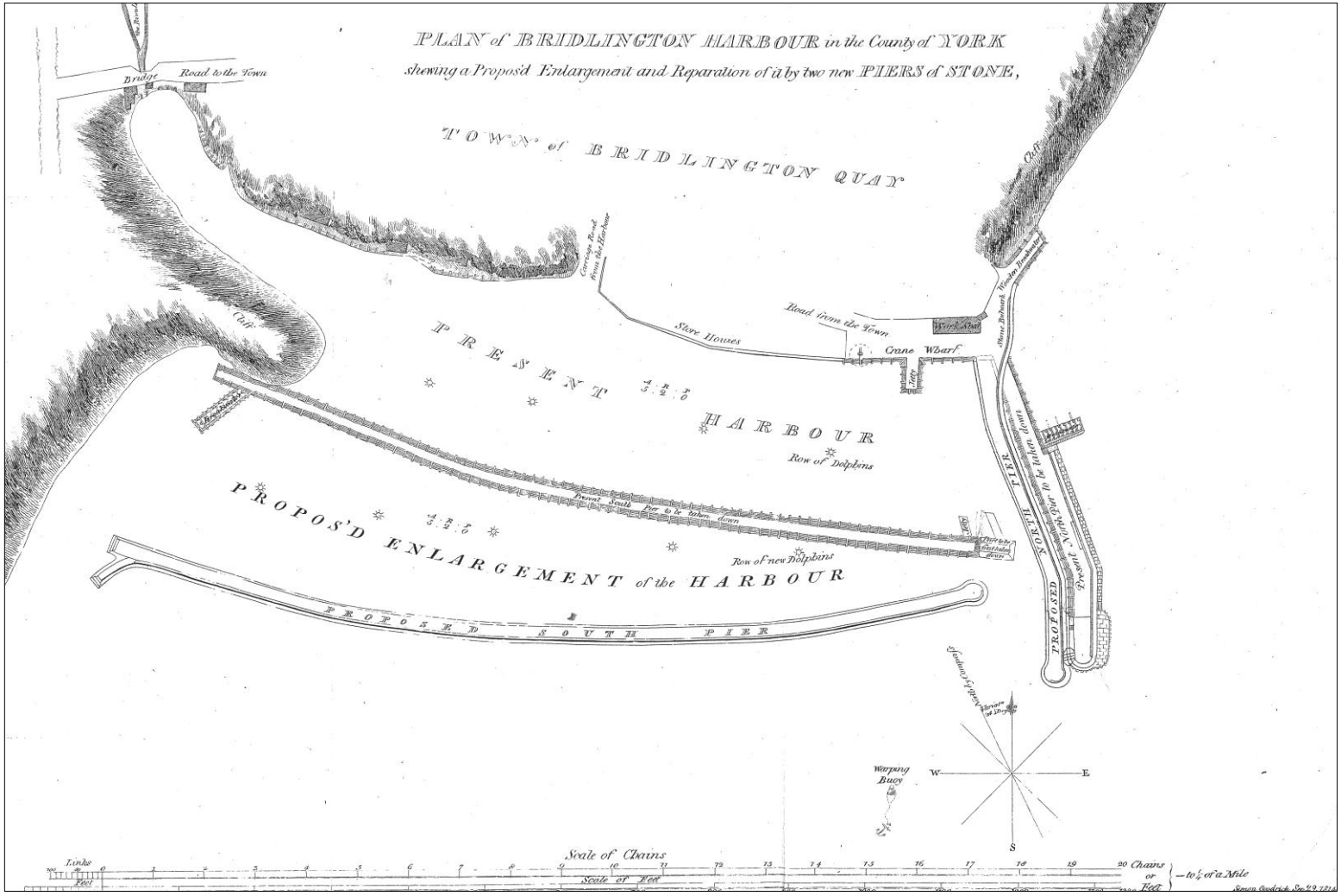

Figure 10, Simon Goodrick's plan of 1811

Figure 11, Inner face of the north pier in the early 19th century showing lateral division within the pier (East Riding Museum Service)

Figure 12, of c.1810 shows that two rows of tie-beams extended across the width of the north pier. This situation can be seen with greater clarity in Figure 13. Although this latter figure depicts a breakwater-type structure that abutted the northern end of the north pier its structural characteristics of angle driven piles, tie-beams, horizontal timber cladding and timber decking indicate that it was constructed along the same lines as the piers. Because this structure was built to reduce the force of waves rather than stop them, it was constructed without external cladding in its upper parts. We can with some degree of reliability therefore, use this visible additional detail to inform us of the construction of the piers themselves. Reconstruction drawings of a single bay unit are presented in Figure 14.

Figure 12, North pier, looking south-south-west (East Riding Museums Service)

Figure 13, Breakwater adjacent to north pier, looking north, early 19th century (photograph of a print in the Bayle Museum, Bridlington)

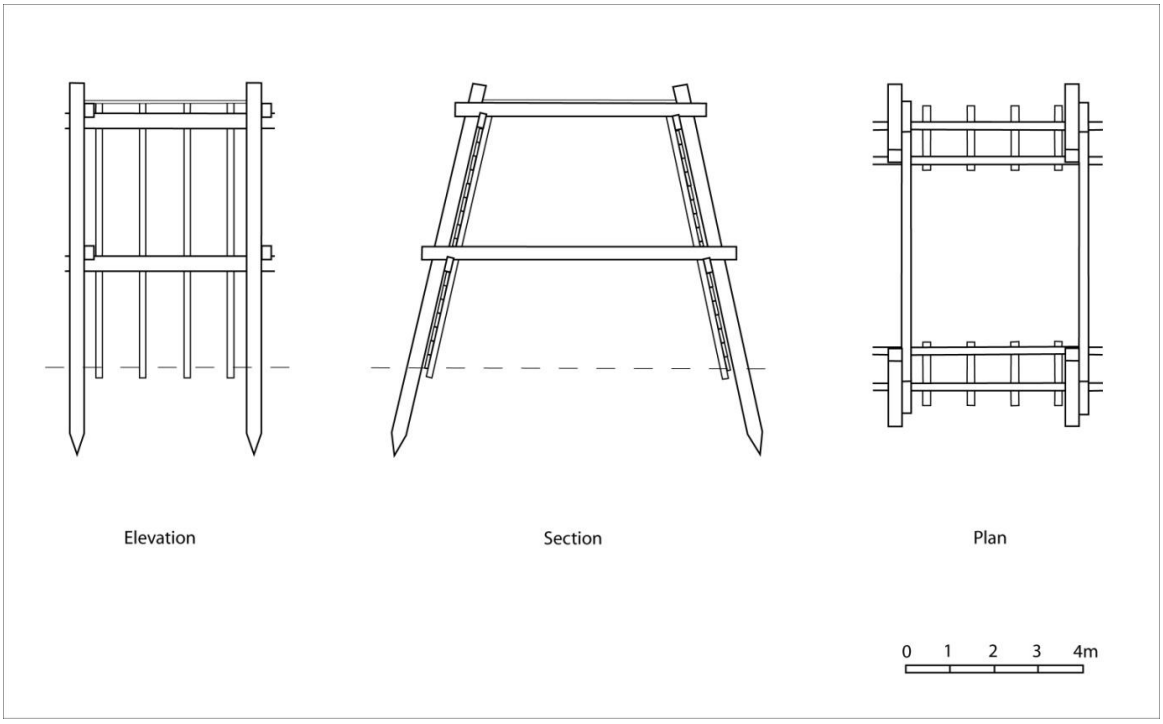

Figure 14, Reconstruction: elevation, section and plan of a typical bay unit of the post 1717 piers at Bridlington (note that for ease of visual clarity the horizontal timber plank cladding is omitted from the elevation and plan)

These depictions indicate that on both sides of the pier two horizontal rails extended from bay to bay, one set mid way down the piles the other towards the top. It appears that the connection between piles and rails was by lap joints. Tie-beams extended laterally across the piers at the points of junction between the piles and sets of rails. The joints used to secure tie-beams to the rails were halved lap joints, whilst those between tie-beams and piles were lap joints. A series of studs extended from top to bottom of the piers and were secured to the inner faces of the horizontal rails, again probably by lap joints. This framework was clad with horizontally lain planks, these being secured to the studs. The piers were decked with planks. These are predominantly shown as running longitudinally with the piers and so must have lain on laterally set joists. It is clear from the observations of one engineer that the spacing of the piles was reduced near the end of the piers, presumably for purposes of strength (Smeaton 1778, 3). Stone is recorded as the principal infill ballast, some of this being described as chalk (Goodrick 1814, 9) with sand also being mentioned (Smeaton 1778, 4). Some similarities are apparent between this late system of timber pier construction and that of roofs, albeit in a somewhat inverted

manner. As such the angle driven piles and tie-beams forming the bay divisions could be regarded as equivalents of trusses, the horizontal rails as purlins, the vertical rails as rafters and the planking as roof covering.

The dimensions of the end of the north pier, that is the tallest part of either of the piers, is given by Smeaton in 1791 as *'thirty Feet at Bottom, and from sixteen to seventeen Feet at Top, and about thirty Feet in Height'* (9.14m, 4.87m-5.18m, 9.14m), (BL 52:67, Smeaton correspondence). Whilst the height of the pier was lower closer to the shore owing to the rising seabed, the various depictions indicate that the angled profile was constant fully along both piers. None of the documentary sources account for the angled profile of the pier sides, although there appear to be two significant advantages to this form over the earlier vertical walled system. Firstly, the reduced angle of repose of the ballast would lessen the tendency for outwards slumpage which in turn would exert less pressure on the timber structure. Secondly, the angled wall would serve to reduce wave impact, as sloping walls dissipate more energy than vertical ones (Thomas and Hall 1992, 134-5).

The new timber piers were larger than their predecessors. At the time of Goodrick's report the timber part of the north pier (the outer side had lately been clad in stone and the southern end extended in stone) measured around 365 feet long (111.25m). The south pier had a length of 1108 feet (337.72m).

There is no firm evidence for prefabrication of the new system of piers involving pre-assembly. However, the estimates for the new piers in 1717 refer to *"Plank and Treenails from London"* as well as later reference to planks and timber (ERRO QSV /1/2, 64-5). It would seem that much of the timber used in the later piers was pre-cut prior to its arrival on site and ready for use.

There remains the question of explaining why the design of timber piers changed. There were almost certainly technical advantages inherent in the angled sides of the later pier system, in terms of ballast stability and wave energy dissipation. It would also seem certain that the later earth-fast frame system was more economical in its use of timber than the earlier close-piled form.

Miscellaneous technical aspects relating to the piers

Materials employed in the piers at Bridlington

Timber formed the principal element of both the old and new systems of piers at Bridlington. This was principally of oak though there are occasional references to other species. In 1539, for example, we hear of *"felling of 4 ffurres for mending of the clowes"* (TNA E 101/622/29) whilst in 1566 mention is made of "*120 suitable oak or other timber trees in the adjacent woods"* (Cal. Pat. R. 1566). Again, in 1590 an inquisition records that the lessees of the harbour failed to plant *"younge okes and ashes in lewe of those that have beyn cutt for reedifienge of the peare"* (TNA E 133/6/920). With regard to the new piers John Smeaton noted that *"Fir plank has been in some places tried"* (Smeaton 1778, 3).

It has long been recognised that medieval and post-medieval wood-working crafts were typified by the employment of timber of uniform scantling that enabled the use of precision close fitting joints formed with sharp tools (Milne 1992, 80; Hewett 1980, 34). There is considerable evidence throughout the earlier documentation at Bridlington that timber was converted from the round to square and rectangular form prior to its use in the piers but little information on specific sizes. The survey of 1554 does tell us of: *"120 trees, so that every tree bene a foot square and 24 in length, and so after the rate"* (TNA E 101/459/7). Likewise we have a reference to felling and squaring of *"small trees for rales"* (rails), though dimensions are not given (TNA E 101/622/29). For the latest repairs on the old pier system there are references to *"Timber and Small Balks"* and *"Plank"* (ERRO QSV /1/2, 64-5). The estimates for the later timber pier system record *"Straight Oak Timber, Three Inch Plank, Two Inch Plank'* and *'Deals for Stageing"* (scaffolding), (ERRO QSV /1/2, 64-5). Observations by late 18th – early 19th century engineers refer to the angle driven piles as being *"in general about a foot square"* and that the horizontally laid planking of the walls was *"three inch plank"* (Smeaton 1778, 3).

With regard to jointing there is virtually no information pertaining to the earlier piers. There is a reference in 1566 to iron, and although it use is not specified it may have been for nails or spikes or for pile shoe's (Cal. Pat. R. 1566). It is likely that in common with most other timber structures of the medieval and earlier post-medieval periods, including waterfront structures (Milne 1992, 80), jointing was primarily by mortise and tenon and lap joints secured with pegs or treenails. Treenails for jointing continued to be used in vast quantities in the later system of piers, with some 50,000 18 inch treenails being

included in the estimate for the new south pier, though this was in addition to *"16 Tun"* of ironwork (ERRO QSV /1/2, 64-5). At least some of this ironwork may have been for nails and spikes, indeed there is reference to the *"felonius Stealing* (of) *Iron Spikes belonging to Bridlington Peers"* at the East Riding Quarter Sessions in 1717 (ERRO QSF/39/C/13; QSF/39/C/14). The use of iron spikes in the London waterfront is not attested until the 17th century (Milne 1992, 80).

Clowes/sluices

These features were used to control the flow of water from streams/rivers into harbour basins and are known to have been present at Bridlington. In 1539 money was paid for *"Amending of the clowes"* (TNA E 101/622/29). The inquisitions of 1590 indicate that *"the clowes are in decey and will hould no water & the groundworke therof worne"* (TNA E 178/2714) and *"The clowes be in great decay & he thinketh must be of necesitie be removed & for ye harbour & slues, they have not skow'red yt as they ought, of long tyme as yt should seame for yt is full of great sand beds"* (TNA E 133/6/920). In addition to hampering the movement of vessels this latter inquisition also states that *"it will cost more than the 30l for the removing & making sure* (replacing)*"*. As the same document estimates that for rebuilding several bays of the south pier *"each room will cost 6l ye building"* (excluding timber) then the likely proportions of the clowes system become apparent. It is probable that in addition to containing a gate that controlled the flow of water for scouring the harbour basin it also contained something akin to a dam wall that extended from either side of the sluice to the adjacent land. In such a system the closing of the sluice before high tide would back up the flow of the stream in its valley whilst the opening of the sluice on the ebb would release a large flow of water to scour the basin.

It is believed that the clowes system became obsolete at Bridlington around 1769 as an entry in the Harbour Minute Book for 24th June of that year records *"Ordered that the clough* (clowe) *at the Upper End of the Harbour be sold by publick sale and the Materials thereof taken away at the Expense of the Buyer or Buyers"* (BL 52:67 Extracts from General Minute Book 1765-89). A sketch map of 1808 outlining the existing piers as well as proposed new ones does appear to show the stream as flowing unhindered into the harbour (BL 52:67, Bridlington Quay 3/11/1808). This same map does indicate an intention of installing a new *"cross wall and sluices"*, at the west end of the harbour

though this scheme never reached fruition. Quite why the clowes system became obsolete is uncertain though it may relate in some way to the construction of the new timber piers at Bridlington in the early 18th century.

Toe rock armour

Technically speaking, the toe of a seawall is that part that terminates the base of the seawall on its seaward side. As such it is located in the critical zone where the rigid structure meets the mobile material of the foreshore. Unsurprisingly *"Toe erosion is the most common cause of seawall failure"* (Thomas and Hall 1992, 163). In modern structures this vulnerable area is normally protected by a line of deep set sheet piles or by the provision of an apron. Such an apron is typically either in concrete or in the form of a linear spread of large rocks – 'toe rock armour' (Thomas and Hall 1992, 163-7). The purpose of this material is to protect the toe and lower body of the wall and lessen wave impact (Thomas and Hall 1992, 134-5).

There is documentary evidence for the erosion of a pier toe at Bridlington in 1590 *"ye wood workes be in great decay, for ye ground work is worne away, ye stone falleth owt of them: & they want dv-* (diverse) *planks & cross barres"* (TNA E 133/6/920). Whilst it is quite probable that the sunken lockers at Bridlington detailed above may have functioned to protect the toe areas of the pier walls, there is no documentary evidence of structural countermeasures in the form of rock armour until 1773. At this time stones were instructed to be laid at the outside of the north pier *"as well to protect the Pier from the violence of the Seas as from the Worms"* (BL 52:67 Extracts from General Minute Book 1765-89).

Sunken Lockers

"Sonke/n joties/lockers" are mentioned on a number of occasions in the Marian and Elizabethan documentation for Bridlington (e.g. TNA E 101/459/7; Cal. Pat. R. 1566; TNA E 133/6/920). Where the location of these features is referred to, it is in relation to the north pier, presumably as this is where the most corrosive of the natural elements tended to impact. It seems reasonably clear that these devices were used to prevent or

minimize the effects of erosion by breaking the force of wave and current. That *"there remeyneth of thold tymbre saved by the delygence of the towneshipp so much as by our estimation will make the sunken joties which be moost necessary defences between the mayne pere and the surge of the see"* (TNA E 101/459/7), leaves little doubt that the features were constructed of timber. The term 'sunken' presumably implies that at high tide the lockers were submerged.

In relation to the later piers there is a reference to lockers, not sunken lockers, in 1728 when it is said that following damage to the north pier *"it is absolutely necessary to build lockers or jetty's to preserve the same"* (ERRO QSF/80/E/25). Again, in 1770, the Harbour Minute Book for Bridlington records a *"locker on the outside of the north pier"* and that it *"be made the same height of the said North Pier"* (BL 52:67 Extracts from General Minute Book 1765-89). The height of these later lockers, certainly that of the latter reference at least, indicates that these were no longer 'sunken'. Whilst it is tempting to see these late structures simply as breakwaters it is interesting to note that elsewhere in both document QSF/80/E/25 and the Harbour Minute Book, reference is made to breakwaters. The implication here is that such structures were not the same and that contemporary distinctions were made.

Dolphins

Small circular features around 4m across and 5-6m tall known as dolphin posts, or dolphins, were present in the harbour at Bridlington from at least the earliest years of the 19th century (see Simon Goodrick's plan of 1814 and the early 19th century print of the interior of the harbour). These consisted of a tall central post around which was a steeply sloping cladding of timber. The lower part of the void between the post and cladding was in-filled with stone. The function of these features was simply to provide mooring within the interior of the harbour. Such dolphins were present within the new enlarged harbour of stone at Bridlington constructed in the early-mid 19th century and their vestigial remains were still present, and in use, until the 1970's.

Material stores

Many of the documentary sources for the piers at Bridlington refer to damage and poor states of repair. To some extent this is a product of the nature of those records. Many of these were generated to detail faults simply so that repairs could be effected. If the piers were to be efficiently maintained then these circumstances required a degree of anticipation and preparedness, particularly in terms of stockpiles of materials which could be employed, possibly at short notice. There is evidence from the earliest detailed records of Bridlington piers that this was the case. The most extensive of the Henrician Exchequer accounts frequently detail *"caryed tymber from the hyll to the key"* (TNA E 101/622/29) whilst similar references also appear in a shorter account of works (TNA E 101/459/5). The hill referred to is almost certainly Beck Hill which lies close to the western end of the harbour on elevated ground and the implication is that this area was used for the storage of timber. There are also hints that a storehouse may have been used at this time as there is mention of *"wyndes-s* (windlass?) *Rames and other things from the howse that they lay in"* (TNA E 101/622/29).

One of the *"Articles to be enquired of"* in an inquisition of the leaseholders of the manor and piers at Bridlington in 1590 concerned the provision of a storehouse (TNA E 178/2714). Whilst it was acknowledged that the lessees had *"tymber lyinge by"* it was claimed that they had *"no store house not synce the grauntinge of this lease"*. It must be assumed that the requirement for such a storehouse had been a stipulation laid down by commissioners of the crown.

There are a number of documentary references to stockpiled timber in the 17th century and on one occasion during the English Civil War timber which had been prepared for use at the harbour was burnt by Lord Newcastle's Parliamentary Army (Neave, 2000, 86). This burning of timber may be the same event recorded in a petition to Charles II by the town where it was claimed that a warehouse valued at £400 containing timber and materials for the repair of the pier had been burnt (Ingram 1977, 53).

Regarding the later pier system, a case brought before the East Riding Quarter Sessions in 1717 concerned the *"felonius Stealing of Iron Spikes belonging to Bridlington Peers"* (ERRO QSF 39/C/13; QSF 39/C/14). Although no reference is made to a store in this case, it is entirely possible that this theft was from such a place. A store was certainly present in the earlier part of the 19th century as a *"Work Shed"* is marked on Simon Goodrick's plan of 1814 close to the landward end of the north pier (Goodrick 1814).

This plan also shows the area between the Work Shed and the seafront named as Store Bulwark.

Sources of timber used at Bridlington piers

There are a number of documents detailing the sources of timber used in the construction and repair of the piers, the earliest of which relate to the Henrician works. That the crown was able to draw on timber from such a vast array of woods across the region in its construction programme at Bridlington is owed to the seizure of monastic, and other, estates. These sources are listed by date, and referenced, below. Many of the woods are mentioned in several documents, only their first mention is indicated below.

1537: *"There may be taken in such woods as now be the Kings at* ***Leckenfelde*** (Leckenfield – willed to the king with the Percy estates by the childless 6th earl (Ingram 1977, 16)) *and* ***Hawtenprice*** (Haltemprice – an Augustinian house (Ingram 1977, 16)) *and other sufficient timber to serve for the said Key"* (estimated 600 loads required), also mention of *"six woods of the King's in that country"* (L. & P. 1537a).

1539: *"felling and squaryng of – and gret tymber trees at* ***Ryss woods****"* (probably Rise, see 1646 below). Also *"ffelling and squaring of one halfe – trees for great tymb att* ***melsay wodds****"* (Abbey of Meaux), (TNA E 101/622/29).

1554: *"The woods nerest metest and nyghest to have the tymbre we thinke to be* ***Yathropp*** *and* ***Holme in Spaldyngmore****"* (Holme on Spalding Moor – formerly of the Constable estates), (TNA E 101/459/7). *Note that 'Holm', presumably Holme on Spalding Moor is mentioned in account (TNA E 101/459/6).

1566: *"120 suitable oaks or other timber trees in the* ***adjacent woods*** *to be cut"* (Cal. Pat. R. 1566). Adjacent woods presumably refers to woods within the manor of Bridlington.

1590: *"they boughte lx trees at* ***selbye****"* (TNA E 178/2714).

In a letter of 1581 to Lord Burleigh from one of the lessees of the manor and piers it is bemoaned that *"fourscore tonnes of Tymber wch they are forced to fetche xxiii myles by lande"* (Purvis 1926, 177). The exact source of this timber is unknown.

There are a few references to the sources of timber in the 17th century and these appear in the Constables Accounts for the manor:

Undated (but early-mid 17th century): ***Driffield*** (Ingram 1977, 84).

1646: ***Ryes*** (Rise, in Holderness) and ***Harwoodale*** in North Yorkshire (Ingram 1977, 84).

By the 18th century it is clear that at least some of this timber is coming from afar. The estimates for the new timber piers in 1717 refer to *"Plank and Treenails from **London**"* (ERRO QSV /1/2, 64-5). Given the dominant role of London in overseas trade it is likely that this timber was imported from overseas. The *"Fir plank"* mentioned by Smeaton may again have been imported (Smeaton 1778, 3).

Evidence for seasonal working at Bridlington

At the Bridlington piers there are a number of direct and indirect references to seasonal working practices.

The earliest mention is in a letter to Lord Burleigh dating to around 1581 where it is stated by one of the lessees of the manor and piers that *"And for that also the said works are to be proceded in somer tyme only"* and *"to fynishe the saide peer before Michaelmas nexte, if it be possible; or ells they will the nexte sommer godwillinge fully and substancially finish the same."* (Purvis 1926, 177). In further correspondence to Lord Burleigh, dating to around 1591, it is said that the lessees had been *"forced to cease the worke, severe theire workmen, and to lose theire sommer season, givinge the masterfull sea unrecoverable advantage"* (Purvis 1926, 32).

Relating to the later piers, there are two early 18th century references to seasonal working. The earlier of these, is a costing for ironwork and wages for work on the north pier *"To finish the Pier for this Winter"* (TNA QSV/1/2, 65). Two years later we hear of *"jucideus charges necessary for this summers work"* (ERRO QSF/45/D/2).

These statements seem to indicate at least a preference for seasonal working and whilst the disadvantages of winter working at the edge of the North Sea may seem self-evident there is evidence pointing towards work over winter. The major set of detailed Exchequer accounts for the Henrician works at the piers in 1539 extend from September until 13th

December when 26 carpenters and labourers were still working (E 101/622/29). These accounts may be incomplete and it is possible that work continued beyond this date.

Social context

The piers of Bridlington originated within the estate of the large Augustinian monastic institution of Bridlington Priory (Neave 2000, 7-9). As a result of bequests, starting with those of the de Gant family, this institution became enormously wealthy and held extensive estates and possessions across Yorkshire and beyond (Lancaster 1912). It is significant that the harbour of Bridlington developed within such a large economic unit as the estate of the priory. It is possible to view the port as a conduit in the economic activity of this estate; a regulated location for estate imports and exports and as bases for estate tenant fishermen. The port may also have played a significant role in facilitating the movement of goods and people to and from the priory's fairs. The resources of the estate can be seen as fundamental to the development of the port. In the context of the building and maintaining of the piers, the most important of these resources were timber, labour, and, perhaps to a lesser extent, coin. Timber was the basic raw material for the structure of the piers whilst estate tenants could be required to perform labour services. It may be that cash payments were required for various craftsmen working on the piers. Within such a large economic unit these resources could be drawn from across the entire estate for use at the pier. The construction and sustaining of the piers would seem to represent an act of estate policy.

The use of labour services, as part of the extractive relationship between lord and tenant, is one of the characteristics of the socially-embedded medieval economy and there is some pre-reformation evidence for the use of such services in the repairs at the harbour at Bridlington (VCH 1974, 98). The later Henrician works at Bridlington drew heavily on the labour services of tenants (TNA E 101/622/29), (L. & P. Henry VIII, 1539), and these from up to several miles around the town. It is very probable that such arrangements by the crown reflected the traditional practices of the pre-reformation era at the town.

The direct social and economic consequences of Henry VIII's 'religious reforms' impacted nationally and permeated, to varying degrees, through all levels of society. The monastery of Bridlington Priory and its vast estates, including the piers, were surrendered

to the crown in 1537 (Neave 2000, 33-6). This large estate was fragmented, with some of the lands and possessions being redistributed though the manor of Bridlington was retained by the crown. The crown chose to invest considerable sums of money and vast quantities of materials in the piers of Bridlington, with several building campaigns in the later 1530's and 1540's in which directly employed on-site work forces in excess of 40 individuals were engaged (see for example (TNA E 101/622/29; E 101/459/5; E 101/495/6) and a number of entries in the Letters and Papers Henry VIII, 1539 and 1540 respectively).

The expenditure of large sums of money, the drawing of timber from former monastic woods across the East Riding, the employment of large directly employed workforces (as well as related providers of services), and the continued use of manorial labour services all indicate purposeful decision making with regard to the piers. The decision to invest in these sites may reflect the wider interests of the Henrician government generally in matters maritime. The state policy of increased investment in naval forces and the provision of a variety of coastal defences form the best known strands of this governmental action and the large scale harbour works at Bridlington, may form part of this greater vision. In a grossly inflated manner the investment at the port by the crown mirrors the policy of investment by the large monastic estate of the pre-Reformation period. The major differences during the Reformation were principally ones of scale, and resources on a monumental scale. This can be seen as the policy of the ultimate estate, that of the crown and kingdom.

The evidence for crown strategic thinking, pro-active rather than reactive government policy, lies firstly in the fact that following the seizure a number of pier sites along the Yorkshire coast, including Bridlington, these were all retained by the crown rather than being sold or gifted. Secondly, there is clear evidence that individual government officials were dealing with the piers at Bridlington and Flamborough, not just with one or the other. At the highest, ministerial, level the Duke of Norfolk commented on the state of both piers (L. & P. 1537b). Further down the scale Richard Pollard, one of the King's General Surveyors dealt with matters at Bridlington (L. & P. 1537a) and at Flamborough (TNA E 101/463/17).

The manors and piers of Bridlington continued to be held by the crown with some of the lands and possessions being leased out piecemeal (Neave 2000, 40). However, a change

of direction in government policy seems apparent with the first evidence for this appearing in a letter of 1562, in which the Marquis of Winchester commented on the state of decay of the ports at Bridlington and Robin Hoods Bay, the consequent erosion of the coast and the costs of this burden to the crown. Winchester went on to suggest that these issues might be resolved by the leasing of the entire manors (Purvis 1926, 167-8). By doing so the intention was that the piers would be repaired and maintained at no expense to the crown who would still receive rents from them (Ingram 1977, 21). As a result of such official thinking the manor and piers of Bridlington were leased as a single unit in 1566 (Cal. Pat. Rolls 1566; Purvis 1926, 37-8). The manor and key of Flamborough was similarly leased at the behest of Treasurer Winchester, possibly as early as 1562 (PE 85/T88) and extended in 1570 (VCH 1974, 158). At both sites the leases were made out to 12 named individuals, one of whom, Thomas Wayfarer, was a lessee of both.

The Bridlington lessees have been the subject of some research by David Neave and they are known to have been drawn from the town's elite and *"were linked by an intricate pattern of connections formed through friendship, business and marriage"* (Neave 2000, 41). Essentially all were yeomen and mostly had local roots. Many owned land and property, two were butchers, another a master mariner, at least one other had shares in a ship whilst one was a schoolmaster. It seems that these men of modest social origin were actively taking advantage of the new economic circumstances wrought by the fragmentation of the former large estate of Bridlington Priory. The opportunities afforded to certain members of this class at Bridlington in the 1560's would seem unlikely to have materialised without the seizure of monastic property in the 1530's.

The lessees were taking on risks as they were required to both rebuild and maintain the piers to the satisfaction of commissioners appointed by the Exchequer. It was perhaps in recognition of this that the lease came with a number of inducements, in particular all old materials of the pier, 120 suitable trees from the adjacent woods, 120L in money and the use of the site of the monastery as a source of stone for infilling the timber pier bays (Cal. Pat. Rolls 1566). It is possible that the establishment of Bridlington as a customs port, as a member of the port of Hull, in 1559 (Neave 2000, 57-8) may have served as an additional sweetener, as this permitted trade to be carried out internationally. The charging of pier rates, a levy on the local inhabitants for the maintenance of the piers, was permitted under the lease from at least as early as 1580 (S.P. online 1; Purvis 1926, 169-170). There is no definitive evidence that the lessees were permitted to demand labour services from the

tenants of the manor, though aspects of this practice were considered customary in 1636 (Purvis 1926, 96).

The lease of 1566 contained built-in protection for the tenants of the manor with regard to the levying of pier rates, with the lessees being required to *'appoint and associate themselves with 24 other more discreet tenants of the manor, who shall assess the tenants fairly'*. In cases of disagreement matters were to be referred to the commissioners (Cal. Pat. Rolls 1566). This first group of lessees also had to contend with opposition from a member of the local gentry, Sir Thomas Boynton, who craved the lease to the manor. Sir Thomas was the son of Mathew Boynton who had been appointed steward of the manor after its seizure by the crown in 1537. Sir Thomas wrote a series of three specious letters to the Chief Minister Lord Burghley in which he denigrated the efforts of the yeomen tenants and appears to have grounded his own case for possession on little more than *"the generall Love I bear unto my countryemen and neyghboures"*; alas to no avail (Purvis 1926, 170-5).

The inquisitions into the state of the manor and piers indicated a number of shortcomings in management and repair (TNA E 133/6/920; E 178/2714) and this first lease ran for only 25 of its intended 40 years. Before this date the struggling, surviving, lessees had already suffered goods distrained and at least one had served time in goal (Ingram 1977 24-5). Following a number of legal actions finalised in 1592 the lessees were found not to have broken the terms of the 1566 lease but it was voided anyway on the grounds of defaulting of payment of rents in 1585 (Neave 2000, 44). A new lease was drawn up in 1591, prior to the conclusion of the lessees legal case, this time in favour of John Stanhope, a Gentlemen of the Privy Chamber (Thompson 1821, 77) and member of the Council of the North (Neave 2000, 44; Purvis 1926, 38-40). Apart from a copy of the lease nothing more is known and it is possible that it may never have been taken up before a new lease was prepared in 1595.

The lease of 1595 was intended to be in the names of thirteen individuals though this was finalised at ten. The terms were the same as those of 1566 (Neave 2000, 44-5). Socially, less is known of these lessees but one was termed a gentleman and the others yeomen. One is known to have been a mercer, another a woollen draper. Again this lease did not run its intended course of 41 years and may have terminated by 1611 (Neave 2000, 45),

perhaps again through an inability of the lessees to meet their obligations (Ingram 1977, 28).

The Elizabethan policy of leasing at Bridlington failed, as it did at Flamborough, and this raises a number of interesting issues. The drawing up leases for individual pier sites and their manors stands in marked contrast to the earlier policy of direct control and investment initiated by King Henry. The new system was very much one of indirect control, with the regulatory work being carried out by Exchequer-appointed commissioners. The motives behind this shift seem clear in Winchester's correspondence and were essentially those of cost-cutting, a characteristic of much of Elizabeth's fiscal policy (Starkey 2000). The system of leasing, with inducements attached, seemed to provide opportunities, and these were taken up by men of yeoman status, a class that is generally perceived as containing elements eager for improvement, ambitious, prepared to muddy their hands and willing to take risks. Ultimately, it seems inconceivable that these 'opportunities' would have arisen had it not been for the effects of the reformation, which in England resulted in the fragmentation of monastic estates and the redistribution of their wealth and resources.

However, for the lessees, the bloom of what may once have appeared as a rosy future soon faded. With hindsight the reasons for this seem readily evident. Within the old systems of large estates to which the piers originally belonged, the access to extensive resources of timber, labour and money ensured their proper provision within the policies of these estates. Upon seizure by the crown the pier sites continued to thrive, this time owing to a combination of state policy and the crown's access to a massive windfall of former monastic lands, including of course, timber, labour and money. The problem for the lessees was that they were now required to rebuild and maintain the piers with only the resources of a single manorial unit. Quite simply, the incomes and material resources from this relatively small individual economic unit were insufficient to maintain piers on the scale of those at Bridlington.

Subsequent to the foreclosing of the third lease at Bridlington the manor and piers reverted to the crown. In 1623 James I granted them to a favourite, John Ramsey, Baron of Kingston upon Thames and Earl of Holderness, (Purvis 1926, 52-65). Upon Ramsey's death in 1625 the Bridlington possessions passed to his brother Sir George. It may have been the cost of maintaining the port that prompted Ramsey to sell Bridlington as in 1630

a group of purchasers was found. These purchasers were thirteen local individuals, all prosperous yeomen, representing the tenants of the manor (Purvis 1926, 65-123). The purchase price of £3,260 was raised by communal subscription. One of those prominent in the community buy-out was William Hustler who had been one of the lessees of 1595. Hustler took an active part in the negotiations for purchase with Ramsey and even loaned money towards the expenses that this incurred. At least four more of the original thirteen prime movers behind the community purchase are likely to have been direct descendants of former leaseholders. In 1636 these men and a significant proportion of the town's populace drew up a document known as the 'Great Town Deed'.

Edward Ingram sees the Deed as being composed of two sections, one dealing with the constitution of the town's new governing body, the Lords Feoffees, and the second with regulating the affairs of the manor (Ingram 1977, 37-9). The constitutional aspects of the Deed are of especial interest in that they are an early example of a democratic constitution. The governing body of Lords Feoffees was, and still is, composed of two bodies, the first of thirteen Lords, the second of twelve assistants. When the number of Lords has been reduced by death to six, replacements to re-make up the number to thirteen are drawn from the body of assistants. The numbers of the assistants are in turn replenished, this time by election of the tenants and freeholders of the manor. Of the aspects of the Deed dealing with the regulation of the manor those of most direct relevance to this study concern the requirement for the tenants to perform day works at the harbour when called upon (labour services), and that to pay an amount of money (pier rates) to maintain the piers. As we have seen, both of these practices had precedents. A requirement to use common bakehouses again has roots in earlier precedent. All profits of the manor were to be used for the common good – in practice probably absorbed by expenses at the harbour. Overall the Deed is a very purposeful document, and was presumably so structured to ensure the survival of the town and port.

David Neave considers that the initiative for the communal purchase of the manor may have come from the merchant community, who had an interest in improving the port (Neave 2000, 46). This may be so, and whilst merchants and a master mariner were amongst the original thirteen purchasing Lords, many of their number appear to have been farmers with no obvious direct mercantile connections; unless of course such connections were through marriage or an interest in the export of agricultural produce. The loss of the piers would have been a major economic blow to the town. The

livelihoods of the populace of the quay were largely dependent upon the port and the loss of the piers would have been likely to remove the livings from nearly all but a few fishermen.

Inevitably, and despite the efforts of community, problems arose with maintaining the piers. This was exacerbated during the Civil War when Lord Newcastle's Parliamentary Army burnt a warehouse valued at £400 containing timber and materials for the repair of the pier (Ingram 1977, 53). After this event the town sent an ingratiating petition to Parliaments' *"Committee for the Publique Revenewe"* seeking assistance, seemingly to no result. After the restoration a petition in similar vein was sent to the crown, again to no avail (Purvis 1926, 184-191). These documents detail storm damage, decay and the resultant problems they caused. At least one further petition was sent to the crown in 1672. This contained a certification of the value of the port signed by local and non local merchants, including 22 of London. Also contained were abstracts of customs records, statements testifying to the value of the port to the Navy and further fine words requesting £4000 penned by local Justices of the Peace and gentlemen. The crown responded favourably in the same year. Significantly, the advantage of the port to shipping generally was recognised; in other words the existence of the port was seen as being in the national interest. It was also de facto recognition that the internal resources of the town would never be sufficient to support its piers, a lesson that had taken over a century to re-learn. The long term solution to this contradiction could only be solved by the injection of external resources. This, to the sum of £4000 was to be raised piecemeal by a small toll on every ship lading in the ports of Sunderland and Newcastle.

It is known that the piers were in a dangerous state in 1696 when an agent of the Admiralty was of the opinion that *"men of war"* would refuse to use the port owing to *"the aforesaid pears being a very dangerous place"* (TNA ADM 106/482/335). Further arrangements for funding construction and maintenance of the piers at Bridlington were put in place and formalised by a succession of Acts of Parliament, the first of 1697 (Act of P. 1697). This Act states that the piers were ruined by storm in 1696 and allowed for money towards the rebuilding of the piers by the levying of duties on coals in all member ports of Newcastle upon Tyne. The Act set up a body of fifteen individuals, a forerunner of the modern Harbour Commissioners, to oversee affairs and this body absorbed many of the roles at the pier that were formerly the responsibility of the Lords Feoffees. All monies were required to be expended upon the piers, books were to be kept and these

were to be open for inspection by Justices of the Peace for the East Riding. Addition powers of the Act permitted local assessment for pier rates and the right to mortgage the duties to raise money. Interestingly, one of the commissioners was a Sir William Hustler, presumably a descendant of the earlier William Hustler who played a significant role in earlier developments at the piers. Further parliamentary Acts followed. An Act of 1718 extended the duties of the 1697 Act and it was the influx of this new found money that enabled the new system of timber piers to be built in 1717-19 (Act of P. 1718). Another member of the Hustler family, James, is listed as a commissioner in an Act of 1747 (Act of P. 1747). These Acts, in viewing a local problem within the perspective of a national overview, finally resolved what had been a centuries old dilemma of funding the piers. The success of these Acts enabled a larger stone-built harbour to be built in the middle years of the 19th century.

Prior to the first harbour Act of 1697 a significant role in the day to day running of the pier, seemingly both in the collection of dues and organisation of maintenance was in the hands of pier wardens. The first reference to this post is in an inquisition of 1590 that relates to the lease of the manor in 1566 (TNA E 178/2714). This document states *"The rates & taxations, so much as could be collected has bene usuallie gathered by the key wardens for the tyme beinge and bestowed upon the saide Peere accordinglie"*. It must be assumed therefore that either the lessees took on the role of key wardens or that they appointed individuals to this role. The same document informs us that there were six wardens. The later Acts of Parliament do not make reference to wardens though they are recorded in local 17th and 18th century court rolls. A connection with the Act of 1697 seems to be apparent in a court roll entry for October 1697 however, when *"Peer wardens chosen De Novo in regard of the p'sent necessity of the rebuilding and repairing of the peere and the necessary constant attendance on that great work"* (Purvis 1926, 288).

Workforces and specialists

Considerable documentary evidence relating to many of the individuals and crafts involved in the construction of timber piers survives for Bridlington. The most detailed of these sources relates to an Exchequer account for the Henrician works in 1539, (TNA E 101/622/29). Of those employed on a full-time basis (as opposed to being paid for the

providing of one-off services or materials) we are informed of carpenters, sawyers, labourers and an occasional input from manorial tenants providing labour service. The role of this latter group principally involved the moving of stone and the infilling of the timber shell of the piers with this ballast. Those providing one-off services were principally supplying such materials as cable, rope, grease, components for the ram, etc. On a typical day at the height of the construction programme there were 42 full-time workers: 15 carpenters, 10 sawyers and 17 labourers. The activities of each of these groups would seem to be reasonably self evident.

Arguably, the key staff in the construction process were the carpenters, At no point in TNA E 101/622/29, or the lesser accounts of TNA E 101/459/5 or TNA E 101/459/6, is there any conclusive indication that these people were strictly 'pier building specialists'. The rates of carpenters pay varied, two normally being paid 8d per day, around half the remainder 7d per day and the rest 6d. These differentials may relate to degrees of experience and responsibility. It is likely that any such experience may have involved previous work at the piers, perhaps even considerable work given the need for regular maintenance and repair of timber structures exposed to the sea. Such requirement for regular maintenance and repair will have built up a set of theoretical and practical pier related knowledge within that body of carpenters involved. Perhaps in this context we can see a 'degree of specialism' on the part of some individuals. It is worth mentioning that in the first Henrician reference to the piers in 1537 the opinions of carpenters, as well a mason, were sought by the crown with regard to the reconstruction of the Key (L. & P. Henry VIII 1537a). However, whilst these individuals may well have been carpenters of repute this is not evidence of specialist harbour builders or engineers.

An important individual in the works at Bridlington was *"John Sykes thelder"*, probably the father of an 8d a day carpenter *"John Sykes the younger"*. This man is recorded as *"Ryding to the wodds and brydlington key 13 days at sundry tymes for setting forthe of tymber at the woods by measures necessary having for hys costs and chargs by the day 12d"* (TNA E 101/622/29). The family connection and mention of timber suggest the probability of a background in carpentry whilst the rate of pay may imply a significant role; perhaps this was a man who had valuable knowledge and experience of work at the piers? Interestingly, a few of the carpenters working at Bridlington also worked at the Key at Flamborough, though this again cannot be taken as proof of full time specialisation (TNA E 101/463/17; E 101/463/18; E 101/463/19; E 101/463/20).

By at least the early years of the 18th century the picture at Bridlington was changing. We first hear of William Lelum (Lellam,Lellaw), of Bridlington Key, in September 1717 when he is described as a carpenter (ERRO QSF 39/C/14). In October of the same year Lelum drew up itemised estimates for a new south pier and for repairs to the north pier, together with charges for wages for himself and the workmen (ERRO QSV/1/2 p 64-5). In the same year Lelum is described as *"surveyor of Bridlington Peers"* and his opinion is asked of the state of a bridge elsewhere in the East Riding (QSV/1/2 p 75). David Neave records that the same William Lelum settled in the boom town of Sunderland in the early 18th century (Neave 2000, 108), whilst Jack Binns notes that work stopped on the building of a stone pier at Scarborough with the death of an engineer named Lelam in the 1730's (Binns 2001, 154, 185). The implication of this trail is that William Lelum probably trained as a carpenter and rose to the position of 'surveyor of the peers' at Bridlington. His skill seems to have been such that his opinion was also sought by the authorities on various technical matters across the East Riding. Perhaps it was new harbour works that enticed him, along with a number of Bridlington master mariners and mariners, to Sunderland. He appears to have spent his last days doing what he had always done, building and repairing piers.

Construction hierarchies in the Henrician pier works at Bridlington

The range and organisation of medieval craftsmen has been subject to previous enquiries (Salzman 1966; Harvey 1975). Less study however has been made for these trades in the 16th century. Using information from a number of State Papers an attempt is made here to reconstruct the range and hierarchy of various layers of 'management' and grades of 'worker' during the Henrician works at Bridlington key. As such, this reconstruction offers a snapshot of major pier building works in the late 1530's – 1540's. The most extensive, but seemingly incomplete, source is an Exchequer account of 41 pages (TNA E 101/622/29). This lists *"Expens for necessarys to the works at the key"*, (including one-off items such as payments to tradesmen and craftsmen for goods and services) from February 1538 to November 1539. The account also includes day by day lists of named carpenters, sawyers and labourers with their wages, from September – December 1539. Shorter Exchequer accounts of the early 1540's (TNA E 101/459/5 and TNA E

101/459/6) covering a similar range of activity and people provide additional data. Information has also been drawn from the Letters and Papers of Henry VIII.

In attributing a position within the hierarchy to an individual official or to trade groups, a system of ranking is necessary. The rankings devised for this study are based upon three principal factors. Firstly, authority/decision making powers, secondly, rates of pay and thirdly, precedence of listing in the Exchequer accounts. The first of these have been determined by reference to occupational titles and by a consideration of 'who is asking what from whom' in the documentation. The second and third factors are self explanatory. To some degree these two factors equate to one another, for example the higher paid carpenters are always listed before the lower paid carpenters and sawyers, who in turn are always listed before the lesser paid labourers.

Quite how the presented hierarchy corresponds to that perceived in the past must remain open to question. Rates of pay, for example, do not necessarily equate to degrees of power, control or status. Again, it could be argued that the individual drawing up the Exchequer accounts was merely listing greater sums before lower sums and that this did not, in their eyes at least, reflect status.

The results of this exercise are shown in the 'hierarchy diagram', (Figure 15) in which high rank is expressed towards to top of the diagram and low rank towards the base. The flow of authority is indicated by solid lines. Where this is speculative it is shown in broken lines. Less certain relationships are left open ended. Notes pertinent to these groups and individuals are annotated in the diagram. The sources of the documentary evidence used in this diagram are:

Ministers of the crown: Norfolk and Cromwell: (L. & P. Henry VIII, 1537, vol. 12 part 1, 593)

Tristram Teshe: (L. & P. Henry VIII, 1537, vol. 12 part 1, 602)

Richard Pollard: (L. & P. Henry VIII, 1537, Addenda, vol. 12 part 1, 416-7) Bridlington (TNA E 101/463/17) Flamborough

Mr Boynton: (L. & P. Henry VIII, 1537, Addenda, vol. 12 part 1, 416-7)

Humph Chawney (same as *umfrayd Chalner*)*:* (L. & P. Henry VIII, 1538, vol. 13 part 1, 568).

Michael Furster: (L. & P. Henry VIII, 1539, vol. 14 part 2, 78)

Robert Laycye of Folketon Esquyer and *Umfrayd Chalner baylyff:* (TNA E 101/459/6).

John Sykes the elder: (TNA E 101/622/29)

8d a day carpenters: (TNA E 101/622/29)

7d a day carpenters: (TNA E 101/622/29)

6d a day carpenters: (TNA E 101/622/29)

Sawyers: (TNA E 101/622/29)

Pilers: (TNA E 101/622/29)

Carriers: (TNA E 101/622/29)

Labourers: (TNA E 101/622/29)

Manorial labour services: (TNA E 101/622/29)

crafts/trades men and others supplying goods/services: (TNA E 101/622/29)

Note that further sources detailing these individuals and groups and their roles that are relevant are also contained in: (L. & P. Henry VIII, 1540, vol. 15 part 1, 11; L. & P. Henry VIII, 1538, vol. 13 part 1, 54; L. & P. Henry VIII, 1537, vol. 12 part 2, 32; TNA E 101/459/5; TNA E 101/459/6).

This diagram allows the assortment of groups and individuals, and the range of necessary skills and services involved in a major construction project to be readily grasped. The postulated hierarchical relationship between these parties is also clearly evident. As can be seen with the carpenters, several distinct gradations are even apparent within a single craft. Towards the lower end of the hierarchy we encounter only large groups engaged in manual work and, where they exist at all, these bear simple titles that are drawn directly from their craft or work. Towards the top of the hierarchy lone managers and administrators can be seen and these are graced with what are arguably grander titles. We should be cautious of reading too much into certain of these titles. Robert Laycye esquyer and Umfrayd Chalner the bailiff and a yeoman of the crown are both described as ‘surveyors of the works at the piers’, though it is probable that their capacity was

managerial rather than of a practical technical nature. This would contrast strongly with the later case of the surveyor William Lelum who was a professional pier builder. Not so evident in this diagram are the servants of those who occupy the upper levels. The Clerk of Works is known to have had at least four servants who assisted him in his tasks and it is probable that others at, and above, his station, also had the use of servants. One curious aspect of the workforce is the employment, at the height of the Reformation, of a monk, William Burton, of Meaux Abbey who was seemingly in charge of a group of pilers and played a role in the carriage of timber from Meaux to the piers. Meaux was surrendered in December 1539 and the monks pensioned off, some at £5, others at £ 6 – though curiously Burton's name does not appear on the list of pensioned monks (L. & P, 1539, vol. 14 (2), 670). The references specifically naming Brother William are in August and September 1539 a mere three months prior to Meaux's dissolution. In fact the fate of Meaux is known to have been decided before January 1538 as instruction was given at this time *"to stay the abbot from cutting down the wood, as it will be required for the repair of the haven at Brydlington"* (L. & P. 1538 vol. 13 (1) 162). The precise attitude of Meaux to the unfolding events is difficult to determine with certainty, but the scant evidence suggests it may have been one of co-operation borne of resignation to a certain fate.

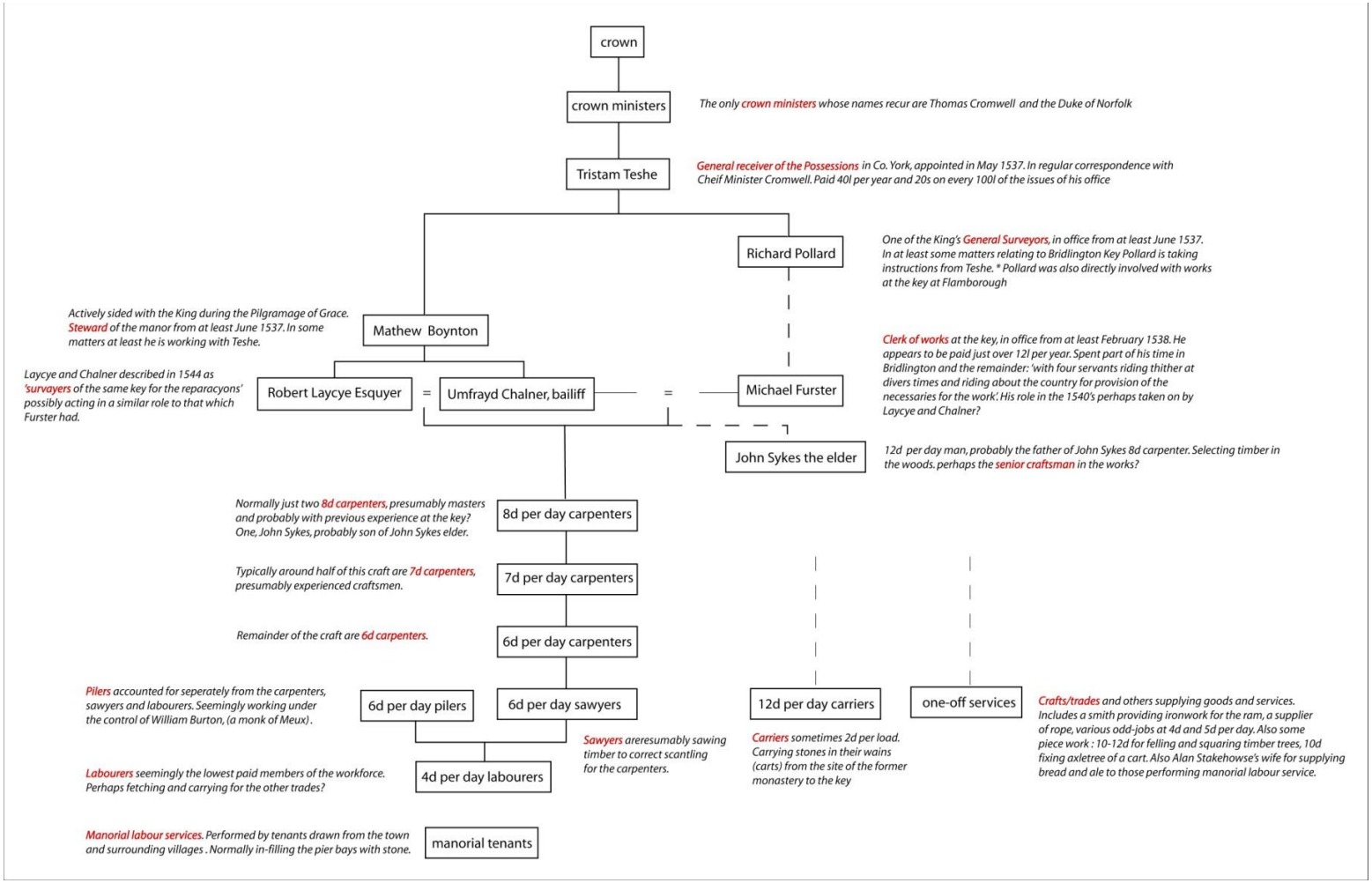

Figure 15, Hierarchy diagram showing the range of individuals and groups involved in Henrician pier construction at Bridlington in the late 1530s – early 1540s. Ranking is from top to bottom with connecting lines showing the flow of authority (broken lines = less certain).

Miscellaneous

Material remains

Bridlington's harbour basin has regularly been dredged for a prolonged period of time though it is possible that the basal parts of earlier structures may survive. It is also a possibility that some remains of the sluices may survive in the area of Clough Hole, though it is worth noting in this context that in1769 an entry in the Harbour Minute Book records the order that *"the clough at the Upper End of the Harbour be sold by publick sale and the Materials thereof taken away at the Expense of the Buyer or Buyers"* (BL 52:67 Extracts from General Minute Book 1765-89).

Related fortifications

In a survey of the King's ordnance and fortifications *"Ordenaunce and Munition"* is recorded at Bridlington in 1547-8 (Kenyon 1982, 107). It is probable that this was housed at the Quay, probably adjacent to the harbour, rather than in the Old Town. Whether the ordnance was mounted within a Henrician fortified work is not known, though the conjunction of coastal ports and forts has been seen to be a common one, both during the 16th century and later. In 1558 guns are recorded as being removed from Hull for the defence of Bridlington and Flamborough (Howes and Foreman 1999, 16). A reference in an indenture indicates that a fort of some kind had been constructed and already demolished prior to 1650.

At the time of the minor 1644 'Battle of Bridlington' in which the parliamentary forces of Sir William Constable routed forces loyal to the crown, the royalist garrison was located at the Quay where on either side of the harbour there were fortifications armed with small cannon (Neave 2000, 86). It is thought that these civil war fortifications were built around the time of Queen Henrietta Maria's landing at the town with troops and arms in 1643.

There is considerable documentation relating to the fort at the Quay during the First, Second and Third Anglo-Dutch Wars of the mid – late 17th century (Purvis 1926, 313-315; Ingram 1970, 59-63; Neave 2000, 90-93). In 1667 there were plans to build three forts, one in the midst of the town to defend the Quay and one to each side. It appears that only one fort, to the north side of the harbour, was built and this housed a number of

pieces of artillery (Neave 2000, 86). The available information indicates that throughout the Dutch Wars, indeed both before and after also, the fort was periodically vacated and allowed to dilapidate before being hastily reoccupied in times perceived imminent threat.

The fort was ordered to be re-armed in 1702 by the Duke of Marlborough, though this occupation may have been short-lived. The 17th century fort may have been lost to the sea as it was announced in 1748 that a new fort was to be built just to the north of the harbour. The fort was restored for the Napoleonic wars. In 1805 is was described as *"a small old brick building containing a dwelling... for the artillery man... and a magazine for ammunition"*. It contained several 34-40 pounder cannon and was surrounded by a ditch and accessed via a drawbridge (Neave 2000, 159). This latest fort went over the cliff during a storm in 1812.

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Case study 8: Hornsea

Summary of previous work

There has been no previous specific study of the 16th century pier at Hornsea though there are a small number of local history books that make reference to it. The earliest of these is George Poulson's two volume 'History and Antiquities of Holderness' of 1841 (Poulson 1841). Poulson refers to some of the documentary evidence for the pier and gives consideration to the historical evidence for coastal erosion in the locality. Broadly similar ground is covered in E. W. Bedell's 'An Account of Hornsea' (Bedell 1848). Again making some minor reference to the pier is Thomas Sheppard's 'The Lost Town's of the Yorkshire Coast' (Sheppard 1912). Sheppard had a deep interest in geology, geography and archaeology and although his book was very much concerned with coastal erosion, he again makes brief reference to some of the documentary material referring to the pier. More recent histories of Hornsea giving reference to the pier are the 'Short History of Hornsea' by of J. E. Hobson and the far more extensive survey of Stephen Harrison's 'History of Hornsea' (Hobson 2002; Harrison 2005). Historical consideration of the settlement of Hornsea Beck, where the pier was located, has been given by Michael Sewell (Sewell 2000). A neat historical summary of the town is presented in volume 7 of the East Riding Victoria County History (VCH 2002). Again, consideration of some of the documentary references to the 16th century pier is given in this volume.

Town background

The settlements that collectively comprise modern Hornsea appear within the Domesday Survey of 1086, the principal of which were Hornsea and Hornsea Burton, the latter of which was located south of a channel known as Stream Dike. (VCH 2002). The 16th century pier was located at the settlement of Hornsea Beck and although there is no specific reference to this settlement in Domesday it is known to have been in existence by 1228 (VCH 2002). By 1086 control of Hornsea had passed to Drogo de la Beauvriere a Flemish underlord of William I. Drogo's successor, a brother in law to King William,

gave Hornsea and its neighbouring lands to the Benedictine Abbey of St Mary's, York. Hornsea was to remain in the hands of St Mary's as part of a large monastic estate for over 400 years until the dissolution of the abbey in 1539. Hornsea Beck took its name from the watercourse, now known as Stream Dike, which flowed from Hornsea Mere to the sea. It appears that the settlement of Hornsea Beck grew up on the banks of this small creek (Sewell 2000, 35). Hornsea Beck always formed a component part of the manor of Hornsea, though was separated from the main body of the township by a distance of over 1.5km. Such polyfocal arrangement occurs at a number of pier sites including its nearest neighbour, Bridlington, to the north. The first reference to the settlement is in a dispute of 1228 between the abbeys of St Mary's and Meux, over rights to tolls on some ships cargoes which were landed *"at the port of Hornsea"*, and in which St Mary's prevailed, (Poulson 1841, 317). The size of the settlement of Hornsea Beck is believed to have rivalled that of Hornsea by the 14th century and in 1539 more men were mustered at the Beck than in Hornsea (VCH 2000).

There are a number of references to fishing and seaborne trade at Hornsea Beck and Hornsea Burton from the early 13th century as well as to fishermen, shipmen and to tolls on merchandise (VCH 2000). Agriculture formed a further mainstay of the local economy. St Mary's was granted the right to a weekly market at Hornsea in 1257. Right for an annual fair was gained in 1275, with permission for a second annual fair being granted in 1358. The market and fairs seem likely to have stimulated mercantile activity in the locale and by 1377 Hornsea was the fifth largest settlement in the East Riding (Sewell undated).

Following the reformation Hornsea long remained a royal manor, albeit in the hands of various crown lessees. Only in 1696 was the crown granted into private ownership (VCH 2002).

Environmental and topographical background

Hornsea is located mid-way along the sweep of coastline between Flamborough Head and Spurn Point. This stretch of coast forms the eastern limits of the flatlands of Holderness. The north and west limits of Holderness are formed of the chalk uplands of the Yorkshire Wolds. The topography of Holderness is generally of a very slight dipping towards the

west rather than to the coast and the drift geology of this low-lying area is principally comprised of glacial deposits with lesser areas of alluvium and marine deposits (BGS). One effect of glacial melt-water in this area was the formation of a lakes, or meres, that created a landscape dominated by boggy marshland. Subsequent drainage has left Hornsea mere as the principal surviving element of this earlier environment. Stream Dike forms an outlet from the mere to the sea and is first recorded in the earlier 13th century (Sewell undated). The Dike outflows to the sea through a gap, known as Hornsea Gap, between the low clay cliffs. The seaward part of the Dike was straightened and slightly realigned in the 19th century and it presently flows slightly to the south of its historic course.

The Holderness coast mainly consists of low cliffs of soft glacial drift (boulder clay), fronted by narrow beaches. The sea is continually able to reach the base of the cliffs and the majority of land-loss is due to the action of storm waves and tidal surges. The rates of loss in this area are generally considered to be around 2m per year which makes it one of the fastest receding coastlines in the world (Department of Geography, University of Hull 2002). It has been estimated that a strip of land several kilometres wide has been lost since the Roman period (Eurosion 2002; Ostler 2007). Concern over this loss has been voiced since at least the 14th century by local communities (Ostler, 2007). In Hornsea Burton, immediately to the south of Hornsea Beck, Meux Abbey recorded the loss of 27 acres of land within the space of a few years prior to 1400 (Sewell 2000, 35). This matter has been the subject of occasional interest to historians (Poulson 1841, Sheppard 1912), with archaeological interest being altogether more recent. Geologists and geographers have been far more active in their researches and have produced many reports on the rates and nature of erosion and continue to monitor the land loss (Eurosion 2008). Longshore drift along this stretch of coast is in a north to south direction and the beach fronting the town has for many years been arrayed with groynes.

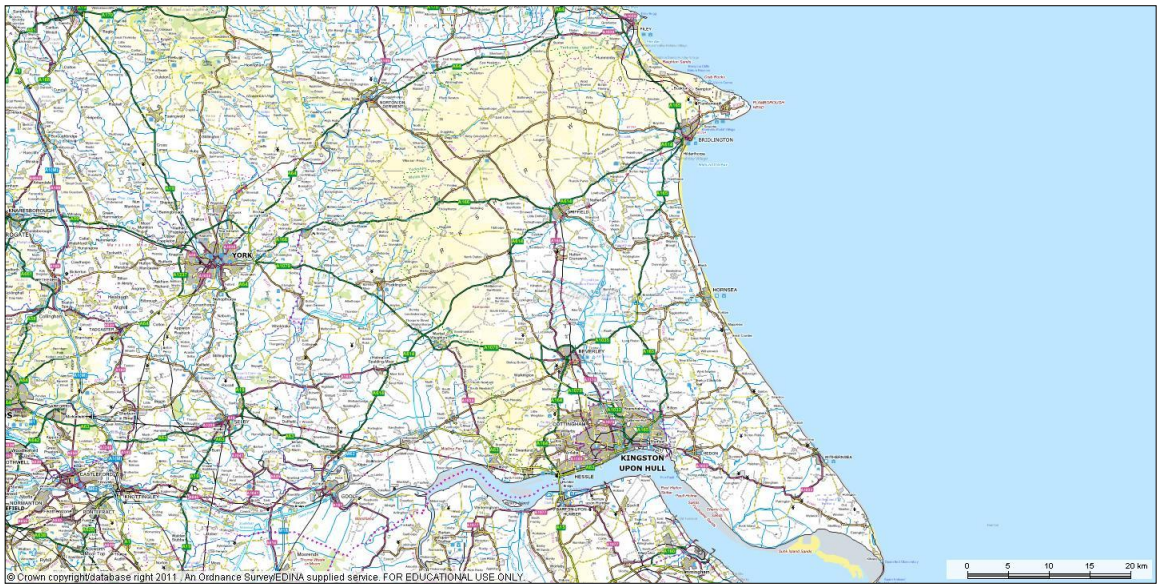

Figure 1, Location of Hornsea along the central part of the coastline of the East Riding

Figure 2, The pier was located to the north of Stream Dike, a few hundred metres south of the printed Hornsea place-name

Material remains

There are no known material remains that can be associated with Hornsea's pier. Given the estimated rates for erosion along this stretch of coastline it is probable that any remains that may survive lie around 1km from the present shoreline.

Place-names

There are no known place-names that can be connected to Hornsea's historic pier.

Technology

Documentary evidence

Hornsea was mentioned as a port long before it was recorded as possessing a pier. There are a number of references from at least the early 13th century onwards that indicate the settlement to have served as a centre for fishing and seaborne trade, for example (Poulson 1841, 317; Cal. Pat. Rolls 1364; VCH 2002, 286).

The first mention of a pier or 'key' does not occur until 1537. In that year correspondence between William the Abbot of St Mary's, York and Lord Thomas Cromwell states *"Are at more charges some years by a key there than the whole of the lordship is worth by year, not only for their own profit, but for the defence of the country, which it would not be his ease to sustain"* (L. & P. Hen. VIII, 1537). Apart from confirming the presence of a 'key' this document is important for two other reasons. Firstly, the reference to the defence of the country implies its usefulness. Secondly, it is clear that maintaining the key often cost more than the entire lordship itself was worth.

In 1549 there is reference to *"a platt"* that declared *"the pere to be ruined"*, and to the requirement of *"summe man of skill to consider what stuff is there toward the reparacion of the pere, and what more shalbe nedfull, and what may be the charges therof, and therupon to certifye"* (Acts of P. C. 1549). Shortly after this date we are informed of *"A letter to Mr Chauncellour to direct owt his warraunt for the diffrayment of jml L more than the other thowsand poundes that hath byn by the ordre of the Kinges Majestie allredy bestowed abowt the peere of Hornesey, in the countie of Yorke, so as the woorkes may be fynisshed owt of hande"* (Acts of P. C. 1553). This document may relate to the

first investment by the crown at the pier following the state taking possession of it from St Mary's Abbey, York, at the reformation.

The first record of construction materials is in 1556 when we are informed of *"xx tonne of tymber & two lytell pecs of tymber"* (at Hull Bridge) *"wch was the Kinge & Quenes tymber And was pr*(ov)*ided to have repaired the pere at horneseye"* which was seemingly stolen (ERRO DDCC 139/65). This quantity of timber for use in repairs, the tradition of timber pier building along the east coast, together with later documentation, leaves little doubt that this was a timber-built pier. Passing comment to the pier is made in a petition of the town of Beverley in 1558 which noted *"her highnesses peare at Hornsea"* (Poulson 1841, 317). No later reference to the pier, during the time it was extant, has been traced, though the Burghley map, attributed to a date of 1595 by the British Library, suggests that it survived until the late 16th century at least.

The Patent Rolls record the lease by the crown of the rectory, tithes and *"the site of the manor of Hornesey and lands* (named) *there all once of the monastery of St Mary next the walls of York"* in 1578 (Cal. Pat. Rolls 1578). The same entry also records *"le dole"* which was a customary payment there from all those occupied with things of the sea and which had been used as a source of funding for the pier. It is curious therefore that the Patent Rolls do not mention the pier, for which cartographic evidence also points towards its continued existence.

Two inquisitions subsequent to the demise of the pier shed a little light on its form. The earlier of these (TNA E 178/160) is of 1602/3 and enquires into works at the pier said to have been carried out in the reign of Queen Mary. That this was believed to have been a timber-built pier is clear from the pre-arranged questions that were posed which were concerned with the amounts of timber, and iron, that were used in the pier. Quantities of timber are mentioned throughout the document as is the matter of *"working framing and setting up of the said tymber and wood at Hornsey peere"*. These latter points are of particular interest with regard to the question of pre-fabrication of pier elements. Such framing was also recorded at the timber pier site at Broadstairs. Iron was a significant component within timber piers, its recorded use elsewhere being principally for shoes for piles and as spikes and nails. Although *"loads of stones"* and *"carrijing stones"* are mentioned so is the term *"fillinge"* and it would seem that the stone formed infill ballast within a framework of timber and not a stone built pier. The later inquisition (TNA E

178/4813) is of 1609 and its primary concern was with coastal erosion. Timber was mentioned in connection with the former pier and its role in restricting the rate of erosion acknowledged. It was also stated that the building of a new pier would be likely to require around 2500 trees.

Cartographic and pictorial evidence

A pier at Hornsea does not appear on Lucas Waghenaer's chart of 1588, nor does one appear on Willem Bleau's chart of 1625 (Waghenaer 1588; Bleau 1625). However, between these dates a pier is depicted on an English manuscript map of 1595 commonly known as the Burghley map (Figure 3, Figure 4 - detail). This map formed part of an atlas that belonged to William Cecil Lord Burghley, Elizabeth I's Secretary of State. The map contains three different sorts of information; military, nautical and administrative. The sands and flats of the Humber are shown and the main channel leading up the river is indicated by a pink line with numbers recording the soundings at intervals along it. This is in fact the first known map to record soundings. In the margin is a list of *"Havens and Crickes on ye Northsyde of Humbre, pertening to ye Custom howse of Hull"*. Although justly renown cartographers, the Dutch charts of Waghenaer and Bleau are known to sometimes not depict piers when they were in fact present, and this was almost certainly the case here in 1588. This is likely to have been to their being dependent upon cartographic information from earlier maps and from communication with mariners. By contrast the Burghley map was drawn as a repository of significant, reliable, local information. As such, the failure to depict the pier at Hornsea on Waghenaer's chart is simply an omission. Its inclusion on the slightly later English map is due to its local significance in the eyes of the state.

Figure 3, Extract of manuscript map of 1595 depicting the seacoast from the Humber to Scarborough. Hornsea is shown towards the bottom of the map immediately above the beck. North is towards top. (British Library, Royal. MS. 18. D. 111, f.63)

Figure 4, Extract of manuscript map of 1595 showing the pier at Hornsea in greater detail. There are distinct suggestions of a double pier arrangement with a large pier to the north of the stream and a smaller pier to the south. (British Library, Royal. MS. 18. D. 111, f.63)

The form of the pier

The documentary evidence for Hornsea refers to a pier (singular). However, the map of 1595 does suggest the possibility that the arrangement at Hornsea may have been a twin 'enclosing' pier arrangement, much like is depicted at Bridlington and Flamborough in the same map. The information within the available sources gives no real clue as to what 'type' this pier/s at Hornsea may belong to. The presence of contemporary piers at nearby Bridlington of 'piled wall type' raises the possibility that such may have been the case here.

Specialists and workers

In 1549 letters to the Earl of Shrewsbury *contained "a platt sent by Richard Mansell, of Hornesey Beck declaring the pere to be ruyned, wherby the King lost certein yerely rentes his Lordship must send thither summe man of skill to consider what stuff is there toward the reparacion of the pere, and what more shalbe nedfull, and what may be the charges therof, and therupon to certifye"* (Acts of P. C. 1549). Mansell is likely to have been a local dignitary as in the later 17th century another Richard Mansell is said to have formerly held the tenure of the manor. This document is of interest as it suggests that some sort of plan of the decayed pier is likely to have been drawn and that a man of skill was called to inspect the structure. Such a man of skill may have been an engineer or a carpenter of repute. Given that this individual was expected to know which materials and in what quantities would be necessary to repair the pier, as well as their cost, a degree of knowledge would appear to have been a pre-requisite for this particular task.

"Workmen" at the pier are recorded in 1555 and in 1602/3 – though the latter of these references was written after the demise of the pier (Purvis 1949, 69-73; TNA E 178/160). This provides us with minimal information regarding the nature of those constructing and maintaining the pier.

Ownership/control/funding

The first indication we have of pier ownership and its rights is in 1537 when it, along with the manor of Hornsea Beck is indicated as being held by St Mary's Abbey, York (L. & P. Hen. VIII, 1537). Within the same document it is stated that this included the *"rule of the waters there"* which is likely to relate to manorial rights over the foreshore.

A tithe dispute between certain local inhabitants and the vicar of Hornsea in 1555 provides some insight into the ownership and funding of the pier (Purvis 1949, 69-73). In this case the vicar was claiming certain "Dolles" that had in the past been paid for maintaining the pier. This document states that prior to the dissolution of St Mary's Abbey the abbey had been the proprietor of Hornsea's church:

"of the town of Hornesey and also of Hornesey Becke and Hornesey Key and undertook during the whole of that time the burden of the repair and maintenance of the same Hornesey Key". It is also said that *"the said Key of Hornesey about thirty or forty years*

ago was once and again in great ruin and the Abbot and Convent being lords as aforesaid of the key put off the repair of the same for a long time apparently on account of the great expense necessary to be made in the repair thereof' ... the said ruin of the key was harmful and no small prejudice to the fishermen of the parish who were accustomed to fish in the sea". In an attempt to obviate this inconvenience and to *"the more move and spur on the Abbot and Convent to the repair of the key"* the fishermen, for certain years *"of their own free will promised to the Abbot and Convent and to their proctors and deputies these Dolles or Cadolles"*. One of the witnesses in this dispute was a former monk of St Mary's and Master of the Manors. He stated that he *"used to go at certeyn tymes aboute xviii yeres ago to Hornesey and see the keye at Hornesey and pay the workmen for workynge of the same by the space of two yeres"*.

The information within this dispute is of considerable interest. It would appear that any income generated by the pier was insufficient to cover its maintenance and in this regard backs up the statement of the Abbot to Thomas Cromwell in 1537 when it was claimed that maintaining the pier sometimes cost more than the yearly value of the whole lordship. The voluntary Dolles intended to encourage the maintenance of the pier by St Mary's is also quite novel. There is no reference to manorial labour service at the pier by the tenants of the Abbey. Whilst this lack of such reference cannot positively attest to either its presence or absence if such was formerly in operation it is perhaps surprising that such relevant information was not presented. Perhaps such service was never established within this lordship? It is clear however, that paid workmen were employed in repairing the pier during the period of the Abbey's ownership.

St Mary's Abbey and its possessions were surrendered to the crown in 1539. The manor of Hornsea was retained by the crown until 1665 (VCH 2002, 273-295). A petition of the town of Beverley in 1558 noted *"her highnesses peare at Hornsea"* indicating that crown ownership of the manor also extended to the pier (Poulson 1841, 317). There is however, definitive evidence for the township contributing towards the upkeep of the pier. In 1552 the government ordered an inventory of church goods and the entry for Hornsea survives (Surtees Soc. 1896, 49-50). It is recorded that the churchwardens, *"with the consent of all the inhabitants"* reported that they had been forced to sell the church plate and other materials to provide funds *"for the repaire and buildinge of the peire of Hornesey"*. This sale apparently raising the sum of £22 6s 8d.

Mention has already been made of the lease by the crown of the rectory, tithes and *"the site of the manor of Hornesey and lands* (named) *there all once of the monastery of St Mary next the walls of York"* in 1578 (Cal. Pat. Rolls 1578). The same entry also records *"le dole"* which was customary there from all those occupied with things of the sea and had been used as a source of funding for the pier. Curiously though there is no mention of the pier itself although cartographic evidence points towards its existence around this time. At nearby Bridlington and Flamborough the crown wished to save itself the expense of maintaining the piers by leasing them out, to groups of individuals, together with their manors. Quite what the situation was at Hornsea is not clear. It may even be possible that no one was prepared to take up such a lease that required maintenance of the pier and that by default it remained in the hands of the crown?

The inquisition of 1602/3 into the late pier at Hornsea provides some information on the managerial context of the pier in the time of Queen Mary (TNA E 178/160). We are informed, by several aged residents, that a number of commissioners held responsibility for the pier during at least part of the period of crown ownership. Named individuals included Marmaduke Constable, Robert Constable, Edward Roos and John Bellowe, most of whom were members of important families in the East Riding. These commissioners may have been acting directly for the crown and although their precise role is not clear they do appear to have been responsible for disbursing money.

Environmental impacts of the pier

The location of Hornsea's pier was unique along the Yorkshire coast in that it lacked the protection of a headland to the north. As such the site lay open to the prevailing elements. The nearest sheltering headland is that of Flamborough Head some 21km to the north and so shelter outside Hornsea's pier was also the less favourable than that adjacent to other Yorkshire piers.

The loss of Hornsea pier within around thirty years of the expenditure by the crown of over £2000 in its rebuilding is particularly interesting and it is likely that this relates to specific problems at Hornsea. Such problems may have been rooted in the rates of erosion along the Holderness coast. Judging by the costs of the works at Bridlington and Flamborough the expenditure of £2000 at Hornsea could have built a pier of some

considerable scale yet this would not in itself have halted erosion. At Bridlington the worst effects of storms and erosion took place at the junction of the piers with the land and any breach in this location led to the silting up of the basin. One of the principal difficulties at Hornsea may have been perpetually maintaining a continuous land link. This type of problem appears likely to have been caused by the placing of artificial structures, that is the piers themselves, within zones of active erosion processes. This intrusion frequently resulted in the undermining of parts of the piers and especially in the erosion of that part linked to the land. Countermeasures to such localised erosion were commonly employed at pier sites and included the use of sunken jetties, breakwaters and toe armour. Whether such structures were ever constructed at Hornsea is uncertain.

Perhaps it was the burden of such works that resulted in its loss. At a number of the Yorkshire pier sites the crown sought to lessen its financial burden by leasing them out with the proviso of the lessees being responsible for maintenance and rebuilding. Whilst no evidence for such a lease has been found for Hornsea it may have been difficult environmental circumstances that either precluded the offering, or the taking up, of such a lease?

The earliest reference we have to the pier suggests that it also functioned *"for the defence of the country"* (L. & P. Hen. VIII, 1537). This reference to the defence of the country relates to the piers importance in preventing coastal erosion rather than to any military significance. Not that many years after the loss of the pier it was very much local opinion that Hornsea's pier played a key role in minimising the effects of land loss through coastal erosion. An inquisition of 1609 tried to quantify the scale of land loss (TNA E178/4813). It was said that since 1546 38 houses and their gardens had been washed away and that a strip of land some 240 yards wide had gone beneath the waves. The local inhabitants giving testimony referred to the former presence of a pier *"during the continuance whereof the decay was very little"*. Further, they concluded that the *"remedye be had eyther in the reedification of a Peer or some other suche lyke defence be maide for the same"*. It was estimated at the same inquiry that it would cost at least £3000 to rebuild the pier, a cost that was to prove prohibitive.

It is worth noting that on the manuscript map of 1595 the wording *"warpe in and owte"* appears next to the pier itself. In nautical parlance to 'warp' is to move a vessel by means of ropes (warps) fixed to a secure point such as a pier, anchor or buoy. This may relate to

the presence of a sand bar close to the pier head. If so, this was quite probably resultant upon the imposition of the pier system through which a watercourse flowed and in which north-south longshore drift operated. In such a combination sediment is likely to have accumulated against the north side of the north pier, eventually rounding the pier head. Whilst much sediment thereafter is likely to have drifted southwards beyond the pier the flow of water from Stream Dike into the sea would serve to locally diminish the force of the current and encourage the deposition of suspended sediment. It is also possible that a current may have run along any south pier exacerbating this effect, much as has and continues to happen at Bridlington (Wallingford 2009, 18).

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Case study 9: Sheringham

Town background

The small settlement of Sheringham was recorded in the Domesday Survey of 1086 (TNA E 31/1/2/1477). Historically, Sheringham consisted of two parts separated by around 1km. The larger Upper Sheringham was a largely agricultural settlement whilst the smaller Lower Sheringham was engaged primarily in fishing. Such polyfocal arrangement has been observed at a number of pier sites along the east coast. Since the 19th century the two settlements have coalesced into one.

Sheringham has always been of relatively small size, being valued at £55 in the Lay Subsidy of 1334 and still only possessing a population of around 100 in the early 18th century. The settlement did not achieve borough status in the medieval or post-medieval periods remaining instead part of a manorial holding. The settlement possessed a market and fair from 1239 (Cal. Chart Rolls 1239; history.ac.uk). In the mid 16th century Sheringham was possessed by the Duke of Norfolk, but following his attainder in 1572 it was escheated to the crown in whose custody it resided until gifted back to later Dukes by James I (Blomefield 1808, 161-4). It was to be during the period of crown custody that the pier building enterprise would be carried out.

In the 16th century at least, Sheringham appears to have been only a minor maritime centre. Although 11 mariners were impressed here in 1577 a survey of 1580 indicated that of the 167 sizeable vessels belonging to Norfolk ports only two were from Sheringham (Day 1888, 226).

There appears to have been only loose manorial control within Sheringham, as across much of Norfolk. Hassell-Smith considers that *"Norfolk had a higher proportion of freeholders than most other English counties, while a fragmented manorial structure, where one lord rarely controlled the social and economic life of an entire community, tended to weaken landlord domination"* (Hassell-Smith 1974, 1). Within this greater degree of independence it was common in Norfolk for the gentry to act in concert with local communities, often performing as intercessors in appeals for external assistance. Sheringham and nearby Beeston Regis had its own system of pier reeves prior to the

commencement of the state sponsored pier works of the late 16th century and the available evidence of an appeal for assistance in 1578 indicates that it was the local inhabitants, albeit with assistance from their neighbours, who built and maintained a system of groyne-like piers (Day 1888, 226-8). This notion is supported by a licence to export grain in 1583 that was granted to the pier reeves and inhabitants of Sheringham and Beeston (Cal. Pat. Rolls 1583b).

Previous study of Sheringham piers

The first writer known to consider Sheringham pier was W. A. Day whose study of 1888 made use of a number of documents, now forming part of the published Bacon Papers that at the time of his writing were still in private hands (Day1888). It seems probable that a number of key documents were either not available to Day or else the volume of documentation was too great for him to fully wade through. In more recent years Day's sources as well, as additional papers, have been transcribed and published by the Royal Historical Society and the Norfolk Record Society (RHS 1915; NRS 1987 & 1988; NRS 2000). The other writer to consider Sheringham piers, or more particularly the infamous licences that raised money for them, is A. Hassell-Smith (1974). Hassell-Smith was also one of the editors of vol. 3 of the Bacon Papers (NRS 1987 & 1988), a sizeable portion of which relates to Sheringham piers. Some reference to Sheringham piers was also made within Walter Rye's 'Cromer Past and Present' of 1889 (Rye 1889). This text on Sheringham contains little in addition to that which appears in the above listed works and has drawn particularly heavily on the transcriptions of the Bacon Papers.

It is a point of some interest that whereas nearby Cromer has a very long and near continuous history of piers spanning over 600 years Sheringham's flirtation was very brief, in fact spanned less than 20 years. Paradoxically, there is as much, if not more documentation for Sheringham than there is for Cromer. This imbalance is owed to the controversial legislation that funded Sheringham and the activities of the patentees and their supporters that collected this money, much of which came to be recorded during contemporary investigations.

Environmental context

Located on the north Norfolk coast some 6km west-north-west of Cromer Sheringham possesses soft cliffs under 40m tall, composed predominantly of thick, soft, clays, silts, sands and gravels that overlay cretaceous chalk (BGS). The upper surface of the chalk is sometimes exposed on the foreshore. There are no creeks or inlets in the locality which are characteristic of that stretch of coast to the west. The tidal range at the site is between 4-5m. This area is subject to coastal erosion that has been estimated historically to average around 0.5-0.75m per year (Wallingford 2003). Erosion tends to be cyclical rather than gradual and continuous, being predominantly the result of cliff landslip, caused by water saturation, followed by a period of stabilisation during which time the fallen material is eroded and transported by wave action. Sheringham lies at a longshore drift boundary; to the west of the town the net longshore movement of sediment is to the west whilst east of the town it is to the east (northnorfolkflag.org.uk).

The locality has long suffered from coastal erosion and the first patent that permitted the late 16th century harbour works stated that funds were *"to be employed in repairing the piers and protecting the townships of Sheringham and Beeston Regis from the violence of the sea"* (Cal. Pat. Rolls 1583a). The case study notes below provide further evidence for erosion and of aspects of adverse alterations to coastal processes caused by the building of great piers.

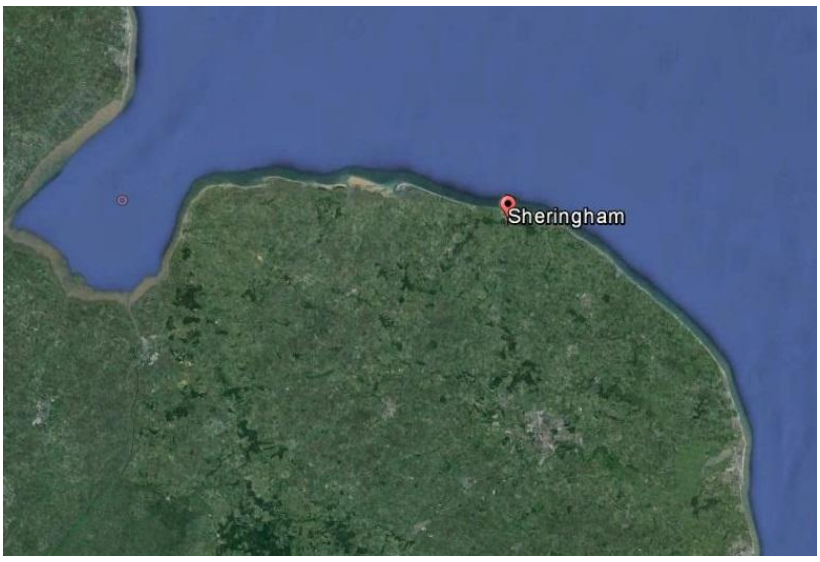

Figure 1, Location of Sheringham on the north Norfolk coast (source: Google Earth)

Documentary sources

Like Cromer, Sheringham, Beeston Regis and this part of the north Norfolk coast generally, has long suffered the effects of coastal erosion. In connection with the lack of a harbour this issue was considered in an appeal, dating to around 1578. It was drafted on behalf of the inhabitants of Sheringham and Beeston and addressed to the Hundred by three magistrates of the county. It was stated that:

"Whereas throughe the rage of the mayne Sea and for want of convenient Harboroughe The townshipps of Beeston and Sheringham are lately fallen into sooche greate ruyne and decaye as thinhabitants are not of theym selfs wthout the helpe of theire frendlie neihbors adioyninge hable to pforme that good worke of providing safetie hereafter" (Day 1888, 226-8).

Later documents suggest that a system of groyne-like structures were in place in the locality at this time and that the gist of this appeal was to raise funds for the construction of a pier.

It may be that the appeal at the local level was unsuccessful as in 1583 a licence for 10 years for the exporting of quantities of grain was granted to the pier reeves and inhabitants of Sheringham and Beeston (Cal. Pat. Rolls 1583b). The profits were to be employed towards the rebuilding of the piers of the towns. Pier reeves, as functionaries, were clearly holding office by the early 1580's, though it may have been groynes as a defence against coastal erosion rather than a pier with primary shipping functions, that they were responsible for maintaining.

Further aid in repairing the piers and protecting the townships of Sheringham and Beeston Regis *"from the violence of the sea"* was granted in Letters Patent to eight named individuals led by Robert Kyrke (Cal. Pat. Rolls 1583a). This aid took the form of the penalties payable in the counties of Norfolk and Suffolk under an Act, originally of Henry VIII, but maintained and amended by Elizabeth in 1578 (Hughes and Larkin ii 1969, 435-8). This Act required a proportion of arable land in holdings of 60 or more acres to be cultivated for the growing of hemp and flax with failure to comply being penalised by a scale of fines. Day suggests that the reason why the crown was amenable to the diversion of funds to Sheringham, which would otherwise have accumulated to the royal coffers, was that following the attainment of the Duke of Norfolk in 1572 Sheringham was

escheated to the crown (Day 1888, 228). Similar cases of Henry and Elizabeth investing in piers that came into their hands in like manner can be found at Whitby, Flamborough, Bridlington and Hornsea. Hassell-Smith indicates that the patentees had influential supporters, amongst them Sir William Heydon (one of the signatories to the appeal of the late 1570's) and Henry Lord Cromwell who were chosen by the Justices of Assize to act as commissioners to ensure the correct use of the money (Hassell-Smith 1974, 248). Whilst the patentees did commence a grandiose pier scheme at Sheringham it is also clear that they were guilty of embezzlement and in many ways abused their authority, seemingly with the connivance of the commissioners.

A number of the Norfolk gentry and magistrates campaigned against the patent and its abusers, foremost amongst these was Nathaniel Bacon. There are numerous entries in the published volumes of the Bacon Papers concerning the abuse of the collection of monies for the Sheringham piers, e.g. (RHS 1915, 102-4; NRS 1987 & 1988, 1-2, 56-79, 131-2, 159-217; NRS 2000, 232-4). Complaints to the Privy Council by several justices of Norfolk in 1586 led to these magistrates being instructed to enquire into the collection and disbursement of monies, by both the hemp and flax forfeitures and the transportation of grain (A. P. C. 1586, 77-8). At around the same time however the Council also wrote to the commissioners, Heydon and Cromwell and the rest of the justices of Norfolk requiring them to see the patent operated fairly and properly (A. P. C. 1586, 42-3). Despite widespread opposition to the patent, in 1590 Kirk was able to produce letters from justices in Norfolk for renewing the licence, this time operating with a London attorney William Garter (Cal. S. P. Dom. 1590).

Following yet more complaints to the Council a group of six gentry, including Nathaniel Bacon, were directed to investigate the operating of the patent (A. P. C. 1591, 88-9). The investigators were directed to call before them the patentees of the former and later grants to ascertain how much had been collected and how much spent. Further, they were required to view *"by your selves and some men of skill and knowledge"* the works at Sheringham in order to determine the present state of the haven, what benefits had been gained and whether continued expenditure was warranted. Considerable documentation relating to this case is found in the published Bacon Papers volumes (see references in previous paragraph). The Investigating magistrates found little in the way of accounts, though what they did find either corresponded badly with their own surveys and estimates of income or had not been entered at all. Of the commissioners Cromwell was seen to

have been the subject of lavish gifts whilst Heydon had sold trees for the works at highly inflated prices and only a few of which appeared to have been delivered. Kirk and Garter failed to appear before the investigators; nonetheless the enquirers felt they had enough evidence to pronounce *"This Kirke is a verie needie man and of small accompt and so is also Garter thought of and* (they) *be men utterly unfytt to have committed unto them the governaunce of so great a somme of money to anie publick use"*. Beyond this, it was considered that the pier works were something of a white elephant. Whilst coast works were certainly needed the scheme put into action was seen to be inappropriate.

Surprisingly, this report did not bring the patent to an end. Although there was pressure to rescind the Sheringham patent and repeal the hemp and flax Act nationally, a petition in favour of the retention of the hemp and flax Acts, probably engineered by Kirk and Garter, claimed that the pier works at Sheringham had saved their town from being *"washed awaie and swallowed up by the same Rage"* and that, if finished, would *"succor fisshermen inhabitinge about the coast but also be a convenient safeguarde for many ships indaungered upon the Coast in fowle weather"* (Cal. S. P. Dom. 1590, quoted in full in Rye 1889, lxi-lxiv). In many respects the hemp and flax Act had run its course and widespread public opposition led to a Royal Proclamation of 1589 decrying malpractice by patentees and regulating the collection of monies (Hughes and Larkin iii 1969, 43-44). The Act was not actually repealed or amended but instead allowed to lapse (Hassell-Smith 1974, 252-3).

A document headed *"The whole accountes of the peerereves of Sheryngham and Beston concerninge their sommes of money desbursed for the reedifienge of the same decayed peares as followeth"* appears within the Bacon Papers of 1585-1595 (NRS 1987 & 1988, 17-19). This document is likely to have been pieced together as a result of the investigations authorised in 1591, of which Nathaniel Bacon was a member. Although the fullness and accuracy of the contents of the document must subject to considerable concern, particularly given the fiscal irregularities of the piers enterprise, it is significant that these accounts are, theoretically at least, those of an entire programme of pier building.

The first item dealt with is timber, for which there are five entries, each seemingly representing separate purchases between 1582 and 1585. In each entry the timber is described solely as oak and in total 1,450 oaks were bought. *"Fellinge, cuttinge sawinge*

and carrynge" for each entry is itemised and costed separately. Given that felling forms the first element of this process, and carriage the last, it is reasonable to assume that cutting and sawing were carried out at the site of felling. Unfortunately, the scantlings of conversion are not detailed. The place of origin for two of these entries is stated. Another entry in the Bacon Papers (NRS 1987 & 1988, 135) indicates timber was also felled at Baconsthorpe for repair of Sheringham pier.

There are several entries dealing with payments for *"wourkmanshipp"*. These are detailed in very simple manner but are informative. These are given below in abbreviated form. Firstly, to *"Richard Newman and his 4 men from 12th April 1583 to 9th August 1584 £139 15s",* with the master at 2s 6d per day and each man 14d per day. Secondly, and for the same period of time we hear of 3 men – 2 *"goinge in the crane and the thirde to guyde the piles and unlose the bettles"*, with each man being paid 12d per day. Thirdly, 4 men *"for breakinge of tymber fitt for the wourkmens hands"*, 180 days, with each man being paid 12 ½ d per day. A fourth entry related to the previous three is for *"three payer of tryces and all thinges therto belonging"* (£1 3s) – possibly relating to ropes and running gear for the machine? Beneath these entries it states *"Whiche workemanship extended the west peere two hundredth and threescore foote"* (i.e. 79.25m). Following on from this it is stated *"the carriage of stone and fillinge of every ten foote whereof amounting to 40s -- £52"*. This is likely to indicate a stone ballast for every 10 foot (i.e. 3m) bay, the bay length of the west pier therefore being 26 bays. Further in the document there is reference to *"also finished* (blank) *footes in breakwaters at the west pere"* – a clear distinction between the terms breakwater and pier being made here. Although the location along the west pier is not specified this may, for example, be at the landward end of the pier and a device/s to stop erosion creating a gulf between the land and the pier, or alternatively to devices along the length of the pier to encourage the deposition of materials against the toe of the pier, thereby preventing undermining. The final entry for the west pier is *"unto Pasfelde and his men for the workmanship of three score foure foote of the west pier"* (19.5m). This may be for an additional length of the west pier, if so, then the total length of the west pier would amount to 98.75m.

The document also lists works to an east pier. Firstly, to *"Brystowe and his 4 men"* from 24th August 1584 to 18th October 1585, with the master at 2s per day and each man 14d per day. Secondly, payments to 3 men, *"two goinge in the crane and the thirde guydinge the pyles and betels"* for 57 weeks at 18s per week during the period of 1584 – 1585

listed directly above. Beneath these entries it states *"Whiche workemanship extended the est peere one hundredth fourscore foote"* (54.85m). Following on from this it is stated *"the carriage of stone and fillinge therof in parte cost £28"*.

Also recorded are monies for bread and beer for carriers of timber and *"divers otherr helpers since the beginninge of the worke"*, (presumably a reference to more casually employed staff). *"tryce ropes"* for unlading the carts and *"great ropes for the crane and beetles, and other ropes nedefull for the wourke of the peere"* are also listed. *"Iron wourke occupied aboute the crane, beetles and peeres"* together with *"brasse wourke in shyves and other necessaries belonging to the betels and crane"* (presumably brass for its less easily corroded properties, or for moving parts in friction?) are likewise noted.

Finally there are also sums for *"buildinge a blockhowse upon the clyffe of lyme and stone with a roof thearunto with porche meete for our great ordynaunce"* together with *"new carriages made for the same ordynaunce"* with this seemingly relating to Elizabethan fears of invasion.

Given the heading to this document it is possible that the role of the pier reeves at Sheringham and Beeston extended from the purchasing, felling, conversion and carriage of timber through to control of the construction work. However, it is evident that Sir William Heydon, who may have been working hand in glove with Kirk, received an exceptionally high price for his oaks, many of which were apparently never delivered (NRS 1987 & 1988; 161-2). If so, were the pier reeves in on the scam, or were such purchases authorised by Kirk in their name?

There are several references to the east and west piers at Sheringham, which presumably extended at 90 degrees to the shore straight out to sea, one on the east, the other the west. One document however also mentions a north pier (NRS 1987 & 1988, 211-4). Quite how this was configured in relation to the other two piers is uncertain.

The investigating authorities interviewed a number of local inhabitants about the effects of the pier, which by 1592 already seems to have been suffering from the elements. It is clear that erosion had not ceased and that the piers were also having other effects on coastal processes.

"the peere being built somewhat into the sea doth cause the byllowe of the sea somtymes to breake and doth indanger therbie their boates coming with their men to land. The peere

also being built so lowe (far?) *into the sea hath been cause that a small channel nere unto the lande, wherinto their boates did often come & lande, is now silted up and therbie thei are lett from landing their boates so nere unto the shoare as thei were wont and are forced to come wading in the water a great waie from the shoare"*.

There was also a consensus that all or most of the timber of the north pier be lifted and *"a great parte of that plucked downe to the sea warde which is already built upon the east and west peere"*. The investigators stated:

"wee rest assured in our owne persuacions that the thinge enterprised is of such difficulty or rather impossibility as the same will never be performed and if it should be performed yet the charge towards the continuance and maintenance of the same would be more than these two counties were able to beare".

Further, it was considered that this timber, together with other timber not yet employed should be used *"to builde smale jetties or peeres from the mayne towards the sea for the saftie of their towne , over and besides those three peeres which thei have already"*. In other words, the harbour of a few great piers was to be replaced by one of multiple short piers – perhaps little more than glorified groynes? Elsewhere in the Bacon Papers it is stated, in relation to coastal erosion, that such small jetties were formerly used *"And saie for the upholdinge the houses & the decaye of the towne thei do knowe the same maie be performed with small jettyes of verie small charge as it hath ben used in former times"* (NRS 1987 & 1988, 206).

Some evidence for a return to the former system can be found in Volume 4 of the Bacon Papers in which a document of 1601/02 gives details of payments made *"for worke about taking up the old peere & making of a small peere"*. Planks and piles are referred to (NRS 2000, 232).

Ownership, control and funding

The available evidence suggests that prior to the state sponsored pier building project of the late 16th century, and after it, a system of groyne-like piers were present at Sheringham. These structures were concerned as much with the minimising of erosion as they were with providing port infrastructure; if not more so. The building and maintaining

of these structures were the responsibility of the pier reeves and community and not the secular lord. Again, we can see the local pier reeves as being directly involved with the day to day process of construction and management, including from a financial perspective. In so far as it is possible to identify the owners and controllers of Sheringham's harbour, it was in all probability the community, as represented by the pier reeves. Whilst the patentees did involve themselves with the scheme, they were effectively interfering middlemen collectors of money; seemingly corrupt ones at that.

It is noteworthy that it was during a period of crown ownership of the manor that funds raised by the state were made available for the ill-fated great piers scheme. Case studies elsewhere, for example, Whitby, Flamborough, Bridlington, Hornsea and Dover, have shown that on occasions the state, particularly where it felt it had a direct interest, was prepared to fund harbour building schemes. One anticipated outcome of the money spent on the Sheringham scheme, raised by taxation, must surely have been a more prosperous Sheringham. Such would have been of direct interest to the crown as a more prosperous settlement is likely to have been one of greater profit to its royal lord.

Pictorial/Cartographic/Place-Names/Material remains

No evidence of the above categories has been found for Sheringham.

Related fortifications

As has been seen the pier reeves accounts for the work on the late 16th century harbour works included sums for *"buildinge a blockhowse upon the clyffe of lyme and stone with a roof thearunto with porche meete for our great ordynaunce"* together with *"new carriages made for the same ordynaunce"*. Such Tudor fortifications in relation to ports is a recurring theme in this wider study and was related to contemporary fears of invasion.

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Case study 10: Cromer

Town background

The small town of Cromer did not achieve borough status in the medieval or post-medieval periods, The settlement did however hold a weekly market and annual fair from at least 1285 (Dymond 1993; Rye 1889, 44). These rights were originally held by the lord of the manor. Cromer's medieval pier was first mentioned in 1390 and this, together with later references, indicates that it belonged to the community and not to a manorial lord; it was they who built, maintained and controlled the pier. There appears to have been only limited manorial control within Cromer, a factor that was common in much of Norfolk. Hassell-Smith considers that *"Norfolk had a higher proportion of freeholders than most other English counties, while a fragmented manorial structure, where one lord rarely controlled the social and economic life of an entire community, tended to weaken landlord domination"* (Hassell-Smith 1974, 1). Within Norfolk this class appears often to have acted as intercessors between communities and the crown, drawing up the appeals and presenting the cases. These people had the connections and were able to facilitate. Whilst Cromer often looked to the county and crown for various means and schemes for funding their pier, its control always remains in the hands of the community.

Cromer appears always to have supported a fishing community, who perhaps ventured as far as Iceland, whilst it is apparent from a number of documentary references throughout the 14th century that Cromer operated as a port supporting trade, seemingly including overseas trade e.g. (Cal. Pat. Rolls 1348; Rymers Foed. iii, part 1, p. 207 quoted in Rye 1889; Calendar of Patent Rolls 1381). There are commonly references to merchants of Cromer in the medieval and post-medieval periods (Rye 1889). From the later 18th century the town began to attract visitors, with this becoming a fully developed tourist industry in the 19th and 20th centuries.

Previous study of Cromer piers

Walter Rye, the pre-eminent historian of Cromer commented on the piers in his 1873 and 1889 works (Rye 1873; Rye 1889). Using information from the Public Record Office, local archives and secondary sources Rye was able to produce a narrative outline covering many of the principal elements of the history of the piers. A number of sources were unavailable to Rye, including those that contained information regarding structural characteristics. The other notable historian of Cromer, Alfred Savin, was as interested in geology, zoology, the precise elevation of hill-tops and other ephemera as he was history. Savin's history of 1937 adds no additional information on the pier though does provide original information on street-names, and episodes of coastal erosion (Savin 1937). Christopher Pipe's booklet on Cromer pier is heavily focussed on the existing structure and the 'show biz types' who have trod its boards over the years. Pipe does nonetheless deal briefly with the earlier history of the piers, though with few exceptions draws on secondary sources alone. His work does incorporate some of the references to Cromer pier that were published in the various Nathaniel Bacon Papers volumes in the 20th century that were unavailable to earlier historians. In the later 20th century a Mr Harbord produced an unpublished document that recounted parts of the history of the piers drawn from earlier works (HER). The important part of his study was the partial survey of timber remains occasionally exposed on the foreshore. Having to rely at least partially on paced measurements Harbord appears to have made the best of a slender resourced job.

Environmental context

The north Norfolk coast in the area of Cromer (Figure 1) is of soft cliffs generally under 40m tall and composed predominantly of thick, soft, clays, silts, sands and gravels overlaying cretaceous chalk (BGS). The upper surface of the chalk is permanently sealed by overlying sands at Cromer. This area lacks the creeks and inlets characteristic of the stretch of coast to the west. The tidal range at the site is between 4-5m. The area is subject to coastal erosion that has been estimated historically to average around 0.5-0.75m per year (Wallingford 2003).

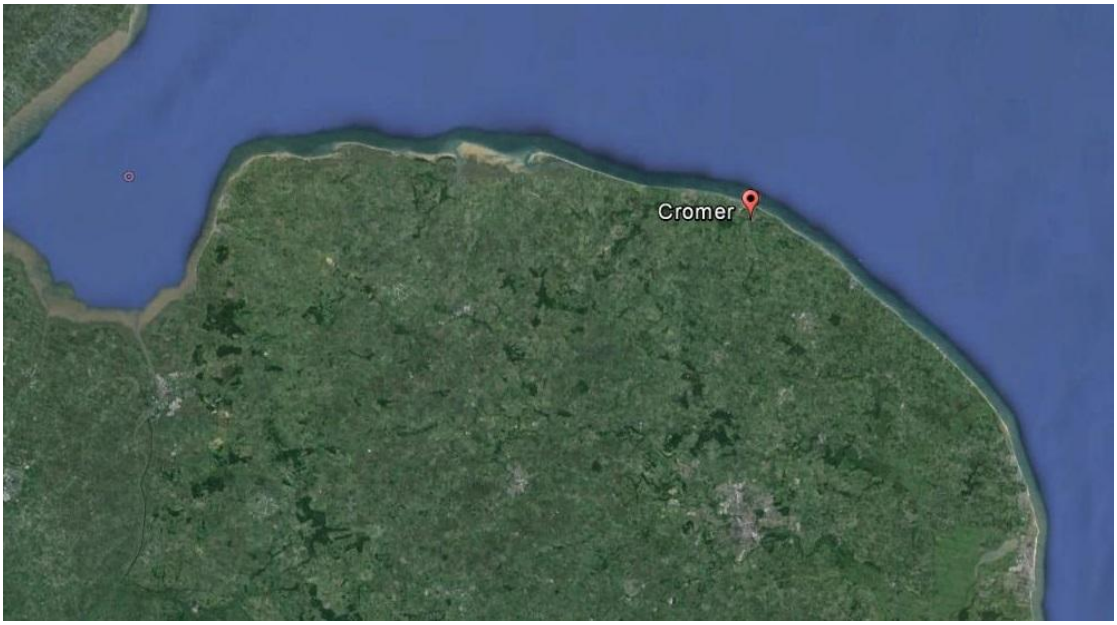

Figure 1, Location of Cromer on the north Norfolk coast (source: Google Earth)

Coastal erosion at Cromer is mentioned as early as 1336 when land was granted for the building of a new church as a petition had shown *"that a great part of the present cemetery has been so washed away by the sea that the church is likely to fall"* (Cal. Pat. Rolls 1336). The perennial problem of loss of land and property to coastal erosion was particularly well documented in the 19th century with measures to counter this put in the hands of 'The Protection Commissioners' founded in 1845. Their role was the upkeep of seawalls, which were first successfully built in the mid 19th century, breakwaters and the pier, this being financed by a local rate (Savin 1937, 91-91). Large landslips are recorded in 1799 whilst in 1805 *"no less than 12 acres, with a sea frontage of some 300 yards slipped down on the shore"* (Savin 1937).

The bulk of this erosion is cyclical rather than gradual and continuous, this primarily being the result of cliff landslip, caused by water saturation, followed by a period of stabilisation during which time the fallen material is eroded and transported by wave action. Incomplete records of major landslips date back to the early 17th century. Longshore drift at Cromer is of movement of sediment from west to east. The connection between coastal erosion and piers at Cromer is thoroughly intertwined and, as is detailed below, it is clear that the one function of the piers was to minimise land loss.

Documentary sources

It is apparent from a number of documentary references throughout the 14th century that Cromer operated as a port supporting trade, some of this seemingly including overseas trade and that there was also a large fishing community e.g. (Cal. Pat. Rolls 1348; Rymers Foed. iii, part 1, p. 207 quoted in Rye 1889; Cal. Pat. Rolls 1381). These functions need not necessarily imply much in the way of provision of physical port infrastructure on the shore. Vessels may simply have beached in the manner that is well attested elsewhere from the medieval period through to the early 20th century. A pier is first mentioned at Cromer in 1390.

"Grant by advice of the council in the present parliament, to the good men of Shipden, Co. Norfolk, that they may for five years lay certain dues in aid of the construction of a pere newly begun by them for the safety and defence of ships and boats touching at the cape called Crowemere" (Cal. Pat. Rolls 1390).

There are a number of points of interest for this entry. Firstly, that the grant is to *"the good men of shipden"*, seemingly implying the community and certainly not an individual. Secondly, the use of the word Shipden, an early name for Cromer, traditionally attributed to part of the town that has been lost to the sea. Thirdly, this represents the first known reference to a pier in this sense of the word as presently known to the OED (OED). Fourthly, a function for the pier is specifically mentioned whilst a means of funding the project by dues, or tolls, was also included. The *dues*, or tolls of this patent, covered a very wide range of commodities, ranging from fish to timber and pitch.

Throughout the 15th and 16th centuries there were a number of references to the ships and merchants of Cromer (e.g. Proceedings and Orders of the Privy Council (Nicholas) vol. V, p. 279, 21 Hen VI quoted in Rye 1889). There are also a number of references to the pier as bequests within wills dating between 1453–1535. John Sparks will of 1483 left a legacy to place great stones for the pier's support. This material is likely to have formed rock armour protecting the pier's toe i.e. the basal part of the pier wall where it contacts the ground surface. Sparks' cottage was known as 'bloberhouse' and this has been taken as suggesting the possibility of whaling from the town (Rye 1889, 51).

Further mention of the pier in the mid 16th century is made in a petition for relief for the town, addressed to the king and council and authored by the Bishop of Norwich and

members of the gentry in 1551 (Duchy of Lancaster Pleadings, transcribed in Rye 1889, 57-8). This document recalls the loss of land and property to the sea and that the *"Inhabytantes hathe to ther grete & importunate charges defended the same by making of grete peeres & are daylye putte to insatiable charges …. the same Inhabytantes in tymes paste hathe hadde grete releiffe towarde the Beryng of that ther charges of the same shire"*. This document appears to make a specific connection between coastal erosion and the function of the pier. All preceding documentary sources mention pier (singular) whereas this document states *"grete peeres"* (plural).

It appears that what probably originated as a single pier system in the late 14th century was coming to an end. Two piers are mentioned in the 1580s, one *"a peere wch was built not longe since"* and the other an *"olde peere"* (RHS 1915, xxxiii-xxxiv). There are later references to multiple piers. In 1607, the specific question of building either a new pier, or multiple piers, was brought to consideration (RHS 1915, 124-6). It was stated that *"The helpe must be eyther in making a great peere, wch maie be the safety both of the towne and small ships, or in making severall smalle peeres or jetties wch can only succour ye towne."* This statement is particularly significant in that it implies that whereas a single great pier would provide protection from erosion and serve the needs of shipping, multiple small piers would protect the town, perhaps providing little benefit for ships. The recommended choice, owing principally to financial consideration, was for small multiple piers. This was probably the outcome as little more is heard of Cromer's harbour and pier until a new initiative of the early 18th century (NRO COL 2/56).

It may be that these piers had affinities to the earlier and later Sheringham piers which functioned as much as anti-erosion devices as they did port facilities. The document goes on to mention that the piers were necessary for fishing, for the transportation of goods and for defence in the time of war. In other words the pier/s function is to protect the coast as well as performing 'more traditional' pier functions. The last part of the document can be interpreted as implying some sort of previous economic support for the piers from the county at large. How successful the petition of 1551 may have been is uncertain.

Further evidence pointing towards contributions beyond Cromer for the pier appear in a letter of Nathaniel Bacon dated 1573 *"Ther was at my beinge nowe at Styfkey demaunded of Momforth 12d. for the town of Styfkey towarde the repaire of Cromer peer by the sea side, a charg laid upon the hole country by commission"* (NRS, 1978 & 1979, p. 71).

Five years later in 1578, a licence for the exporting of quantities of corns was granted by Letters Patent to the *"Peerriefes and Inhabitantes"* of Cromer (NRS 1982 & 1983, 30). The intention of this was to provide financial assistance for the maintaining of the pier. According to one eminent historian *"The export of corn was tightly regulated under the Tudors, ostensibly to ensure an adequate domestic supply"* and to *"prevent high food prices and consequent social unrest"* (A Hassell Smith 1974). During Elizabeth's reign Hassell-Smith believes corn regulation to have *"become a fiscal device which the crown used to support public works or reward courtiers".* The town's cause was sponsored at court by Thomas Sydney, a cornmonger with important connections through his \brother in law Sir Francis Walsingham. The town appointed a magistrate, Sir Thomas Heydon, to sell the licence (Hassell-Smith 1974, 235-6). There was some irregularity in the sale of these licences, which included a sale to Thomas Sydney at a reduced rate, and some thirty years later the town was still trying to recover money (RHS 1915; 126–9, RHS 1936).

Further efforts for the maintenance of the Cromer haven is provided by a legacy of 40 shillings left *"towardes the buildinge maynteyninge and repayringe of the late begonne and erected Piere"* by a widow in 1580. This must be seen as indicating the continued presence of a pier (transcription of parts of this will in: Rye 1873, 38-9).

Evidence for continued rebuilding of the pier around this time is provided in 1582 when, at the suite of the inhabitants of Cromer, the crown granted a further licence, for 7 years, for the exporting of corn with the profits being *"delivered to the pier reeves of Cromer and employed in continuing the rebuilding of the pier there"* (Cal. Pat. Rolls 1582). The practical working of this second grant proved to be as subject to corrupt practices as the first.

Under the terms of the patent a Thomas Baxter, gentleman, and John Bright, were appointed to best sell the licence and pay the proceeds to the pier reeves, who were chosen by the inhabitants according to ancient custom, for works at the pier. The reeves were to regularly account to Baxter and the inhabitants with Baxter in turn being required to deliver the accounts to the Baron's of the Exchequer. The working of this arrangement resulted in disagreements and legal disputes between the various parties involved. In short, there were said to be irregularities with Baxter's selling of the grant whilst some sums of money appear to have remained in the hands of several pier reeves. These irregularities came to the attention of the Privy Council via a complaint of Robert

Cotterell, gentleman, on behalf of the inhabitants of Cromer. The Council were explicit about their suspicion of the abuse of trust which had been placed in certain individuals and also in their converting of some part of the monies to their own private uses. Accordingly, the council commissioned an enquiry into the matter (A P C 1587-1588, p. 289-90, p. 395-6). Although some documentation relating to these investigations survives, the final legal outcomes are not known (TNA E 133/6/886; TNA E 134/35Eliz/East19).

The first evidence for Cromer pier/s being constructed of timber with a ballast of stone is in the later 16th century. This is an account of the 1590s, of a single page of a pier reeve's account detailing the monies paid out by him for the repair of the pier (NRO MS20403 12x6). This document also names a further two of the pier reeves, though it is not clear how many reeves normally served at any one time. In terms of timber, *"plankes"* and *"spares"* (spars?) are mentioned, with *"a shippe wh was Bought for plankes for ye peare"* perhaps implying that some of the planks used in the pier were recycled from an old vessel? The use of bay construction would seem to be implied by a payment *"for fillinge fower huches in the peare"*. Derived from the Latin 'huch/a' was a term used in the medieval period for booth, (Latham 1965), whilst the related term 'hutch' was the word used for the town chest in Great Yarmouth (Palmer (ed) 1854, ii). It seems reasonably certain that the term "*huches"* was being used to describe compartments or spaces just as the terms 'rowmes, roumes and rooms' were used at Bridlington to describe individual bay divisions at a roughly contemporary date. The only other mention of equipment is to *"hempe to make a rope for the fframe"*. Precisely what the fframe was is uncertain, but it may have formed part of an engine or piling rig. This document appears to relate to work done to an existing structure rather than to a major new undertaking. There is no mention of the range of craftspeople involved in the works, nor much with regard to the specific tasks being undertaken. In the three instances where it is possible to calculate a daily rate of pay these work out at 16d, 14½ d and 14d. Such pay differentials appear minor when compared to the detailed daily pay rates at Bridlington earlier in the 16th century. The narrowness of the pay differentials may relate to the employment (or rather recorded in this document at least) of a single category of worker only, perhaps labourers, given the unskilled work involved in ballasting the pier. The single reference to *"a tide"* would seem to relate to works some way beneath the mean high water mark.

One other account for construction work, for parts of March and April 1588/9, is known (NRO MC 934/1 800X5). Timber and plank is again referred to as is the carrying of

stone, presumably for ballasting. The only other materials mentioned are *"ii bolt feten"*. Virtually all of the work listed was paid on a *"tide"* basis, the normal rate being 4d per tide, though two payments of 6d per tide were also recorded. One so far unidentified set of entries are those referring to *"spekes"* and *"spekes maken"*, presumably some sort of fabricated item for use in, or at, the pier during construction.

An outsiders view of the pier works of the 1580's at Cromer, and tinted with a slightly negative tone, is provided by William Camden *"the inhabitants at great expence endeavour'd to maintain a little harbour against the violence of the sea, but all in vain"* (Camden 1695).

The papers of Nathaniel Bacon, magistrate and member of the gentry with court connections throw some light on the pier at Cromer during the late 16th and early 17th centuries. These papers have been published by the Royal Historical Society and Norfolk Record Society. In a petition of 1607 the benefits of a pier at Cromer are explicitly expressed (RHS 1915, 124-126). These can be summarised thus: Firstly, the pier saved the town from wasting by the sea. Secondly, the pier served as a port of refuge in times of foul weather and when being pursued by the enemy. Thirdly, the pier served the country adjoining the town, as commodities conveyed via more distant ports would incur greater charges. The document goes on to explain that the sea *"hath utterly decaied a peere, wch was built not long since of tymber wth great chardge"* and that within the past twelve years *"the bredth of six acres"* of the town has been lost to erosion. Two pier options are suggested. The first would consist of a single *"great peere"*, the second several *"smalle peeres or jetties"*. The petition favours the second option as the one likely to have more manageable costs in terms of quantities of timber, construction costs and subsequent maintenance. It is suggested that two or three piers like *"one olde peere standing"* whose length is *"about one hundred yards"*, be constructed. That the works must be built of timber is put down to the absence of stone within the cliff whilst it is also suggested that *"this timber cut as scantlings for that purpose maie be provided wth lesse losse to the Kingdome out of Norwaie and wth lesse chardge, then in Englande"*. Bravely referring to certain who *"do rather seeke their private lucre than the public good"* in the case of earlier crown assistance with grain exports, it is suggested *"that if the K es Ma tie give them anie gifte yt may be so governed as the former abuse may not agayne be suffered"*.

Although the outcome of the above petition is uncertain it must be presumed that pier work did take place in the 17th century as a response to a 'brief' (authorised appeal for money to be raised for a particular cause) survives from 1664. For the 4th December of that year the Church register of Tissington, Derbyshire, records *"collected then towards the repair of the pier and the parish church of Cromer in the county of Norfolk, the sum of four shillings and four pence"* (Tissington 1996, p. 15). This is the latest reference for the series of timber-built piers at Cromer until the new enterprise of the 1730's. It may be that during the later 17th and earlier 18th centuries Cromer had no pier.

A legal agreement of 1732 details the plan for constructing a pier for the safe riding and lodging of ships and for the importation and exportation of goods and that once built a toll by way of tonnage would be levied for maintaining and keeping the pier (NRO COL 2/56, quoted in Rye 1889 p. 68-70). The management of the undertaking was by four local men and money was raised via subscription, with voting rights being allotted on the basis of one vote for every £20, or multiples thereof, invested. This was not a communal enterprise undertaken by the inhabitants of the town, solely for the benefit of the town. Rather, we can perhaps see this as more of a 'commercial venture' under the captaincy of four individuals with the clear backing of local gentry. The lead role in management appears to have been taken by Richard Ellis, an attorney and manorial steward. The other three were Bozoon Briggs, Richard Smith, who owned a house in Cromer known as the 'Mansion House', and William Claydon, gentleman. The lead men appear to have been of some local significance. The backing of the gentry was financial, at least, with the Harbord's and two of the Windham's/Wyndham's investing £100 each, five times as much as any other individual subscribers. Investment on this scale gave these backers considerable voting power.

Some incidental information on the venture is provided in the letters of a local clergyman, Patrick St. Clair to his friend Ashe Windham (Ketton-Cremer 1951). We are told in July 1732 that the management of the project were anxious for St. Clair's subscription as they thought that this would serve as an inducement to other clergymen to subscribe. We are also informed that timber was imported directly to Cromer specifically for the construction of the pier. In August of the same year St Clair states that *"every great sea doth them considerable damage"* and later on in the month that *"The subscriptions of Cromer flag very much, and I do not hear any hath done it* (subscribed) *since I did"*.

The promoters of the pier obtained leave from the Customs authorities to discharge coal and cinders, export corn and finally to ship and land coast goods generally (Rye 1889, 70-72). Rights of access to the pier were granted to investors, whilst rights to at least parts of the shore adjacent to the pier were in the hands of the pier enterprise or else the manor. This is evident from an agreement of 1735 between Richard Ellis and thirteen named individuals, presumably fishermen. The agreement enabled the thirteen to erect lobster coys (live stores) on the sea shore to the west of the pier head and to land and lay their boats. In return each fisherman was to make an annual payment of 2s 6d and, significantly, to perform *"three days work to be done by each man yearly at such time and place as ye said Richard Ellis shall appoint"* (NRO COL/2/59). It is not possible to be entirely certain whether Richard Ellis was acting here in his role as manorial steward or manager of the pier enterprise, though there is no mention of the manor, the wording referring only to Richard Ellis and the fishermen. The requirement for labour service certainly has manorial overtures, though it may have been a policy adopted by the enterprise to guarantee a certain amount of free labour for pier repair and maintenance work.

A few accounts pertaining to the construction of the pier survive. The earliest of these is of October 1732 and is described on the back of the paper (though this appears to be in a different hand to that of the account itself) as payments made to the labourers. This document (NRO COL2/58/4) contains two lists. The first lists the names of 18 men with three columns of payments, the third of which is the sum total of the first two columns. In the first column 15 men are paid 10s 6d, and two are paid 15s 6d. In the second column each payment is entirely unique with 18 payments ranging between 11s 2d and £1 14s ½d. The entries of the first column may suggest a general weekly payment of 10s 6d, with a higher wage being paid to two individuals, presumably on the basis of skill and/or responsibility. The second column of higher and irregular payments is not readily explained though it may, for example, relate to a period of work longer than a week and with irregular hours – perhaps a variety of works at various states of tide? The second list of this document contains the names of 28 men with a single payment column, presumably a single week, and lists payments ranging from 1s to 16s, (generally between 2s and 4s) i.e. considerably less than the first list. The names on the two lists are different, though as they all occur on the same sheet of paper, probably relate to the same period of time. The recurrence of the same surnames within and between lists suggests family

connections, probably from the immediate locality. It is tentatively suggested that the shorter first list relates to craftsmen, such as carpenters, working for 2–3 weeks, and the second list to labourers employed for a week, perhaps working with stone ballast. Some support for this may be found in the fact that several of the fishermen mentioned in the legal agreement of document COL/2/59 appear on the second list.

Another account entitled *"Cash paid by Mr Ellis to Labourers at Cromer Peer"* (NRO COL/2/58/3) lists 19 names with one payment column. All but three of these names appear in the shorter (carpenter?) list of COL/2/58/4. Again, virtually all payments are for 10s 6d, though one is for an exceptional £2 2s. Although the titling of the document is to *"Labourers"*, it may be that this is simply a failure to make technical distinctions and to use the term as in 'labour, or to work'.

Two receipts relating to the pier works of the early 1730's also survive. One of these acknowledges the receipt, by Dudley Inman from Richard Ellis, of 12 guineas as part payment for work done at the pier (NRO COL/1/58/1). Interestingly, *"Dud Inman"* appears on the account COL/2/58/3 detailed above and it was he who was the recipient of the £2 2s. These exceptional payments and the individual receipt distinguish Dudley Inman from the rest of the workforce and suggest a skilled and specialist role; could he have been superintendent to the works, a master carpenter or engineer? The second receipt is for £17 18s *"for Iron work for the Peir at Cromer"*, (NRO COL/258/2), presumably in the form of spikes, engine parts and possibly, at this date, bolts.

The observations of a local inhabitant, T. Martin, probably an outsider to the pier enterprise, were recorded in the church notes some time around 1740 (NRO RYE MS 17/1 (f.234v)). This entry simply states *"They are attempting to make a small pier or Harbour but tis feard will prove fruitless"*.

No further documentary evidence relating to the pier enterprise of the 1730's has been located, though see below for images that depict the pier in the later 18th and early 19th centuries. The pier appears to have come to an end in 1820. According to Walcott *"An earlier jetty was swept away, March 1820"* (Walcott 1861, 101).

There has been a succession of piers at Cromer subsequent to that of the 1730's. A jetty of open ironwork under a timber decking was constructed in 1822. The form of the landward 30 yards of this harked back to earlier exemplars, it having planked sides and

being filled with a stone ballast. The 1822 pier was lost in a storm in 1845. This was rapidly succeeded by a timber jetty, again of a decking supported by angle-set timber piles. Succumbing to the sea, in 1897, this structure was replaced by the existing iron and timber pier built in 1900 (Pipe 1998, 19-42).

Cartographic/Pictorial/Place-names

No maps have yet been found that depict any of the all-timber piers at Cromer.

There are no depictions of the medieval-earlier post-medieval pier though a small number do survive for the 18th century pier and these are our most informative sources for its structural form. The most detailed of these are three depictions dating to around the cusp of the 18th-19th centuries (Figures 2, 3 and 4). All three show the same basic technical details of slightly angled pier walls formed of regularly spaced earth-fast posts with horizontal planking behind. The clearest of these is that by Samuel Prout which shows the pier in a slightly dilapidated state (Figure ?). Judging by the human scale, this depiction would suggest a spacing between the posts of around 1m or less and the presence of a two bar hand rail around 1m tall. What appears to be a stone and earth fill between the walls is evident to the extreme left of the depiction, rather than a decking of timber, though such could have been present further along the pier. A prop can be seen providing supporting towards the end of the pier, this presumably being a rudimentary repair.

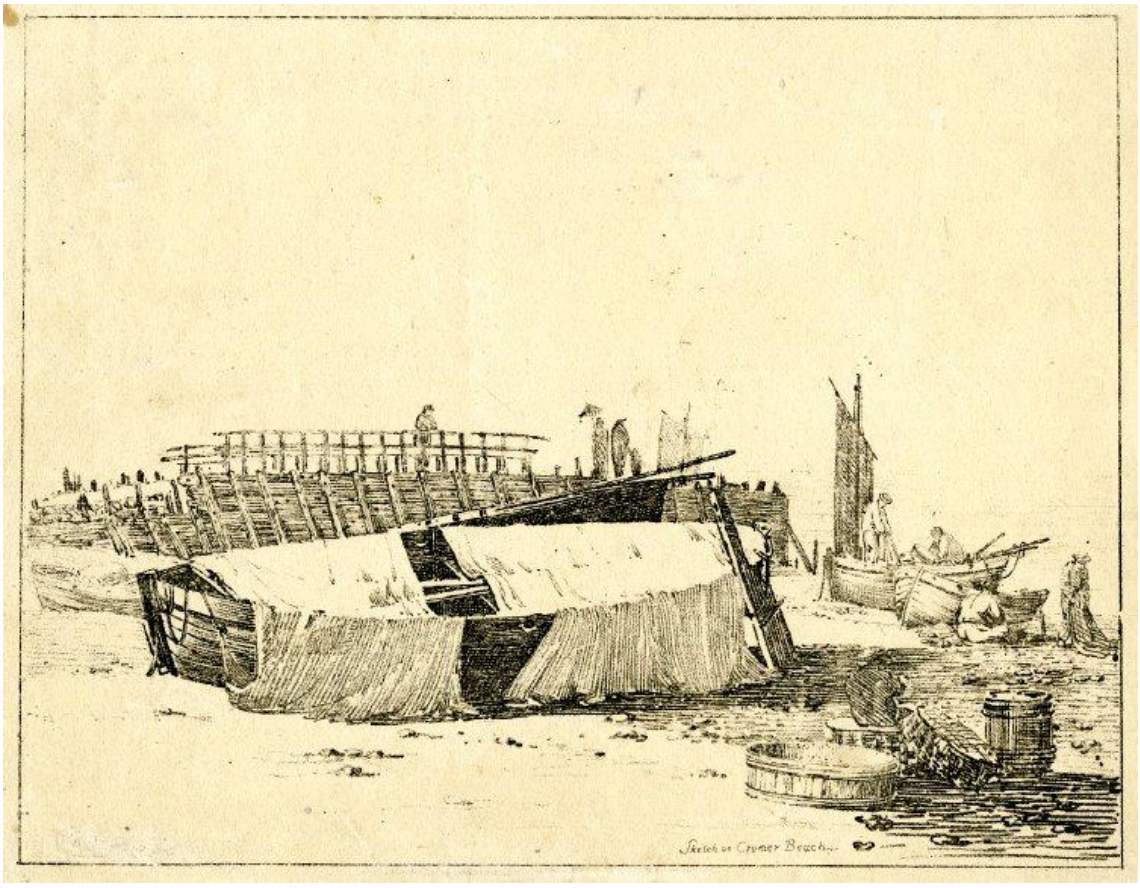

Figure 2, The pier at Cromer circa 1813-1821 as depicted in a print by Samuel Prout. (British Museum, reg. Number 1890,1013.78)

Figure 3, End of Cromer Pier to left, William Collins 1816 (Norfolk online access to Heritage)

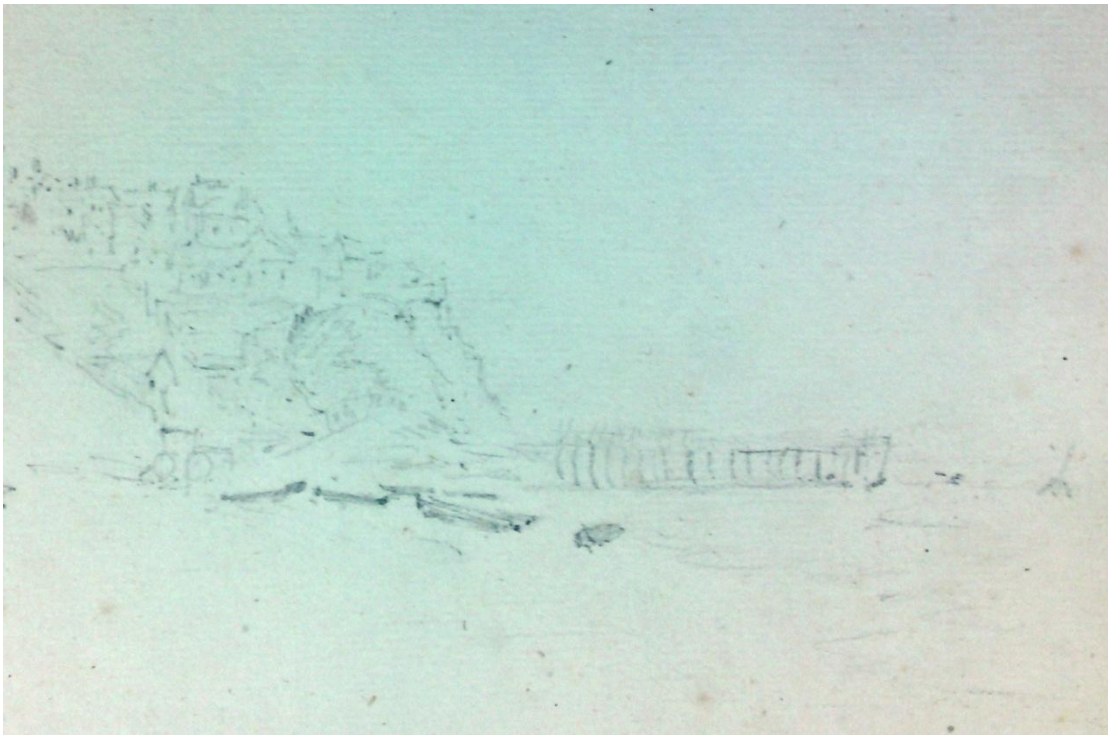

Figure 4, Cromer Pier, looking west, Robert Dixon 1780-1815. (Norwich Castle Study Centre NWHCM 1972.277.17 sketch book p.30:F)

There are two relevant street-names in Cromer, Jetty Street and Jetty Cliff. Jetty Street runs from the core of the old town, near the church towards a small street directly atop the cliff called Jetty Cliff. The course of Jetty Street is aligned with the historic timber-built pier sites. The date of origin of these street-names is uncertain though they were certainly in use during the earlier 19th century (Savin 1937, 127-129).

Ownership, control and funding

The earliest reference to the medieval pier of Cromer in 1390, an entry in the Patent Rolls, granted authority to construct the pier *"to the good men of Shipden"* (Cromer) (Cal. Pat. Rolls 1390). Documentation furthering this notion of community ownership is evident in a number of wills of local inhabitants. There are a number of bequests within these wills to the pier, the earliest, of 1453 leaving money towards the maintenance of the pier. Rye lists a total of 24 wills, dating between 1453 – 1535, that leave bequests to the fabric, reparation, etc of the pier (Rye 1889). These sums ranged from 12 pence to 20

shillings. Such bequests by the inhabitants reinforce the notion of the pier being a communal enterprise by the inhabitants of the town and worthy of charitable giving, rather than it being a manorial appendage.

It has been seen that various petitions for assistance with the maintenance of Cromer's pier were made in the earlier post-medieval period. The earliest of these was in 1551. This document also indicates that assistance had previously been had from the county (Duchy of Lancaster Pleadings, transcribed in Rye 1889, 57-8). Further evidence for the seeking of contributions is evident in 1573 (NRS, 1978 & 1979, p. 71). The granting of licences to export corn in 1578 was again intended to assist the community in supporting its harbour as was a further grant of licences in 1582 (NRS 1982 & 1983, p. 30; Cal. Pat. Rolls 1582). Such appeals, which were commonly supported by clergy and members of the gentry, frequently state that the inhabitants were either struggling to, or incapable of, funding such works themselves. This again serves as demonstration of pier ownership and responsibility within the community.

One of the will bequests, that of John Mason in 1487, appears to suggest that there was a levying of a rate to help maintain the pier in the 15th century (NRO 311 Caston). Some sort of structured management of the pier is suggested by the 'keeper of the pier' referred to in the will of Robert Hayles, vicar, in 1479 – (NRO 64 Multon)

As has been seen, within the community responsibility for the Cromer's earlier post-medieval pier rested with pier reeves, of whom there were several. These officers, who were the equivalent of 'Pier Warden's at other pier sites, were said to be chosen by the inhabitants according to ancient custom. The evidence presented above indicates that these post-holders were responsible for monetary income for the pier as well as the disbursement of funds on its repair.

The pier built in 1732 was not a communal enterprise undertaken by the inhabitants of the town, solely for the benefit of the town. Rather, this was a 'commercial venture' under the captaincy of four individuals with the clear backing of the local gentry. Management of the undertaking was by four local men and money was raised via subscription, with voting rights being allotted on the basis of one vote for every £20, or multiples thereof, invested. Income from this venture to maintain and keep the pier was achieved by tolls levied on visiting vessels and by annual payments from fishermen. Three days of unpaid labour provided by fishermen was also intended to reduce maintenance costs.

Material remains

On occasions after particularly heavy scour material remains are visible at Cromer. There are two photographs of these taken after such an event in 1970 and six taken after another in 2006, all which show various arrangements of posts with a small amount of vertical planking. There are also two incomplete surveys of these remains together with brief HER entries. Site inspection shows the remains to be comprised of three discreet groups. Two of these (those extending from the shore at 90 degrees in Figure 5) almost certainly represent the remnants of former beach groynes of types fairly common to the Norfolk coast. The origin of the more widely spaced posts at 45 degrees to the shore (centre right of Figure 5) is uncertain.

Figure 5, Remains of timber settings on the foreshore at Cromer (photograph: Philip Vicary, reproduced from Pipe 1998)

Bibliography

Primary sources

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Case study 11: Great Yarmouth

Summary of previous works

The haven of Great Yarmouth is mentioned in numerous historic documents ranging from various of the state papers through to the records of the borough town. These records have formed the basis for a number of histories of the town, many of some detail. The earliest of these was written by Thomas Damet towards the close of the reign of Elizabeth I (though not published by the historian Palmer until the mid 19th century and mistakenly attributed by him as the work of Henry Manship senior) (Manship in Palmer (ed) 1847, 1-46). Henry Manship senior was in fact a Great Yarmouth born and bred merchant and some time member of the council who did take an active part in promoting the improvement of the harbour. Much of Damet's work was written with direct reference to the haven and to state papers.

Manship seniors' son, another Henry who served the council in a legal capacity, did write on the history of the town. The younger Manship commenced his researches with the documents in the town hutch, or chest, in 1612 and finished his text in 1619 ((Manship: in Palmer (ed) 1854, 1-193). Manship trawled through the disorganised mass of the town's documents and at his instance the corporation appointed a committee which met almost daily for two months and examined every accessible document. The result of these labours was ordered to be recorded in a book which should be *"engrossed by Henry Manship, and delivered into the assembly; to be disposed of according to their pleasure"* (Palmer (ed) 1854, ii-iii). Manship juniors' work can be regarded as a quasi legal document in so far as one of its purposes was to record the rights and privileges of the town as attested by the documentary sources. It is also of especial historical importance given that it has been claimed that *"with the exception of the Charters and Borough Rolls, almost every document enumerated in it, is now destroyed or lost"* (Palmer (ed) 1854, 93). Expressed on a more quantative basis, the Historical Manuscript Commission in their report of 1883 state that of the two hundred and ninety two writings mentioned in Manship's inventory only twenty eight then remained with the corporation (HMC 1883, 300).

The next great works on Great Yarmouth were Henry Swinden's 957 page tome 'History and Antiquities of Great Yarmouth' of 1772 and Charles Parkin's 412 page 'History of Great Yarmouth' (Swinden 1772; Parkin 1776). Both authors devoted considerable wordage to the haven, particularly Swinden who transcribed and published many documents of mid 16th century and later date. Parkin's work was also based on *"antient records and other authentic materials".* A 144 page section of volume XI of Blomefield's history of Norfolk of 1810 contained extended passages from Parkin's earlier work, though with little additional material relating to the haven (Blomefield 1810, 255-399). George Manby;s short Historical Guide to Great Yarmouth appears to have drawn almost exclusively upon the earlier histories but does describe a number of events of the early 19th century relating to the piers (Manby 1817).

The early works of Damet, Manship, Swinden and Parkin, are characterised by two points of significance. Firstly, much of their content was drawn with direct access to original documentation, and there appears little reason to doubt the accuracy of their transcriptions. Secondly, this succession of writers extended their histories up to their own times. Historical work of this calibre has continued to modern times in both journals e.g (Gruenfelder 1998', related aspects in various 'Yarmouth Archaeology' volumes) and books e.g. (Hedges 1973 'Yarmouth is an Ancient Town', Ecclestone 1959 'The Rise of Great Yarmouth', Gauci 1996 'Politics and Society in Great Yarmouth 1660-1722') and even includes a PhD thesis 'The Port and Town of Great Yarmouth and its economic and social relationships with its neighbours 1550-1714' (Mitchell 1978 unpublished thesis, 2 vols, Cambridge). The Norfolk Record Society has also produced a volume of Great Yarmouth Assembly Minutes 1538-1545 (Rutledge 1970).

Background: town, governance, early havens

The town originated in the pre-conquest period and is said to have possessed borough status by the time of the Domesday Survey of 1086, though its first known charter was granted by King John in 1208 (Rutledge 1972, 8). From the late 12th century the town's livelihood was based on fish, principally herring that together with sea-borne trade provided the wealth that made it one of the great towns of medieval England (Rutledge 1994, 78). Relative to other provincial towns Great Yarmouth underwent a decline in the later medieval period. Ranking fourth amongst the provincial towns in the 1334 tax

returns this position had slumped to eighteenth in 1377, whilst the town ranked only twentieth in the subsidies of the 1520s (Saul 1982).

Governance of the town was by two bodies of officials, the 4 and 20 (24 persons of senior rank – aldermen) and the 8 and 40 (48 persons – common councilmen) fronted by 2 bailiffs. Prior to 1426 there were 4 bailiffs, this afterwards being reduced to 2 with 2 new chamberlain's posts. After 1684 the bailiffs were replaced by the single figure of a mayor. Until 1670 the town was responsible for the haven. After this date, and following the first Haven Act, authority rested with Port and Haven Commissioners.

Historically Great Yarmouth is said to have had seven havens, eight if one includes what may have been a 'natural' original channel or course of the river suitable for navigation. The succession of these havens, which were actually artificial channels cut from the river to the sea, were first documented by Thomas Damet and Henry Manship younger in the late 16th and early 17th centuries and based upon various documents then held by the town and to which they had direct access (Palmer (ed) 1847, 1854). More recently the succession of havens has been detailed by Ecclestone and Ecclestone, (Figure 1), (Ecclestone & Ecclestone 1959). Crown consent, and financial aid, for many of these works are recorded in the Patent Rolls from the early 15th century. Although there is no evidence to suggest that any but the final, 7th, haven had piers to the seaward ends of their channels the study of Great Yarmouth's piers cannot readily be divorced from the wider haven of the town nor its historical setting.

Originally the River Yare exited to the sea around 7km south of its present position but silting caused it to be impassable by the mid 14th century. A new channel, the First Haven, was cut to the sea at Corton, some 6km to the south of the present channel in 1347. This channel became dammed up with silt necessitating that ships to and from Great Yarmouth were obliged to be drawn up on the beach. In an attempt to remedy this Letters Patent for the Second Haven were issued in 1392 with the new channel being cut in a position not far distant from the existing entrance to the harbour. Again, by 1408 this was said to be 'decaying'. A Third Haven cut near Newton Cross, probably around 3km south of the existing piers, fared somewhat better and with considerable efforts towards its maintenance remained viable for around a century. The Fourth Haven, constructed closer to Great Yarmouth survived until 1528 when it was replaced by a Fifth Haven channel close to the existing entrance. The mouth of this haven is said to have choked up

and again been replaced with a new cutting, the Sixth Haven, closer still to the town around 1548. Works for the Seventh Haven, with twin piers, began in 1559-60. The location of the mouth of Great Yarmouth's haven has remained unchanged to the present day with a twin pier arrangement also being a constant accompaniment (Figure 2).

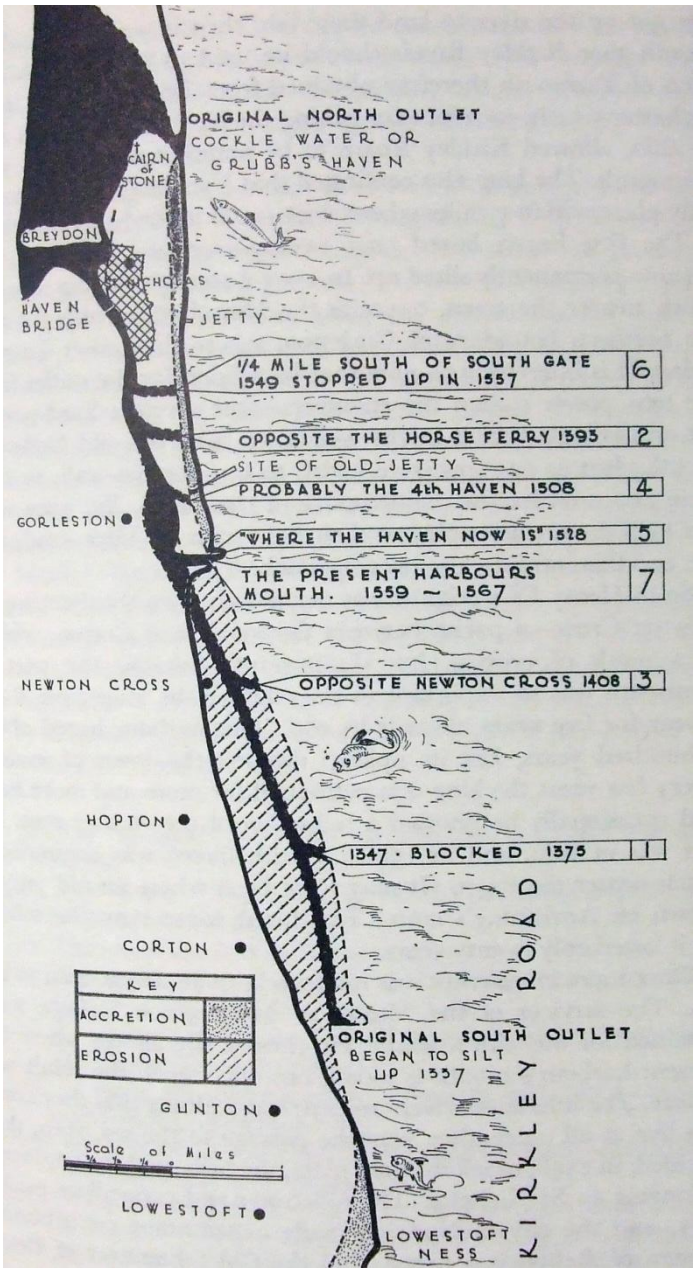

Figure 1, From Ecclestone & Ecclestone (1959)

Figure 2, Topographic setting of Great Yarmouth haven, 19th century, (NOAH website)

Coastal geomorphology of Great Yarmouth (see Figures 1, 2 & 3)

Great Yarmouth occupies a spit of land bounded to the east by the North Sea and to the west and south by waters issuing from Breydon Water. The rivers Bure, Yare and Waveley drain much of the lands and Broads inland from Great Yarmouth and feed into the large body of water known as Breydon Water. Only to the north does the town have uninterrupted land access to its surroundings. In recent years the potential of offshore sandbank systems to support wind farms and marine aggregate extraction has encouraged the comprehensive study of the geomorphical evolution of the area. The broadest overview of the current state of knowledge has been that of Hannah Evans, Anonymous 2005 and the Great Yarmouth Archaeological Map website (Evans 2010; Anonymous 2005; Great Yarmouth Archaeological Map website).

A wide east-west palaeovalley, in excess of 4km across, occupied the area where Great Yarmouth, the Bure and Breydon Water now stand and formed the mouth of a great estuary. Silts and clays with some peat up to 22m thick form most of the fill of the palaeovalley. Around 7,500 years ago the estuary became more saline and this has been attributed to a rise in sea levels related to the retreat of the ice at the end of the last ice

age. Since the last ice age a current running from north to south has deposited sediment that formed a spit at the mouth of the estuary. This all but closed off the estuary leaving only a small channel, Grubbs Haven, between Great Yarmouth and Caister on Sea, and forcing the River Yare to run southwards, against the western side of the spit and thence into the sea at a point several km south of the town. Around the 11th century Grubbs Haven became fully blocked and since around the later 16th century the Yare's outflow has been through the town's piers (Ecclestone & Ecclestone 1959, 92).

The succession of historic havens at Great Yarmouth, as summarised in the previous section, was largely a story of struggle with the natural environment and with the unpredictable responses of that environment to human intervention. Even barring significant human action, the coastal environment in this area was one subject to constant change. Human action within such a dynamic land/seascape appears always to have resulted in a re-action, and these effects seldom seem to have been favourable to the human population. Relative stability seems to have eventually been brought about by the persistence that led to the building of the seventh haven with the piers. Historically speaking, it was accepted that this 'success' was due almost entirely to the piers and related works. But even this success came at a cost, firstly in the need for constant expenditure to maintain the physical impositions and secondly in that the spit to the south of the piers was almost entirely removed by marine erosion. Regarding this latter point, it appears eventually to have become necessary to build works to protect this southern end of the haven (Figure 2). Comparison of Figures 4 and 5 with that of Figure 2 suggest considerable differences in this particular area, not least the disappearance of the watercourse to the south of the haven with all water channelled through the piers (it does need to be borne in mind that Figures 4 and 5 may represent 'intentions' rather than realities). The unpredictability of the consequences of human intervention were highlighted in the 1960s when the old timber piers were removed and new piers built, the change in design resulting in the loss of Gorleston beach immediately to the south (Holmes and Parker 1996, 37).

In the late 16th century there was knowledge, or rather a belief, that Great Yarmouth had originated as little more than a sandbank (Palmer 1847, 5). A map of similar date, known as the Hutch Map and purporting to show Great Yarmouth around the year 1000 also depicts what was to become Great Yarmouth as an island at the mouth of an estuary.

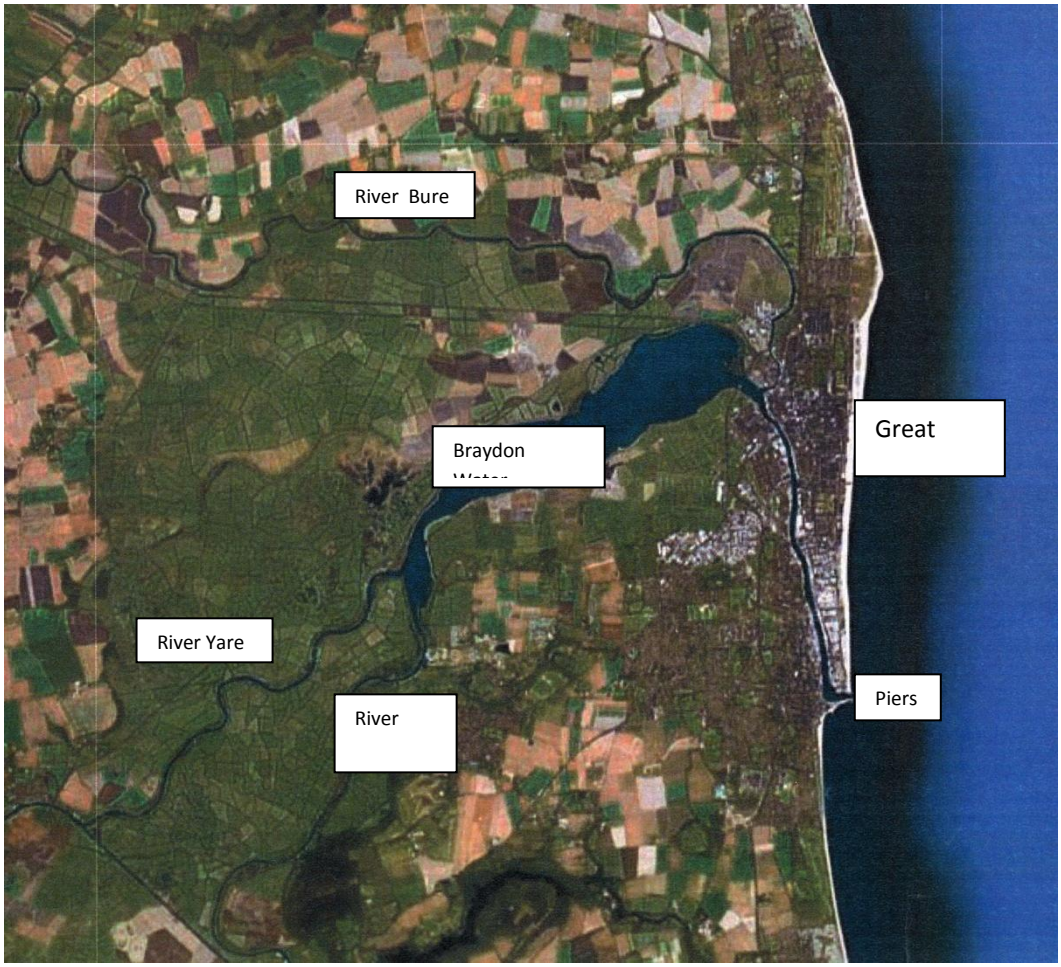

Figure 3, Great Yarmouth and its immediate setting (source: Google Earth)

The piers of the 7th Haven

"for wante of suche two greate peeres the haven felle manye tymes in decaye" (Henry Manship younger: in Palmer 1854, 3).

Technology

Documentary evidence

Two sets of estimates of 1560 survive for the piers of the 7th haven and provide significant structural information. These were drawn up a short time after the channel of the 7th haven had been cut. The two documents were transcribed by Swinden (Swinden 1772, 416-7). A preamble to the estimates states that the waters had started to erode a

southerly course. Just as seriously, sand bars and shoals were forming at the mouth of the channel and had reduced the depth of water here. The same preamble notes that *"there is no jetties at the entring of the havens mowthe"*. A reference to the *"old jettie"* in the document below may relate to something like a timber revetment or bulwark at the point of junction between channel and sea. The proposed piers were seen as a remedy for the problem of sand bars and shoals at the harbour mouth. One set of estimates relates to piers for the recently cut channel, the other to piers, if built, for the older former channel. Although of slightly different lengths the descriptions of the sizes and quantities of materials indicates that the structural form of both proposals was identical. The estimate for the piers at the recently cut channel are detailed below:

"Imprimis there must be a mayne jettye made in the sowth side of this haven into the sea from the old jettie which must be in length XLV roddes, XX foot to the rodd (i.e. 274.32m)*, to which jetty there must be XVIII hundred piles the one half of them XXX foot long* (9.14m) *and the other half XXXV foot long* (10.67m) *and to beare a foot square every which pile will cost with carriage to the towne by estimation XXs. The pece which amountith to 1800l.*

Item there must be to the saide peere for the bynding of the same 100 trees of XX (6.10m) *and XXX* (9.14m) *foote long valued by estimation with the charges 100l.*

Item there muste be a jettie made into the sea on the north side of the haven which must be in length XXX roddes (182.9m) *and must be further into the sea than thither by II roddes which jettie must have XII hundred piles of the like length and squarenes as is mentioned before which will coste with the charges of the carriage XXs. The pece which amountith to 1200l.*

Item there muste be to both thes jetties XXm foot of oken plank of III ynches thicke valewed at VIIl. Xs. The thousand which is 150l.

Item these II forsaid jetties must be XL foot (12.19m) *wide beneth and above XXXVI foot* (10.97m) *and the filling of the same II jetties with stone and other provision will cost by estimation 600l.*

Item the dryving of every pyle into the said jetties esteemed at Vis. VIIId. The pece amountith to 100l.

Item the yron worke for both thes jetties will cost by estimacion 500l.

Sum totalis 5510l."

This document clearly describes a two pier entrance to the haven, the south pier of which is longer than the north pier. The lateral profile of both piers are the same and taper slightly from the base to the top. Given that the pier is 900 feet (274m) long and that it was to be built of 1800 piles each a foot (0.3m) square this strongly suggests that the walls of the pier were in fact formed of two lines of edge to edge driven piles (though this equation does not account for the pier head, or seaward end, of the structure). The reference to timber for *'bynding'* seems likely to relate to beams for bracing the pier walls. This may have involved tie-beams, though if so these must have been composite arrangements given that the bynding timbers are listed as shorter that the overall width of the piers. The precise intended function of the 3 inch oak boards is less certain. This may have been affixed as a cladding to the pile walls either internally or externally, used for constructing a decking, or perhaps even both. A stone (and other) ballast within the timber shell of the pier is clearly referred to. The sum for the iron-work is considerable and on the basis of slightly later documentation is likely to have been not just for bolts and spikes but also for shoes for the piles. Note also the interchangeable use of the terms pier and jetty in this document.

It seems clear from a note of 1567 at the front of the 1st Haven Account Book that the intended piers detailed above were not built after 1560. This note states:

"*Hereafter followethe in this booke the charges and monyes bestowed and expended in and aboute the repairenge of the haven of yermouthe and of the fortifeinge the same with two greate mayne Peeres, which at the first was cutte a newe and digged out into the sea right over agenst the parsonage of Gorleston, and the same haven then running alongeste the cliffe as farr as wiveton crosse was agenste the said p-sonage stopped up and there forced to ronne into the sea which was donne in the year of O Saviour 1559 after which tyme in few yeres the said haven for want of two peeres did eate and seek towards the southe ffor preventinge of whose olde evell and accustomed course the haven did begenne this charge by the advise of a very cunninge workman sent for from beyond sea'* (NRO Y/C28/1).

It is probable that the piers built by the 'cunninge workman' – Dutchman Joas Johnson were of similar form to the estimates above.

A further piece of documentation (in addition to the estimates of 1560 above) transcribed by Swinden were again in the form of estimates and date from 1580 (Swinden 1772, 442-3). This was for extensions of the north and south piers and is detailed below:

"The north mayne peere is to be made LX yards (54.9m) *further into the sea for the two sides and the head wherof is requisyte to have XXtie score piles of oak betwene XXX* (9.14m) *and XL fote* (12.19m) *in length and twelve ynches brode which to be laid redye by the workes to be occupied will cost XXs. a peece CCCCli.*

Item to that peere is nedfull to be occupied beames everey one XXIIII fote (7.31m) *in length XVII or XVIII ynches square XXs. a peece LXli.*

Item to every beame thre brasinges valued at Vis. VIIId. a peece LXli.

Item eyther syde of the said peere is to have five longers of tenne or XII ynches brode and V or VII ynches thick ronnynge all the length of the works vid't two within and III without the peece estemed at IIId. a fott XXli.

Item the fott of this worck throughe which all the said piles shalbe drevyn being for the fowndacyon therof is XL fott (12.19m) *brode and LX yards* (54.9m) *longe which is to be made and wrought of brushwode and is estemed will cost the wode Cli.*

Item there is to be dryven thre tier of piles somewhat shorter to be substanciallye bound with beames langtres and brasinges and the north side of the said mayne peere which shalbe fylled with great rockes and stone to breake the force of the sea from that mayne peere which tymber is estemed will cost CCli.

There is also one other tier of piles to be dryven on the south side of the said mayne peere all the length therof to fortifye the same and will take about CCCC piles with beames longtres and brasinges valewed at CCCCli.

Item three ynche planke to make this northe peere close on both sides with yron to shoe the piles and to make boltes to bolte the same together estemed at CC li.

Item brush faggottes to fill the same pier Cli.

Item rockes and stones for this peere CCli.

Item the workmanshippe of all this peere MCCli.

The somme of the chardge of this north peere M M VIII XL (£2,840)

The south peere is to be made and carried forthe into the sea XX yardes (18.3m) *with the like workes of tymber brushe rockes and stone and is estemed will cost the somme of Mli. The south mayne jettye beinge in lenghte XVII score yards* (310.9m) *is to be fortifyed with great piles betwene XXX* (9.14m) *and XL* (12.19m) *fet longe and will take to doe it about XII(C)* – (1200) *piles and beames and longtres estemed will cost M CC li.*

Item the workmanshippe therof CCCCli

Also the fynyshinge of two breake waters within the haven to break the force of the currant from the said sowthe mayne jettie will cost with the workmanshippe CCli.

Summa totalis is juste V M VI XL or 5640"

This document again suggests that the walls of the piers were formed of two lines of edge to edge driven piles. The reference to beams was presumably for securing the walls of the piers whilst the "*thre brasinges"* to each beam can be best read as 'three bracings' With reference to the 16th century illustration of Great Yarmouth piers it is possible to suggest that the beams are the lateral members between the pier walls whilst the 'three brasinges' may be the three lines of longitudinal members.

It is not entirely certain what the term *"longers"* refers to. The most suitable definition within the OED online is *"a long pole or piece of timber used for fencing … etc"*, a term first recorded in 18th century Canada. Described as oblong in cross-section and running the full length of the works the 'longers' could equate to locking-bars, or rails, connected to tie-beams that help to retain the pile walls of the pier in place. Such arrangements are depicted in contemporary illustrations of the early pier forms at Carrickfergus and Bridlington. However, the document refers to a total of five – two 'within' and three 'without' and it is perhaps more likely that the longers are heavy-duty battens that serve to secure the plank cladding to the pile walls. Such an arrangement would accord well with the mid – late 16th century pictorial evidence.

A foundation, running for the full length of the proposed pier extension and through which the piles are driven, is clearly described. This is said to be of brushwood and would appear to equate directly to the heavy-duty wattle-work depicted in a 16th century illustration. Such work also lined the haven's channel adjacent to the piers and in fact this area became known as the 'brush'.

The three tiers of short piles bound with beams and ?bracings and filled with rock and stone located on the north side of the north pier is explicitly stated to be a break-water. The other tier of piles to be driven on the south side of the pier, along with its beams and ?bracings may have served a similar break-water function or been intended to provide additional support to the wall of this side of the pier. The large number of piles involved together with the considerable expense suggests that this was intended to run the full length of pier and extension combined.

The wording referring to the 3 inch planking argues for this forming a cladding to the pier whilst there is unambiguous reference to iron shoes to the piles. Brush faggots to fill the pier have not to date been encountered at sites elsewhere though later documents also mention them at Great Yarmouth. The precise use of the rocks and stones is not mentioned, though it is tempting to see them as forming part of the fill of the timber shell. This notion is reinforced by similar usage elsewhere, its close listing in the document to the brush fill and the fact that the break-waters mentioned elsewhere in the document may have obviated the need for rocks and stones to be used as armour for the pier toe.

The two sets of estimates transcribed by Swinden are of considerable interest. It is probable that these were prepared by the town for the Privy Council in support of their case for crown assistance. Whether Swinden's transcriptions were based on originals in the State Papers or on copies retained by the town is not certain. Investigation at the NRO suggests that the estimates do not, or at least no longer, exist in the town records – and certainly not where it may be anticipated within those records. It is possible that the estimates may reside within the State Papers as part of a petition though their location is not readily apparent within the calendars, including Acts of the Privy Council where they may be anticipated, nor are they readily aparent via the National Archives online catalogue search. It could be that such estimates are incorporated with other Great Yarmouth documentation of the same date within the State Papers and that only some of the contents are listed in the calendars.

Henry Manship junior recorded dimensions of the north and south piers (Manship: in Palmer (ed) 1854, 96). The north pier was described as:

"235 yards in length (214.9m); *the breadth, at the foundation, is 40 feet* (12.19m), *and at the upper part 20 feet* (6.09m)*; artificially built of mighty timber trees, joined together very cunningly, rampired with brush, millstone, and shingle: it hath three tiers of piles, bound with beams and iron wicker, to break the force of the sea from the pier itself."*

The south pier was said to be:

"340 yards long (310.9m), *and 10 yards broad* (9.14m)*; and is in depth from the top to the bottom, 36 feet* (10.97m)*; whereof 24 feet* (7.31m) *is under water at every tide."*

Manship Junior's length for the south pier matches exactly the combined sum of the 1560 estimates and 1580 estimates for extension, though the north pier appears around 27m longer than the combined 1560 and 1580 sums. This discrepancy may be owed to a further post 1580 extension? The *"joined together very cunningly"* seems likely to relate to the internal framework whilst the *"brush, millstone and shingle"* clearly forms the ballast. The three tiers of piles match the description of the breakwater of the 1580 document. The dimensions of the width imply pier sides that tapered upwards.

Pictorial/cartographic evidence of the early piers

"By the reign of Elizabeth I maps were being employed as tools of government. This was encouraged by the Lord Burghley and the Privy Council which made it clear that local authorities were expected to submit maps and plans of their proposals where appropriate. This led to cartography becoming embedded in government by the late 16th Century." (British Library 1).

The most informative, and earliest, depiction of the piers and haven of Great Yarmouth is a picture map, drawn by an anonymous cartographer and held by the British Library (Figures 4 & 5). It is said by the Library to date to around 1570 and to have been produced to demonstrate the proposed harbour works to the Privy Council. Whilst such a date is entirely possible, it could have originated closer to 1560 – maybe earlier still. This reasoning is based on the documentary evidence of 1560 for proposals to build twin piers and the further documentary evidence for proposals to extend existing piers in 1580. A

hint towards its official character may be provided by the arms of the borough appearing on the map. Whatever the case, this picture map provides significant information on the piers and haven of the town.

The quay of the town with its various facilities, which are known to have included cranes and warehouses, lies on the river on the west side of the town. The river was navigable upstream of the bridge with vessels plying as far as Norwich. Between the town and the working entrance to the haven a former channel is visible whilst a narrow southerly course of the river is shown at the top left of the map (these two factors may even suggest that the map is showing a pre 7th haven arrangement with the piers and new channel as proposals). Both sides of the channel, the southern side of which came to be known as the 'brush' are shown as being stoutly revetted, mostly with large-scale wattle-type (brushwood), whilst some vertical timber-work is also evident. This lining to the new channel was to secure its course and prevent the waters straying. Two projecting works, one of brushwood and one of timber, are shown on the west side of the bend of the river adjacent to the channel. Whilst these pier-like structures could have served as wharfage it may be the case that their primary function was to deflect the southwards current of the river thereby assisting the waters' flow into the channel and hindering it from reinstating its southerly course. The north and south piers have the appearance of short bulwarks rather than the long piers of the documentary sources. This may be the result of artistic impression or could even represent an early intention. However, the depiction of their 'structural detailing' is interesting and does not appear to contradict the documentary sources of the 1560 and 1580 estimates. Both structures appear slightly wider at the base than the top whilst three rows of what may be 'longers' are shown on the exterior faces of the piers. The ?longers are affixed against upright timbers. These uprights may well be a cladding of the three inch planks; if not then they surely represent the walling of piles. The brushwood around the base of the piers accords well with the "*worck throughe which all the said piles shalbe drevyn being for the fowndacyon therof"* of the 1580 estimates. One of the most interesting details of the piers concerns the framework of lateral timbers and three rows of longitudinal timbers within the pier itself. Correlation for such in a documentary context may be the "*bynding"* of the 1560 estimate. This arrangement also accords well with the *"beames"* of the 1580 document equating to the lateral members and the "*to every beame thre brasinges"* equating to the longitudinal members. The framework is visible in this picture map as no decking to the piers is shown. Whether the

pier was, or was intended to be so, or was merely depicted in this way to enable the structural detail to be seen is uncertain.

Figure 4, Great Yarmouth town and haven, later 16th century (British Library: Cotton Augustus l.i f.74)

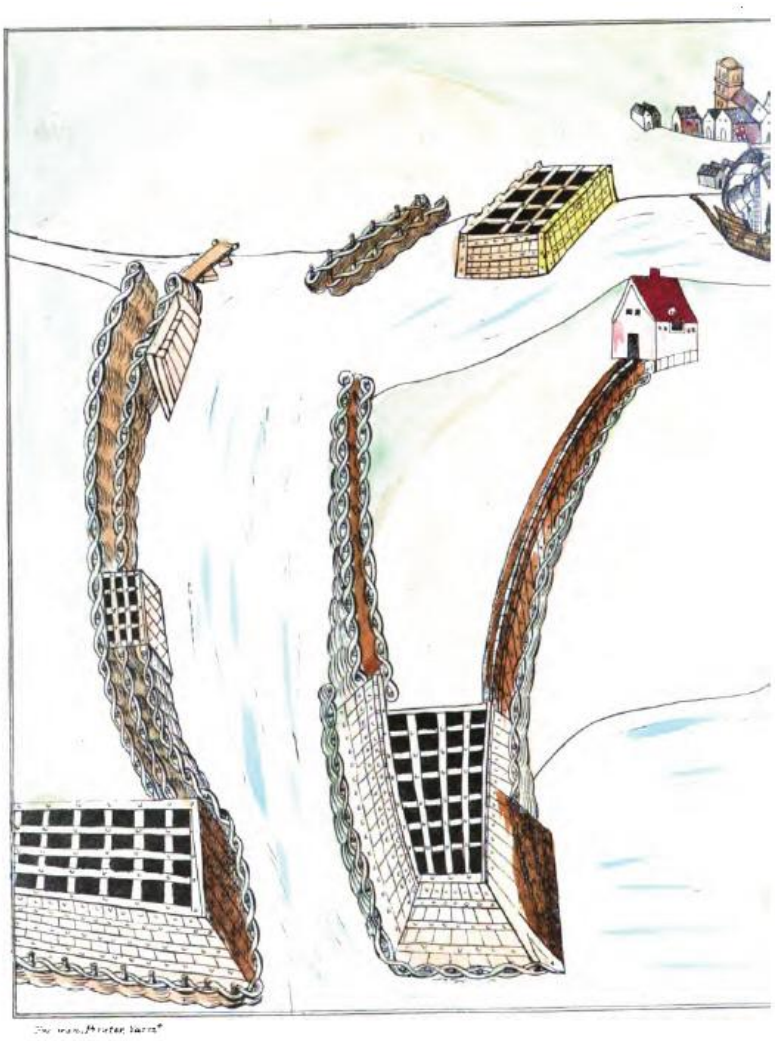

Figure 5, Detail of 16th centurypPiers (From Palmer (1854))

Later technical pier information

Some of the antiquarian writers of Great Yarmouth provide details of the piers in the ear;lier 19th century. In 1819, for example, the south pier was described as 1800 feet (548.64m) long and 24 feet (7.31m) wide (though this may relate to an eastward extension), formed of timber piles and filled principally with chalk and marl whilst the Brush was now constructed entirely of piles and planks (Preston 1819, 157-8). This pier was considerably longer than the south pier of 1580 (by some 780 feet (238.74m), yet considerably narrower than the earlier structure which measured 40 feet (12.19m) at its base and 36 feet (10.97m) at its top. More informative are the reports of engineers brought in to address problems at the haven.

With the increasing formalisation of the engineering profession and the steady income for the town's piers generated by the parliamentary Haven Acts a number of surveys and recommendations for works were produced by a succession of engineers from the mid 18th century onwards. Although much of the contents of these reports and letters relate to other parts of the haven they do provide some information on the timber piers.

There is much correspondence between the engineer William Jessop, dating between 1798-1808, and the Haven Commissioners. Jessops report of 1798, (within NRO Y/PH 101), says that *"the rapid decay of the pier is chiefly to be attributed to the destruction of timber under water"* although he recommended any remedial works to again be of timber with chalk used as infill. Jessop suggests using fir timber, saying it is nearly as durable as oak, but considerably less expensive. Another of Jessop's letters, dating to 1802, mentions a breach in the pier (though which pier is not specified) (within NRO Y PH 101). Jessop's remedy was to pile the breach in the same manner as the rest of the pier with the use of *"two horses to each engine"*. Correspondence of 1804 (within NRO Y PH 101) refers to the successful filling of this breach and to the piling of several hundred feet elsewhere on the pier. It is not certain if this work involved the replacement of piles or the driving of a further set as a cladding. There is in the same letter however, a reference to *"the end of the pier shall be repaired by replacing the piles"*.

The eminent engineer John Rennie produced a report in 1818 though this was largely concerned with water flows and the sand bar and provides no new information concerning the timber piers (NRO Y/PH 102).

A report produced by William Teasdel in 1867 was concerned with new works and repairs (NRO Y/PH 115). The new works were to include a breakwater and the extension of the north pier. The repairs include facing parts of the south pier with 4 inch plank and piling to the north pier and securing this, presumably to the existing pier, with wales (large secured horizontal baulks of timber) and braces. The piles, of English oak and fir, were to be creosoted and scupper nailed (scupper nails: short broad headed nails, affixed to overlap and prevent attack by 'the worm').

A number of reports were produced by Sir John Coode. Coode's report of 1873 provides some information of considerable importance to the understanding of the structural development of Great Yarmouth's historic piers (NRO Y/PH 120a). In considering work to the south pier Coode states that *"this Pier is a formidable mass of old timber Piling, in*

some parts there are as many as eleven tiers of longitudinal oak Piles, and from two to four skins or faces of timber sheeting on the Sea and Harbour sides, the hearting, or centre, consisting of marl, shingle, and small chalk stones, and the whole resting upon a sand and shingle bottom". What Coode is describing in his *"eleven tiers"* is the successive re-casing of the pier, rather in the manner of a Russian doll, as decay and damage has necessitated repair. A simplified section through part of the south pier is shown in a drawing by Coode dating to 1879 (Figure 6), (NRO Y/PH 120b). A more detailed measured survey of a section of the south pier showing the multiple encasings described by Coode are shown in drawings of 1902 (Figure 7), (NRO Y/PH 1360). The successive encasings of both of the timber piers at Great Yarmouth came about as a result of re-piling sections of weakness. Such re-piling is mentioned in a number of 18th and 19th century documents and it is likely that this solution was followed in earlier years also. The section reveals a multiple series of angle driven piles connected at a high level by transverse members or tie-beams. Clearly the innermost sets of piles are of earlier date and those towards the exterior the later. Between many of the successive walls of driven piles there are horizontal timbers that are almost certainly the *"wales"* detailed by Teasdel, above. In many instances successive pile walls were secured to the older body of the pier by short struts rather than full tie-beams. The ballast within the timber shell is clearly shown to extend to a high level. The central framework driven into the ballast and supporting the decking and capstan is almost certainly later work. A design for such a framework of 1893-4 is shown in an engineer's drawing (NRO Y/PH 1293) (Figure 8). What is not depicted in this section is the detailing of internal bracing, as this lay within the body of the ballast. One consequence of successive re-sheathing of the piers is that the width of the piers became ever greater, though this seems unlikely to have been a point of concern. Such multiple re-cladding implies the likelihood of considerable antiquity for the earliest components – possibly even back as far as the piers of the 16th century; that some such parts may have survived well into the 20th century is remarkable.

A report by Coode dating to 1885 (NRO Y/PH 120c) is accompanied by a plan of the piers in which the principal elements of the north pier are visible in outline (Figure 9). This shows the walls of the pier with the interior space being divided by a series of transverse lines. These transverse lines appear to represent the series of tie-beams that effectively partition the pier into a repeated series of bays. A further report by Coode of

1896 (NRO Y/PH 120d) provides similar detail as does an 1865 drawing of Joseph Cubitt (NRO Y/PH 1199).

A report of 1870 by Joseph Cubitt details re-piling to the sides of the piers and records the loss of ballast due to the wash of the waves through the joints between the piles. The same report notes that erosion around the base of some of the piles of the south pier *"the surface of the sand being now only between 6 and 7 feet above the feet of the piles, and this is quite as little as consists with safety"*. That this observation was so suggests that the piles must normally have been driven considerably deeper than 2m below surface level (NRO Y/PH 119).

Photographs of the mid 20th century and earlier show parts of the timber piers that accord well with the 18th – 19th century descriptions and drawings, (Figure 10).

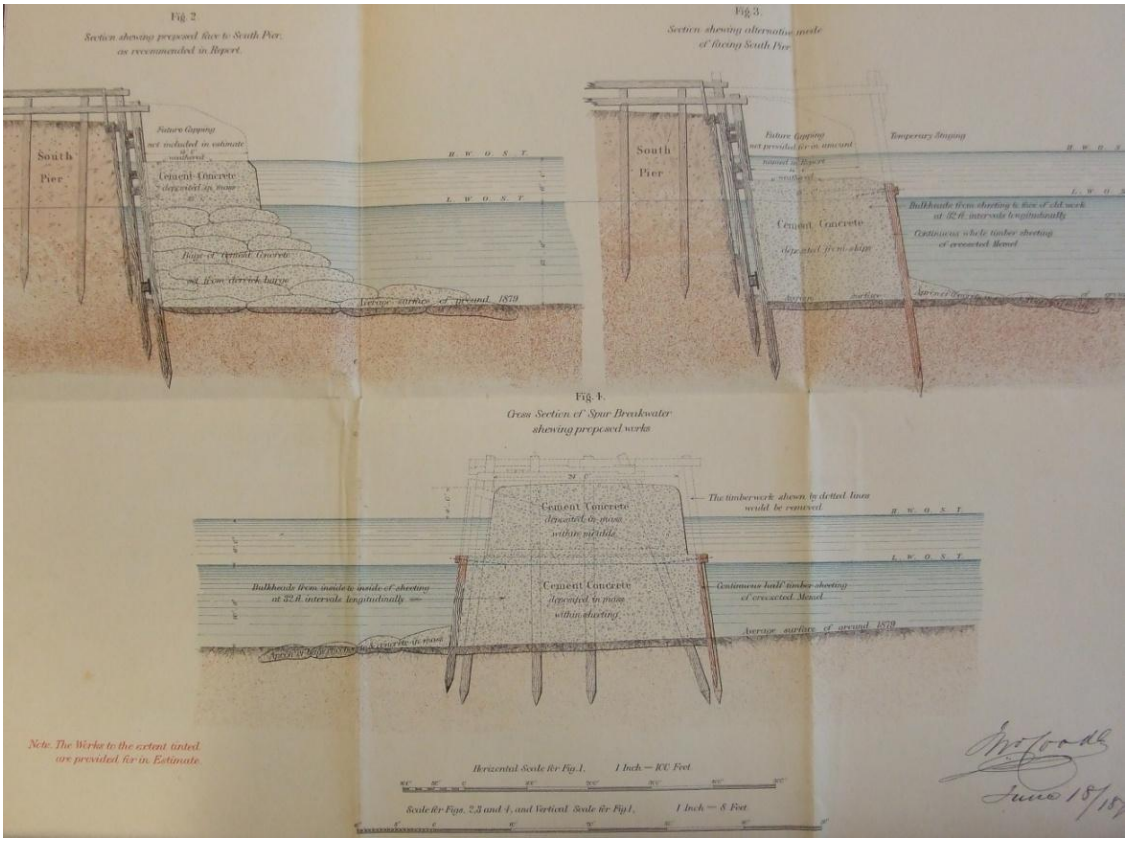

Figure 6, Simplified sections through parts of the south pier. Coode 1879, (NRO Y/PH 120a)

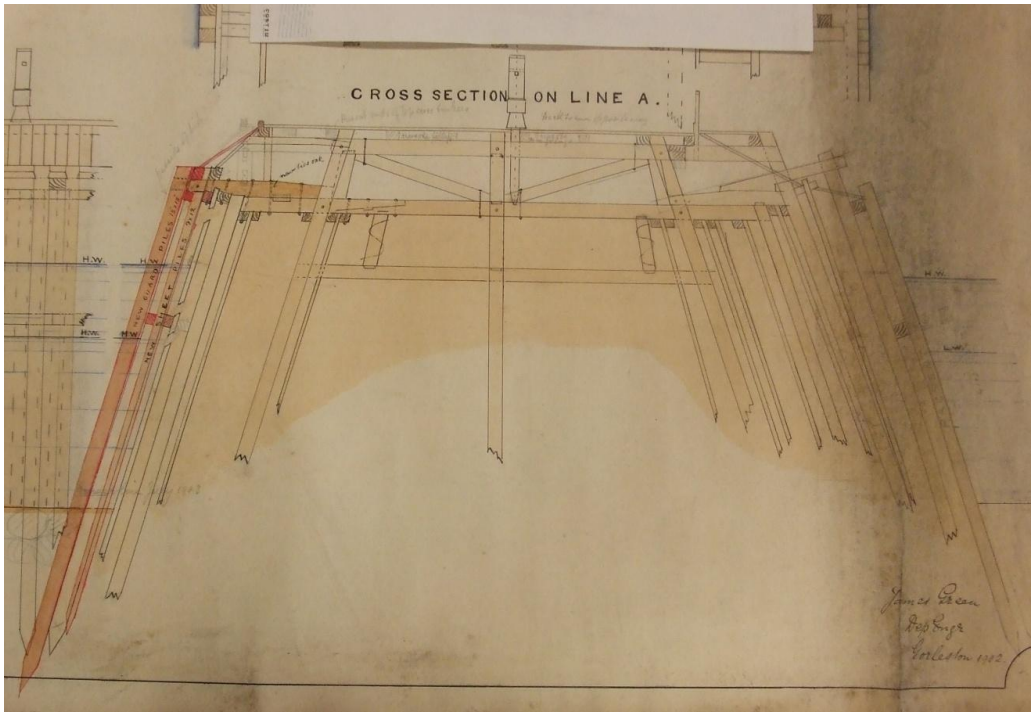

Figure 7, Detailed section through the south pier, 1902, note multiple re-facing (NRO Y/PH 1360)

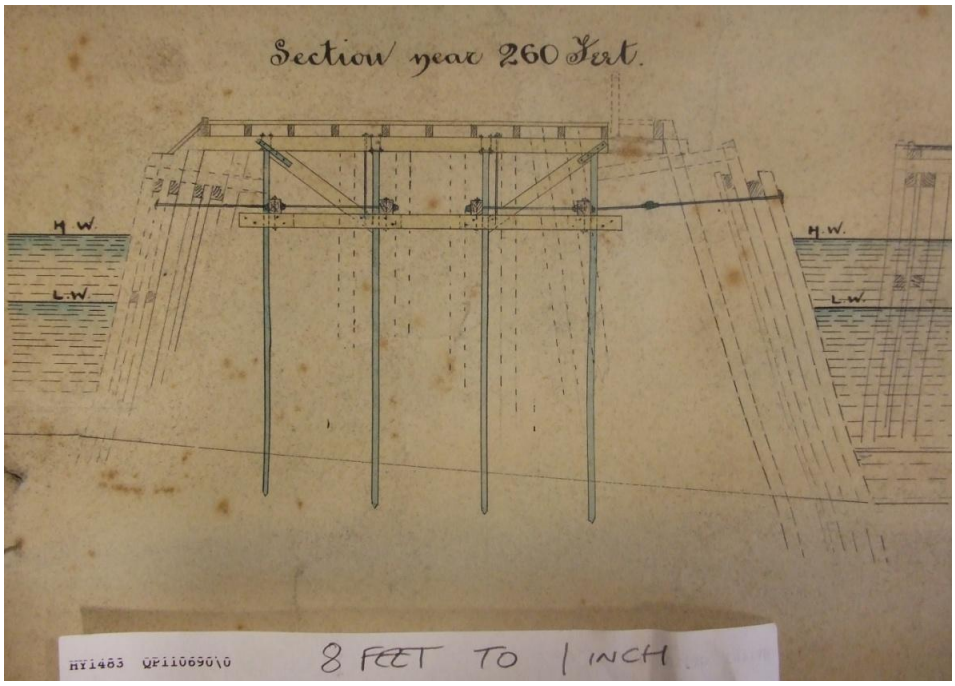

Figure 8, 1893-4, Section through pier showing a new decking element (NRO Y/PH 1293)

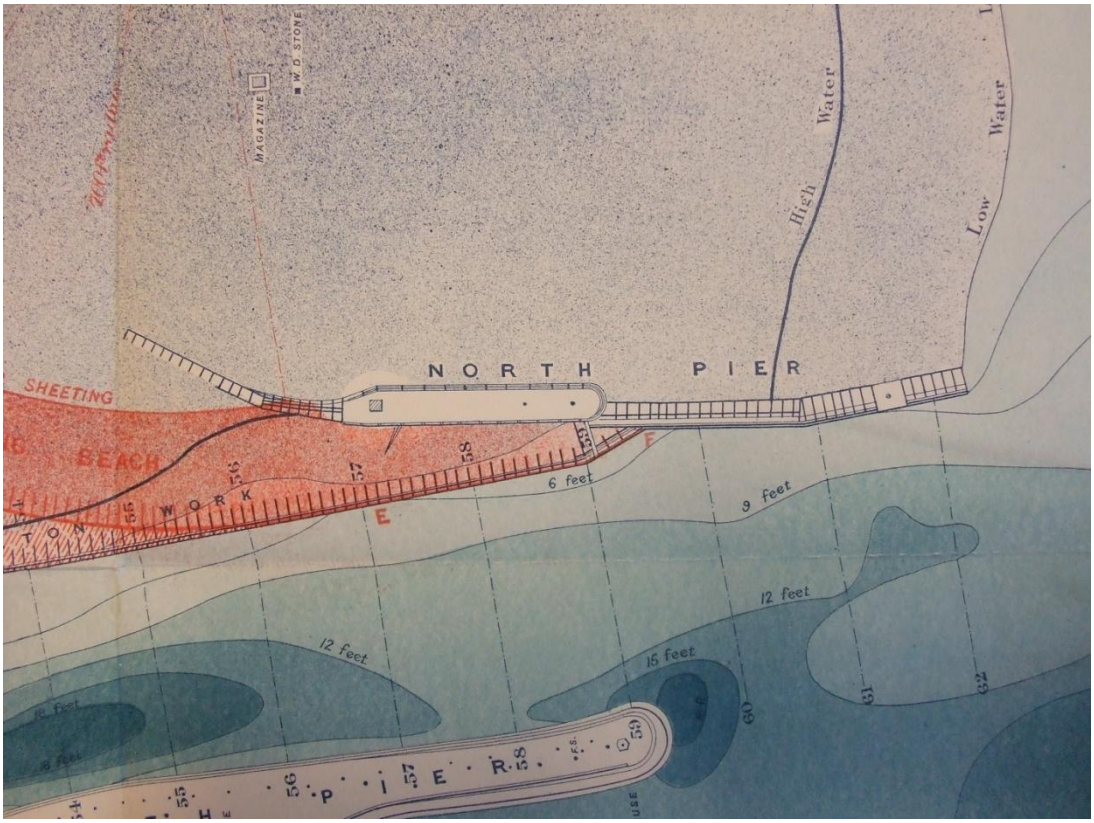

Figure 9, Coode, 1885 Plan showing lateral divisions within north pier (NRO Y/PH 120c)

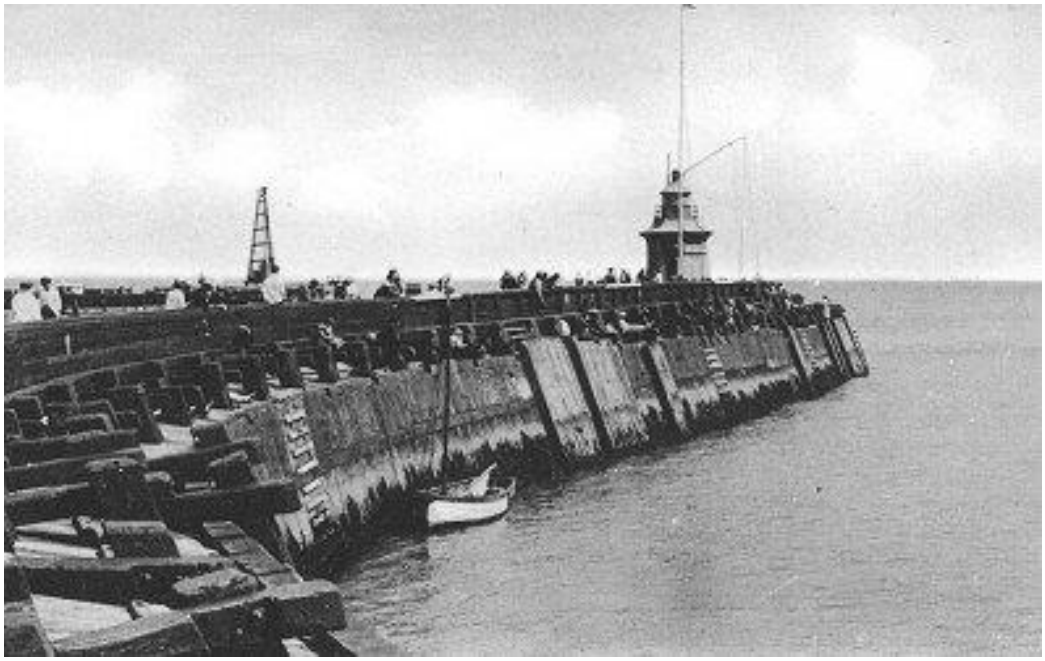

Figure 10, North Pier Great Yarmouth, earlier 20th century. Note the short multiple stretches of tie-beam used to secure successive re-claddings (NOAH website)

The employment of experts

The use of experts at Great Yarmouth pre-dates even the first known piers at the town, which cannot be attested prior to the 1560s. In several instances access to these experts was via the intermediary services of important 'friends of the town'. Known experts include the following:

Hugh Herland

In 1398 the carpenter Hugh Herland, who carried out much royal work and fabricated the great roof of Westminster Hall, was called upon, with others, to impress labour for the works at the new harbour of Great Yarmouth (Harvey 1954, 130; Cal. Pat. Rolls 1398 p.407). It is probable that Herland's expertise was directed towards revetment works for the channel. Manship records that when the haven became ruinous Letters Patent were granted in 1392 for a new channel to be cut and that subsequently this "*was taken in hand by good advise and counsell of some skilfulle p-sonnes for the verye place was not onlye sette downe where it shuld be cutte but the verye lengthe and breadthe also were prefixed"* (Henry Manship: in Palmer 1854, 18). The patent for this work describes this channel as 100 perches long by 10 perches wide and it may be that Herland was one of these skilful persons providing advice and counsel.

Richard Shelton, Master of Mettingham College.

Mettingham College, Suffolk, was a community of secular canons (VCH Suffolk vol. 2 1975). Richard Shelton described as an *"expert in waterworks"* was brought in to tender advice about the construction of the 5th haven in the late 1520s (Suckling 1846), 168-183.

John Thompson, formerly of Dover harbour

Thompson had gained some renown for his service at the pier of Dover harbour (Skempton 2002, 124) and his appointment at Great Yarmouth was apparently owed to his recommendation by some members of the Privy Council and in particular the Duke of Norfolk. Thompson had probably already viewed the haven around three years earlier in the company of the Duke. His appointment, around 1548 was for the construction of the 6th haven. Thompson, who was already an elderly man, died within a year or two of taking up his post and before the haven was finished (Swinden 1772, 400).

Mr Candish

With a view to completing the works of the 6th haven and by an act of the town's assembly in 1553, a Mr Candish was sent for who *"who inspected the work, and gave directions for its continuance"* (Parkin 1776, 38). 1200 baskets and 320 shod and unshod shovels were ordered up from London shortly thereafter (Manship, in Palmer 1854). It is uncertain if Candish was employed in a full-time capacity or on a more periodic consultative basis as in 1555 the Great Yarmouth authorities appointed diverse men to inspect the work and return their opinions whilst around the same time *"two honest townsmen"* were appointed as overseers (Swinden 1772, 402-3).

Joas Johnson

According to the 'Haven Book' that was partially transcribed by Henry Swinden (Swinden 1772, 412) the town, under the advice and counsel of the Vice Admiral of England, Sir William Woodhouse, and other friends did:

"send over sea for a conninge workman well knowen to be verrye skylfulle in suche waterworkes as in Sealand and Holland diverse were well knowen. Whereuppon the towne did send over for a man whose name was Joise Johnson of Midilburghe by whose advise the said haven was then begun to be wrought with great tymber brushwood iron planks and stone to dryve yt into one certen course and the corrante therof was forced to ronne into the sea betwene two great mayne peeres".

Johnson's appointment began in 1567 and it was largely he that was responsible for the construction of the 7th haven. Whilst much of the credit for this, the final of the town's havens and whose position remains largely unchanged to today, belongs to Johnson, the position of the channel leading out to the sea was actually chosen by a committee of eight persons in 1559 who were elected at an assembly. Further, it is clear from the construction estimates of 1560 that twin piers were also envisaged some years before Johnson was appointed. Nonetheless, the association of Johnson with the piers, in the public mind at least, has been such that until the demolition of the timber structures in the 1960s the term 'Dutch Pier' was locally applied (Holmes & Parker 1996, 37).

Other individuals with specialist knowledge whose contribution remains uncertain include a *'Mr Drury of Aylsham'*, described by Swinden as *"an ingenious person"* and the brothers *Sir Thomas and Sir William Wodehouse* (the latter vice admiral of England), all three of whom were consulted in the mid 16th century. As a friend of the town with local

connections the latter appears to have tendered knowledgeable advice rather than being directly involved in the design and construction process. It is entirely possible that the other two acted in a similar role. Vice admiral Sir William in a letter to the bailiffs of the town in 1560 mentions an unnamed *man of Emden*, very expert in sea works with whom he had conferred. Sir William hoped that this expert would, for £40 and charges, view the haven and give his advice (HMC 1883, 315). It is not known if this plan ever materialised. The estimates for the construction of piers in 1560 were drawn up by an *Andrian Harrison*. The formulation of such estimates involving details of the structural elements of the piers requires that some design, even if not expressed in a drawing, was present. Such design required specialist or expert skill, though whether this was Harrison's or another's is not known.

Sir Henry Sheers, described as a skilfull engineer, surveyed the haven and piers in 1685 and was given 100 guineas for his trouble. (Blomfield 1810). He returned to tender further advice about the repair of the haven in 1687 (Palmer 1854, 290).

The requirement to consult 'skilful engineers' is mentioned in the 8th Act of Parliament of 1750 that provided funding for the haven. A number of well known engineers inspected and reported on the haven during the 18th and 19th centuries, foremost amongst these was *Charles Labelye*, the engineer of Westminster Bridge, (Labelye 1747) and *John Rennie* (NRO Y/PH 102).

Ownership/control/funding

"twoe thinges have moste cheiflie and principallye happened sondrye tymes that is to saye the prosperitye of the saide Towne by reason of a good haven and harborroughe and the decaye thereof by reason of a evell haven and harborrowe" (Henry Manship: in Palmer 1854, 1-2).

Until 1670 the borough owned and controlled the haven. Decisions concerning its building, repair and maintenance were taken by the members of its two governing bodies of councillors, the four and twenties and eight and forties. These men formed the social and economic elite of the town. The means by which the town funded the piers and

haven, were many and varied. The cost of harbour works were enormously expensive, particularly during programmes of construction and after bouts of damage caused by raging storms and tempests (Gruenfelder 1998, 143-4). Between 1549 and 1613, for example, the town spent £38,652 (Gruenfelder 1998, 143). The passing of the first Haven Act of 1670 secured and a steady and sufficient income for the haven and largely took responsibility for it away from the corporation and vested it in the hands of commissioners. This can be seen as part of a national trend at certain sites – an increased willingness on the part of the state to secure vital components of the maritime infrastructure and not to leave it in the hands of occasionally unreliable and fractious local authorities. The direct welfare of the piers became the responsibility of a permanently employed 'pier master' and 'sub-engineer' who directly controlled a team of workmen.

During its period of corporation control an important aspect in Great Yarmouth's building, maintaining and funding its haven and piers were its powerful friends. Such friends were influential (often holding important office – including members of the Privy Council e.g. two of the Dukes of Norfolk, Robert Earl of Leicester and the Vice Admiral of England Sir William Woodhouse) with contacts and friends at court and other high places. It is also evident that the corporation was choosing members of the nobility to fill the town's role of High Steward, a largely honorific post; for example the dukes of Norfolk and Northumberland in the 16th century and the earls of Dorset and Clarendon and Lord Henry Cromwell in the 17th century (Hassell-Smith 1974, HMC 1883). The role of such people appears in many instances to have been pivotal in facilitating successful outcomes for the town. It may be reasonable to assume that such relationships were often mutually beneficial and sometimes, particularly in the case of the regionally powerful Duke of Norfolk, in the mould of patron and client. By way of favours expected we can see the Earl of Dorset recommending an individual to represent the town in parliament and the Earl of Leicester requesting the post of water bailiff for another man (HMC 1883, 311, 317). Gifts by Great Yarmouth to Secretary Cecil, the Earl of Leicester, the Lord Admiral, the Lord Keeper and the Master of the Rolls were presumably to gain favour or political stock (Hassell-Smith 1974, 29-30). Similar pandering to the crown is evident at the time of the restoration of the monarchy. In 1650 during the period of the interregnum the town purchased the fee farm rent *"in perpetuum"* from the Commonwealth. Ten years later, after the restoration of the crown and on the initiative of the town itself, the fee farm was returned together with arrears of rent (Swinden 1772, 474-5). The town further

ingratiated itself with a gift to the king of £500 as a mark of their loyalty (Parkin, 1776, 53).

The role of the Privy Council appears very often to have been pivotal in cases of appeals to the crown for assistance. The council is specifically mentioned in an arrangement which was reached between the towns of Great Yarmouth and Scarborough in 1613 (NRO Y/C34/3). This document reveals that both towns had suites with the crown and council for relief towards the re-edification of their piers and that they had agreed that each should be free of all pier related charges at their respective ports.

After the construction of the 7th Haven of Great Yarmouth there are frequent references to the town's harbour within the State Papers, the majority of which, either directly or indirectly, relate to the search for means of funding.

Means of funding the haven and piers included:

Duties and the collection of 'doles'

Sale of certain 'church related' goods and assets at reformation

Export licences (particularly corn and beer)

Remittance of fee farm and other dues

Granting of duties and proportions of customs dues

Briefs for public collections

Donations (Private, municipal: monetary and material)

Wills and bequests

Assessments – particularly at local and county level

Income from property rental/sale

Lottery

Community labour

The majority of the entries in the sub-headings below relate directly to funding of the haven and piers. In a few cases the funding was directed towards the somewhat vaguer entity of 'the town', though this may well have included the haven.

Doles: Payment of doles, typically on a gradated scale were payable on ships at the port and the income ostensibly expended on the maintenance of the haven. Searchers and collectors were appointed to ensure the working of the system. Similar doles for the maintenance of piers are known elsewhere, for example Hornsea and Hastings. Such doles continued to be levied until late in the post-medieval period. There are frequent references to doles at Great Yarmouth in e.g. (Rutledge 1970)

Reformation related: At the disestablishment, the assetts of the charnel were sold to finance the new harbour mouth, likewise assets of the church guilds in 1546 (Rutledge 1970, 19). Church plate, bell metal, vestments and other ornaments were *"by the hoole assent and common concent of the assemble house were these parcelles hereafter particularly solde in the open house for & towardes the buyldyng of the newe haven"* in 1548 (Rutledge 1970, 71-2: Assembly Minutes *fo. 55V – 57V*). A further sale of vestments was held in 1550 (Rutledge 1970, 75: Assembly Minutes *fo. 57V*).

Licences to export grains and other commodities: In 1567 Elizabeth I granted licence for the exportation of 18,000 quarters of wheat, barley and malt whose sale generated £1407. A further licence in 1576 for the exportation of 30,000 quarters was also granted by the queen with another for 30,000 quarters in 1580 and a fourth for 40,000 quarters in 1584. (Cal. Pat. Rolls 1568; 1576; 1580; Manship junior: in Palmer 1854, 30-32). Licence was also granted in the later 16th century to export quantities of herring in foreign rather than English ships (Parkin 1776, 49). In the early 17th century licences were issued for the exportation of beer free of custom (HMC 1883, 307), (NRO Y/C36/6/2).

Remittance of fee-farm and other dues: There is a long history of release and reduction of the fee-farm of the town and of payments of fifteenths and tenths, by the crown. Release was formalised by the issue of Letters Patent, many of which granted remittance for periods of many years. Records of fee-farm remittance appear in the Patent Rolls for the years 1463, 1466, 1471, 1473, 1488, 1490, 1482, 1483, 1502, 1556, (L. & P. 1516). It is thought that remittance was also authorised at later dates.

Duties and proportions of customs dues: The granting of duties on goods brought into the port, and levied for its repair, was in the gift of the crown. Typically such grants were made for set periods of time, quite commonly for five years. In the case of Great Yarmouth these duties were skewed towards the landing of herring. Manship records the first such gift in 1346. Around 1387 Richard II granted £100 out of the customs and subsidies of the port towards the building of the haven as did Henry IV (Cal. Pat. Rolls 1409; 1412). Several such gifts were granted during the reign of Elizabeth (Henry Manship: in Palmer 1854, 16,17, 33).

The favouring of the town by restrictions imposed upon other ports in the region could also benefit the haven. Henry IV for example granted that the shipping of wool, hides and skins, which previously took place at Lynn and Ipswich, together with the packing and weighing of wool, should henceforth within Norfolk and Suffolk, only take place at Great Yarmouth (Henry Manship: in Palmer 1854, 19).

Brief for public collections: Letters were directed to the Bishop of Norwich and Justices of the Peace of Norfolk and Suffolk for the collection of monies in 1573-4 with some £503 9s 5d being collected from the two counties, the clergy of the counties and the city of Norwich. Letters Patent were issued in 1622 for a general collection throughout the kingdom for the benefit of the haven and piers of Great Yarmouth (NRO Y/C36/6/2). This is said to have raised around £500 (Parkin 1776, 51).

Donations and loans: Over eighty individuals gave money towards the building of a new haven in 1549, many were members of the council. These sums ranged from 10shillings to £40 (Rutledge 1970, Appendix C: Assembly Minutes *fo. 56V – 57R*). In similar vein it was agreed at assembly that for a space of ten weeks the four and twenties would pay 2s. per week and the eight and forties 1s. per week for works towards the new haven (Rutledge 1970, 75). In the later 16th century the Duke of Norfolk, a powerful friend of the town, contributed timber from his own estates, gave generously to a harbour fund and persuaded the Norwich aldermen to vote 200 marks towards the haven (Hassell-Smith 1974, 28-9). Around 1622 the city of Norwich made a further contribution of 100 marks (Parkin 1776, 51). In 1579 even the Cinque Ports made a small donation towards the haven (Swinden 1772, 435-6).

In Elizabeth's reign and at the behest of the crown the city of London lent the town £2000 for bestowing upon the haven (Henry Manship: in Palmer 1854, 31), whilst by 1667 the

town was said to be in difficulties owing to the *"borrowing, and paying interest for great sums of money"* (Swinden 1772, 896). There is evidence for borrowing at interest at a later date still (NRO Y/C/28C).

Wills and bequests: Palmer records a number benefactors who left money for the maintenance of the haven. These include: the burgess in parliament for Great Yarmouth, William Bishop, who willed £40 to the use of the haven in 1559 and a former bailiff of the town and member of parliament Roger Drury, a friend of the historian Manship junior, who died in 1599 and bequeathed £10 to the reparation of the haven. A Sir Samuel Tryon gave £5 in 1615 to the haven and his arms were hung up in the church with the inscription *"Sir Samuelss Tryon's armes are placed here; A kinde well wisher to our Yarmouth Peere"*. In 1641 Henry Davie willed £100, the interest of which was to be applied to the maintenance of St Nicholas' church, the repair of the haven and the relief of the poor. (Palmer 1854, 283-4, 415). Palmer also records a number of cases in which monies were willed to the corporation. It is possible that some of this may have been spent on the haven. A number of later legacies are recorded in the Haven Account Books.

Assessments: At the end of the Haven Account Book of 1549-97 a copy of an assessment *"towards the buylding of greate Yarmouthe haven"* levied within the county (NRO Y/C28/1). Following a petition by the town for an assessment on adjacent lands that it was claimed had benefitted by the building of the haven an examination was held in 1621 by the bishop of Norwich, Sir John Wentworth, and four Justices of the Peace. They found that *"the neighbouring low lands are greatly benefitted by the haven and piers of Yarmouth, being better drained, and exports and imports being made more easy; also that Yarmouth is unable alone to bear the expense of their maintenance and of the repairs now necessary"*. They suggested *"a tax upon the lands improved thereby, and a poundage upon the exports and imports from Yarmouth, for their support"* (Cal. S.P. Dom. 1621).

Income from property rental/sale: Under Letters Patent of 1594 authority was granted to the town to purchase or receive by gift possessions to the value of £300 per year (Henry Manship: in Palmer 1854, 33). Pursuing a different tack and in wake of an unsuccessful appeal to Lord Protector Cromwell for financial aid in 1656 the corporation sold the town's gunpowder that year for £100 (Parkin 1776, 53). The following year they sold the island of Cobham together with the houses and lands called the 'Grey Friers'. This raised £3,130, all of which is said to have gone to support the haven and piers (Parkin 1776, 53).

Lottery: In 1567, and for the benefit of the haven, the corporation solicited fortune's favour with a gamble on the Virginia State Lottery – and lost. A similar course was followed in 1614, again to no avail (Parkin 1776, 46, 50).

Community labour: Parkin records that on 21st April 1562 it was decreed at a common assembly *"That one quarter of the towne shall be callyd owte by the constables every day to go to the haven"* (Parkin 1776, 45). No reference to such community labour on quite this scale has been found though Palmer states that the obstruction of the mouth of the haven by a sand bar in the late 17th century was dealt with by voluntary action *"the dangerous condition of the haven was made known by beat of drum, and the voluntary coming in of the inhabitants was desired, to cut and dig a gut or trench through the bar"* (Palmer 1854, 290). Manship junior refers to what are probably unpaid overseers at the haven, possibly men of status within the corporation (Manship: in Palmer (ed) 1854, 97).

The stream of appeals to the crown for relief and assistance for works to the haven, especially after the construction of the piers in the mid 16th century, highlight the endless struggle the town faced in this matter. Great Yarmouth's prosperity, even viability as a town, was dependent upon its port. The paradox was, as with many other pier owning towns, that in order to maintain these piers considerable sums of money were required and yet haven expenditure outstripped municipal income. This dilemma was succinctly summarised in a few short words of an appeal to the Privy Council by the Justices of Norfolk on 1st February 1593 *"The workes whereof in our judgement by their view seem more like to be a princes charge than to be taken in hande by such a poor corporacion whose inhabitants live onlie by their trades to the seas"* (Cecil Papers 1593).

Difficulties with funding were largely overcome with the passing of the first Haven Act of 1670. This Act set up a body of ten Port and Haven Commissioners, effectively withdrawing the haven from the control of the corporation, and enabled the imposition of dues on all cargoes, barring fish, with the monies being used to maintain the harbour (Raithby 1819, 651-653). That the first commissioners were drawn from across the counties of Norfolk and Suffolk emphasises the importance of the port to the wider region and not just the town. The first Act was passed for a ten year period though there have been a continuous unbroken series of similar Haven Acts since that date. The first Act can be seen as recognition by the state of two principal matters, firstly that havens such as Great Yarmouth's were in the national interest and secondly that havens with such

extensive (and expensive) infrastructure – particularly the piers – were in all reasonableness beyond the means of the town to indefinitely support. At around this date similar Acts were passed for the havens of a number of other ports around the country. To some degree these points had long been recognised, not least by the pier owning towns themselves. Recognition at the level of national government can be found for this by at least the early 17th century and is recounted explicitly and in some detail in the Letters Patent for the collection of 1622 (Swinden 1772, 458-464). The haven Act of 1750, which expanded the number of commissioners to twelve, is of some interest in that it also authorised the appointment of a committee of twelve inhabitants of Great Yarmouth to inspect the works and summon the commissioners in case of need (Palmer 1854, 292). The regular monitoring of the haven, often by engineers of national repute, the increasing formalisation of procedures for its maintenance and not least the regular flow of funds to enable this meant that Great Yarmouth would never again struggle to keep its piers.

Workers and administrators

A clerk of the Check was appointed to the haven works in 1560s whilst a paymaster of the haven is also mentioned. It was the clerks job to *"give knowledge unto the paymaster of the haven work of everyone's default, and to make an abatement of one penny for every hour defaulting from labour"* (Manship: in Palmer (ed) 1854, 93).

Commission, for three years, was granted to the town in 1568 *"to take up only for the repair of the haven of the Town in the counties of Norfolk and Suffolk stone, timber, underwood and other necessaries and carriage for the same at reasonable prices, and to take up in the counties of Norfolk, Suffolk, Essex and Kent masons, carpenters and labourers to work on the haven at reasonable wages"* (Cal. Pat. Rolls Elizabeth I 1568 #997). This patent would seem to be authorising the impressment of both materials and labour.

Further staff are mentioned by Manship *"The town maintaineth, in daily pay, a master-workman, carpenters, and labourers, sundry surveyors to ride to make continual provision of iron, timber, brush, and faggot-wood, and of millstone, callion, and other rubbish, wherewith to strengthen the building; besides a paymaster and other overseers, who of their own charges do attend the business; by means whereof, (God having blessed*

their labour,) it is become a very good harbour" (Manship: in Palmer (ed) 1854, 97). Manship's wording suggests that the overseers, and perhaps the paymaster also, were unpaid. These individuals were perhaps members of the corporation?

The Haven Account Books

Five weighty volumes of 'Haven Accounts' span the years 1567-97, 1597-1733, 1733-71, 1771-1813 and 1813-35. These have much to tell regarding the numbers of various types of worker and administrator, their relative hierarchies within the works and of course how much they earned. They are also useful in providing a range of other details, for example, fluctuating numbers of workers, equipment and materials. The first of these books (NRO Y/C28/1) has lists of payments starting from 1567. Each set of related entries span the tenure of a particular paymaster of the works, or provider of wood and timber, which normally covers a period of several months. At the beginning of the successive paymaster's accounts there is a short preamble giving the name of the paymaster and the period of time covered. Frequently the names of the bailiffs are recorded next to this preamble. This is followed by an account of the monies received by the paymaster from the town, in turn followed by the accounts of monies disbursed by the paymaster. The accounts are by the month and quite brief. Few individual names are mentioned, only the numbers of particular categories of worker and the amounts collectively received. At this particular level the accounts are less detailed than those at Bridlington and Flamborough and it is clear that the references to the 'clerks booke' and 'tallys' indicate a primary and more detailed source from which the Haven Book accounts drew their content. The haven accounts are perhaps best viewed as the submitted final accounts compiled from working documents. At the end of each paymasters tenure the signatures of the auditors, generally two or three in number, sometimes appear. The accounts of 'providers of wood and timber' have their own accounts within these books. The hundreds of pages of the first haven account book testifies to a considerable and prolonged period of haven works. The earlier parts of the second account book of 1597 tells a similar story with work only appearing to slow down in the early years of the 17th century (NRO Y/C28/2). The accounts appear to become progressively more detailed from the early 17th century itemising things like receipt/income, allowances, as well as putting expenditure under specific marked headings e.g. timber, ironwork, fines, etc. Even greater sophistication and

detail, in some respects at least, is evident in the later 17th and 18th centuries, probably as a result of a legal obligation for accountability required by the parliamentary Haven Acts.

In light of the information they shed extracts from the accounts are presented below. Firstly the entries of the earliest paymaster of the First Haven Account Book:

Anno DM 1567

Greate

Yermuthe *The accompte of Anthony*

Loveday paymaster appoynted for the haven

Raphe Woulhouse *for vii monethes ended at the feaste of St Micharell*

and Thomas bettes *Th archangel Ao dm 1567 Ao ix Regnne Elizabeth*

Bailiffs *Taken before Nicholas ffen Augusten Peese and*

Willm –yster auditos for the towne appoynted

By a common assemblie *1567*

The said Anthony Is charged with mony	
Delivered to hym out of the Townes Care fore	
The last Daye of Marche	*cc li*
Itm that was Deliv-ed unto hym out of the	
Treasore the xth of June	*cc li*
Itm that was delivered to hym out of the	
Treasore the xx Day of Auguste	*cxxx li*
Itm that was Delived to hym out of the treso	
Re the iid of September	*lx li*

		Sum of all the	*xx li*
		Receytis	*ccccciiiix*
		Wherof	
The firste	*The said Anthony Loveday ys to be allowed*		
Monethe	*That he have payed to xxxiiii labourers working*		
	at the haven the first Monethe as appere by ye		
	Clerks booke deducting all defaultes at viiid p		
	day for eayc loborer	*xxiiii li*	
	Itm that he payed for xii Carpenters and viii		
	Sawers during that monethe eayc one at		
	xiid a daye deducting all defaultes as by the		
	Clerks booke appered	*xix li iiiis*	
	Itm that he payed to Joysour Johnson the Mr		
	of the works for his wages this monethe at		
	iiiis a daye one with another	*v li xiis*	
	Itm that he payed the Clarke of the works		
	for his wages for this monethe	*xxvis viiid*	
	Itm that he payed the smyth for workman		
	ship of Iron during this monethe as by the		

	tallys appered	*vli iiis iiiid*
The seconde Monethe	*Itm that he paid the second monethe to xlii labourers at viiid the day as appered by the Clerks booke, deducting all defaults*	*xxix li iis*
	Itm to xvi Carpenters and tenne sawers at xiid the day as appered by the Clerkes booke all defaults allowed	*xxx li xvis*
	Itm that he paied to Joyse Johnson the Mr of the works this monethes wages	*v li xiis*
	Itm to the Clarke of the Workes for his monethes Wages	*xxvis viiid*
	Itm paid the smythe for Workmanshipp of Iron this moneth as by his tallys appered	*vii li ixs iiid*
The thred Moneth	*Itm that he payed the thred monethe to xlii labourers at viiid the day as appered by the Clerks booke deducting all defaultes*	*xxviii li xvis*

	Itm to xvi Carpenters and tenne sawers at xiid the day, appered by the Clerks book all defaults allewed	*xxxii li iis*
	Itm that he payed Joyses Johnson the Mr of the Workes thys monethes wages	*v li xiis*
	Itm to the Clarke of the workes for hys Monethes wages	*xxvis viiid*
	Itm paid the Smyth for Workmanship of Iron thys monethe as by hys tallys appe red	*vi li vs iiiid*
The fowthe monethe	*Itmthat he payed the ffourthe monethe to xlii labourers at viiid a day as appe red by the Clerks booke deducting all defaultes*	*xxxii li is*
	Itm the xvi Carpenters and tenne sawers at xiid the day as appered by	

	the Clerkes booke all defaultes allowed	*xxix li xvs*
	Itm that he payed Joyse Johnson the	
	Mr of the workes this monethes wages	*v li xiis*
	Itm paid to the Clarke of the Workes	
	for his monethes wages	*xxvis viiid*
	Itm paid the smythe for workmanship	
	of Iron thys moneth as by his Talliys appe	
	red	*vii li viiis iiiid*
The fyfte	*Itm that he payed the ffythe monethe*	
monethe	*to xxxiiii labourers at viiid a day as*	
	appered by the Clerks book deducting	
	all defaults	*xxii li vis*
	Itm to twelve Carpenters and Sixe	
	Sawers at xiid the Day as appered by	
	the Clerkes booke all defaults allowed	*xvi li xviiis*
	Itm that he payed Joyse Johnson the	
	Mr of the works this monethes wages	*v li xiis*

	Itm paid to the Clarke of the works for his monethes wages	*xxvis viiid*
	Itm paid the smyth for workemanshipp of Iron this monethe as by his Talleys appered	*vii li iiis iiiid*
The Sixte Monethe	*Itm that he paid the sixte monethe to xxx labourers at viiid the daye as appered by the Clerks book, deducting all defaults*	*xxi li iis*
	Itm to Tenne Carpenters and Six sawers at Xiid a daye as appered by the Clerks book all defaults allowed	*xvi li xiis*
	Itm that he payed to Joyse Johnson the Mr of the works for this monethes wages	*v li xiis*
	Itm to the Clerke of the works for his monethes wages	*xxvis viiid*
	Itm he payed the smyth for workemanshipp of Iron this monethe as by his tallies appered	*vi li iiiis iiiid*

The seventhe Monethe	*Itm that he payed the Seventh monethe to forte two labourers at viiid a day as appered by the Clarks booke, deducting all defaults*	*xxxii li xiis*
	Itm to six tenne Carpenters & Tenne sawers at xiid a daye as appered by the Clerks booke all defaults allowed	*xxix li xviis*
	Itm that he paied to Joyse Johnson the Mr of the works for his monethes wages	*v li xiis*
	Itm to the Clerke of the works for his mone thes wages	*xxvis viiid*
	Itm he payed the Smyth for workemanship of Iron this monethe as by his tallies appe red	*vii li iiis*
	Itm the said Anthonye hathe paid for vi Tunnes of Spanys Iron at x li vis viiid p Tunne wh the charge of whrfage bringing home at iiiis iid p ton	*lxiii li vs*

Itm paid for Maundes baskets ropes and
shulves occupied about the haven during
seven monethes pticulerly *xiiii li iis*

Itm paid for making of ii newe lighters
to Drive piles wth *xxii li*

Sum total of all the *v lxi li vis*
payments cometh to *viiid*

And

So remayneth in the hands of the said *li s d*
Anthony Loveday at the taking of thisaccompt *xxvii xiii iiii*

The accounts highlight a number of key points. The work is carried out by carpenters using timber prepared by sawyers whilst the largest group of workers are the labourers. The sawyers are paid at the same rate as the carpenters and the labourers at a lesser one. These relative rates match those at Bridlington at a slightly earlier date. Also comparable to pier sites elsewhere are the fluctuating number of workers employed. Quite why this was so is uncertain – could it be levels of employment were based solely on the workers needed on a day by day, or week by week basis, that the workers also had alternative employment, or perhaps even that workers impressed for paid service were going home as soon as permitted? The smith's expenses were considerable (as noted at pier sites elsewhere). This expense was no doubt accounted for by fabricating such items as shoes for the piles and bolts, both of which appear as requirements in the estimates of 1560 cited above. The smith's raw material, the tons of Spanish iron also represent a considerable expenditure. The maundes (item and function unknown), baskets, ropes and

shulves (shovels?) no doubt represent some of the basic equipment utilised at the site. Engines for driving piles are not mentioned, perhaps the town already owned some? Their presence can be inferred however, from the *"to Drive piles with"* whilst in the same context the two purpose built lighters, which were probably secured together with a gap between for the piles, must have served as a floating base for the engines. The 'management' side of the enterprise appears to have remained stable. Joas Johnson the Dutch engineer, or master of the works, was a well paid specialist whilst the clerk of the works, with his *"booke"*, appears to be at least partly involved with financial recording. On the basis of evidence presented above it is probable that paymaster Loveday took on this role on an unpaid basis, certainly there are no wages listed for him. It is possible that the role was taken on as a part-time responsibility. Overall financial checking of the project was by members of the council appointed by the assembly of the town as auditors. One of the auditors whose signature appears regularly in the haven accounts was the early historian of the town Thomas Damet.

Later Paymaster's accounts in the First Haven Book are very much in the mould of the account detailed above. On the basis of staffing sizes and materials purchased, it seems fairly clear that from around the beginning of the 17th century the works at the haven were geared more towards a repair and maintenance basis rather than to one of a major construction programme. From the earlier 18th century, and within the Second Haven Account Book, (NRO Y/C28/2), the accounts appear as annual summaries only. Timber and brushwood expenses appear within these accounts rather than in those of separate 'Provider's (see Timber below). Whilst there is reference to some useful information such as bills for engine and chain pump repairs, the purchase of shovels, scoops, baskets, nails, spikes, rope and the buying of timber, including 3 inch plank, furr baulks and deals, there is little that provides information on the piers themselves. The same holds true for the Third and Fourth Haven Account Books (NRO Y/C28/3), (NRO Y/C28/4) in which there is an increasing use of sub-headings for income and expenditure but little within that to provide new information of the nature of any pier works. Often the carpenters and labourers are lumped together in a single block with an annual cost of their wages and it is not even possible to say how many of each category were actually working within any given year. Various one-off payments are sometimes listed and from this we are informed of the purchase of barrows, the services of a *"pullymaker"* and a payment of £6 to Benjamin ffox for *"intelligences"*! From the early 18th century income from legacies left

for the maintenance of the haven appear in the Haven Books whilst in the early years of the 19th century there are extensive lists of individuals from whom the Haven Paymasters had borrowed money at interest.

Timber

The only early references that have been located referring to species are all to oak. These appear in the estimates of 1560 and 1580 detailed above. In the 18th century *"furr"* is recorded (NRO Y/C28/2). Later still, in 1819, Memel fir is specifically mentioned as being employed, though in which particular part or parts of the piers is uncertain (Preston 1819, 157).

In 1544 four individuals were appointed *"byers & purcheasers of tymber for & toward the reparacon of the haven mowth of this towne"* (Rutledge 1970, 56: Assembly Minutes *fo. 30v*). There is reference to the assembly approving the *"purcheasers of tymber"* viewing a wood at Wheatacre Burgh (Rutledge 1970, 58: Assembly Minutes *fo. 36 R-V*) which Rutledge considers as negotiations to purchase the wood itself.

The most informative sources of information on timber used at the haven are the brief accounts of the *"Providers of Wood and Tymber"* which appear within the Haven Account Books. The earliest of these within the First Haven Account Book are of 1568 (NRO Y/C28/1). The first of these is transcribed below:

Greate *The accompte of Raynolde*

Yarmuthe *Turpyn Provider of Wood and*

Tymber for the haven taken before

Raffe Woulhowse *Nicholas ffen Augusten Peerse*

Thomas bettes : bailiffs *and Willm Lyster At Mihelmis*

Ao 1568 Ao x Elizabeth

The said Raynolde ys charged wth mony

wh he have reseyved for 80 lode of barke

coming of the wood wh was soulde for xiis

a lode *xlviii li*

Itm he ys also charged wh mony wh he

have reseyved for wood and under wood

wh was made in faggots and soulde *x li*

Itm that he hath recyved at iii sevall

tymes out of the towne tresour *ccclix li*

Sum of all

the receipts *ccccxlvii li*

Wherof

The said Raynolde hath paid to Mr

Michaell hare for Wikelingham wood

cont xxx acres *lii li*

Itm he hath paid for felling carreuge

and bringing by kele down the said

wood at iiii li x s ye acre *cxxxv li*

Itm paid to my Lord byshopp of norwch

for a wood at horning cont xii acres *xvi li iii s iiii d*

Itm paid for felling Carriage and bringing

downe therof by kele to yarmuthe at iii li iiis

iiid p acre *l li*

Itm paid to my Lady Paston for a wood called

Morthehawe wood cont xxx acres *xlv li*

Itm paid for fellinge Carriage & bringing

downe therof to Yarmuthe at iiii li viii s p acre *cxxxii li*

Itm layed out for his owne expenses and

Travale about those causes During this tyme *xv li ii s iiii d*

Sum – ccccxlv li v s viii d

And so remaynyth in the hands of the said *xxxiiii s wh was gyven*

Raynolde Turpyn at the making of this *iiii d* *hym by the*

accompte *audito in consideracion*

of hys paynes

The format of this account follows in broad outline those of the Paymasters of the haven works. Firstly we are given the name of the 'Provider', the names of the auditors and bailiffs together with the date. The first figures of the accounts detail the income of the Provider – most of which is derived from the town's treasure, but also in this instance from the sale of bark (possibly for tanners) and from the sale of prepared faggots. It seems certain that both these sales relate to the by-products of the preparation of timber of suitable scantling for use at the haven. Thereafter follows the expenditure of the Provider. This is recorded as for woods and the felling and carriage of the timber to Great Yarmouth. It could be read that the Provider was buying the wood itself, in these instances, and not just the timber contained therein – which may in fact be the case. The size of the woods are stated as is the cost of felling and carriage – costed per acre. There is no direct reference to the conversion of felled trees to timber of suitable form within the woods. Contemporary practice elsewhere would suggest that this is likely to have been the case here whilst the carriage of the sold by-products of conversion also goes some way to supporting the case. It can be seen that the town was purchasing woods from established gentry, the church as well as other landowners. Whereas the Paymasters of the haven works have no recorded expenses the Provider clearly had a personal expenses account. This may well be owed to the travel and time away from town required in visits to woods and in the negotiation of purchases and sales.

The reference to transportation by *"kele"* suggests movement of timber by waterway whilst a later Provider's account refers specifically to carriage *"by barges downe to the haven"* and also to paying for *"lightermen and kelemen"* in the transportation to Great Yarmouth. Other Provider's accounts within the First Haven Book tell much the same story of purchases and transportation. There is however also reference to brushwood, for example *"xxiii Thowsand of Brushwood redye made for the use of the haven"*. This may have been for the heavy-duty wattle work that was utilised around the piers and along the brush. It would seem that the Provider may occasionally have purchased ready converted timber, thus a reference to 10,000 planks purchased for lxx li. Occasionally the term *"Provider of wood and timber"* is expanded to also include *"and other necessaries for the haven"*. There are several references to the Provider supplying stone, including

paying for the carriage of stone given by the Bishop of Norwich and even for *"pykeng diggen & carriage"* which is likely to be reference to the town involving itself in the quarrying of stone. The stone was presumably for use as ballast within the timber piers.

Miscellaneous

Haven house

In 1564 a haven house some 20 feet (6.1m) by 16 feet (4.9m) was built of lime and stone. This building functioned as a store for tools and shelter for the workmen and labourers and was located to the south side of the haven's mouth (Manship: in Palmer (ed) 1854, 92-3). In the 19th century a number of pier related structures and areas are indicated on maps and plans. These are comprised of Pier Master's house, Engineers house, a number of structures entitled 'sheds', a harbour works yard, a Pilots house/lookout, a lighthouse at the end of the south pier and the Hope and Anchor public house (NRO Y/PH 1170).

Stone

Palmer states that the stone from the church of St Mary Ultra Pontem which was demolished in 1548 was used in the constructing and repairing of the haven and piers and that further church stone was used in 1650 (Palmer 1854, 221, 435). See also references to stone in the First Haven Book of the later 16th century and discussed above under the heading 'Timber' above.

Boom

Manship the younger recounts that in 1590 the town *"built at their own costs and charges, in the said haven, close by the Mount last mentioned, a Boom or Inclosure, to open and shut at every tide, thereby to withstand at their pleasure the entrance of ships into the haven aforesaid: which cost them £107 15s"* (Manship: in Palmer (ed) 1854, 48).

Fort

Under Henry VIII the state pursued a campaign of investment in coastal ports and coastal fortification. The relationship between coastal ports and adjacent defences is one that would continue for centuries. At Great Yarmouth this first found expression in 1512 when remittance of parts of the fee-farm were granted provided that artillery was made for the

defence of the town (L. & P. 1512). In 1545 *"Yarmouth and Leistoft are promised certain bulwarks, to be made, at the country's expence"* (L. & P. 1545) (see also Manship's reference to *"the Mount"* in: Boom, above. Lists of ordnance recorded as having been *"lent to port towns for their defence"* in the early 17th century included a number of coastal towns with piers, amongst which was Great Yarmouth (Cal. S.P. Dom. 1633). These are likely to have been the twenty pieces on *"loan out of the king's store"* in 1626 (Cal. S.P. Dom. 1626). Immediately to the north of the north pier a fort mounted with ten pieces of artillery and containing a date stone of 1653 was still present in 1819 and although not in use was kept in a state of proper repair (Preston 1819, 161). This would appear to be the same fort for which money was *"disbursed for the repair of a fort at Yarmouth pier and the pay of the soldiers employed therein"* in 1683 (Cal. Treas. Books 1683).

A map of Great Yarmouth dating to 1734 shows a defensive work termed 'Yarmouth Castle' immediately to the north of the north pier (NRO Y/PP 23). This work was still present on a map of 1832 (NRO CHC 5142). These maps also show smaller scale defensive batteries to the seaward side of the town itself.

A plan accompanying a report by J Walker, civil engineer, concerned primarily with the sand bar, piling to the brush and water flows shows the spatial relationship between the piers (and a proposed new north pier) and the fort, (Figure 10), (NRO Y/PH 103).

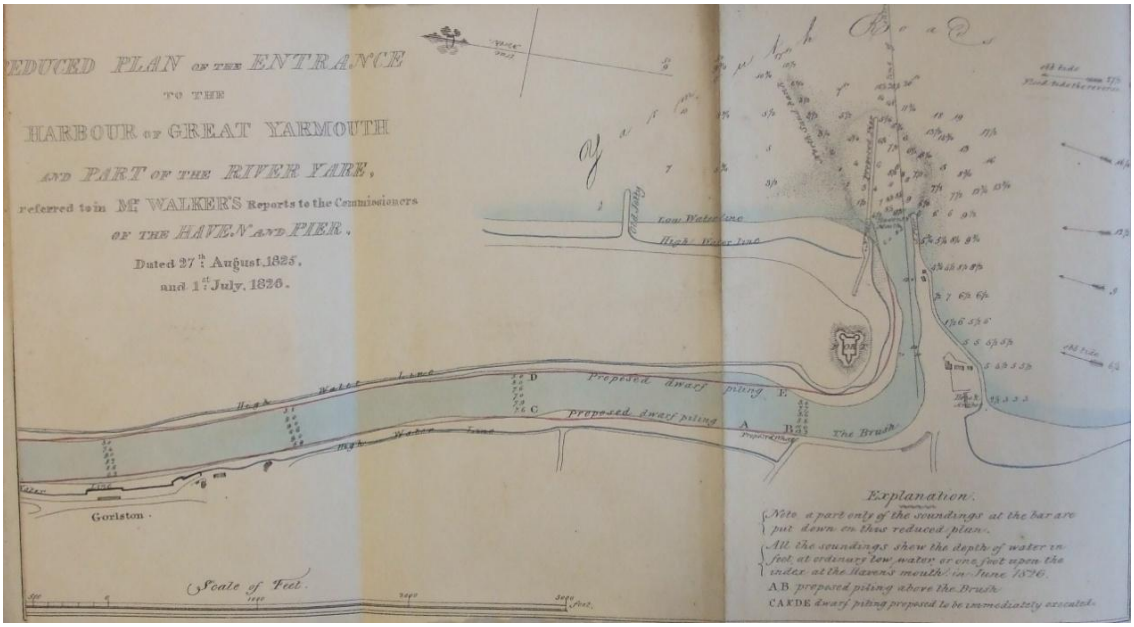

Figure 10, J Walkers plan of the haven, 1826, showing the relationship of the fort to the haven (NRO Y PH103)

Jetty

An open sided jetty of timber to the east of the town was built in 1808 (Preston 1819, 13). This was 453 feet (138m) in length and 20 feet (6.1m) wide, built of piles and with a decking of oak planks and guarded to both sides with a railing at breast height. Another writer in 1817 describes the jetty with slightly different dimensions, 456 feet (139m) long by 24 feet (7.3m) wide, and states that its predecessor was destroyed by a severe storm and very high tide in 1805 (Manby 1817, 69). Correspondence from the engineer to the haven, William Jessop, and the Haven Commissioners dating to 1808 indicates the ruinous state of the jetty and that *"tho' the old timbers may be of no use as part of a new jetty they will be of considerable use as scaffolding in driving the piles and in erection of a new one"* (NRO Y/PH 102). Jessop noted that the ruinous jetty was 400 feet (122m) long and, if the Admiralty would contribute funds for construction it should be rebuilt to 500 feet (152.4m) and have a 'T' shaped form to the head. The itemised estimates within the same document make it clear that the new structure, and seemingly its predecessor, was an open framed structure and not a timber-built seacoast pier as defined within this study. The list of required iron items in these estimates is of some interest and likely to be similar to that needed in the construction of a timber pier. These items consisted of bolts, 6 inch spikes, 12 inch spikes, stirrups and staples, pile shoes and scupper nails. Used by merchants and fishermen this jetty also served as a 'very agreeable promenade'. Preston claims that the first jetty on this site was built in 1560. Whilst this open sided jetty may well have had a precursor it is likely that Preston's 1560 jetty was in fact either the north or south piers which are referred to as *jettye/jetties* (see document of 1560 above). A jetty was certainly present at this location by the earlier years of the 18th century (NRO Y/PP 23), with another further to the south. By 1842 the jetty was no longer present (NRO CHC 5142).

Damage

There are many references to 'decay' and damage by 'the violence of the sea', rarely however, is the extent and nature of the damage stated. In 1612 great damage was done to

the piers by a raging tide; and the ground near the north pier was washed away to an extent of 40 feet (12.2m), and 6 feet (1.83m) in depth. Similar disastrous tides and storms occurred in 1623 and 1650 (Palmer 1854, 330). In 1717 great damage was done to the piers by a large tide (Palmer 1854, 331). In 1767 a gale of wind, with a high tide, carried away 100 feet of the jetty, whilst it was again carried away in 1791 (Palmer 1854, 331). In 1805 a great storm and raging tide nearly destroyed the jetty (Palmer 1854, 331).

Port rivalry

Throughout much of the medieval and earlier post-medieval periods there was an intense rivalry between Great Yarmouth and the Cinque Ports. The Cinque Ports had long been granted important trade and other privileges in return for annual military service, effectively providing much of a part-time navy. One of the Ports privileges was an administrative role in the annual herring fair of Great Yarmouth. At various times a state of de-facto war existed between the two parties. On one occasion when both Great Yarmouth and the Ports had fleets on military service in France they engaged one another (despite a warning from the king not to do so) and it was reported that Great Yarmouth alone lost 200 men in the engagement. Enormous fines were at some point/s levied against Great Yarmouth men for aggressive acts against the Ports. One wonders if the crown's persistent pre 17th century financial support for Great Yarmouth's haven was anything more than acts to benefit the town and wider state; for example, calculated support for a counterbalance to the power of the Cinque Ports? Great Yarmouth's early 17th century agreement with Scarborough may be no more than a financial arrangement beneficial to both parties, rather than, for example, the deliberate seeking of an ally in its long running dispute, as by this date the power of the Ports had waned considerably.

Bibliography

Primary sources

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Case study 12: Southwold

Introduction

The histories of the ports of Southwold and Walberswick (the latter a part of the secular manor of Blythburgh) together with that of Dunwich are inextricably intertwined. The rise of the former two and the fall of the third were directly owed to the oft changing courses of the River Blyth, to related natural coastal processes and to the conflicting claims of the their rival authorities. The rivalries and jealousies between the towns, which was regularly vented in legal dispute, sabotage and periodic acts of violence, were rooted in the economic benefits that primacy of one of their havens brought. Nonetheless, it was more the vagaries of the Blyth and ongoing coastal processes than human intervention that cast the final lots.

Southwold is located adjacent to the coast on slightly elevated ground around 2km to the north of the River Blyth and Blyth valley. A watercourse known as Buss creek skirts around the town on its west and northwest sides and feeds into the Blyth. Walberswick is located around 1km to the south of the Blyth and lies less than 0.5km from the sea. The scattering of houses which form present day Dunwich lie close to the shore and around 5km south-southwest of the Blyth. A small watercourse, Dunwich River, wends from the area of Dunwich on a course that reflects the arc of the coastline and feeds into the Blyth just short of its mouth (Figure 1).

Figure 1, The Southwold, Walberswick and Dunwich locale (source: Edina)

Summary of previous work and data sources

The towns, and to a lesser degree the havens, of Southwold, Walberswick and Dunwich have been studied by a number of local historians and commentators. The earliest local history of Dunwich, Southwold and Blythburgh was that of Thomas Gardner (Gardner 1754). A remarkable work for its time, much of Gardner's book is constructed around an extensive series of original documents drawn from both state and local sources. This work, which compiled information up to the mid 18th century, is regarded by many as an early example of modern historical scholarship and provides a very useful background to the towns. Robert Wake's 'Southwold and its vicinity, Ancient and modern' of 1839 was a more eclectic mixture of topics very much in the mould of the 19th century interests of the more affluent classes in local matters as diverse as history, flora and fauna, and scenic drives and rides. Although far less rigorous than Gardner in his use of historic material Wake's work referred to developments at Southwold harbour from the mid 18th century up to his own time. A number of publications by local man James Maggs form useful 19th century sources of information for the harbours and piers of Southwold/Walberswick. Maggs 'Handbook to the port and shipping of Southwold' of 1842 provides some information on the harbour gleaned from corporation records that may no longer be extant. Maggs was also an assiduous diary keeper and two volumes of these have been

published, the first covering the period 1818-48, the second 1848-76 (Bottomly 1983; Bottomly 1984). A wealth of local information covering events and incidents both large and small are contained within these diaries. With regard to the harbour and piers, details covering such matters as instances of blockage by sand, the appointment of harbour officials, public meetings about the state of the harbour and even a series of measurements, were noted by Maggs.

There are a number of 20th century histories of Dunwich and Southwold. Best known amongst these are Janet Becker's 'The story of Southwold' (Becker, 1948), Rowland Parker's 'Men of Dunwich' (Parker 1978) and Nicholas Comfort's 'The lost city of Dunwich' (Comfort 1994), which draw on a variety of published State Papers, the transcriptions of Gardner and other historic accounts. There is a strong tendency in many of these works not to exploit previously unpublished documentation and to be poorly referenced. A similar trend in selective appropriation is evident in a number of small booklet publications such as 'Southwold, Suffolk' (Carter and Bacon 1976), 'Transport in Southwold through the Ages' (Southwold Museum 1997) and 'Merchants and mariners of Southwold, (Lawrence 2005).

At the time of writing an on-going major research project involving English Heritage and the University of Southampton, amongst others, is investigating the lost town of Dunwich through a variety of media, including mapping, geophysical survey, historical study and diving. Certain results of the investigation to date are presented via a webite (Dunwich web pages.). To date this project provides little truly new information of direct relevance to this study.

Other useful published sources of information have included various State Papers, Reports of the Historical Manuscripts Commission, copies of Acts of Parliament, the Harleian Miscellany (volume III), publications dealing with such matters as the Bailiff's Minute Books of Dunwich, Suffolk wills, the manors of Suffolk, and a number of geomorphological reports. Unpublished sources include wills from the Norfolk and Suffolk (Ipswich branch) Record Offices and a variety of harbour related documents, principally engineers reports and accounts from the same Suffolk source. The corporation minute books of Southwold and a range of documentary material generated by the Southwold Harbour Commissioners were consulted in the Lowestoft branch of the Suffolk Record Office. Cartographic and pictorial material has been sourced from the

Suffolk Record Office (Ipswich and Lowestoft branches), Southwold Museum and a variety of published and web-based sources.

Geomorphology

The solid geology of this part of the Suffolk coastal region is of Pliocene and Pleistocene sediments and weakly cemented sedimentary rocks with a Holocene drift comprised mainly of alluvium. The drift deposits are concentrated in valleys and former small estuaries that were formed during the period of the last glaciation. The inland course of the River Blyth flows through such a valley. Sediment transport along the coastline is southwards and it is this that has resulted in the closure of the small estuaries (Environment Agency 2007, 39). Geological investigation has demonstrated considerable changes in sea level since the last Ice Age, both transgressive and regressive, whilst within the past 2000 years variations in weather and climate are known to have affected sediment transport patterns, local sediment budgets and morphological responses. The tidal range in this area is small with a spring tidal range at Southwold of 2m (French and Burningham 2003, 2).

Geomorphological changes to the coastline over the past 2000 years have been studied by Pye and Blott, (Pye and Blott, 2006). Employing historic maps, air photographs and bathymetric and lidar data they have produced a series of maps showing the evolution of the coast from Southwold to Dunwich (Figure 2). It can be seen that the Dunwich River once flowed into a large estuary, as the River Blyth may also have done, this being deflected by the kneck of land known as Kingsholme. Within the earlier medieval and medieval periods there was considerable loss of land to erosion on the open coast for which documentary references abound, whilst the southward drift of sediment also produced a lengthening of Kingsholme. It was during this time that Dunwich developed into a great town and port, with the port itself being centred within the estuary on the northern side of the town (Bailey 1992, 3-4). A great storm in 1328 finally blocked the haven of Dunwich with shingle and the River Blyth subsequently forced a new way to the sea further to the north. A number of attempts to cut a new channel to the sea near Dunwich failed and Dunwich entered a period of progressive decline. The Dunwich River created a route to join the River Blyth which now enters the sea through what is an

artificial cut closer to Southwold. Progressive coastal erosion has continued to claim land though present rates of erosion are believed to be much lower in the last 50 years than historically, this in part being owed to barriers and other defensive measures.

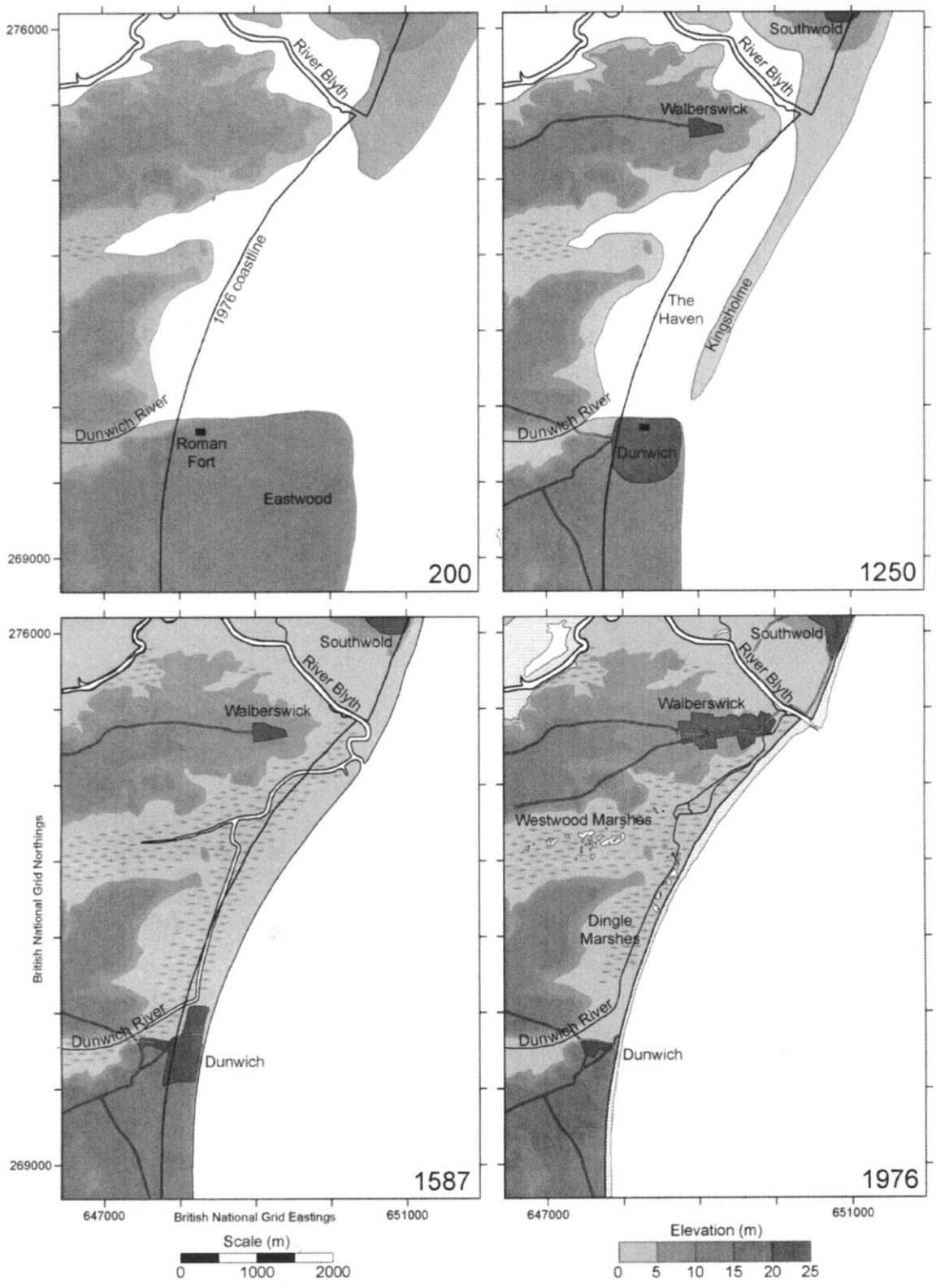

Figure 2, Geomorphological change in the Southwold, Walberswick, Dunwich area (from Pye and Blott, 2006)

The town's and their governance

By the time of the Domesday survey of 1086 Dunwich appears to have been a small town with 120 burgess families with a lesser number tied to the manor (Parker 1978, 25). After the Norman conquest Dunwich came into the hands of the king. It grew rapidly and by the late 12th century it was one of England's largest ports after London and Bristol, paying an annual fee-farm of £108 to the crown. By a charter of 1199 Dunwich became a free borough. On achieving this status the town was governed by an assembly of freemen burgesses with the daily running being undertaken by officers elected from this general body. Originally this was by 4 bailiffs and a mayor, this later being reduced to 2 bailiffs. These individuals were responsible for maintaining law and order, for some judicial functions and for the administration of the town's finances including taxation. Dunwich returned 2 members of parliament, who were normally burgesses of the town, to the House of Commons. Following marine incursions and decline, by the early 16th century Dunwich did not even rate in the top 50 English towns (Bailey 1992, 1-2). It was probably the loss of the town's 'natural harbour' that spelt the death knell. Areas of the town lost to erosion could arguably have been relocated further inland but it was simply not possible to replace a natural harbour on such an unstable coastline. This decline continued throughout the post-medieval period with the town becoming little more than a rotten borough of small village proportions.

Southwold was a manorial possession of the Abbey of St Edmunds prior to the Norman conquest and in 1086 is recorded as having 5 villeins and 4 bordars. In 1259 Southwold was exchanged with the Earl of Gloucester but in 1495 came into the hands of the king. By charter of 1504 Southwold became a free borough governed by two bailiff's – who also served as Justices of the Peace, a recorder and other lesser officials. The charter also granted two weekly markets and two annual fairs (Copinger 1908, 155-6).

The village of Walberswick again has early origins though always formed a part of the manorial holdings of nearby Blythburgh.

With considerable chronological overlap the rise in status and economic significance of Southwold, and to a fair degree that of Walberswick also, coincided with the progressive decline of Dunwich.

Environmental change, town rivalries and early port development

Documentary

It has been seen that the port of Dunwich was situated on the estuary to the north side of the town and south of Kingsholme and that the Blyth also appears to have flowed into this estuary. As a consequence vessels belonging to the then inland ports of Southwold and Walberswick were obliged to enter and leave via waters considered to be under the jurisdiction of Dunwich and for which a toll, payable to Dunwich, was demanded. Furthermore, Dunwich claimed legal right for merchandise for sale in vessels belonging to ports on the Blyth to be exposed firstly for sale in Dunwich. A charter of 1230 enshrined rights to Dunwich to collect tolls on ships bound for its rivals port and effectively allowed the town to dominate local trade (Bailey 1992, 11-13). It was perhaps inevitable that these claims, in what was essentially a shared haven, should lead to centuries of local dispute. Additional grievance was fuelled by rival claims to certain lands by both Dunwich and the manor of Bythburgh (Bailey 1992, 11-13). In this context we hear of legal complaint from the burgesses of Dunwich in 1281 (Cal. Pat. Rolls 1281). Wrangling over these matters was already long standing and appears to have been the cause of a raid by certain men of Dunwich in which a number of houses were raised by fire in Walberswick in 1216 (Parker 1978, 66-7). In 1299 ships belonging to the Earl of Gloucester's men were pillaged and sunk in the port of Southwold and others of his men prevented from putting into the port (Cal. Pat. Rolls 1299).

Legal processes favoured Dunwich as authority to stop-up a certain port north of Dunwich was granted in 1253 (Cal. Close Rolls 1253) whilst an entry in the Patent Rolls for 1300 states:

"on complaint by the burgesses of Dunwich that whereas heretofore they in conjunction with men of the adjoining parts stopped up a port at Suthewald by order of Henry III, and afterwards that port was in great part reopened by an inundation of the sea, whereby

merchants preferred to put in and take their goods there rather than Dunwich, and carried on trade and paid toll there, to the loss of the said burgesses of Dunwich, and on their complaint the king commanded the sheriff of Suffolk to inquire into the matter and to close the port again by distraint of the adjoining tenants, and whereas the said burgesses have by the king's command applied 2,000L. to the closing thereof, yet some persons have come by night and day and reopened that port, and have broken down certain causeways put within that port to strengthen the obstruction thereof, whereby the course of the water leading to Dunwich is impeded, so that merchants cannot come up to Dunwich as they were wont". (Cal. Pat. Rolls 1300).

A fascinating insight into the port rivalries, this entry is also of interest in that it is stated that the blocked up port was initially reopened by an inundation of the sea - this presumably being a re-breaching of the northern part of kingsholme. Such a breach presumably diverted waters from flowing out of, and scouring, the estuary on the north side of Dunwich. This may have hastened the blocking of the estuary.

Further complaints about the prevention of toll payments and the failure to expose merchandise for sale firstly in Dunwich continued into the 14th century and the claim of a legal right to the port at Walberswick was made the subject of enquiry of a commission (Cal. Pat. Rolls 1328; Cal. Pat. Rolls 1331a). The most villainous incident in this saga concerned the reported murder of sixteen men aboard a ship moored at Southwold and owned by Anastasia, widow of John But of Walberswyke, who had already had one ship stolen, its goods taken and the vessel sunk (Cal. Pat. Rolls 1331b). Similar legal disputes between Dunwich on the one hand and Southwold and Walberswick on the other were still ongoing in Chancery in the early 15th century (Cal. Pat. Rolls 1409). Aside from the disputes over the legal rights of the port, Dunwich was also keen to exclude any other economic rivalry and it is in this context that the burgesses tried to prevent neighbouring towns and religious houses from holding fairs and markets (Parliament Rolls 1379).

Dunwich was having problems keeping its port open in the later 13th century (Cal. Close Rolls 1250; Cal. Close Rolls 1253). It is thought that the effects of the great storm which blocked the port of Dunwich in 1328 are likely to have resulted in the Blyth forcing a breach to the sea. Dunwich was complaining in 1348 of their port being obstructed and it is probable that they were now obliged to reach this via the Blyth's breach. Things appear

to have become so desperate that in the same petition the burgesses requested that the town be taken into the kings hands and a keeper be appointed (Cal. Pat. Rolls 1348).

Gardner records a succession of five havens to the sea (Gardner 1754, 39-41). The first is represented by the early configuration of the Dunwich estuary, into which flowed the Dunwich River and probably the Blyth, and which was shielded on the east side by the spit of kingsholme. There is some evidence for a reconfiguration of this haven in the mid – late 13th century (Cal. Close Rolls 1250; Cal. Close Rolls 1253). With the blocking of this in 1328 the pressure of the pent up waters broke out to the sea nearly two miles to the north, i.e. much closer to Southwold. This marks the second haven which apparently suffered the same fate as the first. A third 'cut' (whose precise location is uncertain but is known to be close to the fourth haven), was fortified with a strong bank of 'ouze' and continued to function until 1464. Whether this originated as an artificially cut channel or not is uncertain. A fourth haven, called Hummerston's cut was dug out near the third haven but is said to have often been choked with sand and a new one was created to its north – though whether by 'natural' or human agency is unknown. In 1589 it was resolved to have a new cut but there was disagreement as to its location. The inhabitants of Dunwich wanted it nearer to their town, those of Walberswick and Southwold were for having it closer to Southwold. In the end, the inhabitants of Southwold and Walberswick forcibly opened up a cut, essentially creating a mouth in the area of the existing one. The result of this last disagreement between the towns resulted in a law suit that continued for ten years.

Port development 16th century – mid 18th century

Documentary

Thomas Gardner provides documentary evidence for harbour works, up to the mid 18th century, at Dunwich, Walberswick and Southwold, none of which fronted directly onto the seacoast. A few 15th – 17th century accounts for these Walberswick and Southwold 'keys' were transcribed by Gardner and indicate that at Walberswick they were timber-built and to have been at least partially secured with bolts. There was also a crane on this key and in 1571 an individual left £5 towards it (Gardner 1754, 162-3). The town 'key' of Southwold was again timber-built and employed piles, plank and wale's in its

construction (Gardner 1754, 163). At the time of Gardner's writing the remains of some of the old keys were still visible and evidence of warehouses, tackle houses, blubber pans, dwellings and shipbuilding grounds still survived. A will of 1531 is of particular interest as this left money for *"the reparation of the pere and the keye"* at Woods End (Gardner 1754, 214). Woods End was, and still is, entirely riverine and some considerable distance from the sea and the term pier is here clearly being used in an unusual sense, i.e. for a structure other than one projecting into the sea. Robert Wake refers to the repairing of *"two jetties"*, one of which was opposite the Dunwich River (Wake 1839, 251). It is probable that this was the *"old pier"* (n) that Gardner marked on his published map (see below). It is clear that some of these port facilities were in the corporate ownership of the individual settlements and that others were in private ownership.

The first mention of a seacoast pier is in a pamphlet written by Tobias Gentleman, a well to do fisherman and mariner, in 1614 (Harleian Miscellany 1745, 378-392). Gentleman's pamphlet was addressed to a Privy Counsellor and was essentially a call to promote and expand the national fishing industry. In discussing Southwold Gentleman states:

"But these men of this Place are greatly undone, by Reason their Haven is so bad, and in a Manner often stopped up with Beach and Chingle-stone, that the Wind, and the Tide, and the Sea do beat thither; so that, many Times in the Season, when they be ready to go to Sea; neither can they get in when they return from the Sea, but oftentimes do cast away their Goods and Themselves: This Haven, if that it had but a South Pier, built of Timber, would be a far better Haven than Yarmouth Haven, with one Quarter of the Cost that hath been bestowed on Yarmouth-haven: They are now suiters unto his Majesty, God grant they may speed; for it is pitiful the Trouble and Damage, that all the men of these three Towns (Southwold, Dunwich, Walberswick) *do daily sustain, by their naughty Harbour".*

This text bemoans the absence of a pier rather than the presence of one. It is curious that the problem was said to be the lack of a south pier. Given the southwards drift of sediment in this area it may be supposed that the most expedient way to maintain an open channel to the sea would have been thought to be the provision of a north pier. One reading of this text may lead to an assumption that a north pier already existed, however, no archival or cartographic evidence has been found in support of this and Gardner, who was well attuned to the maritime history of 'his patch' was seemingly not aware of any such pier either. Travel accounts, including Camden's topographic 'Britannia', which

comments on the harbour, makes no reference to any piers (Camden, 1971, 374-5). It may even be possible that volume III of the Harleian Miscellany, which was a bound re-publication of *"scarce, curious, and entertaining pamphlets and tracts, as well in manuscript as in print"* made a simple error and referred to a south pier instead of a north pier.

A rapprochement between the rival settlements of Dunwich, Southwold and Walberswick would appear to be indicated by a joint appeal to the crown for assistance in improving the haven – no doubt the suit referred to by Tobias Gentleman. That such an appeal could be made collectively is likely to be an indication of how far the fortunes of Dunwich had fallen. The once great town was so reduced by erosion and the loss of its once commodious haven that it could no longer behave as if it were still the major player. The various proclamations of the Letters Patent of 1619 granted for a collection for haven works clearly describe the port (singular) as of the towns of Dunwich, Southwold and Walberswick (EEBO 1). The single entrance to the assortment of public and private keys along the riverfronts was of common interest to all parties.

The Letters Patent reveal a number of points of relevance to the process of appealing for aid for harbour works. Upon the appeal of the inhabitants to the crown a number of knights and justices of Suffolk inspected the haven with *"divers artificers very skilfull & experienced in the faculty of waterworks, inquired and found that by pyling, peering, juttying, and other like artificial workmanship, there might be made a sufficient haven"*. Support for the cause, in the form of certificates testifying to the worth of the renovation of the haven were also forwarded by the gentry, justices, bailiffs and burgesses of nearby towns, as well as by Trinity House of Deptford. The wider benefits of new works were said to be the continuance of the towns (which might otherwise become depopulated), to the advantage of merchants, travellers, to the strength of the coast, to the continuance of fishing in the northern seas and as a source of mariner supply to the navy; in short it was seen as *"a work profitable to the common wealth"* and to *"the safetie and defence of that coast"*. In addition to the depredations of *"Dunkirkers"* and other *"pirats"*, 'natural processes', *"the great rage and fury of the sea",* were recognised as the root cause of many of the problems *"by reason of the northerne and northeast winds, and by the violence of the great tydes which have driven the said haven to the southwards many rods, for want of sufficient peering and pyling to stay the same"*. On the surface at least, this would seem to imply that it was believed that a pier or piers, perhaps together with

revetting of the sides of the channel leading to the sea, would stabilise the haven – just as it had at Great Yarmouth around half a century previously and in very similar circumstances. The knights and justices estimated the works would cost around £6000 and it was conceded that the towns were too impoverished to pay such a sum themselves. It had been intended to refer the matter to parliament, but this being inconveniently dissolved, a brief for collection throughout England and Wales was issued instead.

There is no evidence to suggest that any works that did take place as a result of this brief involved the construction of seacoast piers

Cartographic

The earliest known map that covers this area is Christopher Saxton's 1575 map of Suffolk, one of a series he drew that formed an atlas of England and Wales (British Library 1575). The scale of this map is such that port facilities in the area are not shown though it does show the River Blyth and Dunwich River flowing into the sea just to the south of Southwold.

The earliest deatailed map of the locality is that known as the Agas Map, (Figure 3). This purports to be a map showing the locale as it was in 1587 and is named after the renowned later 16th century cartographer Ralph Agas who is perhaps best known for his maps of London. Agas was a Suffolk man and is known to have carried out a survey in this area, indeed a written description of the area by him appears in Gardner's work (Gardner 1754, 20-22). However, the map that Gardner published is clearly a work of the 18th century. This is stylistically evident, for example, in the multi-lined convention depicting water along the coastline and rivers and equally so in the form of the script, let alone the fact that the detail map of Dunwich has a broken line depicting what was the *"Present Cliff"*. Geomorphological studies have accepted this map as representing the topography of 1589 though there is in fact no proof as to whether Gardner's map is actually a copy of one produced by Agas or one that was drawn to accommodate some of Agas's observations. Whatever the case may be, the map is still of considerable use as it shows the location of much of the non-seacoast infrastructure of the harbour that Gardner knew of through a combination of historic records and physical survival.

The map shows the location of the 16th century 'key' and port of Dunwich on the Dunwich River to the north side of the town (c), (d). The sea- link to this, and the other havens, was via a channel to the sea a short distance to the south of the present outlet with the former haven entrance of Hummerston's Cut (h) being shown to the south of this. Along the river's the old and new port facilities are indicated and listed. These are comprised of old Walberswick key (f), Walberswick key (r), Blackshore key (t), Reydon new key (3), Woods End Creek (u). The position of an old key (w) and new key (q) belonging to Southwold are indicated whilst the junction of the Blyth and Dunwich River's is referred to as new port (k). A site called old pier (n) and nearby new piers (pp) can both be seen to be riverine and not projections from the land out into the sea.

One interesting aspect of this map, which mirrors some of the terminology of the documentary evidence, is the use of the term 'pier' for a structure in a riverine context. The historical application of the terms, pier, key, jetty, etc. have been seen to show 'regional tendencies' but to retain some degree of inconsistency. Occasionally, for example, seacoast piers are referred to as jetties whilst the term key, which is generally used to describe a structure attached to the shore and running parallel to it, is again sometimes used for piers and more commonly for harbour complexes. Note also that the 16th century seacoast pier at Dunwich which was consistently referred to as a pier was in fact an anti erosion structure and there is no evidence for it serving port-like functions (see below). The broad use of the term pier in this area may be local phenomenon.

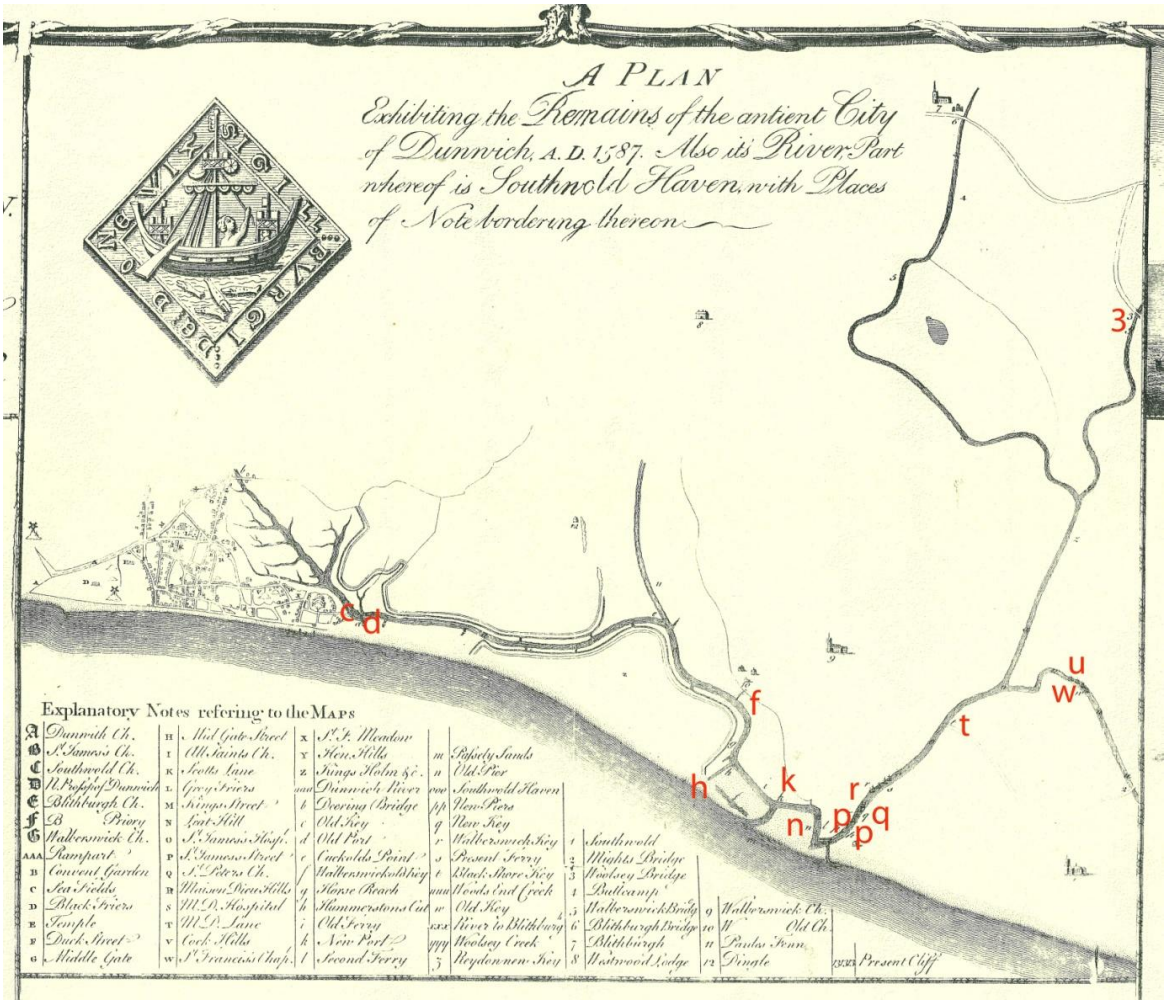

Figure 3, The 'Agas map' showing port structures mentioned by Gardner. North is to right (from Gardner 1754)

The piers

The earliest recorded seacoast pier, that of Dunwich was built in the early 16th century. None of the earlier havens detailed above, or rather the channels from the sea leading to them, is positively known to have possessed piers at their seaward ends.

Dunwich pier

Given the progressive southerly lengthening of the spit of Kingsholme it might be anticipated that attempts would have been made by the citizens of Dunwich to prevent the eventual blockage of the entrance to its haven by the construction of piers. Such an

arrangement could conceivably have comprised a north pier at, or close to, the southern tip of Kingsholme and even an opposing one on the northern side of the town.

In the context of the medieval port the Dunwich 2008 Project Report states: *"We know from records that the harbour had extensive infrastructure including piers to prevent sediment blocking the harbour mouth (Comfort 1994, Bacon and Bacon 1979, Parker 1975)"* (Sear et al 2009, 11). Curiously, none of the cited references does actually provide conclusive evidence, documentary, material or otherwise, for seacoast piers here. The books by Parker and Comfort are histories of the town, both based on published material. Much of this is derived from Gardner though Parker also drew heavily on published transcriptions of various State Papers. Comfort's reference to a pier is: *"Dunwich quay, known as the Daine, was the most sheltered point. Ships could tie up there, anchor in the haven or lie at a pier jutting from the opposite bank."* (presumably he means the southern tip of Kingsholme) (Comfort 1994, 35). No reference for this claim of a pier is given. The nearest Parker gets to the mention of a pier is his interpretation of what the re-making of the harbour (as mentioned in the Close Rolls for 1250) are likely to have been comprised of. In discussing the likelihood of a new channel being cut Parker states: *"It would be lined with a revetment of stout timbers on both sides, and very probably protected by a projecting groin on the north side."* (Parker 1978, 87). Parker's comment is entirely speculative and he does not make any claim for it being otherwise. These books were written for 'a more popular audience', undemanding of justificatory evidence and references, let alone extensive and accurate referencing. In these works it is not always easy to separate material and statements derived from original and secondary sources from speculation on the part of the author. I would suggest that the notion of a pier to this haven was originally derived from a statement by Gardner (see below). What is perhaps most surprising is that the Dunwich research project, with input from English Heritage and the University of Southampton, has in its turn picked up on unsupported claims by modern authors and presented the idea of a haven pier as 'a matter of fact'. This may be owed to a technological bias in the project.

There are at least two references in the State Papers to works at the port in the century prior to the blockage of the haven of Dunwich when the spit of Kingsholme is likely to have been fairly close to the northern side of the town (Cal. Close Rolls 1250), (Cal. Close Rolls 1253). In the first entry in the Close Rolls the king remits the town monies owed and promised to him for the town to use to remove and repair their port. In the

second entry remittance of the fee-farm was given as aid to works connected with an obstruction of their port. In neither entry is there reference to a pier or piers. Regarding material remains the 2008 Dunwich Report makes two references. The first is to *"periodic exposure of wooden piles from former harbour structures"* (Sear et al 2009, 20). The second is to: *"Recent exposure in 2005 of wooden piles on the foreshore to the north of the current car park that may have been associated with earlier attempts to constrain the position of the harbour and quays (Bacon pers. Comm.)."* (Sear et al 2009, 21). The suggested context of origin may be correct. No claim is made for these representing seacoast piers, and this would clearly be impossible on the present foreshore area given that any pier at the end of Kingsholme would now lie some distance out to sea.

In considering the haven at Dunwich Thomas Gardner states: *"ON the North Side of the Town was the entrance into the Haven which was very commodious to the Inhabitants for Transportation between their new Possessions and native Country, rendering the Town a mercantile Place of great Traffick, and the Emporium of these Parts. For its Safeguard, a Pier was erected on the North Side thereof, Part of the Key is yet obvious to all Travellers passing that Way, by Piles still standing; some of which are always exposed at low Water, and at Spring Tides, upwards of two hundred of them shew their Heads."* (Gardner 1754, 39). It is possible to interpret the second sentence as meaning a seacoast pier at the southern tip of Kingsholme. However, it cannot be certainly stated that this refers to the northern side of the port or the northern side of the town, which are different locations, and as has already seen the term 'pier' has been locally used, including by Gardner, to refer to projecting structures within estuaries i.e. not sea-coast piers. Furthermore, Gardner rather unusually does not explain his source. The last part of Gardner's second sentence regarding the piles appears to relate to the haven within the former estuary, not to a seacoast pier. Could it be that Gardner's reference to a pier in the first part of that sentence is in fact based on the observation of the estuarine piles in the last part of the same sentence?

There are only five documentary references to what was almost certainly a sea-pier at Dunwich and all occur within a time span limited to 34 years and are mostly of a testamentary nature. There are no known depictions or records of material remains.

In the will of Baty (Beatrice) Gosmere of Dunwich in 1510, she declared *"that John Brown of Dersham have my maser payinge therfor xl (40s) the whyche xl (40s) I geve*

toward the byldyng of the pere a geyn seynt Johnys church in Donwych" (SROI, IC/AA2/5/219).

In the same year the will of Robert Barker the rector of Huntyngfeld stated *"I will that all suche detts as be owing in esto(n?) to Syr John Barker my brother late of esto(n?) remayne to y?h? convnt of ffreiys in donwych x (s?) And the residue I will yt remayne to edyfieng and byldyng of the jety before the church of Sayent John to defende the vyolence of the sea"* (NRO, NCC will register, Spyltymber 303).

A further will, that of Edmunde Chever, a *"mariner" of "walbswyke",* dated 1543, mentions the same pier *"I gyve & bequeth to the repacon of Saynt Johns Pere (5? S?)"* (SROI, IC/AA2/14/406).

The sale of church goods belonging to St John's, Dunwich in the 1540s, with the proceeds going to the use of the pier is also recorded *"Also solde 1542 by thands of Thoms halydaye and Wyllm fflete & Robert Jackeson so muche plate as cumythe to the sme of xxi wch ys bestowed in making a pere for Imploymets the Defence of the churche and thole towne Also solde by thands of Wyllyam Burneston and Robert Jackeson 1544 so moche plate as amounteth to the sme of xvii Li wch ys bestowed lykewyse in making a pere"* (East Anglian 1886, 188).

This handful of brief, almost indirect, references to the pier are unusual. The willed monies nominally represent acts of charity and form only one of a number of such charitable gifts within each of the wills. Whilst the pier as a suitable recipient for such gifts was a conscious selection on the part of the testator, it was merely one of many and not necessarily singled out for exceptional treatment. The sale of church goods during the reign of Edward VI was common-place and was at least partially motivated by a desire to be rid of Romish baubles. The money raised by such sales was sometimes spent on causes beneficial to local communities. The income from similar, though larger scale, sales at Great Yarmouth were spent on the haven there as they also were at Melcombe Regis. All recorded funding for this pier then was essentially charitable. This was normally a source of relatively minor significance in the funding of pier projects. Were this pier to have been funded entirely by charitable means one suspects that it was not one of great proportions.

The function of the pier is stated in the documentary sources. Robert Barker's will intimates that it was to defend the church of St John's from "*the vyolence of the sea",* whilst the records of the church goods sale expand this to "*Defence of the churche and thole towne"*. There seems little reason to question the purported function of the pier. As such the Dunwich pier does not technically form a pier in the same sense as the other piers, i.e. as part of a port, within this study. Rather it purely forms a defence against erosion. St John's church stood by the market place in what was originally the centre of the town but such was the rate of land loss that by the mid 16th century it stood immediately adjacent to the sea (Gardner 1754, 47). Dunwich pier also represents an example of the limited interchangability of technical terms – a factor that repeats itself in a number of instances in this particular case study. It should be mentioned that there is no evidence of how this pier was built nor of its materials. However, given the traditions of the east coast it is probable that this pier was timber-built.

Southwold piers

Setting, materials and form of construction of the piers

The minutes of the Assembly of Southwold corporation of the early years of the 18th century contain a number of references to *"stopping up"* of the haven and the *"digging of a new haven"* (S. Assembly Bk. p.10, 42). Such works are likely to have involved redefinition of the channel of the Blyth where it meets the sea. In 1726 the Corporation resolved *"that two jettyes should be built out into the sea in such places and in such manner as the bailiffs and chamberlaine shall think proper"* (S. Assembly Bk. p. 53). This reference would seem to refer to sea-coast piers and not to riverine jetties. In 1731, 30 loads of timber at £2 9s per load were bought from Harry Stiles and W Johnson of Wrentham (north of Thetford and some 65km to the west of Southwold) for the repair of the jetty (S. Assembly Bk. p.84). In the same year it was resolved that *"an engineer to be sent for from Yarmouth to consult on the best and most proper means for the repair of the jetty"* (S. Assembly Bk. p.85). Further reference is made to this 'jetty' in 1736 *"considering the jetty belonging to ye said Town and Corporation being greatly broken down and carried away by raging tides and inundations and it being Judgd absolutely necessary to repaire ye said jetty again lest there should be no inlet for shipping for*

Traffick & commerce and considering ye great benefit & advantage it will be to our successors in this corporation afores'd ... in order to compleat ye said repairs to mortgage the Town land laying in ye comon ... for £150" (S. Assembly Bk. p.107). Taken together, these references support the notion that the corporation of Southwold may have built some sort of timber-built seacoast pier/s at the mouth of the Blyth in the earlier part of the 18th century. However, there remain enough ambiguities, both terminological and in the nature and wording of the documentary evidence, to prevent us asserting such as fact.

Following the first Act of Parliament for improving the harbour of Southwold in 1747 a north pier was built at the mouth of the Blyth in 1749 with this being followed by a south pier in 1752. The historian Gardner was witness to these events and dedicated his book to the new body of Harbour Commissioners who took over responsibility of the haven from the corporation (Gardner 1754, 41; Jenkins 1907, xi; HA11/B1/12/16). Prior to the building of the piers the cut leading to the sea was wont to shift its location slightly, the precise direction of this being owed to wind and current. In 1747 the commissioners of the harbour advertised for *"persons to survey the haven and river, and to give in plans of the manner of improving the same"*. (HA11/B7/2, 14). The north pier was built following a survey by a Mr Reynolds whilst the south pier was built under a contract with the same surveyor for a sum of £506 8s 6d (Maggs 1842, xi). A new north pier was built in 1780 to a plan by a Mr Hayward (HA11/B7/2, 14), and in 1806 the south pier was extended with other additions being made at other times (HA11/B1/12/16). It proved necessary to extend the piers inland in the late years of the 18th century and breakwaters to parts of the exterior sides were subsequently added. The core of the 1780 north pier and that of the extended south pier of 1752 survived until the earliest years of the 20th century; as they appeared in1830 is shown in Figure 4.

Figure 4, Extract of 1830 plan of Southwold harbour by T.W Ellis (Suffolk Record Office, Ipwswich, B15082.23)

Technical descriptions of the physical structure of the piers are very thin on the ground. There are printed abstracts of the treasurers yearly accounts for 1836 (HA11/B1/88) and 1856 (HA11/B7/10) and a number of accounts records of the commissioners held under 491/20c/ (Suffolk Record Office, Lowestoft branch). These show the largest sums of expenditure to have been paid towards labour, timber, blacksmith's work and paint but are no more explicit than these titles. There are also a number of 19th century tradesmen's invoices to the commissioners, e.g. (491/20c/22-23, 29). These detail various pieces of equipment purchased by the commissioners such as spikes, nails, augers, files, tar, bolts, wedges, grease, etc. One of the more useful records are the earlier 19th century 'Surveyors Books' of the commissioners. Although these provide only limited clues as to work being undertaken at the haven they do supply information on materials and their uses (491/20c/17). Further clues as to the nature of works carried out at the piers are provided

by ‘Weekly Labour Books’, that for the period 1867-73 being particularly informative (491/20E/4). This book indicates regular and continuous repair to the haven such as: repairing tool house, clearing and removing soil (sediment), preparing and fitting shoes to piles and sheet piles, drawing old piles prior to the commencement of new work, driving sheet piles at the piers, fixing lower and upper wale planks, repairing the engines (piling equipment) and boats (there are several of each of these belonging to the commissioners), repairing capstans and mooring posts and making a shed for the protection of timber and materials from the weather. Similar information is provided by a Work Book of 1836-44 (491/20C/20). These books also provide a limited view into the workforce employed by the commissioners. Only three categories of worker are mentioned: carpenters, labourers and boys. Few seem to have been permanently employed, the majority being employed on a daily basis with rates of between 2s and 3s 6d per day in the period 1867-73. There is little evidence to be found in these records that would suggest large-scale campaigns of pier rebuilding after 1806, with most work seemingly being on a repair and maintenance basis.

The environmental setting of Southwold haven was always problematic, consequently a number of engineers, including John Rennie, John Drury, William Teasdel, Cubitt, Jessup and James Walker were called upon to tender advice for improvement. In at least one case, that of John Drury, an engineer was employed to survey and report on the harbour and *“was subsequently employed by the commissioners as a surveyor for 14-15 years in constructing, repairing, and lengthening the piers, and carrying other works into execution for the improvement of the harbour”* (HA11/B7/2, 14). Some of these reports provide brief descriptions of the piers. In James Walker’s report the north pier is said to be *“close piled on both side”* and the south pier to be *“close piled on the north, or harbour side only”* i.e. edge to edge driven piles (HA/11/B7/4, 16).

Timber

There are records specifically stating the species of timber used in the construction of the piers though James Walker’s report of 1841 states that *“the piers are chiefly of fir timber”* (HA/11/B7/4, 6). William Teasdel’s report to the commissioners in 1856 which considered an extension of the north pier stated that *“The cost of such work of fir timber would be £10 10s per foot; if oak 25 per cent more”* (Teasdel 1856, 2). The most useful

records for timber are the earlier 19th century 'Surveyors Books' of the commissioners. These list quantities of timber by name, the most common being Riga fir, American pine or fir, American birch, and Norway fir. Lesser amounts of Memel fir, Baltic fir, Dantzic fir, Petersburg deals and yellow pine are also mentioned as occasionally is oak and a single reference to elm. Clearly timber was widely sourced, the majority seemingly being derived from the Baltic area, some from North America with perhaps only a small amount originating in England. This timber was being utilised for piling, joists, stanchions, beams, braces, staging and trestles' oak only being mentioned in reference to floors, beams and planks (491/20c/17).

Excepting maps and plans the earliest depiction of Southwold piers is an engraving of 1822 which shows the basic form of construction (Figure 5). The inner wall of the north pier appears to be of close piling (i.e. piles driven edge to edge) whilst the profile of the end of the pier suggests these to have been driven at a steep, but not vertical, angle. Towards the top of the pier a stout horizontal wooden rail can be seen. This appears to have helped retain the pile sides in alignment and is likely to have been connected internally to a series of tie-beams or other structural members. Visible areas of decking are all of laterally lain timber plank.

Ellis's plan of 1830 indicates the north pier to be around 40 yards (36.5m) long by around 5 yards (4.6m) wide and the south pier to be around 60 yards (54.9m) long by around 8 yards (7.3m) wide. The ends of the piers are not square, the north seemingly forming a blunt point and the south being slightly rounded. The northern side of the west end of the north pier splays out slightly, at an angle similar to that of the breakwater which butts up to it. A breakwater at a similar splayed angle is also evident to the south side of the south pier. From the western ends of both piers timber revetting to the sides of the channel holding the Blyth extends some way up river. In 1841 James Walker described the piers as being nearly parallel to each other, and 115 feet (35m) apart at the entrance (HA/11/B7/4, 6).

Figure 5, Engraving of Southwold piers, 1822, looking north (Southwold Museum)

Some plans, elevations and sections drawn up for the early 20th century rebuilding of the piers in timber still exist as do a number of photographs depicting the works in progress. These are depicted in Figures 6, 7, and 8. It is clear from notes on these drawings that at least some of the landward parts of the existing piers were retained during the initial works. The drawn and photographic record indicate that the piers were timber-built and had angled sides. The heart of the pier system was comprised of a single central line of vertically driven piles with sides of angle driven piles, all metal shod at their tips. These 'main piles' were each 1 foot (0.3m) square and 36 feet (11m) long – a significant proportion of which was driven into the sediment. The longitudinal distance between each of these piles was 10 foot (3.05m). Within the upper part of this arrangement there were three sets of tie-beams (referred to as *"cross walings"* whilst two pairs of *"cross braces"* reinforced this arrangement. These subsidiary elements were each of a cross section of 12 inches (0.3m) x 6 inches (0.15m). Against the outer sides of this framework 2 parallel sets of horizontal timbers referred to simply as *"waling"* and of a cross section of 12 inches,

were constructed. Driven hard against these, and at the same angle as the outer main piles, were the *"sheet piles"* that formed the outer skin of the pier. These were of a size 12 inches x 6 inches and were close driven i.e. butted edge to edge. The only elements external to the sheet piles were two lines of outer waling – directly opposite the inner waling. Plans within this set of drawings show the pier to be formed of bays, each unit being defined by the major piles and associated tie-beams and bracing.

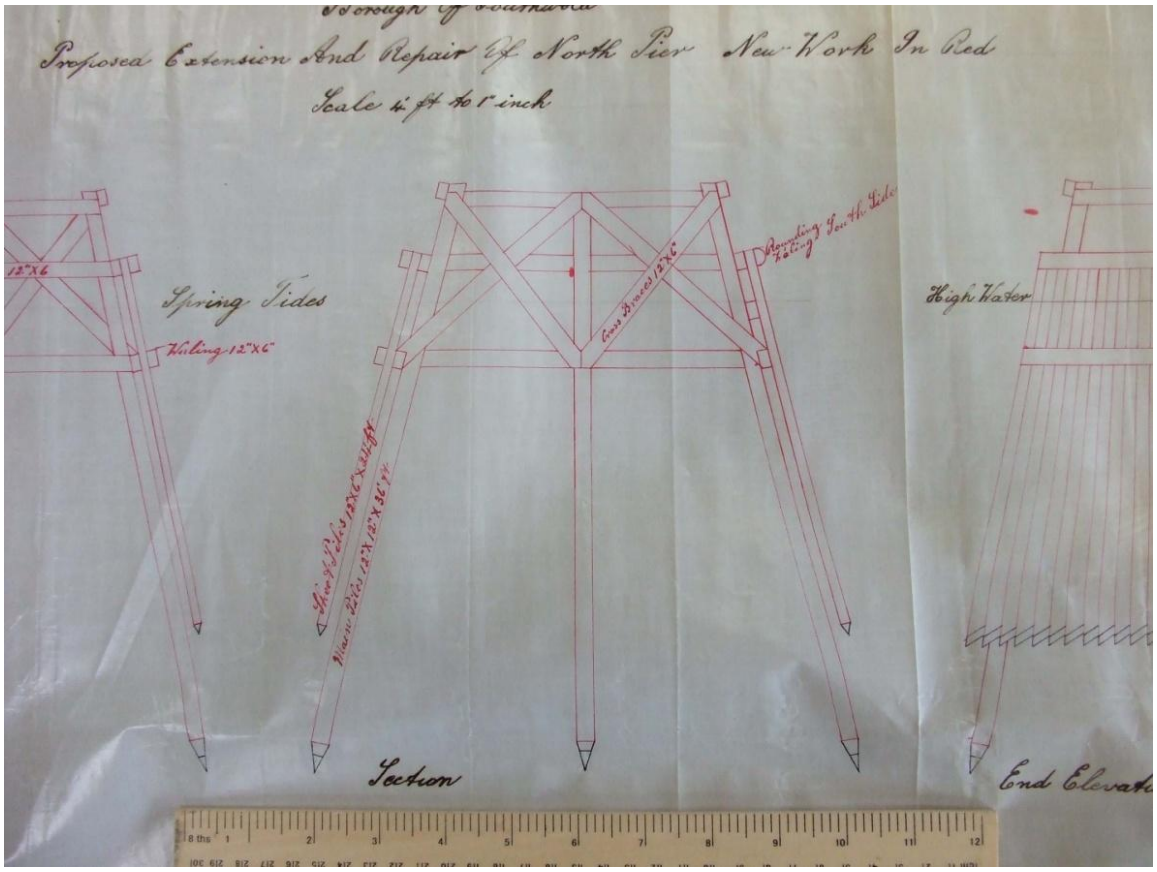

Figure 6, Section, from drawing of 1902 for North Pier rebuilding/extension (1312/6/8)

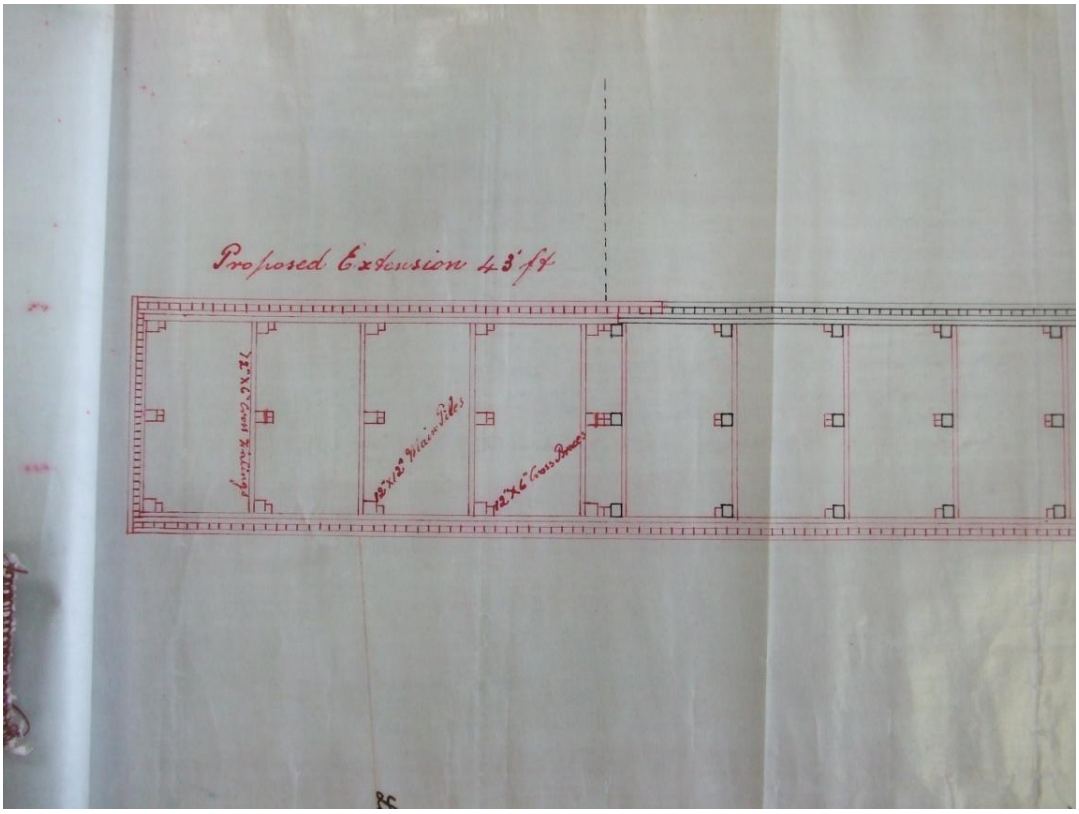

Figure 7, Plan, from drawing of 1902 for North Pier rebuilding/extension (1312/6/8)

Figure 8, Photograph of rebuilding of North Pier, early years of 20th century (Southwold Museum)

Material remains (Figures 9, 10, 11, 12)

Since the 1930s the piers at Southwold have been built of steel and concrete. Immediately to the south of the existing south pier however there are a number of parallel aligned close pile arrangements of timber orientated at a slight angle to the piers. The more complete of these (closest to the existing pier) extend for a distance in excess of 50m. The staggered northernmost line is driven at an angle of around 5 degrees from the vertical as is much of the adjacent and incomplete line a few metres to the south. It is tentatively suggested that these relate to elements of the 19th century timber south pier with the staggered part projecting slightly to the north representing repair work to this landward part of the pier in the early years of the 20th century. The shorter discontinuous lines of piles to the south of this may have formed part of the breakwaters known to have existed adjacent to the piers from at least the early 19th century. The observed piles are in many places of quite 'knotty' appearance and seem likely to be of some sort of pine.

Figure 9, Last of the timber pier. Photograph of 1936 showing landward end of south pier with adjacent parallel pile alignments (Southwold Museum)

Figure 10, Remnants of the last of the timber south pier? (staggered line to left representing inner side and line of piles to right of this the outer side? Piles to extreme right may relate to piles to south of 1936 pier in old photograph above?)

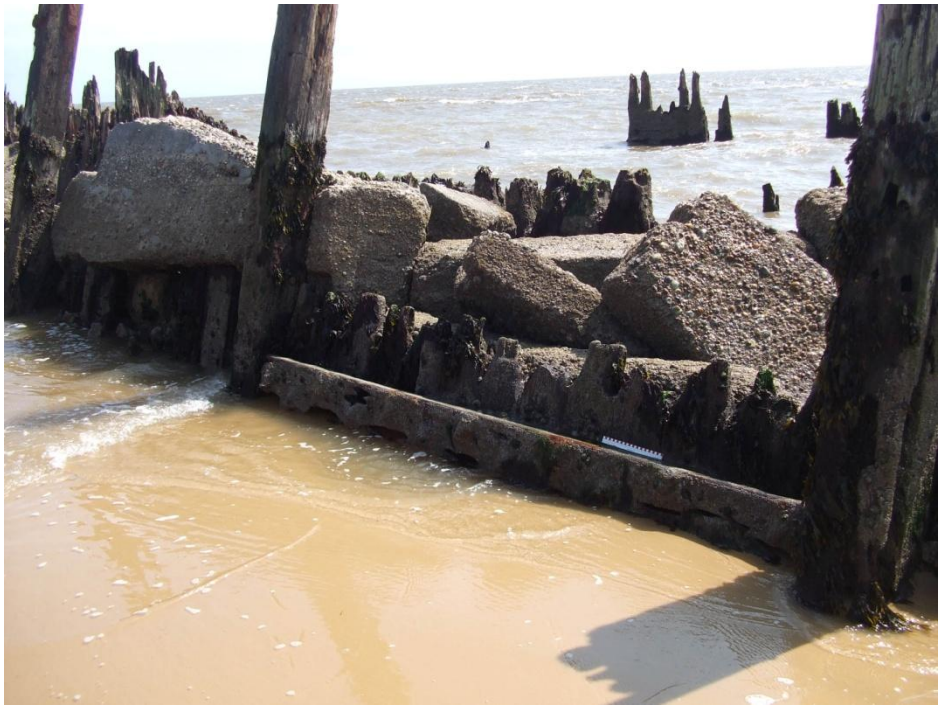

Figure 11, Detail photograph of the staggered projection to left side of photograph above. Angle driven main (tall) 300mm square piles, each spaced 3.50m apart. Close

spaced driven timber sheet piles (260 x 130mm) between main piles – each bolted to horizontal timber to front and rear. The large blocks behind are in fact concrete with that directly behind the timber being cast directly against it – seemingly work of the early years of the 20th century and representing repair/widening of part of the inner face of the south pier. Note that bolts are present to all elements of this northmost staggered line of piles.

Figure 12, Oblique aerial photograph of Southwold harbour piers, looking NE. The material remains of older work are visible to the south side of the south pier (photo accessed via web)

Ownership, control and funding

It has already been noted above that prior to the building of the seacoast piers at Southwold the various keys and piers (jetties) within the river systems of the Blyth were held both privately and publicly by individuals, and the townships, of Southwold,

Walberswick and Dunwich. Further upstream there were also keys belonging to Blythburgh and Reydon. The control and funding of these was likewise by private and corporate means. At least two individuals are known to have left monies for the repair and mending of such keys in the 16th century (Gardner 1754, 214). Until the 17th century there appears to have been no single body responsible for controlling the harbour. The legal suit of Dunwich against Southwold and Walberswick following the creation of the cut to the sea close to that of the present by the latter two appears to have left control of the haven in the hands of Southwold and Walberswick. Nonetheless, the brief for national collection of 1619 does refers to the *"townes of Donwich, Southwold and Walberswicke"* and so such possession does not appear to have been exclusive. Again, a petition in the names of Southwold and Dunwich for a Bill to enable the imposition of a rate on goods imported in and out of the haven, and to be used for the maintenance of the haven, was made in 1657 (H. Commons Journal 1657). Around 1688 a group of commissioners, who had been required to ascertain the limits of every port in the kingdom, referred to the port of Southwold, a member of the port of Great Yarmouth, and made no mention of either Dunwich or Walberswick (Maggs 1842, vii). The bounds of this port are detailed as extending as far south as Thorpness, just to the north of Aldeburgh (Gardner 1754, 215). As such, Dunwich and Walberswick were administratively at least considered to be parts of the port of Southwold. By this date Southwold was certainly the pre-eminent of the towns in terms of size and economy and it is likely that control of the port and harbour became vested in its corporation. From the later 17th century the records of the Corporation of Southwold make reference to works and maintenance at the haven and in 1723 appeals to collect *"aid from the gentlemen in the country"* were issued by the Assembly of the town (S. Assembly Bk, p. 42). Around the same time the town was also funding stopping-up and digging works at the haven which seem likely to relate to attempts to redefine the mouth of the Blyth. In the same year it was agreed to mortgage the revenue of the town for the next year to make up any deficiency (Maggs 1842, ix). Similar appeals to the gentlemen were made in 1733 and 1741(S. Assembly Bk, p. 24, 149).

The north seacoast pier was built at Southwold in 1747 and the south pier in 1752. These were built under authority of an Act of Parliament of 1747 that vested control of the harbour in a body of appointed commissioners, which originally included the bailiff's of

Southwold (HCP 1747). By this time authority over many of the seaports of England were in the hands of such commissioners rather than in the corporations of towns.

This change of responsibility/control for the haven from the town to a body of commissioners does not appear to have offended civic pride as in 1745 the corporation actually voted £50 towards obtaining the Act (S. Assembly Bk. p.170). Further, in 1749 and 1752 the corporation voted £50 towards the building of the north and south piers (S. Assembly Bk. p.184, 192). This attitude may have been engendered by the fact that the town had some representation within the body of commissioners and its accounts were to be available for inspection by the corporation. It may also been felt that any loss of control was compensated for by avoidance of direct financial responsibility and outlay.

Investment in the piers and harbour developed into a wider scheme of economic development. One strand of this was the setting up of a station of the Free British Fishery, a venture to expand the national fishing industry and challenge the supremacy of the Dutch which was assisted by government bounties. Another was the canalisation of the upper reaches of the Blyth to better aid export of agricultural produce from inland areas via Southwold harbour. The commissioners were responsible for maintenance and construction works and for the appointment of harbour masters and engineers. Income for such undertakings was primarily from duties imposed on a very wide range of incoming goods, double duties being paid by foreign vessels. No goods could clear customs until duties had been paid. The commissioners were also allowed to borrow money for harbour works on the security of future profits, for example a loan of £100 from the Corporation of Southwold during the 1830s (Wake 1839, 132). The commissioners records also contain a number of later 18th and early 19th century legal documents which mortgaged their future income for the loan of sums of ready money from private individuals, typically at an interest rate of 5% per annum (491/20C/19, 20,21,22,24). The majority of the commissioners were drawn from the landed classes and normally included several titled individuals. Upon the death or retirement of a commissioner the remainder selected a replacement; they were effectively a self perpetuating oligarchy. As at other harbour sites such Acts ran for certain time periods, most commonly 21 years, though were always replaced by new Acts. Replacement Acts tended to replicate the same powers, occasionally expanding them, particularly in light of new or changed circumstances. By the time of the 1809 Act for Southwold the list of harbour officers that could be appointed by the commissioners had grown to treasurer and clerk, collector or collectors, surveyor

or surveyors, haven master or haven masters as well as any other such officers as they should think fit whilst the power to enable bye-laws was also within their remit (HCP 1809).

The Act of 1830 specified certain fiscal criteria that any potential commissioner had to meet, namely residency within the county and an income of £100 or being an heir apparent to someone with an income of £200 (HCP 1830). Control by such a self selecting elite drawn primarily from the landed classes was not without criticism, even from quasi-governmental bodies. The report for 1845-6 of the Tidal Harbours Commission, for example, commented on the fact that the body of commissioners contained only one sailor (Tidal Harbours Commission 1846, 14). Some sensitivity to criticism by the Commissioners is indicated by an extensive statement printed by them in 1847 in which they denied that landed, fishing and corporation interests had been preferred at the expense of merchants, ship-owners and navigation generally and claimed that they were doing as much for the harbour as they could with an income of little over £1000 (HA11/B1/12/16). In the later half of the 19th century the trade of the harbour is said to have declined considerably and its infrastructure to have been in a state of great disrepair (Southwold Museum 1997, 2).

Anxious not to lose its harbour the Corporation of Southwold stepped into the breach and by Act of Parliament of 1898 re-assumed control of the haven. The Act stated that *"no adequate provision for the maintenance of the harbour has for several years prior to the commencement of this order been made by the commissioners and considerable sums of money will have to be expended in restoring it to a state of efficiency"* (HCP 1898). In order to reinvigorate the haven, and with the support of the Board of Trade, the harbour was sold to the Southwold Harbour Company, with details being set down in an Act of Parliament of 1907 (HCP 1907). The new harbour company was owned by the Fasey brothers of Essex, successful public works contractors who agreed to spend at least £45,000 on improving the harbour – though with substantial parts of these costs coming from government grants. This transference to subsidised private enterprise did result in the piers being rebuilt, in timber again, and for a short while trade did increase.

Prior to World War I the harbour was once again in a dilapidated state and yet again the corporation intervened. An Act of Parliament of 1932 facilitated the re-purchase of the harbour by the corporation for a nominal sum from the long bankrupt harbour company

(HCP 1932). Administration of the haven was now by a Harbour Committee. The piers were largely rebuilt in 1936 with reinforced concrete (Becker 1948, 66).

Environmental factors

Environmental studies have shown that the coastal geomorphology of the Dunwich – Southwold area has been subject to considerable change in the historic past. The same applies to much of the Suffolk/Norfolk coast and parallels for the development of long spits similar to that of Kingsholme can be found at Yarmouth and Aldeburgh. At Yarmouth a succession of artificial channels were cut to the sea with the construction of piers and revetment of the river finally stabilising the position in the 16th century. On a smaller scale and at a later date, the 18th century works at Southwold largely mirror that of Yarmouth. At Aldeburgh medieval and post-medieval navigation was along the river to the landward side of the spit which appears historically to have remained open and never to have required piers. At Southwold the succession of human cut channels, never fully stabilised the course of the Blyth and Dunwich Creek to the sea. The 1590 cutting of the channel from the Blyth, which broadly equates to that of today, is reported as having regularly *"shifted about according to the wind over a range of about 400 yards on each side of the present entrance"* (Cooper 1907, x). Further, the mouth was also often said to be stopped up by shifting sediment (HA11/B7/2, 10). The principal aims of building the piers at Southwold in 1747-52 were firstly to regularise and constrain the entrance to the sea and secondly, to prevent blockages of the harbour mouth. The first of these aims was recognised in various engineers reports to have been successfully met, although in addition to the piers this also required revetment of the sides of the Blyth for several hundred metres inland – much as was the case at Great Yarmouth in broadly similar environmental circumstances. There is no doubt, considering Tobias Gentleman's pamphlet of 1614, let alone the experience of Yarmouth not far distant to the north, that it was long recognised that piers would accomplish this. The fact that piers were not built at an earlier date may have been partly due to the feuding between Southwold/Walberswick on the one hand and Dunwich on the other, particularly the disagreement of the late 16th century as to where a new cut to the sea should be built. This dilemma was only resolved when the former townships took the initiative into their own hands. Perhaps of equal importance in this delayed action, if not more so, was a lack of sufficient funds.

Although the building of the piers did regularise the course of the Blyth to the sea they did not, in the longer term, prevent blockages to the harbour mouth, a fact evident from a number of engineers reports and from observers such as James Maggs. In the period 1808 - 1827 Maggs reported the blockage of the mouth 13 times and the expense of manually clearing this at £310 5 s (Bottomly 1983, 65). Maggs also records other instances of blockages both before and after this date. Many considered that the piers did not make much difference to the occurrences of blockages, the engineer Ellis commented that the piers did *"not appear by the result that they ever tended to prevent the blocking up of the entrance"* (HA11/B7/2, 10). Again, all engineers reports are unanimous in their understanding of why this was so. In essence, once the piers were built sediment progressively accumulated against, and to the north of, the north pier. This build-up started at the landward end and over time expanded eastwards towards the end of the pier. Once this build-up reached the end of the pier further sediment was deposited to the south side of the head creating a bar between and beyond the ends of both piers. In situations where a river runs through the piers to the sea, as at Southwold, the flows are to some degree rendered neutral at their point of junction and sediment that was once in suspension is more readily deposited. Extensions to both piers were only temporary expedients as the sediment would merely repeat its earlier pattern. This was succinctly expressed by Ellis *"When piers are extended in a moving soil, the space fills up on either side, shoaling the water at the extremity and carrying the bar further out, thus frustrating the object sought to be obtained. The extension of piers in such a case to obtain deep water at the end of them is a delusion; for in proportion as the piers are carried out to sea, in that proportion will the bar be removed from them"* (HA11/B7/2, 12). The instances of near total blockages of the harbour mouth, as opposed to the permanent presence of the bar (which itself could shift slightly depending upon the direction of the prevailing wind), were most commonly caused by gales and winds from the east and north-east (HA11/B7/2, 11-12). Although such obstructions could, at expense, be removed by human effort, significant alterations in the wind. South and west winds, could also 'naturally' clear parts of such blockages.

The level of understanding in how to maintain a static permanent channel to the sea would appear to be as comprehensively understood Southwold as it was at Great Yarmouth in the mid 16th century; this being achieved with piers and river revetments. Exactly why bars and blockages occurred once piers had been built in environmental

settings such as this (i.e. twin piers with north – south drift of sediment) was also understood, at least by the 18th century, if not earlier. Very similar problems were faced at Bridlington and Yarmouth where successive pier extensions only served to move the bars further out. The net result of these processes was typically to create periodic occasions when vessels, at least for those of certain draughts, were denied access into the havens. Alternative means had to be sought. At Southwold, the situation was exacerbated by the low tidal range and often a lighter was used to transfer goods from larger vessels (Maggs 1842, xii). This was also the case at Yarmouth, where capstans on the pier heads were also used for drawing vessels over the bar. Certain blockages could be manually dug out, though this was not so readily achieved for bars below the surface of the water. Dredgers, powered by horse and later by steam, could also be used and although expensive could work quickly and even reduce, in the very short term, the effect of bars.

There was an additional problem at Southwold, as at Yarmouth, namely the successive intakes and embanking of saltmarsh for agrarian purposes. Such embankments excluded the inflow of tidal waters, the return of which to the sea has the potential for scouring and therefore clearing the harbour of sediment and obstructions. That such was causing problems for the haven appears to have been recognised by 1634, and in consequence of the decay of the haven and its likelihood of being blocked, the Privy Council instituted an enquiry into heading banks and sluices that had been constructed for private gain (Trinity House 1634), (Cal. S.P. Dom. 1634). Even Southwold Corporation itself enclosed areas of tidal saltings (Becker 1947, 59). By the early 19th century the problem was being quantified by engineers. Using figures calculated by James Walker the Tidal Harbours Commission stated that the spring tide waters of the Blyth formerly covered an area of around 2000 acres and that by the earlier 19th century this had been reduced to around 450 acres by successive embanking. This embanking effectively excluded around 4,500,000 tons of water at each tide which led to an enormous loss of scour (Tidal Harbours Commission 1846, 13). It was equally recognised by the 19th century that there was doubt about the lawfulness of attempting to remove such enclosures and that proposals to do so would be subject to opposition from the landed classes (HA/11/B7/4, 21).

The 19th century engineers inspecting Southwold haven could already draw on the engineering and technical knowledge of their professional forebears, particularly those of the 18th century who had increasingly applyied mathematics and ‘science’ in their work in addition to observation. The engineers at Southwold were measuring tidal ranges, speeds

of flow of the Blyth, calculating volumes of water and drawing plans and sections showing depths of water. Their written reports were thoughtfully structured, typically they begin by explaining the problems and its history, recounting previous attempts to resolve these and finally by expounding their own solution/s and the rationale behind these. Virtually all engineers agreed with certain points i.e.: piers and associated works fix the courses of channels to the sea, that N-S drift builds up sediment to the N side of a N pier and will in most cases eventually lead to the creation of a bar, that winds from certain directions will lead to blockages and that the exclusion of tidal waters will lead to the loss of scour. Engineers disagreed however, on how these matters could be resolved. That this was so would seem to be owed to levels of accrued knowledge and past experience which had already come to grips with fixing the courses of channels, with comprehending the basics of longshore drift and with elementary hydrodynamics. These factors were sufficiently understood to be readily, if expensively, overcome. Those factors which had not been successfully overcome, or even attempted, was where the problems lay and where disagreement could be found. Increased technical efficiency rather than enlightened design resolved some of Southwold's problems, particularly the steam dredger which could deepen the channel of the Blyth from some distance upstream to the haven mouth.

The principal point of disagreement between various engineers was over the form and lengths of the piers. Rennie considered that the piers were probably of the correct length and that both north and south should be of the same length (HA11/B7/2, 17), whilst in 1812 Smith considered that they already *"extend beyond the proper range"* and further that they were *"trumpet mouthed"* and *"do not stand in the right direction"* (HA11/B7/2, 15). In his report of 1841 James Walker considered that the gap between the piers was too great for the current to keep it clear, but that were it to be narrowed this would entail considerable expense and make it too narrow for vessels to enter in rough weather. Walker summarised the range of opinions on the length of the piers: *"some arguing for the extension of the south pier; others for adding to the north pier; some for the extension of both piers; and others for their entire removal"* (HA/11/B7/4, 12). Walker favoured the extension of both piers at equal length into slightly deeper water and forwarded his arguments for this case. Edward Calver, an admiralty surveyor, proposed the extension of both piers with two walls of close piling, one extending from the north pier, the other from the south pier (Figure 13), (627.3 1844). These would extend the length of the piers

by around 130 feet (39.6m), tapered towards the mouth and would be orientated in a slightly more northerly direction than the piers themselves. Calver argued his case over several pages and countered Walker's navigational concerns by suggesting that in anything worse than moderate weather alternative ports, namely Lowestoft or Harwich, should be used. As it happened there was no significant work to the form or length of the piers after 1806, most works being restricted to the river, and so the ideas and theorising, which in this particular environmental setting may not previously have been experienced, were never tested. A quote from Rennie recounted by Ellis would seem to ring true: *"there are so many circumstances over which works of art can have little or no control, that even the principles, though just in themselves, are so affected by storms, and by the change of banks to sea-ward, that what in one case is perfectly well calculated to effect the object in view, is entirely changed when a change of banks or currents without the harbour's mouth, gives a different direction to the currents, or exposes the entrance of the harbour to a swell of sea, which had not been foreseen"* (HA11/B7/2, 6-7). A lack of understanding of the complex and unpredictable variables may be less now than it was in the 19th century, though the loss of the beach at Gorleston as a direct result of the replacement of the piers at Great Yarmouth in the 1960s suggests that even this is within tolerances.

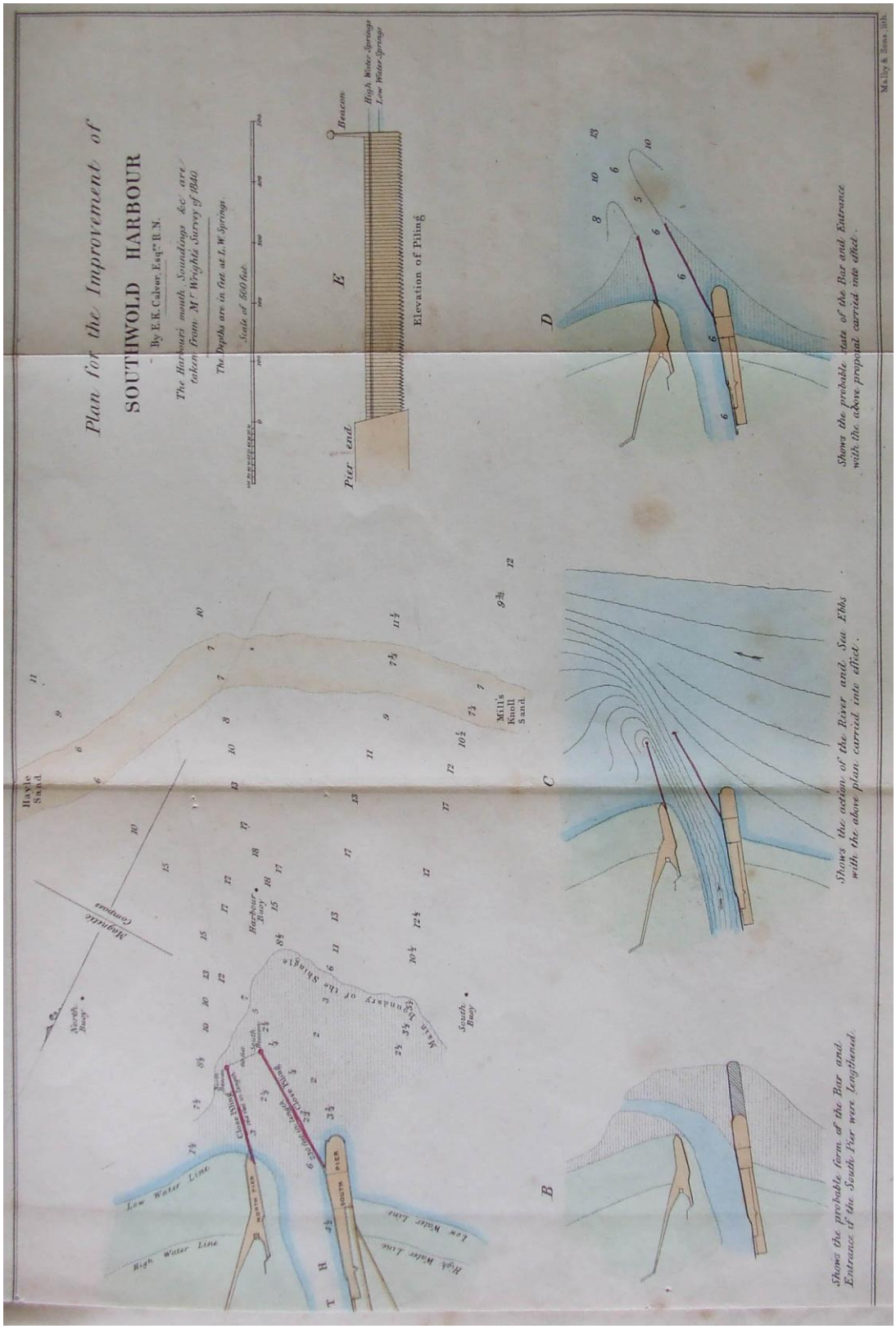

Figure 13, Calver's proposals of 1844 for extending the piers with walls of close piling. Note the drawings suggesting different bathymetric outcomes with various pier arrangements (Sufflok Record Office, Ipswich Branch 627.3 1844)

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Case study 13: Margate

Summary of previous work

There are no published works that deal specifically with the port and timber-built pier of Margate though there is reference to both of these in a considerable number of published and unpublished works spanning the early 18th to 21st centuries. The earliest and by far the most informative of these is John Lewis's two volume 'History and Antiquities, as well Ecclesiastical as Civil, of the Isle of Tenet, in Kent', first published in 1724 with a second edition of 1736 (Lewis 1724/36). Lewis provides the first detailed descriptions of the town, the pier – its raison d'être and its system of management as well as of the wider local economy. Edward Hasted's multi volume 'The History and Topographical Survey of the County of Kent' also provides detailed background information for the pier and town (Hasted, 1800). The works of Lewis and Hasted both employ original source material and can be regarded as histories in the modern mould.

The majority of the source material for Margate employed in these town histories relates to the 17th century and later. In large part this is owed to the town having no pre mid 19th century corporation records of its own. This is as the town did not achieve corporate status until 1857, some years after the replacement of the pier by one of stone.

As a consequence of Margate's early rise as a watering place popular with Londoners, a large number of guides to the locality were published. The earliest of these dates from the mid 18th century and their modern equivalents continue to be printed today (Newbery and Bristow 1763; inhabitant 1797; Oulton 1820). The earlier of these are of some interest as the timber-built pier was still in existence and they afford contemporary descriptions of it and its usage.

There have been a number of 'collectors of historical information relating to Margate' in the 20th century and the results of much of this labour are housed as lists and transcripts at Margate Public Library. The produce of these individuals has proved very helpful in identifying potential sources of information likely to be of use in this study. Amongst these is Archibald Gritten, who collected and compiled lists of local history publications and sources for Thanet. Another was local man Arthur Rowe who carried out historical

research on the town and whose detailed lists of references to Margate in the state papers has been especially useful.

Background: town, membership and governance

Within the medieval period two zones of occupation are said to have evolved within the Margate area (Whyman 1981, 3-4). One of these formed a village clustered around St Johns's parish church, on elevated ground some ¾ mile from the shore, and was engaged primarily in agriculture. Adjacent to the shore the other settlement Mergate/Meregate (Margate) was associated with seafaring and fishing. Similar bifocal settlement arrangements are known at Broadstairs, Scarborough, Bridlington and Hornsea. In each case one of the settlement elements was situated by the shore, possessed a pier and was primarily engaged in maritime activity.

Despite attempts in the 18th century, Margate did not achieve corporate status until 1857 when it became a municipal borough (Clarke 1961, 1). Prior to this date, and from at least 1229, the town was one of the members, or limbs, of the Cinque Port of Dover, to whom it was subject in all matters of civil jurisdiction (Seymour 1776, 555-6; Hasted 1800, 312). As such, the mayor of Dover appointed one of the inhabitants of the town to be his Deputy there. The parish (St John's) and town was also required to contribute its share of the ships fitted out by the head port in crown service as well as contributing to the common relief of all the Cinque Ports and their members. All the Thanet pier towns were such member, or limbs, of the principal of the Cinque Ports. In the post-medieval period Margate's overseas trade is known to have been hampered by its status as a limb port. Although Waiters and Searchers of the Customs Service had a presence at the town, where they supervised the lading and unlading of goods, there were no 'legal quays' for foreign trade. Accordingly, documentation had to be obtained from the Cinque Port of Sandwich before such overseas material could be handled. The inhabitants complained of this situation in 1731, but to no result (Andrews 1953, 57).

A town without a corporation of its own, lacking a mayor and councilmen to run it, must have limited the ambitions of any would-be ruling class. Perhaps the office of pier warden, together with other parish posts, provided an alternative vehicle for such ambitions? There may be some evidence in support of this in so far as the role of pier

warden at the town was not always held by an old salt. Gentlemen are also recorded as post-holders. A particularly unusual former pier warden was John Litherer who was both a farmer and owner of a ship trading to the continent. During the final years of the 18th century Litherer apparently used his continental voyages as a cover to engage in espionage against the French, in particular identifying the number and type of French vessels in Dunkirk and their rate of progress in preparing for war (Twyman and Carter, undated). The only other evidence for meaningful civic organisation at a local level unearthed in this study is of 'publick vestry assemblies' or 'meetings', presumably held in the parish church. At such a public meeting in 1767 it was decided to authorise pier repairs, with funding monies agreed to be privately sourced (White, undated).

The town of Margate today is considerably larger than that of its historical antecedent. In 1583 the parish possessed just 107 households (Hasted 1800, 312). In the time of John Lewis's history of Thanet the population stood at around 600 families (Lewis 1736). This is said to have become 700 families by 1800 (Hasted 1800, 312), whilst a population of 10,000 is recorded in 1861.

Farming and fishing were the mainstays of the Margate economy until the later medieval period. It is said that the most part of the town was built in the valley adjoining to the harbour through which the one principal street, King Street, ran. Its houses in general were said to be *"mean and low"* (Hasted 1800). The town's proximity of ready sea passage to London ensured it the place as the principal point of corn exportation, from the Thanet area, to the capital in the early post-medieval period. Malting and the curing of herrings also played significant roles in the post-medieval economy whilst a regular market and two annual fairs are recorded in the same period (Seymour 1776, 556). Even as late as 1757 the town was described as a *"fishing town"* (anonymous 1757, 23). The geographical location of the port, as providing the shortest crossing to the Low Countries, may also have served to increase its volume of shipping, of both goods and passengers. The importation of coal from the north was a long standing trade whilst the large-scale importation of deals, hemp, tar and iron from Memel and Riga are recorded in the 18th century (Hall, J. 1792, 7; Brayley 1817, 48).

Technology

Documentary evidence

State Papers of the 14th and 15th centuries describe the town as a port, e.g. (Cal. Pat. Rolls 1316; 1326; 1364; 1441). Designation as a port need not necessarily imply the presence of infrastructure such as a pier and it is not known when a pier was first built here. The earliest definite reference we have to a pier at the town is in the late 1530's – early 1540's when Margate is described in John Leland's Itinery as *"a village'* with *'a peere for shyppes, but now sore decayed"* (Leland 1964 vol. 4, 61). A little after this date the pier is depicted in a map of north-east Kent dating to the mid 16th century Brit Lib. 1). These, and all later depictions and descriptions indicate that Margate has always had just a single pier. There are few additional references to the pier in the 16th century and these do not provide technical details (Cal. S.P. Dom. 1584). Although there are many more references to the pier at Margate in the 17th century, these tend to be somewhat oblique and again provide few technical details. In 1671 for example it is said that there was *"about 100L worth of damage done to Margate pier"*, but no indications of the nature of this (Cal. S.P. Dom. 1671). Another example of the oblique character of the 17th century references would be item 26 of the Orders, Decrees and Rates (Margate Pier) which state that *"no Vessel shall moor or fasten any Rope or Fasting unto the Braces of the Peer or any other part thereof, but only to such provision and things as are appointed for that purpose,"* (Lord Warden 1693). The *"Braces of the Peer"* would seem unlikely to relate to anything other than a timber-built structure.

It is recorded in 1646 that the materials of which the shoreline jetties protecting the town were constructed was timber. Although there is no reason to doubt that the pier itself was also constructed of timber we have little conclusive documentary evidence for this until 1724 when Lewis's history describes it as such (Lewis 1724, 87). A view of the pier appears in Lewis' second edition of 1736 and this clearly shows both the pier, as well as the shoreline jetties to be of timber (Figure 2). *For the implications of this see: Cartographic and Pictorial evidence, below.

A legal case in the second half of the 17th century involving the pier wardens and inhabitants of Margate concerned rights to the digging of gravel, chalk and ballast from the grounds, lands and shore adjoining the pier (Hull 1966, 524; Lewis 1724, 88). It was decreed that such ancient custom was necessary for the maintenance, preservation and cleansing of the pier and harbour. Although it is not possible to be certain, one reason for

such extraction for the benefit of the pier may have been for providing infill ballast for that pier. Certainly a description of the pier from 1757 describes the pier as *"of timber and filled with chalk and stones in the form of a crescent"* (Anonymous 1757).

It is recorded that in 1766 the foot of the outward side of the pier, for a distance of approximately 250 feet, was decayed, rotten and worm eaten, and that if it were not to be repaired soon it would be washed down (White undated). Apparently, this part of the pier had been *"footed, double footed and patched"* (this presumably relates to systematic re-planking at the vulnerable foot of the pier together with piecemeal patching in places) and that further like work would not be secure against the sea. It was therefore proposed to widen this part of the pier, the costs being estimated at around £700-800. It would seem probable therefore that the existing outward wall of the pier was in a parlous state and incapable of successful localised repair. The proposal would seem to be for a whole new stretch of outward wall being built parallel to the existing decayed one (widening). Presumably it was intended to tie this new build into the existing pier above the level of the foot. There is a description of just such a pier widening at Broadstairs in the 19th century. Later documentation informs us that much work was carried out, but this was destroyed by the sea only several months later (White undated).

An Act of Parliament in 1787 revised the financial system of maintenance of the pier and provided the legal authority for taking down the old wooden pier, this to be *"entirely taken down, and a new stone head built in its room"* (Act of Parliament 1787). Writing shortly after this date the historian Edward Hasted noted that instead *"the old wooden pier has begun to be cased on both sides with stone, and extended, and the whole is now completely finished"* (Hasted 1800). This observation is also recorded by another contemporary writer (Nichols 1793, 26). Such encasing is known to have taken place at a broadly similar date at Bridlington whilst there were proposals to do the same at Broadstairs. This did not prove to be a successful long term solution at either site.

The stone encased timber pier was largely destroyed by a storm in 1808. The new all stone pier was built shortly thereafter (English Heritage 2007, 70).

Cartographic and pictorial evidence

A map of 1548 showing the north-east coast of Kent depicts the pier of Margate, as well as those of Broadstairs and Ramsgate (Figure 1), (Brit. Lib. 1). The pier is shown as having the plan-form of a gentle arc that extends from the land at the east, out to the west. Margate's pier appears on a number of historic maps and views. These include William Borough's map of 1576 (Brit. Lib. 2), Richard Poulter's map of 1584 (Brit. Lib. 3), John Lewis's view of 1736 (Lewis 1736), (Figure 2) and Hasted's map of 1778 (Figure 3) (historykent.org). All depict a single curved pier extending from the shore at the east, westwards into the small bay.

The first of these sources that unambiguously identifies the structural characteristics of the pier is Lewis's view of 1736 (Figure 2). The broad landward end of the structure is depicted as tapering to form a narrow slightly curvilinear pier, the head of which out-turns at an acute angle. The pier in this view does not have a wall of close piling but appears likely to be of an earth-fast frame type. Vertical, or near vertical posts are clearly shown, whilst behind these are walls of horizontally lain planks (these presumably secured to vertical battens, with these latter being affixed to horizontal rails or beams extending between the posts). Two sets of ladder steps are evident close to the pier head, with another set on the inner face of the pier close to the landward end.

Support for the structural interpretation of this view can be found in a detailed picture produced some 54 years later (see Figure 7). The view of 1736 shows the shoreline sea-wall to be depicted in exactly the same manner as the pier, the implication being that they were constructed along similar lines. The later and more detailed depiction clearly shows the timber sea-wall to be constructed of planks set behind vertical posts and with some front bracing. More precisely, Lewis's view of 1736 shows the sea-wall as comprised of three sets of walling interrupted by three lanes running down to the shore. Several sets of steps are also shown extending from the tops of the sea-walls to the shore. There are a number of interesting documentary sources relating to these sea-walls and its appears certain that direct relationships between the pier and sea-walls exist, this in the sense of the former necessitating the latter, in the nature of their similarity of construction, and in the acrimonious nature of the dealings between the separate parties responsible for the maintenance of each. This matter is considered further in the section dealing with Environmental Aspects below.

The view of 1736 also depicts a number of structures related to the pier. At the landward end three buildings are depicted. Two of these are warehouses, the other the Kings watchhouse and warehouse – presumably this was serving a customs-like role. A lamp for purposes of navigation, and a crane for the lading and unlading of goods, are both shown close to the pier head. A mooring post is also shown, as is a short narrow causeway, or such-like, extending out from the pier head and bearing a cruciform structure at its end. The purpose of this latter element is not understood though it perhaps relates to navigation.

There is documentary reference to the *"King's Warehouse in Margate"* in August 1729 when 190 gallons of smuggled, and apprehended, French brandy were advertised for sale *"in several lotts"* (The Kentish Post, or Canterbury News Letter; quoted in Whyman 1981, 56).

The proportions of the timber-built pier, which had been clad in stone in the late years of the 18th century, immediately prior to its near total destruction in a storm of 1808, can be gauged from a scale drawing of that year which shows the old pier, and then under construction new pier of stone (Figure 4). It can be seen that the old pier was fractionally under 500 feet (152.5m) long and generally around 50 feet (15.24m) in width. Given that these dimensions relate to the pier after it had been clad and extended in stone, then the old timber structure within was clearly of somewhat lesser proportions.

A drawing of Margate pier, described as a 'rough sketch' is held by the British Library within Harleian Manuscript 7598.

Figure 1, Map of 1548 (north is towards bottom). Margate and its pier are depicted to the lower left (British Library: Cotton Augustus l.i. f.54)

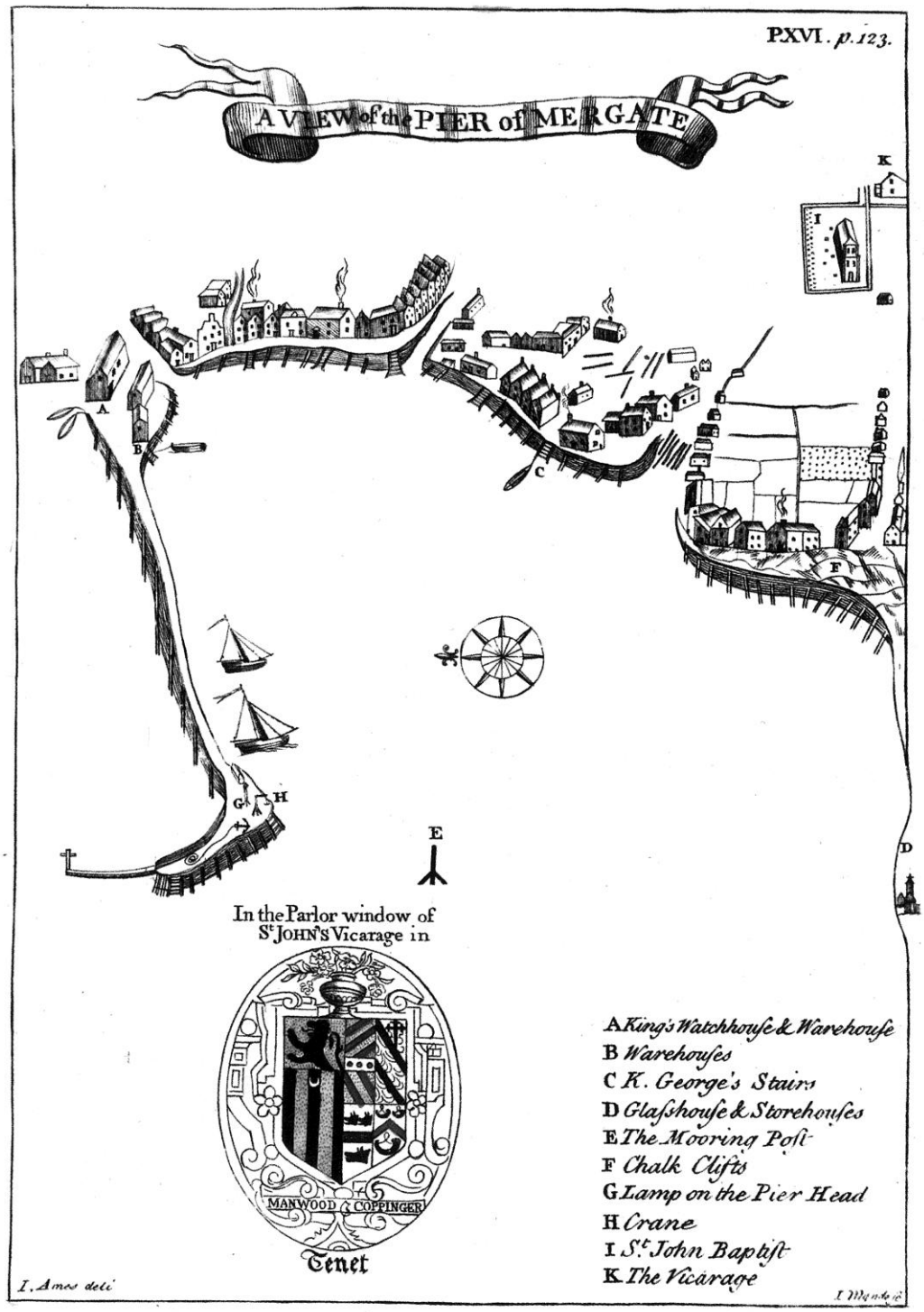

Figure 2, View of the pier and part of the town of Margate (reproduced from John Lewis's history of 1736)

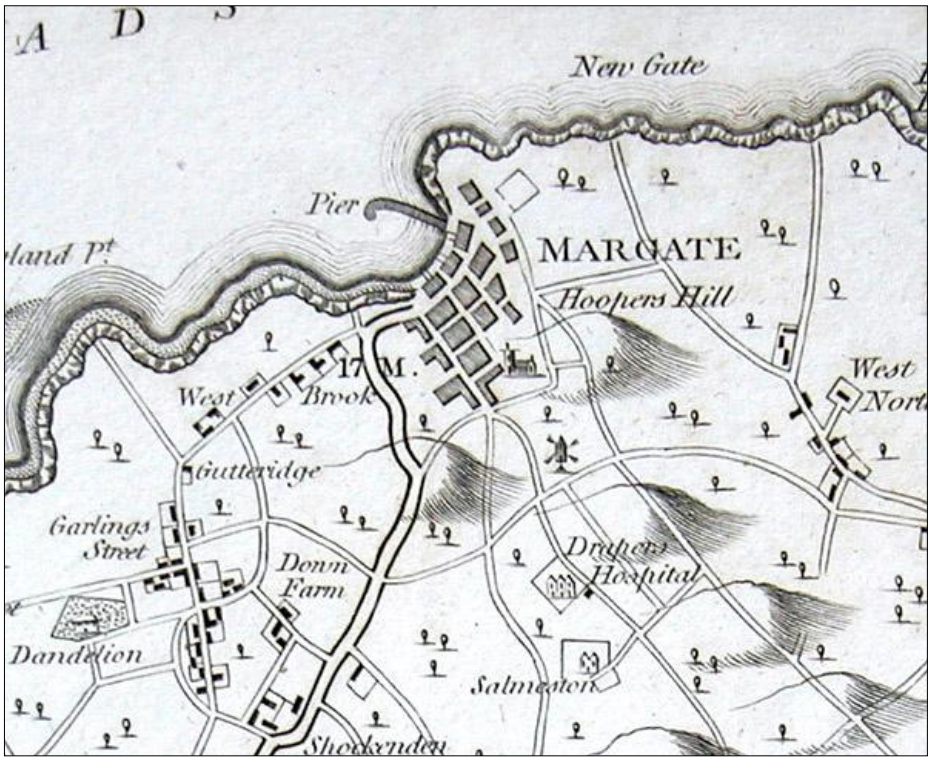

Figure 3, Extract of Hasted's map of 1778

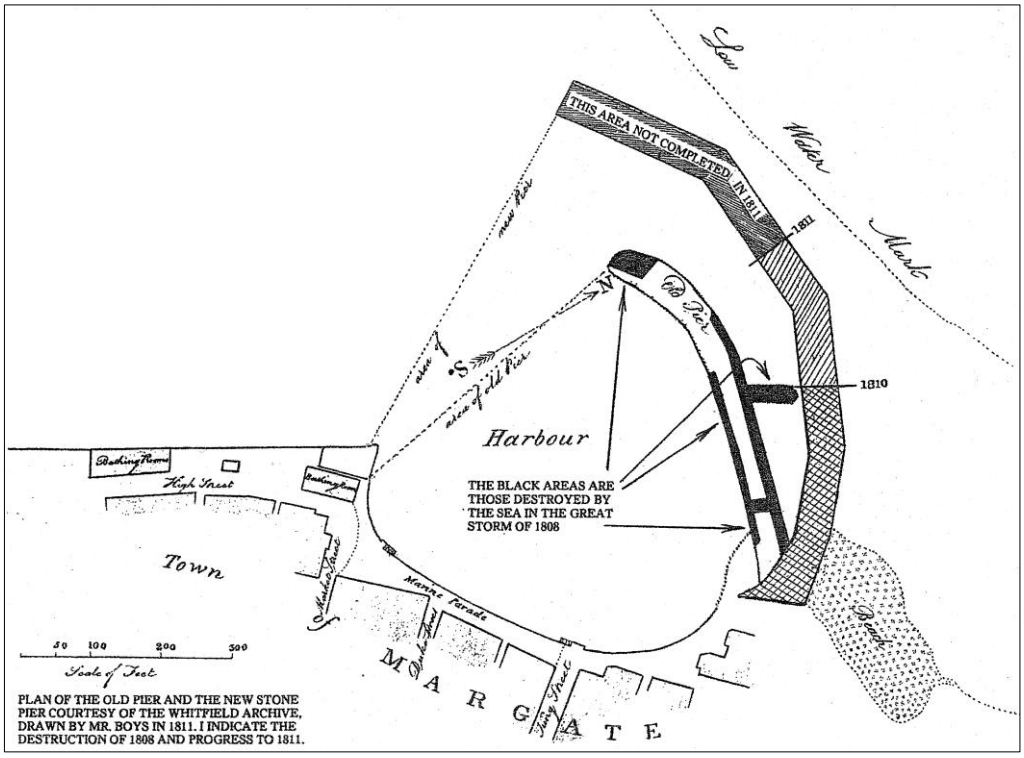

Figure 4, Boy's map of 1811 showing outline of smaller stone-clad timber pier and new larger stone pier beyond (reproduced from Twyman 2006)

Environmental aspects

Margate lies on the northern side of the Isle of Thanet within a small bay (Figures 5 and 6). Since the later post-medieval period no longer technically an island, Thanet is formed of the land at the southern side of the wide mouth of the Thames estuary and is bordered on its landward sides by the rivers Wansum and Stour. The coastline of Thanet is composed principally of steep chalk cliffs. In a number of places short narrow valleys cut through the chalk down to the shore. Margate lies within, and to the sides, of one such valley. That part of the town in the base of the valley and adjacent to the seafront is low lying and historically, including in the recent past, has been liable to inundation by the sea (Anonymous 1898). In the distant past watercourses ran through the valley to the sea, the principal of these running along the course of what is now King Street and entering the sea immediately to the south of the present stone pier. Between the high and low watermarks the silted up channel of the former watercourse is said to contain a mixture of sands and clays some 16 feet (4.88m) deep (Twyman 2006, 19). To either side of the former channel the foreshore is of chalk, in places under a thin covering of sediment. The place-name Margate (Meregate/Mergate) is said to be derived from a small mere or stream that formerly ran through the lower part at least of the valley in which the historic settlement was focussed (Hasted 1800, 313).

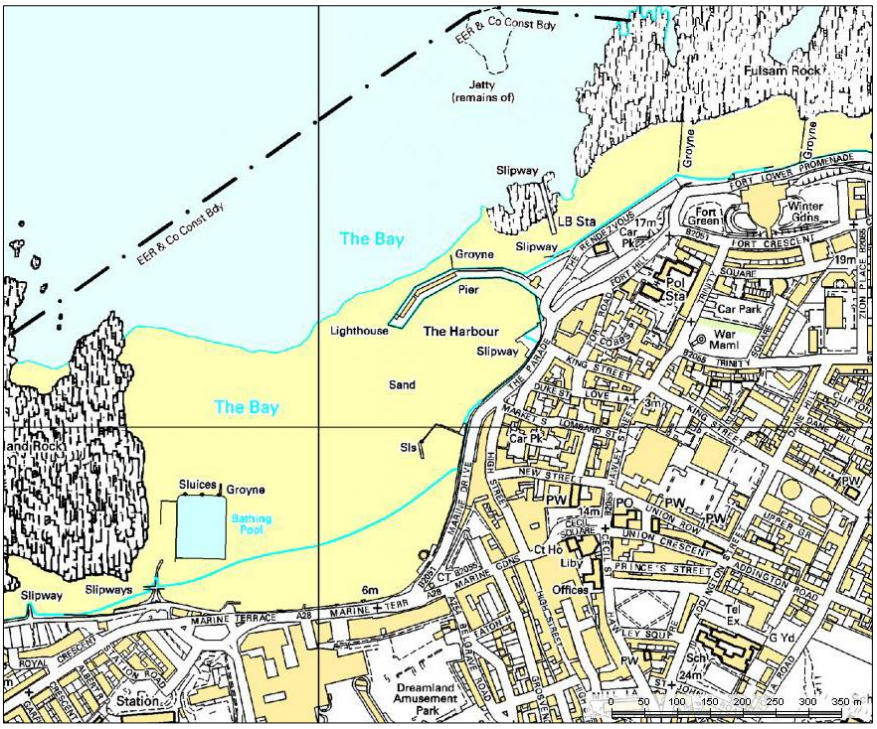

Figure 5, Map of the northern part of Margate (source: Edina)

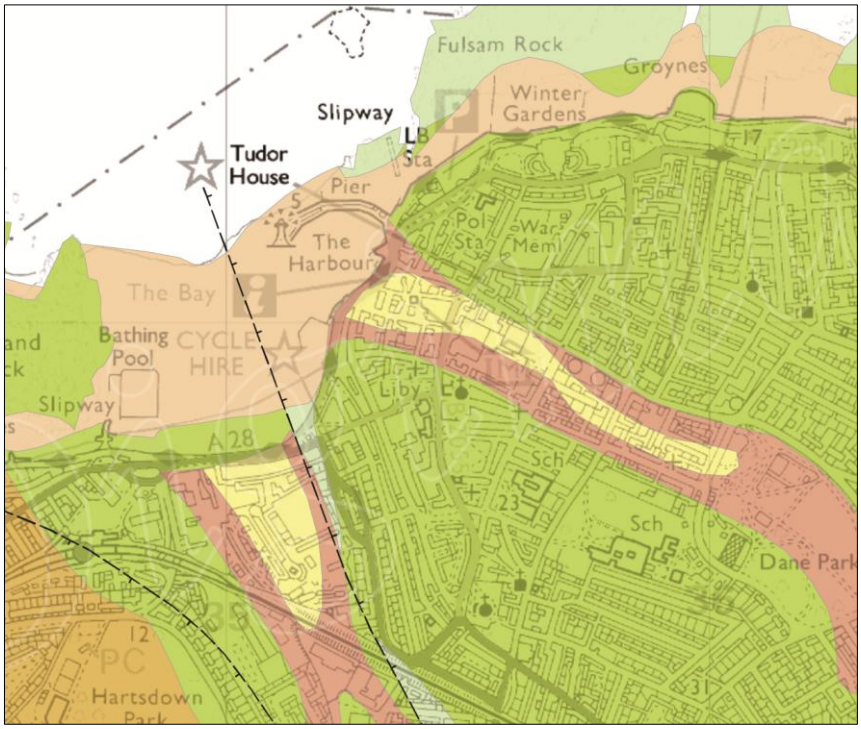

Figure 6, Geological map of Margate. Green = chalk bedrock, Beige = beach and tidal flat deposits, Other colours = superficial deposits, mostly within former watercourses (source: Edina)

Inundation by the sea is a long standing problem at Margate recorded firstly in 1322. In his study of early references to the town Arthur Rowe cites a legal dispute in which an individual sued another resident of Margate in the Court of Kings Bench for *"breaking and carrying away barriers which he had set up against the inroad of the sea"*, an action in which he was successful (Rowe MS). There are a number of further documentary sources referring to episodes of severe flooding, these being particularly well documented from the 17th century onwards.

Inundation in 1621 resulted in the loss of 18 houses and imperilled 74 more together with 350 acres of land (Cal. S.P. Dom.1621a). A jetty built adjoining the pier was said to be the cause of the danger. The available evidence suggests that the jetty referred to was not a groyne-like structure, but rather a wall-like barrier hugging the shoreline. Such wall-like barriers are depicted in a view of 1736 and are referred to in 17th and 18th century documents as 'jetties' (Lewis 1736). In referring to the same episode of damage it was recorded that a tax levied on the pier and houses and lands endangered by the sea was not sufficient for *"the expense of jetties built to protect them"* (Cal. S.P. Dom. 1622). More detailed information of the problem is presented in the British Museum document Egerton 2584 (Egerton 2584, 1621). This source holds that the pier was the cause of much of the loss and suggests that the problem be remedied by the building of two new jetties of 54 rods length. One of these was to extend from *"John Sacketts jettye to Thomas Barrowes jettye"*, the other, *"a lowe jettye or defence to be made with pyles from the end of Thomas Barrowes jettye alonge against the sea towards Birchingtonne".* The total cost of these jetty works was estimated at £198. 10s, and two named pier wardens were required to pay £80 towards this, "*Valentine Pettit, gent and William Coppin, marryner, whose pier hath gained greatly by that jettey, and done all the hurt"*. This money was to be paid *"out of the stock of money goods and lands of the sayd peere"* to an expenditor (for the jetties) ffrances Howorth, gent, of the town of Dover, who had been especially appointed to see the jetty works carried out. Additional money was to be raised by local *"scott"*, or taxation.

A point of especial interest is that the pier was held to be at least in part responsible for the flooding and was accordingly obliged to contribute to the costs of new defences.

Similar problems recurred in the 1640s. The then expenditor of the sea-works, John Smith of Sandwich had been appointed to the post in 1641 by the Commissioners of the Sewers

and he complained of his woes in a petition to Parliament (Smith 1646). Smith was unable to raise funds for the sea defence works, neither by taxation nor in the form of cash or timber from the pier wardens. His suggestion that timber be taken from the lands of a delinquent royalist had likewise come to nothing. He had therefore expended considerable sums of his own money on the works and was petitioning for compensation and for the setting up of mechanisms for funding future sea-works. A number of worthies and witnesses supported Smith, with one observation being that the pier was again to blame *"25 or 26 years since, there was a peece of work added to the said Peer of Margate, which had proved very advantagious for the Peer, but desperately ruinous for part of the said Town"*. It is also reasonably clear from Smith's petition that the sea defences were in the form of sea-walls and not groynes.

A *"Committee of Lords and Commons for the Admiralty and Cinque Ports"* was established to look into the state of the jetty affairs and a report, much in line with Smith's opinions, was made to the House of Lords (J.H.L. 1647; Cal. S.P. Dom. 1649; Cal. S.P. Dom. 1650). There are a number of significant aspects to this report. One of these concerns the necessity of imposition of a regular local tax to fund the works, another the structural nature of the 'jetty' sea-walls. Comment has already been made on the apparent similarity of appearance of the pier and sea-wall sides in Lewis's depiction of 1736. The Admiralty report informs us that three carpenters inspected the sea-walls and prepared costings, resources required together with some brief technical comment. It was estimated that 55 rods of work were required with 5.5 tons of timber being needed for each rod if carried out as single work, with so much more needed if carried out as double work. It is assumed here that single work was comprised of vertical timber piles retaining a single plank wall, with double work being two such walls laid in parallel; presumably connected by tie-beams/braces and with an infill occupying the space between the walls. Such a structure would resemble an earthfast frame pier, but one running parallel to the shoreline rather than into the sea. It was also commented that *"the workmanship, for carpenters, sawyers and other workmen"* would cost at least as much as the timber.

There is further reference to destruction by the sea in 1688 when *"The great storm carried away two small houses at Margate, broke into the chief wagon way to the pier, and rendered it impassable"* (Cal. S.P. Dom. 1688). There were also *"fears for the destruction of the pier"*. This proved to be fully justified as a great part of the pier was beaten down (Cal. S.P. Dom. 1688). Damage at the pier is again recorded in 1763 when

"the sea made a free passage over the new pier-head, beat down the light that guided vessels into port, threw down the gun battery, and forced the cannon into the sea; some shops and warehouses on the shore were washed away, and a great number of small craft were dashed to pieces" (City Remembrancer 1769, 230). The same source recounts extensive devastation on shore during a violent gale from the north-west a few years later in 1767 (City Remembrancer 1769, 228).

The curious question of why the pier was often held responsible for inundation by the sea at Margate finds some resolution in an entry in the state papers of 1691 (Cal. S.P. Dom. 1691). Proceedings upon a petition of the town found that foul weather from the north-west carried away part of the pier known as the 'new pier' and that that part of the town normally guarded by the pier and jetties was laid open to further weather from this direction. It was estimated that repairs would cost 2,500L. Inundation at the town in 1767 is again specifically recorded as being as a result of a gale from the north-west. The existing stone pier at Margate is slightly larger than its timber-built predecessors though is of similar plan-form, located in a close position and aligned in a similar, roughly east – west, direction. This existing configuration again *"offers little or no protection to the nor-wester"* and until the building of the extant defended Marine Drive, just above the shoreline, the lower parts of the town adjacent to the shore were open to regular batterings from this direction (Twyman 2006, 16). The situation would seem to be that rough seas from the north-west become funnelled between the pier and the shore and become concentrated in the low lying area immediately south of the pier. When these conditions coincide with high spring tides there is/was a likelihood of inundation.

Whilst the effects of foul weather from the north-west on the low lying parts of the town appear to have been made worse by the pier there is every reason to suppose that the same pier protected the town from weather from other directions. The anonymous writer of 1757 states that one of the roles of the pier was *"to defend the bay from the surge of the sea"* (anonymous 1757, 23). Further, *"were it not for the pier the town would soon be demolished by the sea"*.

Consideration also needs to be given to the location of the historic timber-built piers. Figure 4 shows the old piers to be of broadly similar morphology to the extant stone pier, though of somewhat lesser proportions and to be located a short distance to the south. It is known that the stone pier was built to the north of the older piers so as to take advantage

of firmer ground presented by chalk to the north of the silted up relict creek (Twyman 2006, 19). The timber-built piers were apparently constructed upon the softer deposits within the former creek (Twyman 2006, 19). This precise choice of location for the timber piers may well have been deliberate as such softer ground conditions will have better facilitated the driving of timber piles as part of the pier's frame.

One limitation on shipping within the pier of Margate was that it fell dry at low water and this was held to impose limits on its usage by vessels of large burden (Newberry and Bristow 1763, 10).

Figure 7, The 'defended' shoreline immediately west of the pier, 1790. Note the close degree of structural correspondence between the sea defences in this picture and those depicted in Figure 2 (source: British Library)

Ownership/control/funding

Pier wardens are recorded at Margate in 1621 (Cal. S.P .1621b). A document entitled the *"Orders Decrees and Rates, Time out of mind used by the inhabitants ... etc"*. drawn up

by the Lord Warden of the Cinque Ports, formed the legal framework for the organisation and operation of matters concerning Margate pier, including the role of pier wardens (Lord Warden 1693). Drawn up in 1693-4, the core of this lengthy document draws upon what was already an old, customary basis of organisation at the pier and these are listed within the document's thirty three *"items"*. The oldest of the decrees from which this document was drawn is said to date to 1615 (Hasted 1800). Earlier reference still to pier wardens at Margate, in 1609, is provided by Lewis, who used as his source a pier account book of 1609-10, which is unfortunately now lost (Lewis 1736, 125). Lewis also stated that in the reign of Queen Elizabeth the *"pier was maintained by certain rates paid by corn and other merchandise shipped and loaded at it"* (Lewis 1724, 87). Lewis's assertion may be correct. It has also been regularly repeated by later historians, though none of these provide a referenced source. Such a source is not readily evident in the state papers. The contents of the Orders, Decrees and Rates were intended to be widely known, indeed the final item, (32), required that a fair copy be displayed in some convenient place near the pier and that the same be openly read out in church twice in every year.

The method of electing pier wardens is explicitly stated. The Deputy (i.e. the mayor of Dover's appointee in Margate) was to call the parishioners to assemble on May Day and two pier wardens together with two deputy pier wardens were to be elected by those present. The deputy wardens were to stand in for the wardens should they be absent at any time. Tenure of office was for a period of one year. Failure to take up office was punishable by a fine of £5. At the time of election the old pier wardens were required to hand over to the new post-holders all such books and accounts they had received from their predecessors. Within a space of twenty further days they were to deliver up to the new wardens and inhabitants a true note and perfect account of all the collections and receipts they had gathered in office, the same for the money they bestowed on the pier, with any remaining money to be handed over.

though John Lewis, quoting from a now lost pier account book of 1609-10, indicates that pier wardens were allowed 'droit gatherers' to collect dues from vessels lading or unlading goods within the pier. (Lewis 1736, 125). These rates, often referred to as droits, varied according to commodity and quantity and whether the goods were being transported within England or beyond. Lesser rates were required to be paid by vessels belonging to the Cinque Ports than by non Portsmen. Most rates for fishing vessels were based around a separate seasonal formula. Ships using the harbour solely for refuge were

to make small one-off payments, these varying according to vessel tonnage. All sums levied, paid or forfeited were to be wholly employed to the use, benefit and maintenance of the pier, by the direction of the pier wardens.

The pier wardens were required to carry out necessary works for repair and maintenance. They were prohibited however, from setting up any new works costing more than £5 without the joint consent of the Deputy and parishioners. This measure was presumably intended to stifle maverick ambition and minimise financial irregularities. The Orders and Decrees do however, vest considerable discretionary powers in the office of pier warden, these ranging in such matters as determining where vessels shall berth, rights to distrain goods and having the final say on the scale of payment rates. The wardens also had authority over parcels of the land and shore adjacent to the harbour, and, with the consent of the Deputy and parishioners, had the right to lease these grounds.

Writing in 1724 Lewis informs us that these same regulations of the 'Orders, Decrees and Rates' were still enforced though he states that whereas the pier wardens had formerly collected the 'droits' (monies or rates) due to the pier these were now collected by an appointed droit gatherer whose income was provided from a percentage of collected monies (Lewis 1724, 87). A droit gatherer in 1609-10 is recorded as collecting £125. 14. 7. Out of which he received £12. 11. 0., approximately 2s. In the £ (Lewis 1736, 125).

There is some evidence to suggest financial irregularities in the dealings of the pier wardens in 1662. The *"ruinated and decayed"* state of the *"peere and harboure of Margate"* resulted in, or encouraged, complaint against the wardens when they were accused of not spending collected monies for the repair of the pier, of not presenting accounts and of desisting in the holding of annual elections for office – *"as by ancient customes and orders of former said Wardens"* (Letter of Col. Strood, 1662). The Governor of Dover Castle demanded the appearance of the pier wardens together with *"Writings and Orders concerning the said Peere, and your Accountes of receites and disbursements for the said Peere, to the end the affaires thereof may be settled according to Right"*. A captain of the Trained Bands issued the summons to "*Edward Taddie, Thomas Wheatley, John Francklyn, Jeffery Tamlyn, and the widow Bishop, late Peere-Wardens of the Peere and Harbour of Margate"* (Un-named captain, 1662). The outcome of this case is not known. It is a point of some interest, given a previous record of non-occurrence, that a woman appears in the list of pier wardens. The fact that her Christian

name is not given and that her status as a widow is, may be of some significance. Might this suggest that she was the widow of a pier warden, and therefore summoned to account for his alleged misbehaviour, rather than a pier warden in her own right?

These irregularities regarding pier wardens appear to have been resolved by 1679 as wardens were being regularly appointed after this date, though by 1690 they were £200 in debt and requesting a new schedule of harbour dues (Andrews 1953, 38).

The crown was sometimes willing to give encouragement and assistance. When *"a great part of the pier was beaten down"* in 1688, and the repairing thereof was estimated to cost £250, the town made an assessment and prayed *"his majesty to confirm it and empower the collectors to collect it"* (Cal. S.P. Do. 1688). A petition by the inhabitants in 1691, when the town is said to have been much in debt, attempted to gain help from the crown in repairing their pier and jetties. Referred to the Lords of the Admiralty, the outcome of this appeal is unknown. The result of a petition of the inhabitants for an allowance of 20L per annum towards the repair of the pier, it being *"broken down"*, is likewise unknown (Cal. S.P. Dom. 1693). A few years later in 1696 the pier wardens petitioned the king for assistance with repairs to the pier. The king had the petition forwarded to the Treasury with the recommendation of a payment of £100 (Cal. S.P. Dom. 1696; Cal. of Treasury Papers 1696). This was a shrewd move on the part of the town as Margate offered one of the shortest routes from England to the Netherlands and King William III is known to have made the crossing from here.

Issues of harbour maintenance lay, at least in part, behind a petition against a new Dover Harbour Bill of 1717. The Bill proposed to extend the term of years for imposing 3d per ton, on vessels of a certain size, loading and discharging within the realm, from, to or by Dover, or coming into the harbour there. The owners and masters of ships in Margate petitioned the House of Lords on the grounds that they had lately, and several times before, expended very great sums for repairing the pier at Margate over and above the income thereof. Arguing that this funding situation was unlikely to change the petitioners were seeking exemption from the proposed charges for Margate vessels, in the same manner as vessels from Ramsgate were already exempt (J.H.L. 1717, 641).

In the opening years of the 18th century the legal powers of the pier wardens to enforce the collection of droits was questioned by the masters of some of the vessels using the port (Lingham, 1986, 13). Petitioning by local inhabitants resulted in legislation being

enacted in1724 (Act of Parliament 1724). The date of this Act broadly corresponds with other Acts passed for the benefit of costal piers elsewhere in England and can be seen as an expression of the preparedness of the state to intervene in matters concerned with the safeguarding of these important pieces of infrastructure. The Act of 1724 was entitled *"An Act to enable the Pier-Wardens of the Town of Margat, in the County of Kent, more effectually to recover the ancient and accustomary Droits, for the support and maintenance of the said pier"*, and provided the pier wardens with powers, which if anything were stronger than those previously held by custom. In essence the Act legally formalised previous practice, including the later development of appointing collectors. The new Act permitted the collector/s to be appointed by the pier wardens and to receive no more than 1s 6d in the pound. New powers attributed to the pier wardens included the right to enter vessels, distrain goods and summon masters of ships to appear before them.

It has already been seen that the droits were often not sufficient to meet the costs of repairs and maintenance of the pier. This was the case when the outward 250 feet (76.2m) of the pier towards the head needed widening repairs, at an estimated cost of £700-800, in 1766. This time it was decided at a *"publick vestry assembly"* to borrow the money from subscribers at a rate of 4% per annum (White undated). £450 was raised from nine subscribers, each putting in £50. It is probable that these individuals were all local, or at least had local connections. Three of the subscribers were actually signatories to the vestry assembly. Several months later, in 1767 when much of the work had been carried out, all was lost to the sea. Shortly afterwards a further £850 was raised from fifteen subscribers, this time at an interest rate of 5% per annum. Three of the fifteen subscribers were amongst the original group of the loan of the previous year. A letter of 1778 concerning pier shares owned by an individual indicates that shares were also sold to raise money (EK/U1453/B3/15/1888).

Aspects of the legal rights of the pier wardens, in particular the collecting of tolls from vessels claiming immunity from such and the imposition of dues on commodities not specified the rates listed in the Act of 1724, appear to have been questioned in the later 18th century. Legal opinion on these matters was given in 1776 (EK/U1453/062/1). Legal opinion over the Act of 1724 was again sought in 1782, this time regarding any legal authority the pier wardens may have in farming out the collection of droits for the best return. The received opinion was that such a move would contravene the Act (EK/U1453/062/2).

A single set of pier wardens accounts survives for Margate pier (EK/U1453/053/3). These are of no great detail and may even be summaries of more detailed accounts. The first part of the accounts, which cover the years 1775 and 1776, are not entirely complete. A single page lists the *"Recievings"* (for 1775 only) whilst four further pages list the *"Disbursements"* for both years. The receivings are comprised of single entries for the first of each month from four named individuals, the majority from just one of these. It would seem likely that the named individuals were droit collectors. The disbursements are accounted for by day and month and include payments for timber and its freight as well as wages to named individuals. For the most part it is not clear what exactly it is that these people are doing, though they were being paid by the day or multiples thereof. This suggests that these people were employed on a casual basis. Occasionally it is recorded that certain of these people are being paid for *"One Tide each"* or multiples thereof. Of the few named tasks, the "*taking up of the Buoy and Tarring"* is mentioned as is *"scraping"*. In the May of each year there are entries titled *"Paid for the choice of Pier Wardens"* and these presumably represent expenses incurred during the annual pier warden elections. Other expenses include such things as the payment of bills to named individuals and even *"To postage of Letters"*.

The second part of the accounts covers the entirety of a single year, probably in the 1780s and seem certain to relate to pier wardens accounts rather than to the succeeding body of commissioners who subsequently took over their role. Again, these accounts are listed under *"Rec'd"* and *"Paid"*, both by date and month. The value of the receivings are listed by type of commodity. The outgoings are un-detailed and titled simply as *"mens wages, sundries, postage, paper, ink, wax, expenses in the county, bills, and disbursements for ships, journeys gifts, table articles and brewhouse articles"*.

An Act of 1787 provided the legal authority for a new pier, intended to be of stone, to be built, as well as *"ascertaining, establishing and recovering certain duties in lieu of the ancient and customary droits for the support and maintenance of the said pier"*, (Act of Parliament 1787). The same Act dealt with other matters of civic improvement such as paving, cleansing, lighting, guttering, house numbering, the appointment of watchmen and keeping livestock off the street. The preamble to the Act states that the town and its commerce were growing and that the tourist trade was now an extensive one. Relating specifically to the pier and the task of building a new one, authority over the pier was to be vested in the hands of 34 commissioners, amongst whose number were included the

existing pier wardens, knights of the shire, members of parliament and officials of the town of Dover. The commissioners, who were required to qualify for office on the basis of income or estate, were responsible for both the pier and the town improvements. In carrying out their work they had the right to employ collectors, surveyors and other officers as they deemed necessary. The Act continued the office and role of annually elected pier warden's according to old custom; presumably the wardens continued in their established role of practical day to day supervision and repair of the pier, albeit subservient to the commissioners. Some information regarding property 'attached' or belonging to the pier is also given. This included buildings on the pier, the beach behind the pier and the right to hold a regular market in the middle of the town on a piece of land known as pier green. Licence for this market, in the name of two pier wardens was granted in 1776 (TNA C202/164/21). The old system of powers, droits, duties and rates was replaced by a new set of powers and charges. These bore considerable similarity to the old system but were additionally boosted by a duty on coals, coke and cinder carried through the town or parish, even if not via the pier. Such additional money was clearly needed as the pier owed some £1,345 1s 5d to several persons, upon the credit of future pier income. In order to better enable the commissioners to 'improve' the town and build a stone pier they were permitted by the Act to borrow up to £14,000.

A new Act of 1799 amended that of 1787 (Act of Parliament 1799). This Act acknowledged progress by the commissioners to date and allowed them to borrow larger sums and revised the system of duties, including a new duty on bathing machines and an additional duty on coal.

An account book covering the years 1787 – 1793 relates to the early management of Margate pier by the commissioners (EK/U1453/053/2). This lists annual income and expenditure under monthly headings with an auditing statement signed off by a number of commissioners at the end of each year. The major sources of income were monies from named droit gatherers, duties on coal, and from the collector at the market. Lesser sources of income included highway duty (the commissioner's presumably retaining authority over roadways adjacent to the pier), payments of long-standing debts and accounts in the names of various individuals and even the payment of a charge for the breaking of a lamp. Expenditure covered the payment of salaries (the only ones mentioned by role being a clerk, collector in the market and a lamp lighter) as well as payments to labourers, a blacksmith, a painter, an engineer and other individuals. A number of payments were

made to named individuals and described as *"for a years interest"*, typically on sums of £50 or £100. These are presumably payments to those buying shares from the commissioners. Other items of expenditure include such things as the purchase of scales and weights, paving slabs and other sundries. There are a few entries relating to timber and at least three to the payment of carpenters. It was during the years covered by this account book that the timber pier began to be clad in stone and there are many entries concerned with the purchase of large quantities of stone, just one of these, for example, being for 385 loads. Directly associated with this stone are numerous entries referring to masons working on the pier.

Of the Thanet sea ports, Ramsgate had its small timber pier replaced by large stone piers in the mid 18th century purely and simply as it was chosen by high authorities to be a harbour of refuge. That Margate obtained a stone pier, larger than its timber predecessor in the early years of the 19th century appears to be owed to several factors. It was by this time the largest of the Thanet towns by far and it had frequent shipping links to London, both as the principal point of export of grain from Thanet and as the popular destination in Kent for those members of the capital's population seeking a watering place. Its pier served a practical shipping function as well as a resource for promenaders. The small timber pier at Broadstairs was never fully rebuilt in stone, it merely struggled on, just, with piecemeal patching. It remained a small town and attracted lesser numbers of tourists, and these of a type that avoided the larger and more gaudy Margate.

Miscellaneous

Material remains

No material remains of the timber-built pier/s at Margate are known. Given the proximity of these piers immediately to the south of the present stone pier i.e. within the existing harbour basin, it would seem reasonably certain that the old pier will have been systematically removed. It is possible however that the basal parts of piles may still lie deep within the sediments of the relict channel in which the timber piers were built.

Specialists and workers

Sir Christopher Wren is known to have viewed the damaged pier and jetty works at Margate in 1691 and agreed with the mayor and jurats of Dover that repairs would cost 2,500L (Cal. S.P. Dom. 1691).

Why

The 1724 Act states that the pier was a benefit to the trade and navigation of the country, a refuge for ships in times of bad weather, and from enemies in time of war. Convenient for the export of commodities, the safety of the town and neighbouring country was also said to be dependent upon the preservation of the pier. Similar sentiments were expressed in a petition of 1808 for repair and extension of the pier (EK/U1453/062/3).

In everyday terms the chief business of Margate pier was coastal trading (especially grain exports from Thanet to London, and from the 18th century passengers to and from London). Fishing and 'foying' were also important. The latter embraced several maritime functions, notably servicing and provisioning passing ships and going off to assist vessels in distress – especially on the nearby Goodwin Sands, with anchors and chains. That foying was largely a Kent practice was owed to the large volumes of shipping passing this stretch of coast on their way to and from London, the greatest of all English ports by far. Due to its proximity to the continent smuggling on this part of the coast has historically been said to have been rife, albeit one extremely difficult to quantify with any degree of accuracy. In the medieval period the commodity smuggled overseas was principally wool. In the post-medieval period a wider range of commodities were smuggled into the country, geneva (gin) and tea being the most common. When Britain became committed to a policy of free trade in the mid 19th century smuggling ceased to be particularly profitable and the practice became greatly diminished. There are reports of vessels from all the Thanet piers, including Margate, being implicated at some time or other (Whyman 1981, 38-73).

Promenading

Margate and the Thanet coastal towns early developed a tourist industry, the principal clientele being drawn from London and most commonly making the journey by ship. This has been extensively considered by John Whyman (Whyman 1981).

By 1820 promenaders were required to pay to gain access to the pier (Oulton 1820, 64-5). Might it be that the popularity of promenading on piers such as Margate's led to the development of purpose-built pleasure piers?

Fort

Ordnance was mounted at Margate by at least 1627 (Cal. S.P. Dom. 1627). There was still reference to a gunner in 1693 (Cal. S.P. Dom. 1693). It appears likely that this was sited on elevated ground close to the pier, in the area where guns were mounted at a later date (Lewis 1724, 96). In 1757 it is said that *"a little above the town northward on the cliff is a small piece of ground calld the fort at present of very little use, the guns and carriages neglected and in no order"* (Anonymous 1757, 25). The Napoleonic fort was built in the final years of the 18th century on high ground some 300m to the east of the pier (ADS). Writing in 1800 Hasted describes the fort as *"a small piece of ground maintained at the parish charge; there was a large deep ditch on the land side of it next the town; at its entrance towards the east was a strong gate, which was kept locked to preserve the ordnance, arms and ammunition; for here were two brass cannon, bought and repaired by the parish; here was likewise a watch-house; a gunner was appointed by government, with a salary of twenty pounds per annum, and a flag hoisted upon occasion; and there were sent hither from the tower, ten or twelve pieces of ordnance, with carriages. This was not only a great safeguard to the town, but a means of preserving merchant ships going round the North Foreland and the Downs"*. Further, *"But this appointment of a gunner has been for some time discontinued; the gate at the entrance to the port has been taken away, and the ditch has been converted into a small square of houses. A small battery is now erected on its site, and the guns mounted on the improved construction"* (Hasted 1800). In light of Hasted's comments there is a distinct likelihood that it was this same area of high ground that was always used for the siting of artillery.

However, it may be that ordnance was also placed on the pier itself as damage at the pier in a storm of 1763 also mentions the throwing "*down the gun battery, and forced the cannon into the sea"* (City Remembrancer 1769, 230). In the storm of 1808 the *"magazine stores on the pier"* which were being guarded by a member of the militia, were washed away (Brayley 1817, 38-9). We are also told that after their destruction the unfortunate soldier was unable to retreat from the pier and was obliged to lash himself to

the crane where he remained, *"in momentary expectation of death"*, until the storm had abated.

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Case study 14: Broadstairs

"We have a pier – a queer old wooden pier without the slightest pretensions to architecture and very picturesque in consequence. Boats are hauled up upon it, ropes are coiled all over it, lobster pots, masts, oars, sails, ballast and rickety capstans, make a perfect labyrinth of it"

Charles Dickens, on Broadstairs, 'Our English Watering Places' Quoted in (Bird, 1974, 37)

Summary of previous work

When it comes to written histories Broadstairs has very much played second fiddle to its larger neighbour Margate. The town is given some small attention in John Lewis's two volume 'History and Antiquities, as well Ecclesiastical as Civil, of the Isle of Tenet, in Kent' first published in 1724 with a second edition of 1736 (Lewis 1724/36). Lewis provides brief descriptions of the town and the pier – its origins, significance and briefly its system of management. Edward Hasted's multi volume 'The History and Topographical Survey of the County of Kent' also provides some background information for the pier and town (Hasted, 1800). The works of Lewis and Hasted both employ original source material and can be regarded as histories in the modern mould.

Like Margate, Broadstairs was subject to Dover and so the town has no corporation records of its own and this seems likely to have lessened the amount of documentary material for the pier, in the first place as generated, and in the second place as preserved. Again like Margate, Broadstairs became one of the earlier English seaside watering places with many of its visitors being drawn from London. The town was considered less racy and less populist than Margate; a resort for the more discerning sort. Whereas Margate had a number of 18th and 19th century guides specifically for the town, Broadstairs did not. However, brief comment on Broadstairs is made in a number of the Margate, as well as Thanet, guides (e.g. Oulton, 1820). There do not appear to be any 20th century histories of the town, save for a number of pamphlets. It is perhaps surprising then that Broadstairs has a recent booklet about its harbour, written by local man, sailor and man of the cloth, Bob Simmonds (Simmonds 2006). Eccentric, entertaining, frivolous yet thoughtful,

Simmonds' booklet dedicates 22 of pages to matters that could be considered relevant to this study. Simmonds, who has no pretence to be a historian, recounts much of what has already been published, though he also tapped into pictorial, photographic, cartographic as well as early 20th century newspapers. Simmonds' also cautiously conjectured on the form of the historic piers suggesting that a timber shell, filled with chalk, was probably constructed of driven timber piles with horizontal planks secured to them – he was pretty close to the mark.

Background: town, membership and governance

Like Margate, Broadstairs was a limb, or member, of the Cinque Port of Dover (Gibson 1993; Hasted 1800). The town and parish of St Peter's was subject to Dover in all matters of civil jurisdiction and the mayor of Dover appointed one of the inhabitants of the town to be his Deputy there. All the Thanet pier towns were such member, or limbs, of the principal of the Cinque Ports. Although Waiters and Searchers of the Customs Service had a presence at the town, where they supervised the lading and unlading of goods, there were no 'legal quays' for foreign trade. Accordingly, documentation had to be obtained from the Cinque Port of Sandwich before such overseas material could be handled (Cal. Tr.B. 1685; Cal. Tr.B. 1742; Andrews 1953, 37).

In the 1566 survey of the Kent coast the number of houses listed at Broadstairs was 98, more than that of Ramsgate with 25 but less than that of Margate with 108 (Gibson, 1993, 345). The pier does not appear to have been engaged in trade and shipping to the same degree as Margate, though it was home to a fishing fleet. This fleet was actively engaged in the Icelandic and North Sea fisheries in the post-medieval period (Hall, 1792, 41). Broadstairs gained some renown for its ship-building, a craft attested between the 16th and 18th centuries at least (Lewis 1736).

In a trait shared with both Margate and Ramsgate, St Peter's and Broadstairs were in effect two distinct settlements. In the 18th century St Peter's was described *"as a beautiful rural village, the inhabitants respectable and very hospitable"* containing *"a population of about 1,740 inhabitants and 2,584 acres of land"* with *"a great many respectable yeomen residing on, and farming, their own estates"*; and Broadstairs as *"a small fishing place in this parish"*, where, *"the inhabitants are few"* (Mockett 1836, 1-2).

Such duality of settlement, a small one clustered around a pier and a larger one some distance in land also finds a parallel at Scarborough, Bridlington and Hornsea.

Technology

Earlier documentary evidence

There is little documentary evidence for the pier at Broadstairs in the 16th and 17th centuries. Writing in 1736 Lewis recounts legal agreements of the 1560s and 1580s which record the *"framing of timber etc. for the repair of the pier"* (Lewis 1736, 165). This leaves little doubt that the pier was timber-built but it may be a mistake to read too much into the term 'framing'. We cannot be certain of the piers form, as with regard to buildings a framing-place could be one where timber was prepared and worked, not simply tested, or part assembled (Salzman, 1952, 237). It need not necessarily follow therefore that the pier was a framed type as opposed to one of close-piled wall form.

The bulk of references to the pier in the 17th century merely mention the presence of a pier and provide no technical detail e.g. (Cal. S.P. Dom. 1636; Cal. S.P. Dom. 1672).

18th – 20th century documentary sources – Pier Books

There are a number of Pier books relating to Broadstairs. Part of one was compiled during the period of control by pier wardens with the remainder, from 1792 onwards, compiled by their successors, a body of commissioner's. These are held by the East Kent Archive Centre, Dover. The pier wardens accounts, which record receivings and disbursements, record quantities of timber and related materials, including *"sawen timber, plank, spikes, beams, baulks, old plank' shovels"*, and *"rope to draw the timber"* – this latter possibly for withdrawing old piles? (UD/BS (uncat.) 1769-1807).

The early records of the commissioners also mention material relating to a timber-built pier, this including *"beams, planks, carriers bringing timber"* and *"carriage for chalk"* – this latter almost certainly as internal ballast within the pier (UD/BS (uncat.)1769-1807). Later commissioners records list *"posts, piles, piles of oak, trees, spikes* (the latter typically purchased by the cwt, lbs or by hundreds) *3" plank, split deal, whole battins* (battens) *2 barrels tar"* (presumably for coating timber or for making seals between timbers). There is also further mention of barrels of tar and a "*tar brush, grease for*

capstans, loads of chalk, flint" as well as recording *"oak timber and fur timber* and a single mention of *elm"* (UD/BS (uncat.) Box 1, 1792-1807; UD/BS (uncat.) Box 14, 1831-1841; UD/BS (uncat.) 1842-1852). There is a reference to "*pitch pine"* in 1877; the same late source also makes reference to "*engines"* for pile driving (UD/BS (uncat.) Box 10, 1870-1880). Such timber and other materials are frequently recorded in most of the other pier books. Occasionally the commissioners undertook a stock taking of material held by the pier. In 1840 their stock was comprised of:

New oak timber	*£126*
New fir timber	*£85*
New buoys and chains	*£20*
Ironmongery	*£10*
Old timber	*£15*
Sundries	*£30*

(UD/BS (uncat.) Box 2, 1825-1843)

In addition to the pier the commissioners records indicate that work was also carried out on *"lockers"* (breakwaters), *"two to the north"* and a *"south locker"* (UD/BS (uncat.) Box 2, 1792-1814). There are many further references to such lockers e.g. (UD/BS (uncat.) Box 2, 1825-1843).

The use of tar as a protective coating for the pier and its associated works finds support in an entry of 1835 when it was *"Resolved that the present timber jetty be repaired forthwith and blackened over with coal tar"* (UD/BS (uncat.) Box 2, 1825-1843).

There is mention of a committee set up in 1844 to *"consider the practicability and probable expense of an extension of the pier or jetty"* (UD/BS (uncat.) Box 2, 1843-1853). There are no later indications as to whether this proposed extension was carried out. Indeed the same volume records just four years later that *"the committee be called together and make a report on the probable cost of caseing the pier with flint and cement"*. Later in the same year it was recognised that the finances of the pier were insufficient to meet the expense of such caseing work and the idea was shelved. The stone cladding idea seems to have been dismissed fairly quickly as the next year, 1849, large quantities of timber of various sizes was purchased by the commissioners *"and notice*

given to public for tenders to repair the pier". The commissioners inventory of materials in 1849 consisted of:

44 oak trees 350'	*£30.0.0*
24 2" plank (oak) 410'	*£10.0.0*
7 pieces of fir timber 164'	*£16.8.0*
12 fir planks 2" 304'	*£6.6.0*
97 1 ½ " oak planks	*£14.0.7*

The following year, 1850, it was recommended that *"3 loads of fir timber"* and *"1000 feet of 2" oak plank"... "be purchased for the works at the pier"*. Expenses for flint and chalk (?ballast), ironmongery and more timber in the same year suggest that these works were of some scale and duration. The use of flint as ballast within the pier mirrors its use in lockers as in 1850 it was recorded that *"the Box Locker be repaired and filled up with flints"* (UD/BS (uncat.) Box 2, 1843-1853).

The most detailed description we have of pier works at Broadstairs is given in the report of an engineer, John Norrissey, in 1872 shortly after damage by a gale (UD/BS (uncat.) Box 10, 1870-1880). This letter, which appears to have been poorly copied, recommends:

"that timber piles 12 inches square should be driven outside of the present timber work 8 feet apart and secured at the tops by longitudinal timbers around 9 inches square of such length that each piece shall pass from the outside to the inside timber work and bolted on the main timbers two of the longitudinal timbers to be secured to each main pile, one at the top, the second midway down where the main piles have been driven, inside planking 3 inches thick to be placed against the piles on the inside, closely jointed and spiked thereto, as the planking is secured it is to be backed with solid chalk if this work be done I consider that pier will be well repaired".

This letter is detailing a proposed method of repair to a damage face of the pier. The intention seems to have been to drive a line of piles parallel to, and in front of, the damaged face, these piles being spaced 8' apart. Each of the piles was to be attached to the main body of the pier by two horizontal braces. Horizontal planking was then to be spiked to the inner face of the line of new piles. Finally, the space between the new wall of piles and planking and the body of the damaged pier was to be in-filled with chalk. In

effect, part of the old pier was being re-faced. What looks like a similar kind of repair can be seen in Figure 5.

Cartographic and pictorial evidence

A map of 1548 showing the north-east coast of Kent depicts the pier of Broadstairs, as well as those of Margate and Ramsgate (Figure 1), (Brit. Lib. 1). The pier is shown as having the plan-form of a gentle arc that extends from the land at the east, out to the west. Broadstairs pier also appears on a number of later historic maps and views. These include William Borough's map of 1576 (Brit. Lib. 2), Richard Poulter's map of 1584 (Brit. Lib. 3) and Hasted's map of 1778 (Figure 2), (historykent.org). All depict a single curved pier extending from the shore at the north, southwards into the small bay.

Figure 1, Map of 1548 (north is towards bottom). Broadstairs and its pier are depicted at the extreme left (British Library: Cotton Augustus l.i. f.54)

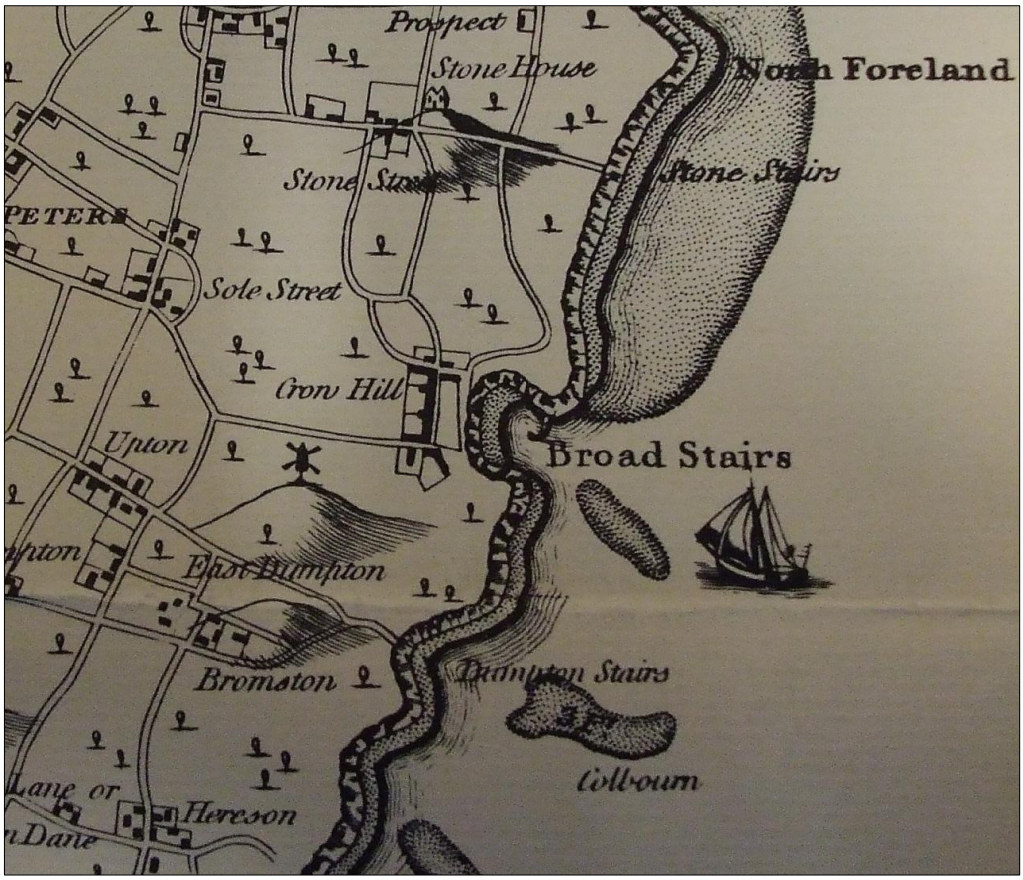


Figure 2, Extract of Hasted's map, 1778

A number of reasonably detailed engravings, drawings and sketches dating from the later 18th to late 19th centuries provide some insight into the manner of construction of Broadstairs pier. Figure 3 shows the outer side of the head of the pier with much of this being of horizontal planking. The southern side of the head appears to be principally of what are likely to be angle-set driven piles. A large, somewhat irregularly shaped building is present near the head whilst extending into the sea roughly at right angles from the outer wall of the pier are a series of groynes. These groynes are of vertically driven piles and can be seen to have trapped large amounts of sediment.

Figure 4 is a view looking southwards along the outer face of the pier. This confirms the outer walling to be of horizontal planking, some support to which appears to be provided for by several tie-plates (retaining tie-bars) which presumably extend through, or some way through, the width of the pier. Several timber-built groynes extend out into the sea from the pier wall and in places a number of small timber walls extend from groyne to

groyne. These structures almost certainly served to reduce the impact of waves and to trap sediment against the toe and lower parts of the pier wall – a task seemingly accomplished in this view. It would appear that the upper part of the outer wall forms a parapet above the pier deck. This is indicated by the opening in the upper part of the wall to the right of the picture which provides access via a small flight of steps to a low, timber-built pier-like structure with solid walls (ie: not open sided). There is a flight of steps at the end of this small structure that lead to the shore. This structure appears to be what was referred to in an account of the storm of 1897 as the 'grid-iron' and is said to have functioned as a breakwater with parts of it utilised for storage purposes (presumably sacks of live mussels as bait for long-lines; or such like). In the left central part of the depiction a projecting timber structure is shown. The purpose of this is unknown and it is unlikely to be the 'lookout house' referred to in the storm of 1897.

Figure 5 is a view of the head of the pier, looking in a northerly direction (head on along its length) and shows an unusual arrangement. The inner wall of the pier is clearly visible. This is of horizontal planking and appears to be strengthened by a number of tie-rod arrangements. Immediately to the right of the inner wall is a further wall set at a level slightly elevated to that adjacent. The technical intricacies of this arrangement are not entirely certain, but there appear to be two likely cases. Firstly, and probably most likely, the lower wall may be an 'added on' replacement, or re-facing of the inner wall (see final paragraph of 18th – 20th century documentary sources – Pier Books, above). Secondly, this inner wall may be a parapet. The outer wall of the pier is also visible though few details can be discerned. Groynes can be seen extending from this wall out into the sea. Atop the pier two timber-built buildings can be seen, that to the right may be the look-out house mentioned in 1897. Perhaps the most unusual element in this view is the slipway extending from the pier top down to the sea; an arrangement that appears to be unique at any of the east coast pier sites.

Figure 6 is a sketch from a newspaper depicting some of the damage at Broadstairs pier sustained during the Great Storm of 1897. This is almost certainly the 'grid iron' referred to in the newspaper text and can be equated to the small pier-like structure in Figure 4. This sketch effectively provides a section through the structure which can be seen to contain an infill of stone between the walls and deck of timber. This mini-pier is likely to be of an earthfast frame, rather than having walls of vertical piles, judging by what looks like horizontal planking in Figure 4.

A view of further damage at the pier is shown in the photograph, Figure 7. In this photograph the assembled crowd are stood on the head of the older part of the pier and the timber work in the foreground is the remains of the unusual east – west aligned pier end known as the 'slipway'. This was not actually a slipway giving ramped access to the sea but a level area, covered by an awning in summer, and used principally for promenading. Cartographic and pictorial evidence suggests that the 'slipway' is probably of mid 19th century date. The pictorial evidence shows it to be an addition to the pier head and the point of junction between the two is apparent in the photograph – the old pier being that part that survived reasonably intact, the later slipway being that part near fully destroyed. The principal point of interest in this photograph is that the structural nature of the slipway is readily visible. There seems little doubt that this is an earth-fast frame, seemingly a complex one in which there are six parallel lines of driven posts across its width. Strewn around the remnants of the frame are what appears to be the spread remnants of the stone infill of the slipway.

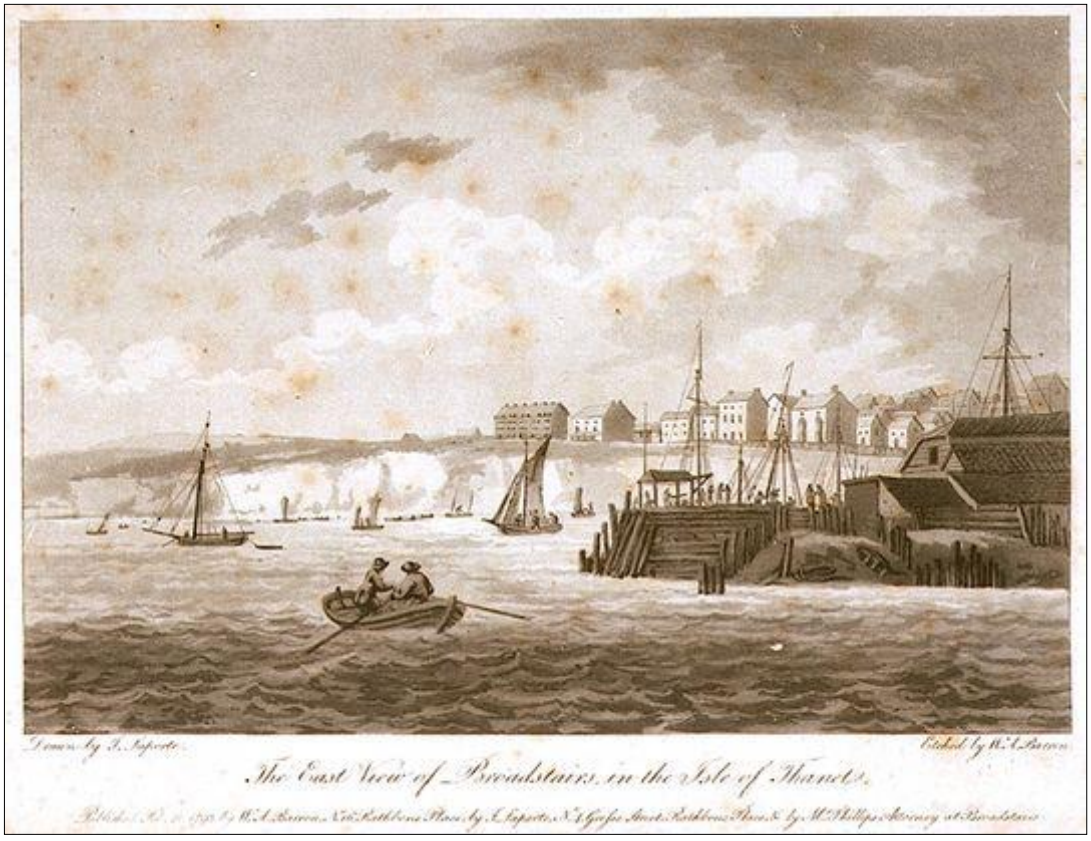


Figure 3, View of part of the head of Broadstairs pier, 1793, looking west. (source: National Maritime Museum: PUO967)

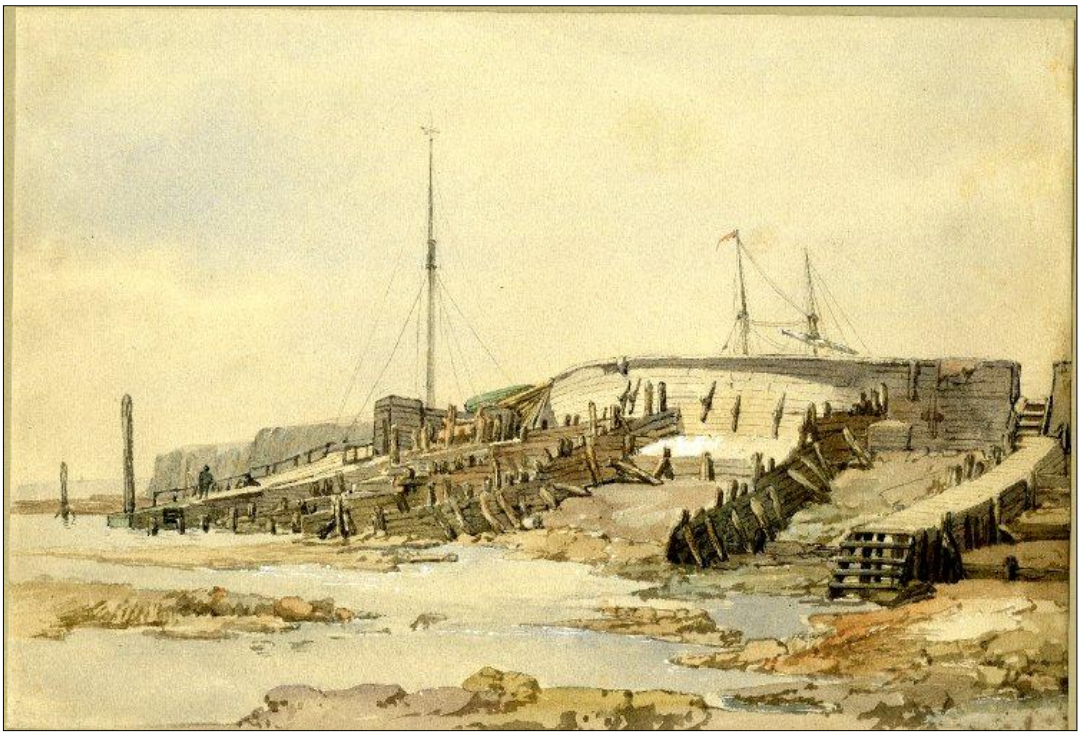


Figure 4, Mid 19th century view of part of the outer face of Broadstairs pier, looking south. By George Clarkson Stanfield (source: British Museum)

Figure 5, Mid 19th century view of part of the head of Broadstairs pier, looking north. (source: National Maritime Museum: 3134)

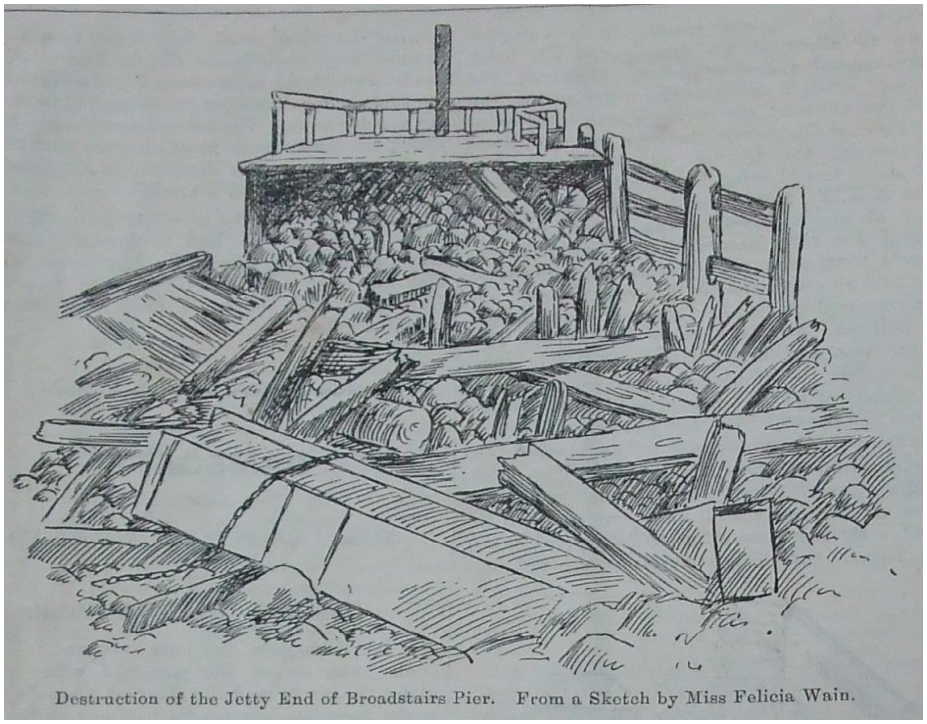


Figure 6, Sketch of damage at Broadstairs pier in 1897. (source: Keebles Margate and Ramsgate Gazette, Margate Public Library)

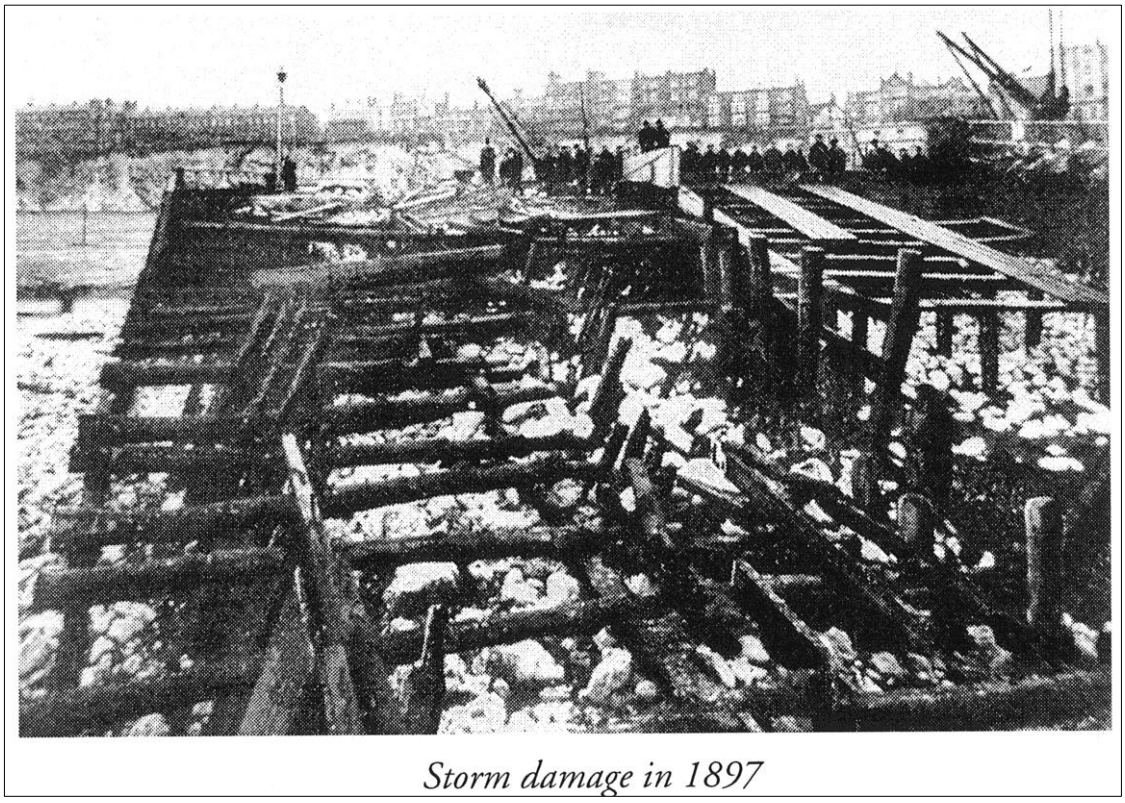


Figure 7, Pier frame exposed by storm damage, 1897. (source: Simmonds 2006)

Maps of the mid 19th to later 20th centuries show the changes to the pier in the more recent past (Figures 8-13). In the 1870s the pier was much narrower than that of today and on its eastern side there were arranged a complex of short, close spaced breakwaters. The length of the pier can be seen as around 100m and its width around 9m. At the head of the pier the east-west extension known as the slipway is present. Maps of the 1880s and 1890s indicate the pier to have undergone very little change, this seemingly being limited to a crane and capstan on the west side of the pier head appearing in the later editions. In some ways this is surprising given that a Bill of 1882 permitted unstated alterations to be made; perhaps these were superficial?

More significant change is evident on maps of the 1900s. This was comprised of the rebuilding of the slipway after the Great Storm of 1897 in a form slightly different to that of earlier years and the widening, or bulking-out, of the pier on its eastern side immediately to the north of the slipway. This work can be seen to directly overlay several of the breakwaters. Within this widened area the narrower, former eastern limit of the pier is still indicated by a line. A similar though more restricted area of widening is also apparent at the very north end of the pier.

Maps of the 1930s indicate that that central part of the eastern side of the pier between the areas of earlier widening was also widened by this date. Again, the narrower, former eastern limits of the pier remained visible in plan. A new landing stage on the west side of the pier head is also shown whilst space on the slipway is delineated in different form. Maps of the 1950s show no apparent changes. Little change is also evident in modern mapping, this being limited to a slipway in the northern area of the western side of the pier, and to different structural arrangements on the east – west part of the pier head.

A site visit shows that the map line of the old eastern limit of the pier is formed of a narrow, slightly angle set wall. This is built in sections defined by steel stanchions between each of which the walls are of concrete cast between planked shuttering (Figures 15, 16). As well as marking the old eastern limit of the pier the concrete walling resembles the parapet seemingly evidenced in Figure 4. It seems reasonable to see the existing arrangement as an accurate and direct reflection of old arrangements, but in modern materials.

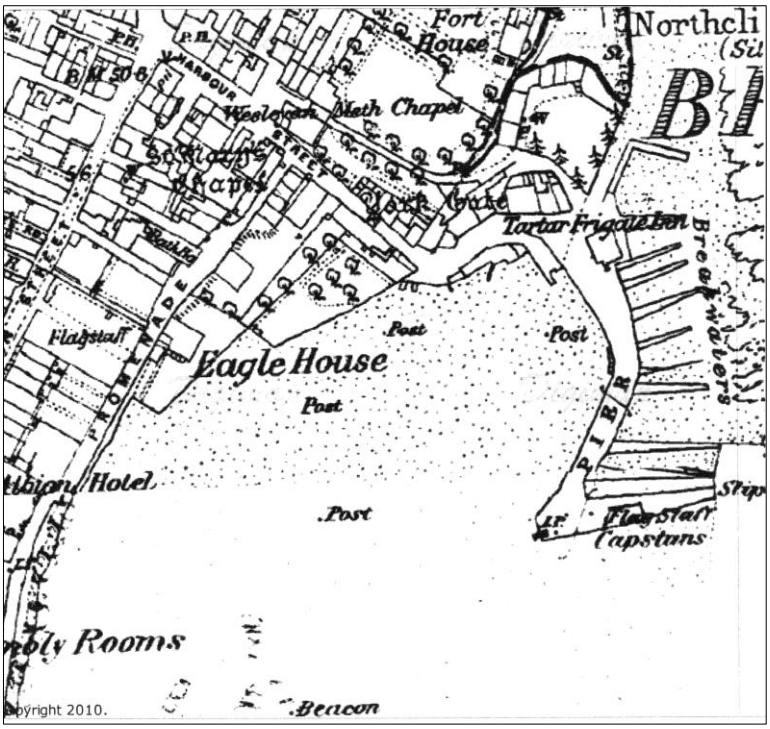


Figure 8, Ordnance Survey map of Broadstairs pier, 1870s. The Look-out and Store/Boathouse building is that at the landward end of the pier

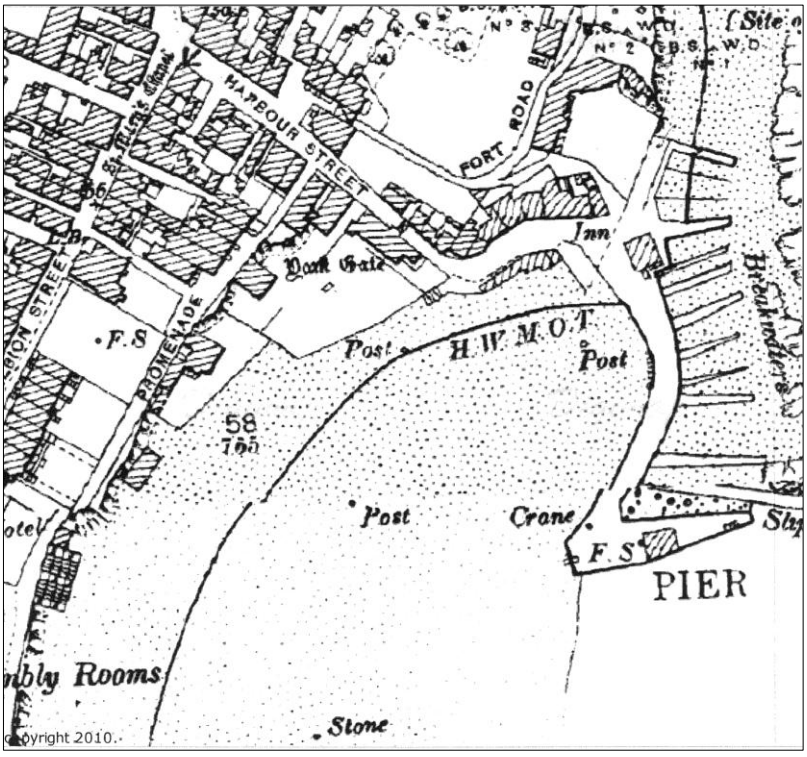


Figure 9, Ordnance Survey map of Broadstairs pier, 1890s

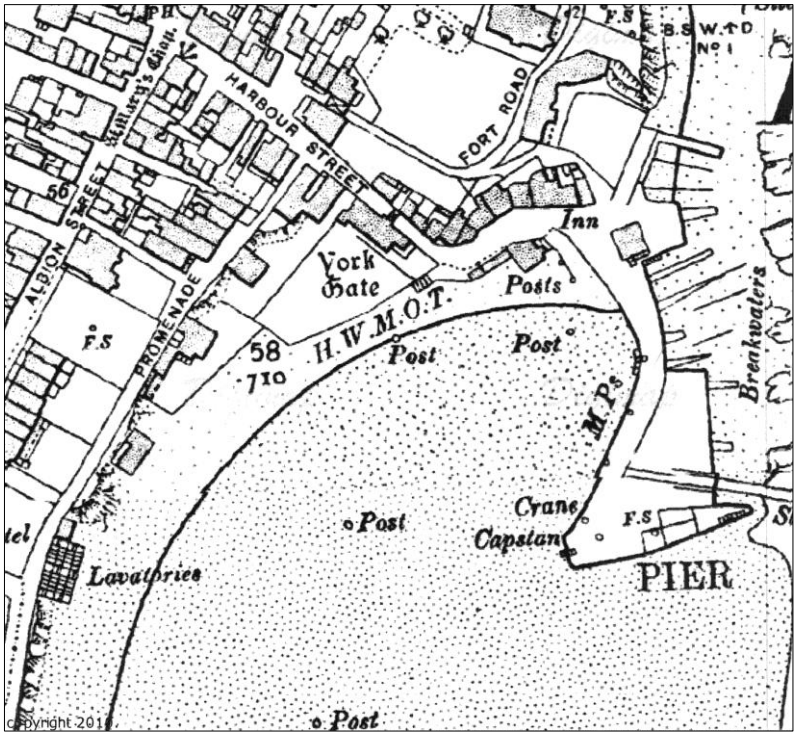


Figure 10, Ordnance Survey map of Broadstairs pier, 1900s

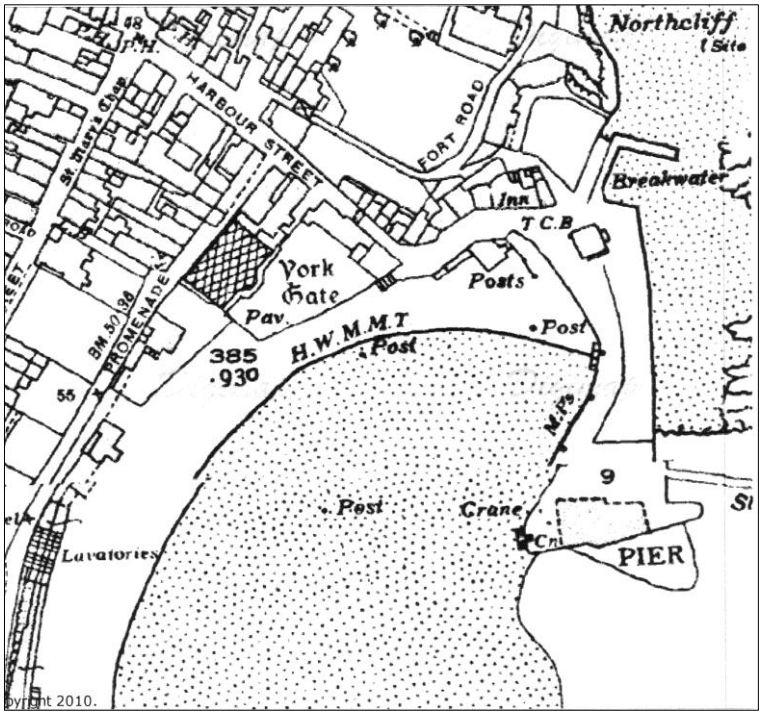


Figure 11, Ordnance Survey map of Broadstairs pier, 1930s

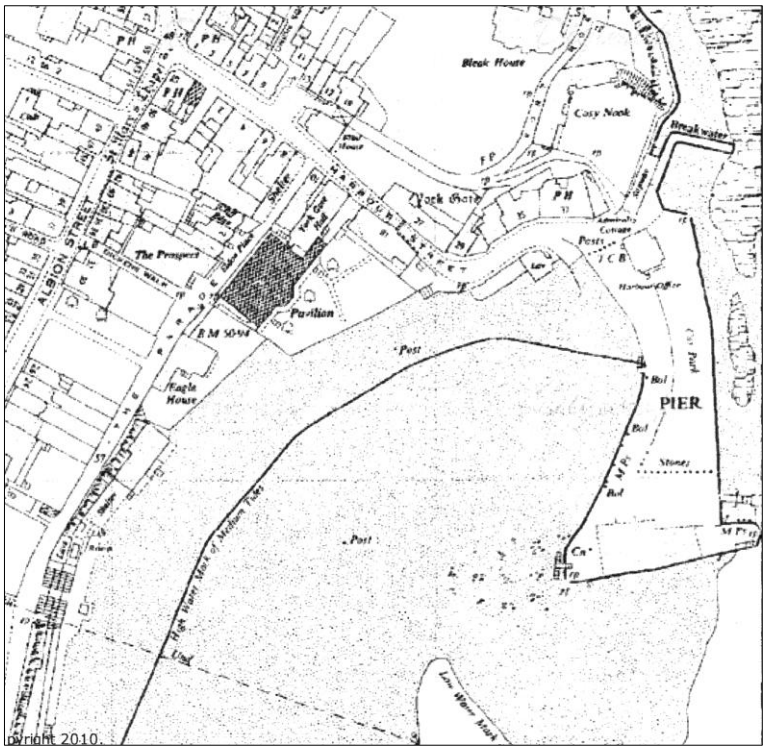


Figure 12, Ordnance Survey map of Broadstairs pier, 1950s

Figure 13, Ordnance Survey map of Broadstairs pier, 2010

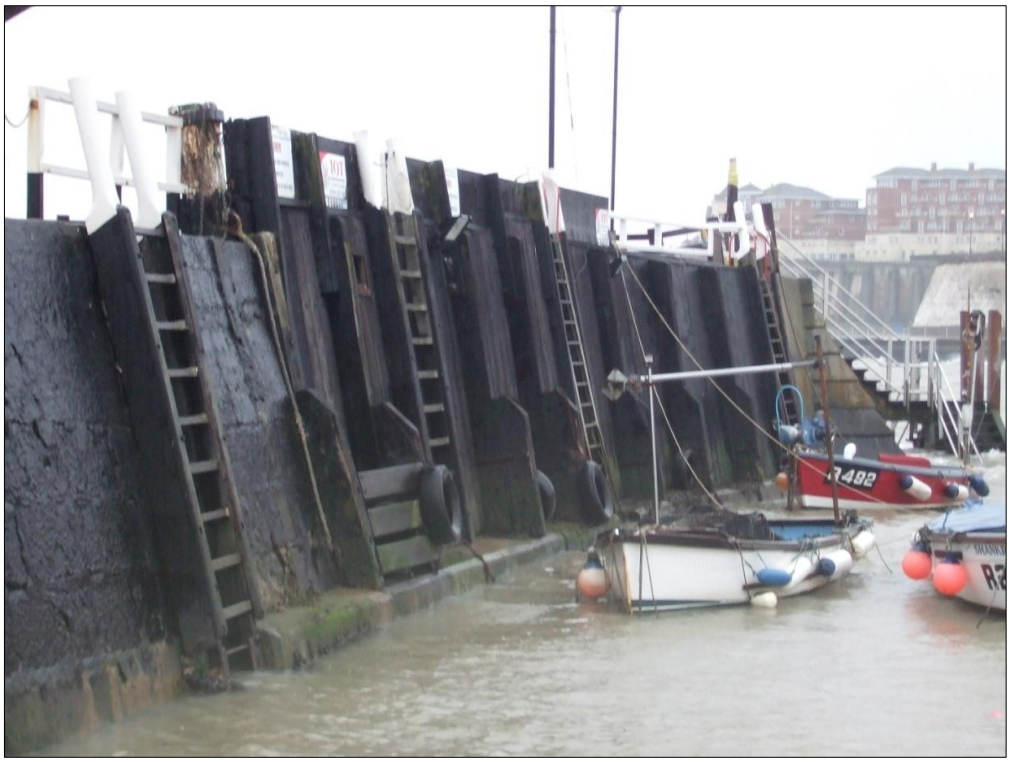


Figure 14, Timber to inner wall adjacent to head of Broadstairs pier, looking south

Figure 15, Elevated walling marking former outer face of Broadstairs pier. Note also 'the boathouse' at the landward end of the pier. A fort was situated just adjacent to the house with crenallations. Looking north

Figure 16, Detail of elevated walling (in position of former outer face of pier) now in concrete. Looking north

Harbour buildings

There is but one building on the pier that is of some antiquity, that known as 'the boathouse' at the landward end of the pier (Figure 17). Timber built with painted weatherboarding and roofed with slate, it is known that prior to 1843 it was roofed with thatch (Simmonds 2006, 27). A map of the pier and its immediate environs of 1856 shows this building and describes it as *"Pier House"* (Q/Rum 389B). The Earliest references to the pier house are to be found in various of the Pier Books. This includes a reference of 1792 to *"making tight the pier house"* and to carpenters re-framing the pier house in 1793 and 1798 (UD/BS (uncat.) Box 2, 1792-1814; UD/BS (uncat.) Box 1, 1792-1807). A resolution was passed in January 1799 *"that a new pier house be built 7' high with 2 lofts over for purposes of store houses for boats"* (UD/BS (uncat.) Box 2, 1792-1814). There is also reference in the 1790s to the *"tarring of the pier house"* (UD/BS (uncat.)) and for new planking and painting the south-west side of the pier house, in 1843 (UD/BS (uncat.) Box 2 1843-1853). It is not known if the proposed new pier house of 1799 was built, as only two months after the proposal for rebuilding in 1799 it was intended to let out store houses over the pier house to the highest bidder – this being achieved the following month. However, it seems reasonable to assume that the extant 'boathouse' relates to

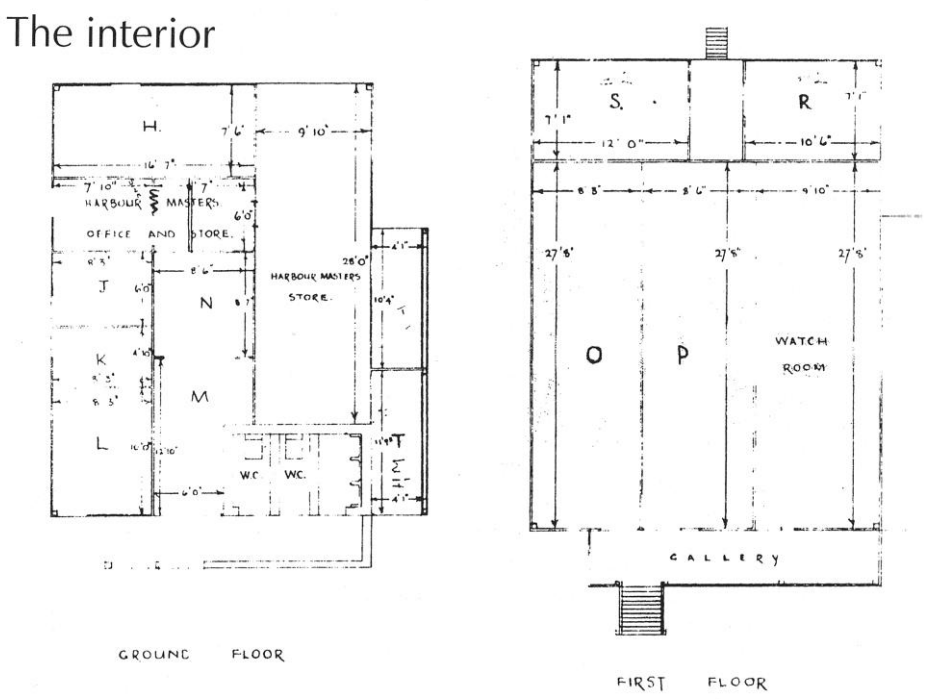
either the proposed pier house, or to the pier house recorded in 1792. This pier house building may also be the *"look-out house"* referred to in 1877, and in an article concerning the damage of the storm of 1897 (UD/BS (uncat.) Box 10 1870-1880; anonymous 1898). There is record of the painting of the figures on the look-out house in 1917, these being the ships figures that still grace the building. Around the same time there is also reference to shops on the pier and it is possible that these may have occupied parts of the ground floor of the boathouse UD/BS (uncat.) Box 7, 1914-1922). In 1921 wooden shutters were ordered for the lookout house whilst a request of the same year to rent a store house on the pier may also relate to this building (UD/BS (uncat.) Box 8 1912-1923; UD/BS (uncat.) Box 7 1914-1922).

The boathouse building is Grade II listed, and in this listing it is titled as 'The Look-out and Stores'. The building is of two storeys and appears to be of two parallel ranges with hipped roofs though the northern end of the east range has a gabled roof aligned at 90 degrees to the other roofs. To the west side there is a single storey extension with lean-to roof. There are external staircases leading to the first floor at both north and south ends. The arrangement of doors to the ground floor is irregular, as are the window arrangements to both floors. It is highly likely that this building has a complex structural history. At least three local writers are known to consider the building to be around three hundred years old though the listing details suggest a late 18th – early 19th century date. Its spatial arrangement with the pier strongly implies a direct connection between the two. Its location at the junction of town and pier in a position where access to the pier could be directly regulated is interesting. Today, at least part of the building serves as the Harbour Master's office and look-out. A simple plan drawn in 1947 (Figure 18), (reproduced in Simmonds 2006, 34) shows the building to be divided into several rooms on both floors (This plan is overdrawn as Figure 19 for clarity). Two ground floor rooms are labelled as a Harbour Master's office and a Harbour Master's store whilst one first floor room is labelled as Harbour Master's lookout. It is not possible to be entirely certain of the original, and probably developing, functions of this building. Given that Broadstairs has always been a small pier these may well have been multi-functional and probably always included a supervisory role. This is the only surviving pier building that can definitely be associated with a timber-built pier that has been encountered in this study to date. This rare, possibly unique, survival is therefore of some interest. A more thorough

investigation/survey of this building, both as a developing structure and in what was probably a regulatory role, may prove rewarding.

A plan of 1856 also shows the Droit House, presumably where the collectors had their office, on the east side of the harbour (Figure 20) (Q/Rum 389B). This building is also mentioned in the commissioners pier books, e.g. (UD/BS (uncat.) Box 2, 1843-1853). The location of this building reinforces the comments above on piers as being highly regulated places. One further aspect of regulation can be found in the pier books. This concerns an entry which states that a new bye-law is to be passed by the commissioners to the effect that no one can act as a porter on the pier unless they are *"sanctioned and appointed by the commissioners"* and that *"they wear a badge"* (UD/BS (uncat.) Box 2, 1825-1843).

Figure 17, Look-out and Stores/Boathouse, looking East



A plan of the 'Watch House and Stores' drawn by S. W. Richardson MIMonF, Engineer and Surveyor at Pierremont Hall in June 1947.

Figure 18, Plan of 1947 (from Simmonds 2006)

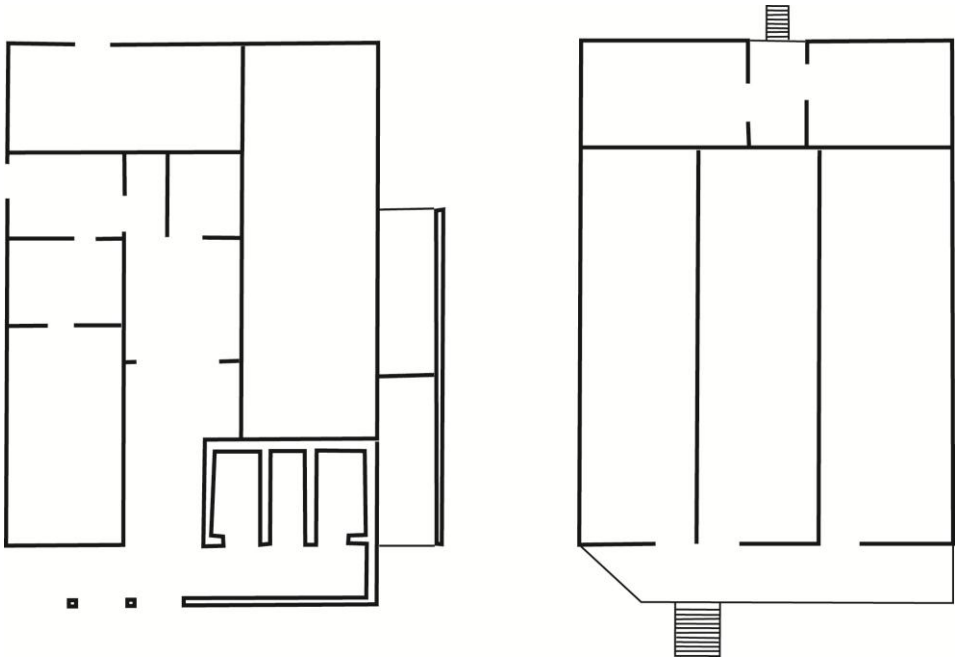


Figure 19, Overdrawing of above plan of 1947(ground floor to left, first floor to right)

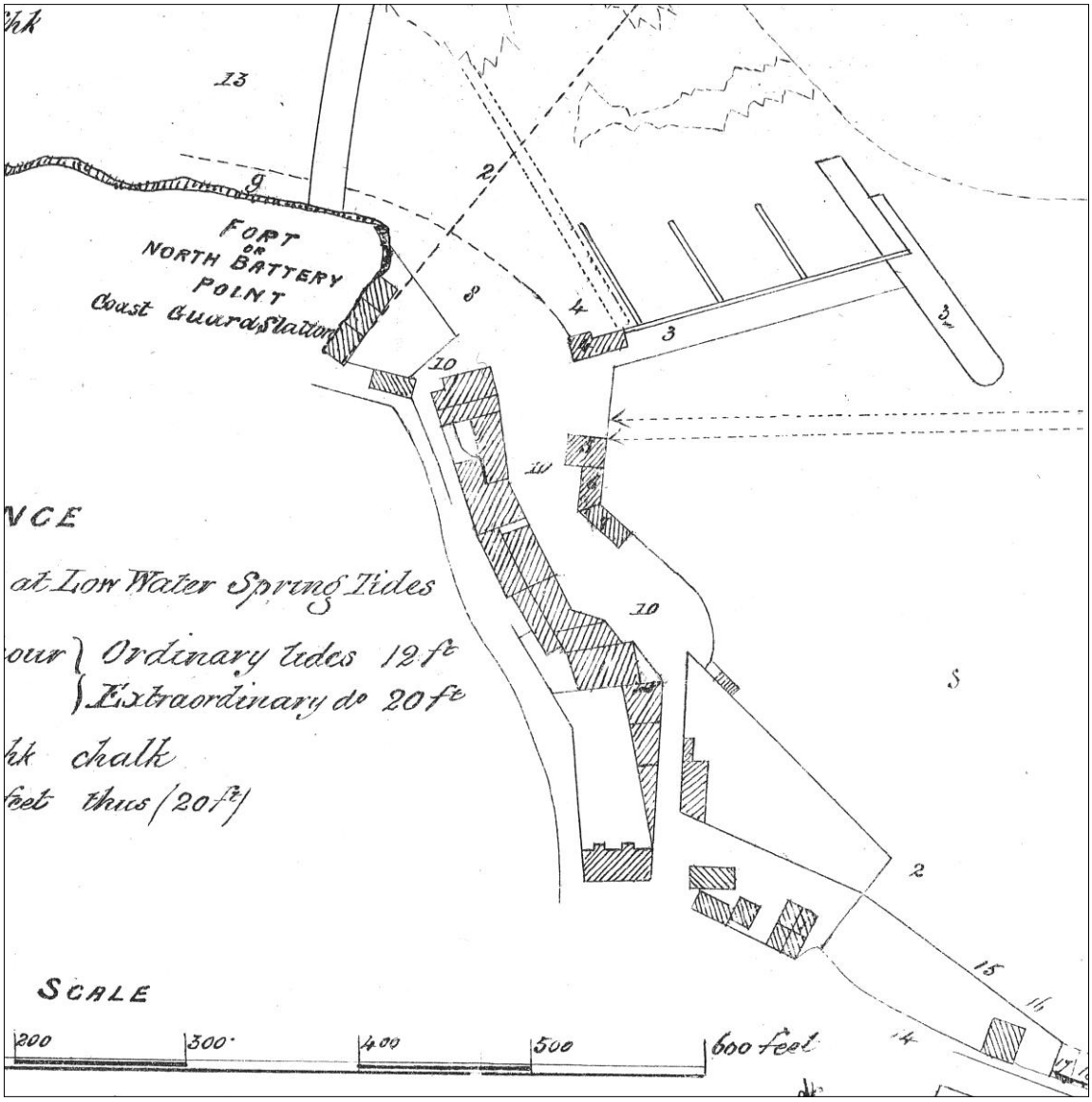


Figure 20, Plan of pier and its surroundings of 1856. No. 4= Pier House, No. 5 = Droit House, 6 & 7 = Baths (under control of the Pier Commissioners)

20th century documentary evidence

Some technical information on the pier in the early years of the 20th century is provided by a newspaper article entitled *"Condition of the Pier: Commissioners Lively Discussion"* (Broadstairs & St Peter's Echo & Thanet Herald, 1913, 4). It is reported that *"The discussion arose out of the report of the Works Committee which stated that the structure of the pier was in a very fair and sound condition, but for the future preservation, they*

advised the sheeting up of the same with vertical close jointed oak planking". One member of the Works Committee, councillor Emery, objected to the adoption of the recommendations. He insisted that at the base of the pier there were spaces between some of the existing 2 inch planking (which had apparently been in place for 15-16 years) and behind this there were cavities (*it would seem that if the intention was to affix vertical planks to the existing, which were then almost certainly horizontal – as in 19th century depictions). Emery made the point that to proceed may be merely to cover over serious structural defects. Further discussion between the commissioners indicates that there had been much rebuilding work 15-16 years previously, no doubt after the Great Storm of 1897. The article mentions the restoration work at this time involving walls of stone with a concrete infill and that between this and the outer timber shell of the pier there were piles with planks nailed to them. Comments from the Harbour Master at this meeting indicate that some of the oak had probably been there for a hundred years. The implication of this meeting is that the pier, as it stood in 1913, was probably an amalgam of works. Much of the pier was probably composed of work carried out after the storm of 1897, yet still retaining material of much older date. The Harbour Books covering the period 1912-1923 mention the requirement of, and the putting up of, planking (UD/BS (uncat.) Box 8, 1912-1923). This is described in greater detail in 1920 when 1,200 feet of oak planking together with 1 cwt of 5 inch spikes and 1 cwt of 6 inch spikes were needed for repairs to the south-west side of the pier (UD/BS (uncat.) Box 7, 1914-1922). In the same volume there is frequent mention of the replacement of timbers and planking. That this is likely to be so finds support in the O.S. maps of the 1900s and 1930s. This shows the head and its east – west arm to be rebuilt to a slightly different plan-form, and for the eastern side of the pier to have been widened. The main body of the pier however, is shown to be of identical form and proportions.

Environmental aspects

Broadstairs lies on the eastern side of the Isle of Thanet within a small bay, known today as Viking Bay (Figures 1 and 2). Since the later post-medieval period no longer technically an island, Thanet is formed of the land at the southern side of the wide mouth of the Thames estuary and is bordered on its landward sides by the rivers Wansum and Stour. The coastline of Thanet is composed principally of steep chalk cliffs. In a number

of places short narrow valleys cut through the chalk down to the shore. Broadstairs lies in one such valley, at the head of which the pier is located (Figure 21).

There is considerable documentary evidence for damage to the pier during gales in the post-medieval period. Damage is recorded in 1763 whilst in 1767 it is said that *"The pier, being old and ruinous, was totally destroyed by a violent storm, Jan. 2, 1767; but the harbour having been found to be of great use, it was totally rebuilt by voluntary subscriptions in 1772"* ((Remembrancer 1769, 229; Fisher 1772, 280). This storm may have done for those parts of the pier that had already suffered damage in a storm of three years previous (Remembrancer, 1769, 229). A prolonged gale in 1808, which wrought considerable damage to the old pier at nearby Margate, reduced Broadstairs pier to a state of ruin (Brayley 1817, 95). Further severe damage is also recorded in 1897 (B & SP Echo & Thanet Herald, 1913, 4).

A petition of 1808 stated that the pier not only protected the harbour of Broadstairs but also served for coastal protection *"a very considerable and the most valuable part of the Houses and Buildings of Broadstairs aforesaid , to the security of which Houses and Buildings, the continuance and support of the said Pier is essentially necessary"* (Petition 1808).

One limitation on shipping within the pier of Broadstairs was that it fell dry at low water and this was held to impose limits on its usage by vessels of large burden

That part of the bay adjacent to, and within, the harbour has historically accumulated large deposits of sand. This appears to be as there is little current within the area of the harbour itself and so sand held in suspension readily falls (Simmonds 2006, 66-68). Excess sand has historically, and still is, removed and sold. Whilst this appears to be a long-standing problem Bob Simmonds suggests that the situation was exacerbated with the construction of the promenade which was built after the 1950s. These works removed a slipway at the seaward side of the landward end of the pier which appears on the earliest O.S. map of the 1870s as well as successive editions. Whilst the slipway was in place the sea was able to wash over the landward end of the pier and wash away at least some of the sand. Since the construction of the parade this agency has been removed. It may be more than coincidence that the depiction of the pier in Figure 4 shows a gap in the parapet on the seaward side of the pier in a similar location; this may have been a tried and tested system of controlled scour to lessen blockages. This silting problem goes back a

considerable time. There is a reference in 1795 stating *"labourers to take the beach out of the pier"* (UD/BS (uncat.) Box 1, 1792-1807). In the same source there are also frequent mentions of payments to "*labourers working at the bank"*. This latter may refer to a bar of sand near the harbour mouth. It was recorded in 1920 that 2,205 loads of sand had been removed in recent months (UD/BS (uncat.) Box 7, 1914-1922).

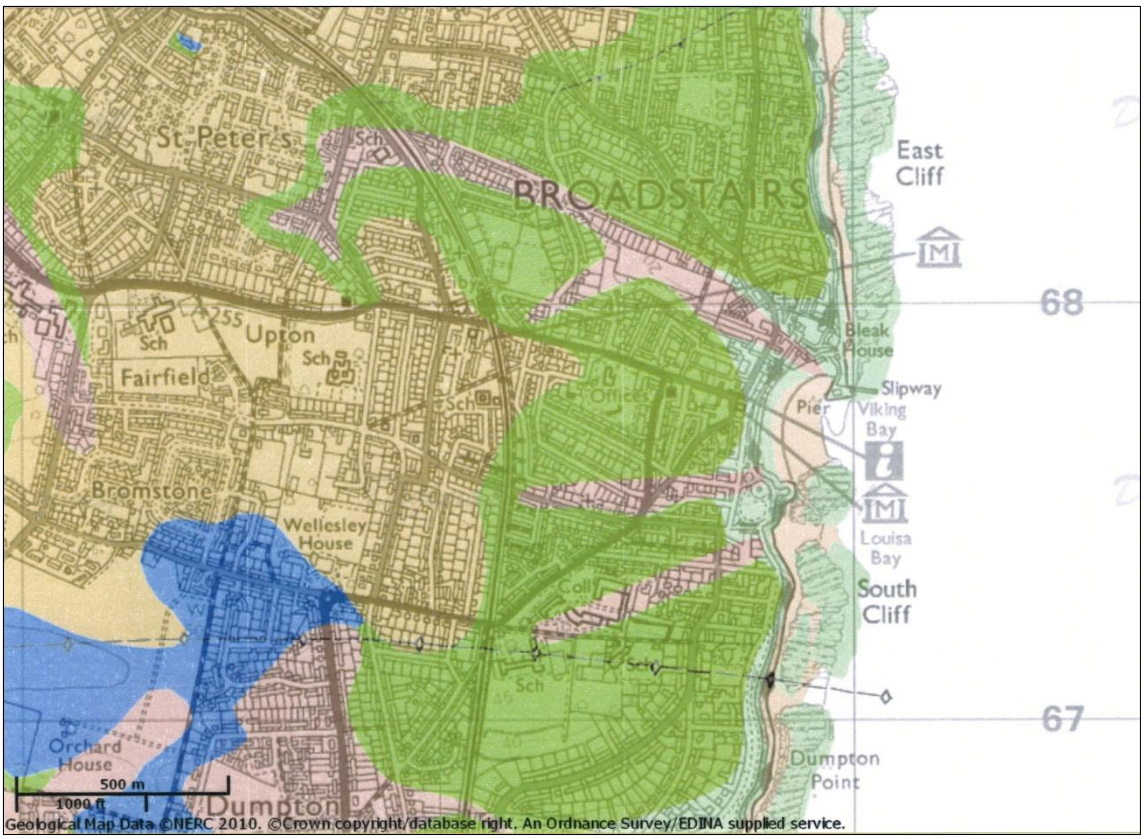


Figure 21, Geological map of the Broadstairs area. Green = chalk, Beige = beach and tidal flat deposits, Other colours = superficial deposits (note that ribbon of superficial deposits leading to harbour lie in a steep narrow valley)

Ownership/control/funding

According to the historian John Lewis, in a decree of the Lord Warden of the Cinque Ports authorised in 1616 the inhabitants of the town were entitled to annually elect for themselves two pier wardens to look after the repairs of the pier and to collect the droits (rates or dues) for its maintenance. In the title of this decree it is said that the rates have

been *"time out of mind"* (Lewis 1736, 164). The posts of pier wardens and the collection of droits can be traced to the 16th century. Lewis quotes two indentures, one dating from 1564, the other 1586 (Lewis 1736, 164-5). These indicate that in the mid 16th century the pier and road leading to it were in the ownership of the Culmer family who were wealthy shipbuilders and owners. It was sold by them to the inhabitants of the town for the sum of £10 on condition that the accustomed dues for its maintenance were paid to the pier wardens. The Culmer family wove into the agreement conditions that permitted them lesser payments though granted the inhabitants room on Culmer land to frame timber etc. for the repair of the pier. It was further agreed that at the parish church two pier wardens were to be chosen each year, at least one of whom was to be a fisherman. If any damage to the pier was not repaired within two years then the agreement was to be forfeited.

It has not proved possible to locate the original original documents quoted by Lewis and they may even no longer be extant. However, an abstract of their contents also appears at the back of the 1843-1853 committee minute book under the title *"A list of Ancient deeds and documents relating to the Pier, and Harbour of Broadstairs, presented to the commissioners by Mr Robt. Covell, October 1st 1850"* (UD/BS (uncat.) Box 2, 1843-1853). Also cited in this list of deeds are further documents of considerable interest for the funding of the pier at an early date. One of these, No 3 states *"A parchment of the Indenture, of covenant, between John Sprackling and others, and George Culmer, for setting Rates, and diverse rules, for the Maintaining, the Harbour of Broadstairs. Dated the May 1st Eliz-th 33rd 1591"*. Another, No 4 states *"A parchment, the Lord Wardens precept, for the better recovering the Rates, and Duties, payable to Broadstairs Pier, Dated the 26th Decem-r 1593"*.

Earlier work in this wider study has indicated that in Yorkshire the majority of the piers originated in the context of large estates, both lay and ecclesiastical, and that in southern England the earliest records we have point towards a corporate origin within town communities. The picture for the Thanet pier sites is less clear. There is an absence of early documentation for these pier sites, a factor highlighted by a number of historians (e.g. Whyman 1981, 15, 18). The earliest information we have concerning Margate and Ramsgate indicates community ownership in the early 17th century. This is the case at Broadstairs by the late 16th century, though here we have private ownership within the Culmer family, prior to this date. It is uncertain if this is a one-off case or whether a similar situation could apply to the other Thanet piers.

Like all coastal pier sites, there were times when the pier wardens and inhabitants of Broadstairs were simply unable to find the necessary resources to repair their pier. This predicament was succinctly summarised by Fisher in 1772 *"this pier has been frequently injured by storms and as the revenue for its support and preservation is but small, the inhabitants of Broadstairs have been sometimes obliged to solicit the subscriptions of the public, which in consideration of its commercial utility have been liberally promoted"* (Fisher 1772, 322). External assistance was provided in 1667 for the rebuilding of the pier through a national subscription (Hills 1887, 17 – quoted in Whyman 1981, 93). It is also recorded that in the wake of *"very great damage in the storm of 1763"* the inhabitants again petitioned for a brief, or public collection (Remembrancer 1769, 229). The same source informs us that their petition was rejected. It has been stated by a number of writers, most lately John Whyman and Bob Simmonds, that in 1774 the Corporation of Great Yarmouth, the Cinque Ports of Dover and Hythe, the City of Canterbury, the East India Company and Trinity House gave £2,000 towards rebuilding the pier; their source for this is P.W. Barlow: Broadstairs Past and Present of 1887. It has been suggested that the East India company's interest in preserving the pier at Broadstairs may have been prompted by Whites shipbuilding yard at the town which is known to have supplied a number of the company's ships. Such institutional donations for works to piers have been encountered at other pier sites.

There is only one book of accounts which relates to the control of the pier by the system of pier wardens (UD/BS (uncat.)1769-1807). These accounts are in the form of two entry types, receivings and disbursements, with itemised entries being arranged on a day by day basis. At the end of the pier wardens annual term of office the accounts are summarised and signed off by a number of witnessing inhabitants.

An Act of Parliament, of 1792, was obtained for repairing or rebuilding the pier, for its preservation, for removing and preventing obstructions, nuisances and annoyances and regulating the mooring of ships within the harbour (Act of Parliament 1792). The basic problems with the pier were summarised in the Act's preamble, the pier: *"become in a ruinous and decatyed state, and it will require a considerable sum of money to be forthwith laid out to put the same in good Repair and Condition: And whereas the only fund for repairing and maintaining the said Pier arises from certain Rates, Droits, or customary Dues, payable by the Owners and Masters of Shpis, and other Vessels, making use of the harbour of Broadstairs aforesaid; which said Rates, Droits, and Dues have*

been found insufficient". It was further said that the existing powers to enforce payment were ineffectual. The Act was to provide precise rates of dues on specific commodities, with discretionary powers on non specified materials, as well as providing considerable legal power in the demand for payment. Such powers included the right to examine those liable and to distrain goods or ships. Further, clearance for cargoes would not be provided by waiters and customs authorities until such payments had been made to the pier. The precise definition of the limits of the harbour within the Act also seem to relate to these matters of financial control.

The Act replaced the old system of Droits which had previously been payable to the pier wardens or their appointed collectors. Indeed the old pier warden system was completely done away with by this legislation. Instead, authority over, and legal ownership of, the pier was now vested in a body of around forty commissioners. These individuals were drawn from the ranks of civic and governmental worthies/officials together with a large body of named townsmen. This body was self perpetuating in so far as at the death or retirement of a commissioner, the remaining commissioners were to elect a new one. Qualification for the office of a commissioner was dependent upon their being a particular civic or governmental postholder, or else of having a certain level of income. The commissioners were permitted to appoint salaried officers, which included a treasurer, clerk, collectors and surveyors. Records, both of proceedings and financial matters were required to be kept, with these being annually open to inspection by the inhabitants. The commissioners met regularly, often once a month, with the venue, until around the mid 19th century, normally being one or other of the local hostelries, often the 'Tartar Frigate' immediately adjacent to the pier (UD/B5 (uncat.) Box 2, 1792-1814). After this date these meetings were normally held in the Droit Office (UD/BS (uncat.) Box 2, 1853-1869).

A number of books kept by the commissioners survive. These include Pier and Harbour committee minutes, Treasurers account books and Treasurers account books (commissioners). The format of these accounts is somewhat different to those of the pier wardens, they no longer being annually signed off by witnessing inhabitants and are seemingly the work of professional appointees. Many of the Pier Books of the late 18th and early 19th centuries refer to the spending of money, and the holding of meetings, towards the goal of amending the Acts of Parliament relating to the pier, seemingly with the ultimate intention of increasing income, e.g. (UD/B5 (uncat.) Box 2, 1792-1814; UD/BS (uncat.) Box 2, 1814-1824).

It is clear that the overarching aim of the Act was to physically set right the pier. This required the outlay of large sums of money and to this end the commissioners were permitted to raise money through various forms of loans. This included borrowing money at interest, mortgaging future income from rates and by granting annuities for life upon the receipt of sums of money. Certain of the records of the commissioners record such dealings, e.g. (UD/B5 (uncat.) Box 2, 1792-1814; UD/BS (uncat.) Box 2, 1814-1824).

A particularly interesting aspect of the 1792 Act concerns the specifics of the new and complex sets of dues payable to the pier for its usage. At a simple level local fishing vessels were to pay a given percentage of the value of their catches and charges for such things as taking on ballast were by the ton. Things became more complicated in so far as some duties were variable depending upon the particular tonnage of vessels, those of greater burden paying slightly more than those of lesser burden. Presumably it was considered that larger vessels were more economically efficient and could therefore afford to pay more. More surprising still is that different rates of dues were payable according to the origin of the master or owner of a ship. These rates fell into three bands. Portsmen (i.e. members of the Cinque Ports) fell into the lowest band, Shiremen (British subjects) fell into the middle band, whilst aliens or merchant strangers (non Britons) were within the higher band. The same system was in operation at Margate under its own Acts of Parliament. The upshot of such variable tariffs was that it encouraged, for want of a better term, regulated un-free trade, one corollary of which was smuggling and this is known to have been rife at this time, not least so in Kent with its proximity to the continent. The banding of tariffs must surely have related to intended economic advantage, this being given firstly to the Cinque Ports and with foreigners at the bottom of the heap. It is probable that the Act was merely formalising existing tariff arrangements at the ports of the Cinque Ports and this practice may have been an ancient one. Less advantageous rates for foreigners at ports has been seen to be common throughout much of the medieval and post-medieval periods, but differential bands within the nation have not previously been encountered. This protectionism, together with other tax etc advantages of the Portsmen gave them an economic edge which appears to have been one of the root causes of the centuries old disputes between the Cinque Ports and other towns, particularly Great Yarmouth.

A further Act of Parliament for Broadstairs pier was enacted in 1805 (Act of Parliament 1805). Its preamble gives a picture of the then state of affairs: *"And whereas the*

Commissioners appointed or elected by the said recited Act, have made considerable Improvements and Erections within the said Harbour, and for such Purposes have borrowed a considerable Sum of Money on the Credit of the Rates thereby granted, which Money cannot be repaid, nor the several Works already made, many of which are out of Repair, be repaired, maintained, or supported, unless such Rates are increased, and further Provisions made for carrying the Purposes of the said Act into Execution". In essence, this new Act enabled the commissioners to borrow further monies, up to £10,000 in total at any one time and a new system of rates was imposed in place of the former one. This Act no doubt finds correspondence to resolutions of the commissioners that *"droits arising to the harbour"* were *"not adequate to keeping up the said Pier of the said Harbour"* and the need to *"ammend the present Act"* (UD/BS (uncat.) Box 2, 1792-1814). Further powers within the Act enabled the commissioners to make bye-laws for the better regulation of the harbour. The three tier system of rates payable by Portsmen, Shiremen and Merchant Strangers continued.

In times of misfortune the benefits of the Acts of 1792 and 1805 could still fail to keep the pier in order as a petition of 1808 seeking the assistance of Parliament makes clear. A prolonged violent gale from the north-west combined with two successive spring tides in January 1808 made several breaches in the pier and left it in a dangerous and ruinous state, and this after considerable sums had recently been expended upon it (Petition 1808). The funds of the commissioners for maintaining and repairing the pier were already exhausted and a considerable debt had been incurred by them. Further, the inhabitants were said to be *"totally incapable of raising a sufficient sum of money for rebuilding the said pier"*. This petition was referred to a committee who examined a number of witnesses including Elder Brethren of Trinity House, sea captains, pilots, mariners, the Navy Office and merchants, all of whom attested to the value of the harbour and pier. Perhaps to try to sway committee opinion one mariner pointed out that four Broadstairs ships were fitted out to carry guns for protection of the coast – free of expense. A surveyor, acting for the commissioners, presented two estimates for repair. That for repairing the pier in timber to its previous state was costed at £12,917. 15. 4. That for casing the present pier with stone instead of timber was costed at £15,980. 18. 7. The surveyors preference was for stone on account of the worm. Whilst the costings for the stone clad work were itemised, that for restoration in timber unfortunately was not. An examined commissioner presented accounts of income and expenditure for the pier from

the time of the first Act of 1792 up to 1807. These showed that over that period expenditure was slightly greater than income and that despite some voluntary subscriptions from amongst the inhabitants the pier was £500 in debt. The same commissioner went on to state that although the Acts permitted them to borrow up to £10,000 they had only borrowed £500 *"that, were they to borrow to the full extent of the power of the Act, it would be impossible for them to pay Interest for the Money, and keep the Harbour and Pier in repair with the present Income"*.

Despite the evidence presented to the committee the outcome of this petition does not appear to have been a positive one. According to one contemporary observer *"nothing essentially effectual has yet been executed"* (Brayley 1817, 95). Further contemporary observation tells us of a memorial presented to the Lords of the Treasury in 1825 and attested by the principal inhabitants of the town (Mockett, 1835, 104). This stated *"that the funds of the commissioners of Broadstairs pier were exhausted, and that they were totally incapable of raising a sum sufficient for rebuilding the pier"*. The same source informs us that in 1828 *"the harbour master and treasurer passed their accounts at the annual meeting of commissioners, shewing a balance in hand of £68. 2. 9 ½"* (Mockett, 1835, 120). Presumably the root of the problem was that although the commissioners were legally permitted to borrow, the pier income would not readily permit repayment. As such, either potential lenders were aware of this problem and unwilling to become involved or the commissioners were too prudent to embark on economic misadventure.

A new Bill was passed in 1882. This authorised the improvement and regulation of the pier and the construction of new works. The same measure also permitted the commissioners to borrow up to £25,000. The Bill gave permission for any alteration, widening and extension of the pier deemed necessary. Ordnance maps of the 1880s – 1890s indicate little change at the pier and it may be that projected works either didn't materialise or they were minor in scope. In 1909 the pier passed into the hands of the Broadstairs and St Peter's Urban District Council and in the 1970s to the custody of the Thanet District Council (C/A3/9B/1; Simmonds 2006, 19).

Of the Thanet sea ports, Ramsgate had its small timber pier replaced by large stone piers in the mid 18th century purely and simply as it was chosen by high authorities to be a harbour of refuge. That Margate obtained a stone pier, larger than its timber predecessor in the early years of the 19th century appears to be owed to several factors. It was by this

time the largest of the Thanet towns by far and it had frequent shipping links to London, both as the principal point of export of grain from Thanet and as the popular destination in Kent for those members of the capital's population seeking a watering place. Its pier served a practical shipping function as well as a resource for promenaders. The small timber pier at Broadstairs was never fully rebuilt in stone, it merely struggled on, just, with piecemeal patching. It remained a small town and attracted lesser numbers of tourists, and these of a type that avoided the larger and more gaudy Margate.

Miscellaneous

Material remains

The sections discussing documentary, and pictorial/cartographic evidence have highlighted the possibility that fragmentary early structural remains may have lain encased behind the shell of the pier as it stood in 1913. Given that works since that date appear to have been accretions rather than rebuilding this still remains the case. It should also be remembered that the extant 'boathouse' building was constructed when the pier was entirely of timber and the cartographic evidence indicates that this structure is in the same place as it was in the mid 19th century. On the assumption that the building has not moved, there is a very distinct likelihood that remnants of the old timber piers survive underneath.

Whatever some of the core material of the pier as it has stood in the 20th century, the later documentary material makes it clear that until the 1920s at least large quantities of timber planking were still being ordered for use at the pier, this almost certainly as cladding. Amazingly, around 15m of near vertically set timber plank cladding set between large rectangular posts and spaced just under 2m apart presently survives on part of the inner wall of the pier adjacent to the head (Figure 14). The posts have buttress-like strengthening pieces towards their bases which are secured by metal strap-work. This 'fresh looking' timber, which is clearly of 20th century origin, is set on an elevated footing of concrete. Adjacent areas of pier wall are of concrete. The entirety of the timberwork is coated in a black bitumen-like substance, presumably to act as a preservative. As far as is known, this relatively modern timber pier-work represents the last of the tradition of timber pier building on the east coast.

Specialists and workers

The late 18th century accounts of the pier wardens record payments to labourers and carpenters as well as pier wardens fees and collectors expenses (UD/BS (uncat.)1769-1807). The payments appear piecemeal rather than regular, often by days and their multiples and occasionally by the tide. This arrangement may suggest a casually employed workforce.

Records of the commissioners refer to labourers and carpenters with their payments again being piecemeal rather than regular, typically by multiple days and sometimes by the tide or half tide (UD/BS (uncat.) Box 1, 1792-1807). However, reference to works carried out by *"self"* may suggest a small core of regular pier employees (UD/BS (uncat.) Box 1, 1792-1807). This latter source also makes reference to sawyers cutting timber in 1799 and 1800. Many of the harbour records refer simply to *"payments to workmen"* whilst others make wage payments to individuals by name but fail to mention the nature of their work (UD/BS (uncat.) Box 14, 1831-1841; UD/BS (uncat.) 1842-1852). The records of the commissioners detail what appears to be almost continuous work at the pier, albeit much of this of probable small scale. A Harbour Master and assistant to the Harbour Master are mentioned from the late 18th century and it appears that the Master had a role to play in the regular maintenance of the pier. In 1792, for example, it was *"Resolved that the Harbour Master shall or may Buy such old Ship Timber, Spikes etc as he may think fit for the use of the Pier"* (UD/BS (uncat.) Box 2, 1792-1814). In the mid 19th century there is even clearer evidence within one of the harbour books for the role of the Harbour Master in repair and maintenance work (UD/BS (uncat.) Box 2, 1853-1869). This source informs us that cheques were given to the Harbour Master for labour and wages on a fairly regular basis. Later still, we can see the Harbour Master inspecting and reporting faults and thereafter being instructed to procure timber and carry out repairs as he thinks fit (UD/BS (uncat.) Box 10, 1890-1899). What appears to be re-cladding of part of the pier in 1920, was carried out under the supervision of the Harbour Master (UD/BS (uncat.) Box 7, 1914-1922).

A payment to Mr Rennie serving as *"engineer attending"* at Broadstairs was made in 1808, though precisely why he was engaged is uncertain (UD/BS (uncat.) Box 1, 1807-1827).

Raison d'etre

The petition of the inhabitants of Broadstairs and the commissioners of its pier addressed to the House of Commons in 1808 stated what they saw as the benefits of their pier, most of which were centred around issues of safety (Petition 1808). It was claimed that the pier gave shelter to vessels in stress of weather and that the vessels for which it was a station frequently performed vital services to ships in distress. It was also claimed that ships seeking refuge that were heading north and had missed the safety of Ramsgate still had the opportunity of heading into Broadstairs. Interestingly the same petition stated that the pier not only protected the harbour of Broadstairs but *"a very considerable and the most valuable part of the Houses and Buildings of Broadstairs aforesaid , to the security of which Houses and Buildings, the continuance and support of the said Pier is essentially necessary"*.

Promenading

The Thanet coastal towns early developed a tourist industry, the principal clientele being drawn from London and most commonly making the journey by ship. This has been considered by John Whyman (Whyman 1981). During the 18th century, and particularly the 19th century Broadstairs attracted large numbers of visitors and the town was particularly popular with literary and artistic types. Famous visiting figures included Charles Dickens, Wilkie Collins, Mark Twain, George Elliot, William Thackery and Hans Andersen. Another regular visitor was the young Queen Victoria (Lapthorne 1980, 4). Whilst an assembly rooms and libraries offered indoor recreation the chief outdoor activities for visitors were sea bathing, walking and promenading on the pier. It is known that the pier was regularly trod by visitors and the east – west aligned pier extension known as the slipway, which was partly covered with an awning in the summer months, was a particular favourite with promenaders.

Fort

A coastal battery was built in 1794 on an area of high ground immediately to the north of the pier adjacent to Bleak House. This ground was known in the mid 19th century as Fort,

or North Battery Point. This battery remained in use until the end of the Napoleonic Wars after which it became a base for the Coastguard Service (ADS). A further coastal promontory, a little to the south of the pier was known as Fishess Point or South Battery and appears to have housed a second fort (Q/Rum 389B). The topography of the town itself offered a degree of natural defence. Steep coastal cliffs are present on both north and south sides of the town which can only be readily accessed through the narrow valley that runs from the shore, in the area of the harbour, up to the historic core of the settlement. A stone gateway known as York Gate, which still stands, at the lower end of this valley, was built to protect the town from incursion by foreign privateers. An inscription indicates this to have been built by the Culmer family in 1540 (Lewis 1848, 389).

Place-name

The street of Harbour Street leads directly from the town to the harbour.

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Case study 15: Ramsgate

Summary of previous work

Ramsgate and its timber-built pier have had little mention in historical works. The town is given some small attention in John Lewis's two volume 'History and Antiquities, as well Ecclesiastical as Civil, of the Isle of Tenet, in Kent' first published in 1724 with a second edition of 1736 (Lewis 1724/36). John Lewis provides brief descriptions of the town and the pier together with its system of management and was the only writer to do so whilst the timber-built pier still stood. Edward Hasted's multi volume 'The History and Topographical Survey of the County of Kent' also provides some background information for the pier and town though the piers extant at his time were of stone (Hasted, 1800). The works of Lewis and Hasted both employ original source material and can be regarded as histories in the modern format. Ramsgate's small timber single pier was replaced by a much larger arrangement of twin piers, built mostly, and eventually exclusively, in stone, in the mid 18th century specifically as a harbour of refuge. The technicalities and political circumstances of this later pier have been the subjects of a number of historic studies, though being of stone it lays beyond the bounds of this present study.

Ramsgate was a limb of the Cinque Port of Sandwich. It has no corporation records and its subordination to Sandwich seems likely to have lessened the amount of documentary material available for the pier, both in terms of generation and preservation. This subsidiary status is similar to the other Thanet seaports of Margate and Broadstairs. Again, like these neighbouring towns Ramsgate became one of the earlier of the seaside watering places, its visitors being drawn principally from London. As such the town appears in a number of 18th and 19th century guides, mostly those dealing with the Thanet area generally. However, as the pier had already been replaced in stone by this date these guides, unlike those for Margate and Broadstairs, do not provide us with contemporary descriptions of the timber-built pier.

Background: town, membership and governance

Ramsgate developed as a hamlet within the parish of St Laurence and was a limb, or member, of the Cinque Port of Sandwich (Gibson 1993; Hasted 1800). Ramsgate was subject to Sandwich in all matters of civil jurisdiction. The mayor of Sandwich appointed his Deputy there in the same manner as the mayor of Dover did at Margate and Broadstairs. Waiters and Searchers of the Customs Service had a presence at the town, where they supervised the lading and unlading of goods, but there were no 'legal quays' for foreign trade. Documentation had to be obtained from the head port of Sandwich before such overseas material could be handled (Andrews 1953, 37).

In the 1566 survey of the Kent coast the number of houses at Ramsgate was listed at a mere 25, considerably less than Margate with 108 and Broadstairs with 98 (Gibson, 1993, 345). By the late 18th century the population of the town was well over 2,000 (Hasted 1800, 377) whilst by 1811 it had grown *"to 4221: a most astonishing increase, and the best proof of the rapidly rising prosperity of the place"* (Oulton 1820, 89). There appear always to have been at least a few fishermen operating from the town, which also, from at least the later 17th century carried on a successful trade with Russia and the East Country (Oulton 1820, 89; Lewis 1736, 175).

Figure 1, Ramsgate location (source: Edina)

Technology

Earlier documentary evidence

There is very little documentary evidence for the timber-built pier at Ramsgate in the 16th and 17th centuries and none of that was generated by the pier controlling authorities. This may in part relate to the whole-scale transference of control of the harbour from one authority to another. More particularly, the replacement of the small timber pier controlled by locally elected pier wardens by a massive new haven of refuge built in stone and controlled by a body of appointed commissioners/trustees. It may be that there seemed little point in keeping administrative and technical records of a defunct structure and administrative system.

Our earliest reference is of the late 1530s – early 1540s when John Leland noted in his 'Itinery' that "*Ramesgate a iiii myles in Thanet, wher as is a smaul peere for shyppis"* (Leland, vol 4, 61). Leland does not actually mention the material of which the pier was built, though given the technical traditions of east coast piers and its recording as timber-built at a later date, there seems little reason to doubt that this was the case in the 16th century. Reference to *"Ramsgate pier"* is common in the 16th century state papers, entries for the years 1625, 1626, 1633, 1672, 1674, 1675, 1677 and 1699 being typical in so far as the pier is explicitly mentioned but no description provided (Cal. S.P. Dom. 1625; Cal. S.P. Dom. 1626; Cal. S.P. Dom. 1633; Cal. S.P. Dom. 1672; Cal. S.P. Dom. 1674; Cal. S.P. Dom. 1675; Cal. S.P. Dom. 1677; Cal. S.P. Dom. 1698).

The historian John Lewis provides some our first descriptions of the pier and indicates that around the early years of the 18th century it had been enlarged *"At the Eastern Part of the Town is built a Pier of Timber to make a Harbour for Shipping, and defend the Town against the Ocean. Accordingly Ships are laid up and fitted out here, of considerable Burden. But the Foreign Trade of the Place being increased in the late wars, and the Inhabitants desirous to have as much of their Shipping as they could laid up at home, and fitted out there, to promote the Trade and Benefit of the Place, a few Years ago this Pier was considerably enlarged, and the Harbour thereby rendered more commodious"* (Lewis 1736, 175).

In his historical report on Ramsgate harbour in 1791 the engineer John Smeaton stated that in 1715 the pier had been lengthened and that a bar of sediment about 40 yards length

and breadth had been cast up (Smeaton 1791, 10-11). It would appear likely that the extension to which Lewis and Smeaton referred were one and the same.

Cartographic and pictorial evidence

A map of 1548 showing the north-east coast of Kent depicts the pier of Ramsgate, as well as those of Margate and Broadstairs (Figure 2). The pier is shown as having the plan-form of a gentle arc that extends from the land at the north, out to the south. Ramsgate pier appears on a number of historic maps and views including Hasted's map of 1778 (hereshistorykent.org). All depict a single curved pier extending from the shore at the north, southwards into the small bay.

Figure 2, Map of 1548 (north is towards bottom). Ramsgate and its pier are depicted at the top left of the Isle of Thanet (British Library: Cotton Augustus l.i. f.54)

John Lewis produced a plan in his edition of 1736 which depicts the town and pier in some detail (Lewis 1736, between pages 174 & 175), (Figure 3). This map shows the pier to be essentially linear, though with a few angular kinks along its length and to measure a maximum of just under 350 feet (106.6m) and with a width of around 20 - 25 feet (6.1-7.6m). To the outer side of the pier a series of five curvilinear lines between 150 – 220 feet (45.7-67m) long are evident and these curve outwards towards the north-east, stopping a little way short of the low water mark. These almost certainly represent groynes designed to attract a build-up of sediment thereby providing protection to the pier, particularly its foot. No doubt these structures also lessened the impact of waves striking against the pier. A cluster of buildings are depicted close to the landward end of the pier in an area known as the 'pier bank' and the adjacent area, on the inner side of the harbour, known as 'the waterside'. The proximity of these buildings to the pier and shore, together with their distancing from the rest of the town, suggests that they are related to the pier, and/or, maritime activity. It may be that they were warehouses, customs buildings, stores and such like. There is documentary reference to the *"King's Warehouse in Ramsgate"* in September 1729 where *"209 Gallons of Foreign Brandy, 6 Quarts of Arrack, 5½ Gallons of Rum, and 100 lbs of Cake Soap"* all seized from smugglers, were advertised for sale *"in several lotts"* (The Kentish Post, or Canterbury News Letter; quoted in Whyman 1981, 56). It is probable that the 'Kings Warehouse' was one of the buildings adjacent to the pier.

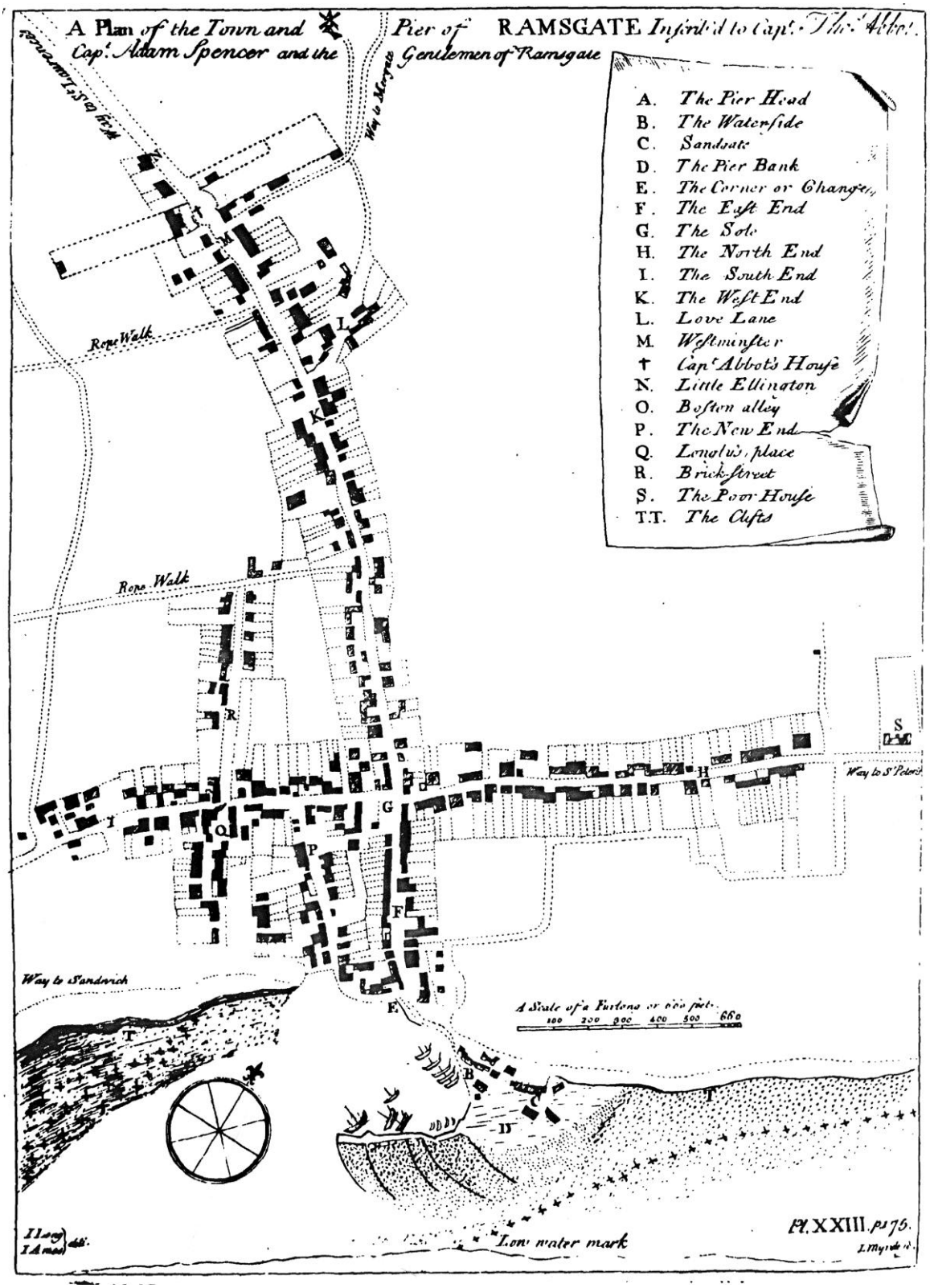

Figure 3, Map of Ramsgate and its pier (source: Lewis 1736)

Perhaps the most detailed of all maps to show the old timber-built pier at Ramsgate is that surveyed by Sir Piercy Brett and captain Desmaretz in 1755 (Figures 4 and 5). This shows the new pier works to be constructed around the old timber-built pier. Later cartographic evidence indicates that the old pier remained here until at least the 1770s

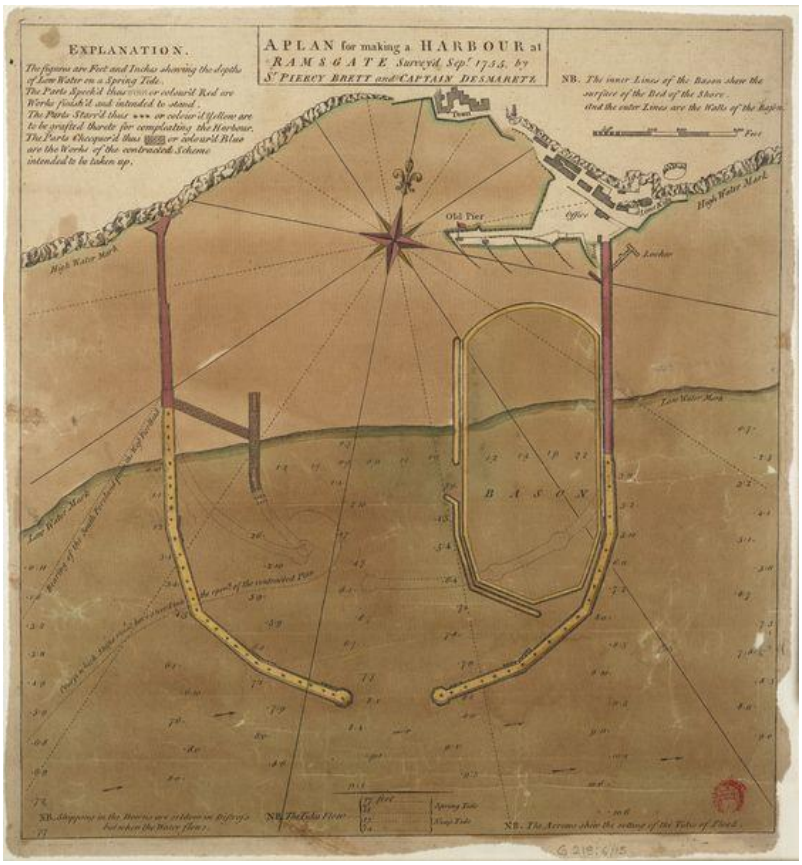

Figure 4, 1755 plan of the new Ramsgate pier built as a haven of refuge. Note the old timber-built pier within – apparently left until some time around the 1770s. (National Maritime Museum G218:6/13)

In the detailed picture of the old pier it seems fairly certain that the inner face and head of the pier was of a steep sided timber wall. On the outer side however, the groynes extend into the pale coloured area parallel to the inner face (which appears to represent land above the level of the sea) where they appear to be joined unto a wall parallel to that of the inner wall. It is probable that the outer wall does in fact represent the outer wall of the pier and that the white (dry) area beyond this represents a permanent accretion of

sediment above mean high water. The plan also suggests that two small structures, one with a flagpole, were located on this putative accretion. There are other notable features to this plan. A sizeable area of hard standing is evident at the landward end of the pier, at the margins of which is located an 'office', with further buildings beyond. Structures described as 'lime kilns' are also shown, these perhaps supplying mortar for the stone pier building works. A 'dock' is depicted in the angle between old and new piers, this presumably being a creation of the new works. Finally, and with regard to the new pier a 'T' shaped structure can be seen projecting out from the pier into the sea, close to shore. This is titled 'Locker', seemingly a breakwater protecting the landward end of the pier from rough weather. The form and location of this locker, together with the usage of the term, have close parallels elsewhere, e.g. Bridlington. To its inner side the pier is shown with a length of around 150 feet (45.7m), to its outer side with a length of around 325 feet (99m).

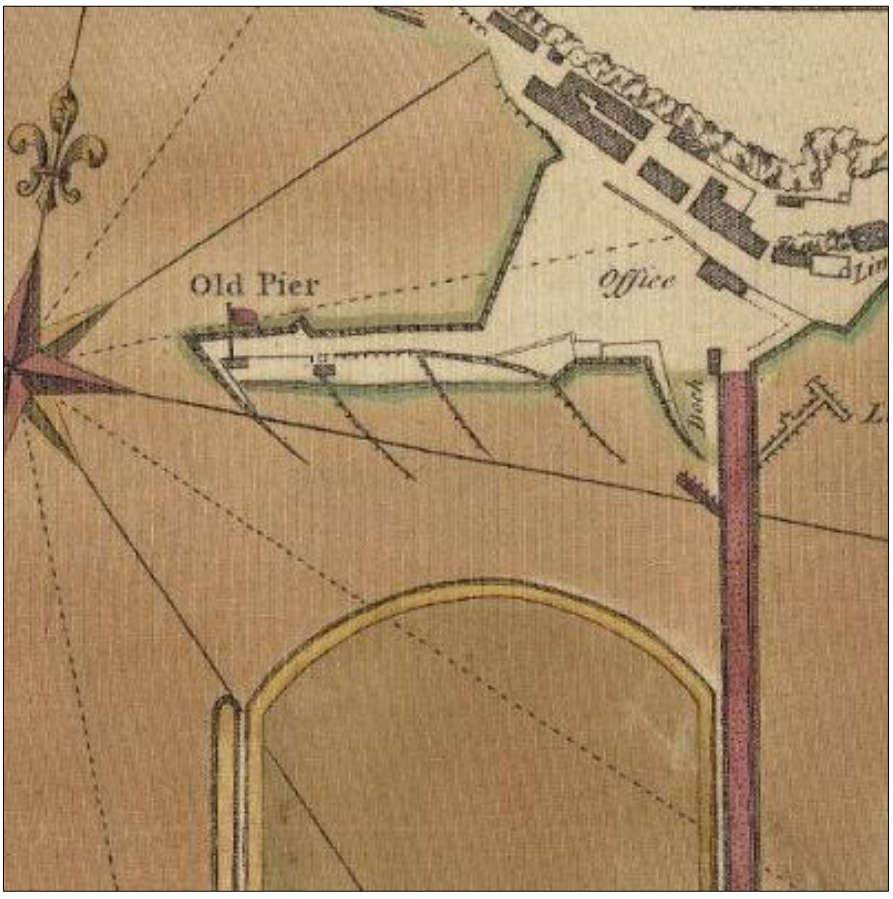

Figure 5, Detail of the 1755 plan showing old timber pier in greater detail

The old timber-built pier survived surrounded by the new Ramsgate harbour until at least the mid 1770s, it being depicted intact on a plan of 1774 (Matkin 1976-7, 57).

Environmental aspects

Ramsgate lies on the eastern side of the Isle of Thanet within what is perhaps better described as a small indentation rather than a bay. Since the later post-medieval period no longer technically an island, Thanet is formed of the land at the southern side of the wide mouth of the Thames estuary and is bordered on its landward sides by the rivers Wansum and Stour. The coastline of Thanet is composed principally of steep chalk cliffs. In a number of places short narrow valleys cut through the chalk down to the shore. Like Margate and Broadstairs, Ramsgate lies in one such valley, at the head of which the pier is located (Figures 6 and 7).

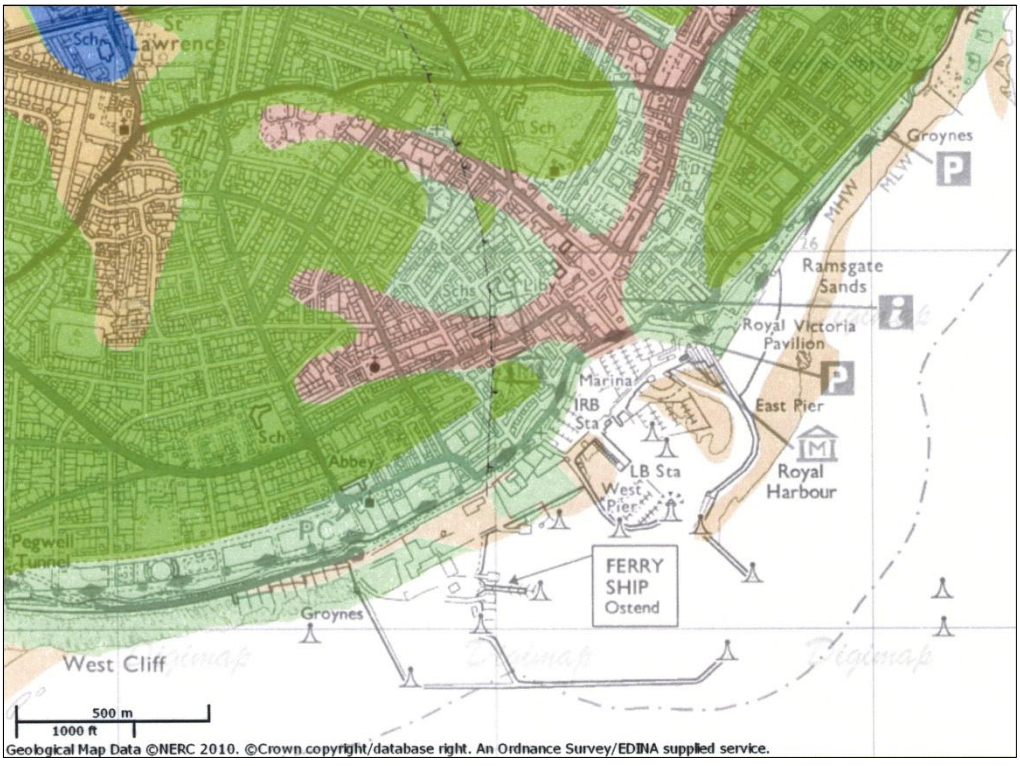

Figure 6, Geological map of the Ramsgate area. Green and pale green = chalk, brown = superficial deposits (source Edina)

Figure 7, Engraving of 1797 illustrating the topographic location of Ramsgate and its successive piers

Writing in 1736 John Lewis informs us that the pier at Ramsgate was not solely for shipping but also to *"defend the Town against the Ocean"*, much in the manner of the other Thanet piers of Margate and Broadstairs (Lewis 1736, 175).

The old timber-built pier was never of great proportions and immediately prior to its replacement was said to be *"so small as to be scarce capable of receiving vessels of 200 tons, at any state of the tide"* (Smeaton 1791, 4). One of the restricting factors of the harbour is likely to have been the *"bar"* that had been *"cast up"*, presumably near its entrance (Smeaton 1791, 10-11). The bar was presumably resultant upon the southward drift of sediment building up against the outside of the pier, assisted by the arrangement of groynes, and thereafter accumulating as a bar in the area of the harbour mouth.

Ownership/control/funding

The method of funding the pier at Ramsgate appears to have been along the same lines of those of the other Thanet seaports of Margate and Broadstairs. Droit collection is mentioned recorded in the 17th century, though was apparently an old established practice by this date (Hasted 1800, 377-406). In 1678 the upkeep of Ramsgate pier was said to cost about £50 per year (Matkin 1976-7, 53).

We are reliant again upon John Lewis for some of our earliest information on funding and control. Lewis declared that from time to time orders and decrees had been given by the Lord Warden of the Cinque Ports whereby *"the Inhabitants are impowered to choose wardens, to look after the Repairs of the said Pier, and to collect such Droits or rates, as by the said decrees and antient immemorial Custom are payable for Shipping and Goods brought into this Pier"* (Lewis 1736, 176). One of these was supposed to have been dated to Queen Elizabeth's reign, the latest of them to 1616, but that *"the Title of them shews, that the Rates then confirmed were Time out of Mind"*. Further, *"By a Paper among the Writings of this Pier it appears, that in 1575 the Payment of these Rates was disputed by some contentious Persons; but on the Pier-Wardens applying themselves to Henry Howard, Earl of Northampton, at that time Lord warden, they obtained his Injunction for their Payment"*(Lewis 1736, 176).

One confirmation of the *"Decrees Orders Rates etc to the Pier Wardens"*, dated 1726 and issued by a Lord Warden, survives (EKAC CPW/RO2). Addressed to all and sundry, this document recites that the Decrees, Orders and Rates had previously been issued and confirmed by earlier Lord Wardens and that they have been *"time out of mind used by the Inhabitants of Ramsgate ... for and towards the perpetual maintenance and Preservation of the Pier and Harbour"*. The collection of such droits for the keeping of the pier is further justified on the grounds of their also being beneficial to the Cinque ports as a whole, to the pier as a commodity for all subjects and allies of His Majesty trading or sailing on that coast. The document ends with a stated requirement for all present and future pier wardens to *"put the sd Decrees Orders and Rates in due effectual Execution and that for their better performance thereof you the sd Mayor Jurats & other of hi Maty's Officers be unto them therein diligently aiding & assisting wherein you nor they may fail as you will answer the contrary at yr peril"*.

The town of Margate petitioned for exemption from a new Dover Harbour Bill of 1717 which proposed to extend the term of years for imposing 3d per ton, on vessels of a

certain size, loading and discharging within the realm, from, to or by Dover, or coming into the harbour there. It was noted within this petition to the House of Lords that Ramsgate vessels were already exempt (JHL, 1717, 641). Margate's appeal for exemption was on the grounds of a bare ability to fund the upkeep of its own pier. It is likely that Ramsgate's existing exemption was on such grounds.

The town submitted a petition to the House of Commons in 1736 requesting a Bill to finance the construction of a second pier and the preservation of the first which had, apparently, got beyond their means (Andrews 1953, 39). For some time there had been discussion for the creation of a haven of refuge in the Downs. After a severe gale in 1748, during which a large number of vessels took refuge within Ramsgate pier, the town became the selected site. A Bill for enlarging and maintaining the harbour of Ramsgate was read before Parliament in 1749 and enacted shortly thereafter (Bill 1749). This provided the legal authority for building the new large harbour of refuge and construction of this began in 1750. Authority over the new harbour was vested in a body of Trustees, or commissioners, much as happened at the other Thanet seaports. There is no reference in the examined legal literature referring to pier wardens and it seems certain that their role ceased to exist when the new harbour was built.

Miscellaneous

Stone versus timber

The building of the harbour of refuge at Ramsgate, commencing in 1750, led to some minor controversy over whether to construct in timber or in stone. The following is an extract from an account of the proceedings of the trustees appointed by the Act of Parliament for the building of a harbour at Ramsgate. *"One of the Trustees, who has the Care of a neighbouring Pier which is constructed with Timber, insisted upon building the Piers at Ramsgate with the same Materials, offering to conduct the Work himself. The Reasons alledged were the saving Expence, and that no stone-Work could be made to resist the Force of the Sea"* (Trustees 1755, 8). In considering that continual repairs would be required if this course was followed the trustees preferred to build in stone. However, the gentleman preferring timber proved quite insistent and so to preserve unity amongst the trustees it was decided to build the east pier with stone and the west pier with

timber. All did not go well: *"And now the Patrons of the Timber Pile shewed how sincere they had been in their objecting against Stone-Work, as unable to withstand the Force of the Sea, by chusing for their Timber Structure the Pier which would be covered from the greatest Force of the Sea by the other, which was to be built of Stone. And it also in Time appeared how unable they were to compleat what they had begun; for before they had advanced as far as the Ground, by the recess of the Tide, is left dry, they were unable to proceed, and were glad to adopt the Stone-Work they had affected to condemn, for continuing this Pier within the Water'* (Trustees 1755, 10). This state of affairs came eventually to be described by the trustees as *"that ridiculous Medley of Timber and Stone"* (Trustees 1755, 22).

Writing in 1797 an anonymous writer stated that *"About 400 feet* (122m) *of the western pier is constructed of wood, but the remainder of stone, like the other"* (Fisher 1799, 287). Some 23 years later it was commented that the timber part of the pier (curiously said to have been 550 feet (167.6m) in length) had been rebuilt with stone (Oulton 1820, 92).

In addition to whatever difficulties were encountered in actually building the timber element of the piers an additional factor working against the timber is believed to have been *"the worm"*, toredo navalis, which is said to have wreaked its *"sad havoc"* upon the structure (Richardson 1883, 130).

Material remains

No upstanding remains of Ramsgate's timber-built pier survives at the site. Curiously, in 1838 during excavation work for a slipway in the stone harbour it was reported that at a depth of 7-8 feet medieval coins were found and at 11-12 feet large flints and bricks, considered at the time to be Roman, were uncovered. At the lowest level, at around 16-20 feet wooden piles sunk into the chalk and thought to be evidence of a pier or wharf were found. A number of Roman coins were found in the same area (Pastscape 469452; VCH 1932, 166). It has been conjectured that these timbers may have been the remains of a pier or wharf of Roman or medieval date. The remains are said to be located at NGR TR 3858 6468 which places them at the outer landward end of the old timber-built pier. Given this spatial coincidence there is a distinct possibility that the material remains could be

associated with the medieval harbour. The potential for sub-surface basal remains of the post-medieval period to have survived to the present time is not entirely certain. However, given that the possible remains encountered in 1838 survived the construction of the stone pier it is possible that remains of the landward parts of the old pier survive in that block of ground sandwiched between Harbour Parade and the slipway of 1838 and immediately to the east of this.

Specialists and workers

The small quantity of surviving documentary material pertaining to the timber-built pier does not provide information on specialists or workers.

Fort

An anonymous writer informs us that in 1797 that *"For protecting the town and harbour towards the sea'* a *'very formidable battery of cannon was constructed in 1797, by Colonel Cuppage of the Royal Artillery, upon the cliff near Sion Hill"* (Fisher 1799, 288). It is said, though without quote to a reference, that three nine-pounder cannons were placed on the seaward side of the pier (E.K.M. Trust 1997, 20).

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Case study 16: Sandwich

Introduction

Given that piers were never built at Sandwich it is unlikely that this case study will be pursued beyond the level recorded here. Note that with the exception of the maps, Calendars of State Papers and the reference to Slater 1663, much of the information in the following text is derived from secondary sources. The most referenced of these secondary source is William Boys, whose lengthy book of 1792 was largely comprised of transcriptions of documents relevant to the history of Sandwich (Boys 1792). Although there is no reason to doubt the accuracy of Boys' transcriptions they are, by modern standards, poorly referenced to the original source material. Much information has also drawn from Skelton and Summerson's description of maps originally held by Elizabeth I's chief minister William Cecil (Skelton and Summerson 1971, 48-9). This work contains extracts of transcriptions of original documents, much of it corroborating information in Boys work, and is well referenced to archival material.

Sandwich was an entirely riverine port located on the River Stour and never possessed seacoast piers. In the later medieval period the town underwent considerable decline. A major factor in this decline may have been the River Stour's shallow riverine system that could not well accommodate the increasingly large vessels of the period. A considerable number of sources indicate that from the later medieval period, if not earlier, silting within the River Stour was becoming a problem (Cal. S.P. Dom. 1624; 1629). This was said in 1559 to be due to the *"turnyng awaye of diverse streames and ryvers, and with the stoppyng of sinsetts for innyng of mershes, which streames and ryvers were wont to ronne with force through the said haven, for long lack whereof the havens mouthe and all the haven is growne to greate flatness, narrowness, crokednes and shallowness"* (Boys, 1792 736-7). As at a number of other case-study sites, e.g. Southwold, Rye, processes of land reclamation appear to have been the major cause of ruination of the navigable waterway. The increasing ship sizes in the medieval and post-medieval periods, will only served to have exacerbate the port's problems.

In an attempt to improve its port facilities a number of schemes were proposed that were intended to either reduce silting or create artificial channels to the sea. At least three of these proposed schemes, none of which came to full fruition, involved the construction of channels cut to the sea with piers placed at the point of junction between channel and sea. The earliest of these pier schemes dated to the mid 16th century, another of the 1570s and the latest of the earlier 18th century. The leading 'technical' figure in the proposed project of the 1570s was a Dutchman, Andrian Andrison. Earlier use of *"hollandyrs"* at the haven is recorded in the late 15th century and in the 1550s when Henrique Jacobson *"a man very expert in water works"* prepared a report for proposals estimated at around £10,000.

Figure 1, Map showing Sandwich in relation to the River Stour and the coast. A small part of a cut, said to be the work of Rogers, survives in the golf course between the town and coast (source: Edina)

Backgound

The incorporated town of Sandwich was one of the original corporate members of the confederation of Cinque Ports. As the power and influence of the Cinque Ports expanded in the medieval period a number of other ports in the south of England were increasingly drawn into their orbit. These became non-corporate members, or limbs, of the Ports, each

under the control of one of the individual original corporate ports which served as the head port (Burrows 1888, 224-254). As such Ramsgate, which possessed a timber pier from at least the mid 16th century became a member of the Ports with Sandwich as its head port.

The decline of the Cinque Ports as both a mercantile and naval force coincided with, and to some degree mirrored, the decline of Sandwich. The threat to the port of Sandwich posed by the silting of at least parts of the River Stour attracted a degree of outside support in a manner similar to that of many seacoast pier communities. In 1550 for example, the crown permitted the town to sell their church plate *"upon condicion they shall emploie the same on thamending of their haven"* (APC 1550), whilst at a slightly later date the town appealed for a licence, subsequently granted, to transport 20,000 quarters of grain, with the intention of the profits being expended on the repair and preserving of the haven (Cal. S.P. Dom. 1581). Indeed two of the channel and pier proposals outlined below were submitted to the Privy Council with the aim of recruiting government support. Various individuals, as well as the community itself, made significant contributions to attempts to improve the navigation. In this context during the 16th century a Canterbury alderman, Mr Rose, *"contributed liberally to the work during his life and at his death gave 300L towards* it" (Boys 1792, 730). One of the justificatory reasons often given for the provision of a new harbour at, or adjacent to, Sandwich, in appeals to the crown and governmental bodies, was the usefulness of the Downs area to the navy (e.g. Slater 1663). The naval significance was based principally on the closeness of The Downs (relatively sheltered southern part of the North Sea) to the continent and the potential enemies, real and imagined, therein.

Like most of the Cinque Ports the town's maritime activities continued well into the post-medieval period but at a level that was very low in relation to the major ports of the period. Although many of the institutions of the Cinque Ports continued to survive, indeed still do to this day, the reality was that by the later medieval period it was an outmoded organisation. What real influences the corporate members maintained over the non-corporate members, including the right, until the 19th century, to appoint officials concerned with local governance, was increasingly seen as anachronistic and antagonistic.

It is ironic that the regional position of pre-eminance of the head port of Sandwich was supplanted in the 18th century by that of its member, Ramsgate, when its great new harbour was built – in the teeth of considerable opposition from the head port.

Three proposed schemes involving piers: overview and pier technology

As an entirely riverine port Sandwich never possessed seacoast piers. However, in an attempt to improve the qualities of its port facilities at least three grandiose schemes involving cuts and piers were formulated.

John Rogers

The earliest of these was by the English military engineer John Rogers. Work on a channel down to Sandwich Bay was begun, probably in 1551, but never completed (Hasted 1800), (Figure 2). A map of Sandwich and the Isle of Thanet dating to 1548 was commissioned as part of the Rogers' proposals and 'the plat of Sandwich' was delivered to the Privy Council whose assistance was sought. The map shows what appears to be a single pier to the south side of the juncture of cut and sea (British Library). The channel, 6,000 feet in length is described as the new cut. A pre-existing cut of 4,000 feet, effectively a canalisation of the River Guestling is believed to have formed part of an earlier work. Also part of an earlier work is the channel, represented by parallel dotted lines heading north from Sandwich. Further, shorter, stretches of cut channels that reached the sea on the north side of Thanet are also depicted on both maps, and annotated in detail on the original. The technical details of Rogers' intended pier are not known (Skelton and Summerson 1971, 48), though the traditions of the east coast may suggest that they would have been of timber.

Figure 2, Map of 1548, believed to be the work of a cartographer known only as Littlejoy, showing the proposed cut of Rogers across Sandwich Marsh to the sea. Note the pier/s at the cut – sea interface. This is also the earliest known depiction of the timber piers of Ramsgate, Broadstairs and Margate. North is to the bottom of the map. (British Library: Cotton Augustus l.i. f.54)

Andrian Andrison

The other scheme known to have proposed the construction of piers was that of the Dutch engineer Andrian Andrison in 1572. Andrison prepared costed estimates for the works and these have been transcribed by Boys (Boys 1792, 679-740). One recipient of these

costings is likely to have been the crown who it was hoped would contribute towards the works. It is probable that this scheme proposed to create a channel to the south of that begun by Roger's, in a similar position to that suggested by Jacobson some thirteen years previously. This cut was to be 12,000 feet long, 20 feet deep, at the top 200 feet wide and at the base 100 feet wide.

Andrison's costings for the digging of this channel were based on a formula founded on his estimates of the volume of earth one man with a spade, working a ten hour day, could dig in one hour with the assistance of three labourers with wheel barrows to remove the up-cast. His estimates then are founded on mathematical reasoning and not mere guesswork based on experience – arguably one of the attributes of an engineer in the modern usage of the term. Andrison's programme envisaged using sixty such spade men and one hundred and eighty labourers. This spade men was to be supervised by six clerkes (ratio 10:1) and the labourers by six clerkes also (ratio 30:1). To deal with water during the excavation horse mills were to be used whilst four great sluices and floodgates of elm were also to be built.

At the head of the channel twin piers were proposed. The costings for the pier are detailed below:

Jutties

Item, there must be two juttie heddes towards the sea, thone towarde the south of xxx roddes longe and xl foote broade, and thodre towardes the northe of xxv roddes longe and xl foote broade, and every of them xxii foote depe above the grounde: for the which wilbe requyred mm.c. peces of tymber for pyles conteyninge in length xl fote, which being worthe by estimacion every pece viii s. Amounteth to viii c.cl. li

Item, more for the yron worke and for carpenters wages about thiese ii jutties, and for fyllynge of the same with bolder stone, M li

Item, xl m. Of iii ynche plancke for the saide jutties at c s. The M. – cc li

And so is the chrge of the said jutties mm. xl li

These costings clearly describe a twin, timber-built seacoast pier arrangement. The length of a "*rode"* (rod) historically has some variation though was most commonly reckoned as 5.5 yards – 19.5 feet. In describing the work of the channel the document states a rood to

be 20 feet, the same distance used at Great Yarmouth in the later 16th century. Using the distance of 20 feet, this would give the south pier a length of 600 feet, and the north pier a length of 500 feet, each of which was intended to be 40 feet wide. At 40 feet long the piles are of considerable length. One wonders if would it difficult to obtain 2,100 of these regionally, or were they to be imported? Given the number of piles and lengths/widths of the pier, it would seem probable that they were to be built close-piled with each pile probably being 1foot square – though these figures do not compute perfectly, i.e. total lengths of both sides and heads of piers = 2,280 feet though the number of pieces of timber required for the piles is 2,100. Some idea of the depth to which it was intended to drive the piles can be gained from the wording which states that the 40 foot piles were to project 22 feet above the ground i.e. were to be driven to a depth of 18 feet. Obviously this can only have applied to some of the piles given that it will have been intended for the deck of the pier to have been level whilst the seabed will have been shelving down away from the shore. The requirement for 3 inch planking is likely to have been for the pier decking, though perhaps, given that four thousand are stated in the estimate, also for sheathing, or partial sheathing of the pile walls of the piers. An infill of stone ballast is explicitly stated as is the use of ironwork – presumably for pile shoes, spikes and bolts. Carpenters are the only workers mentioned. The use of the term *jutties*, for piers, is also noteworthy.

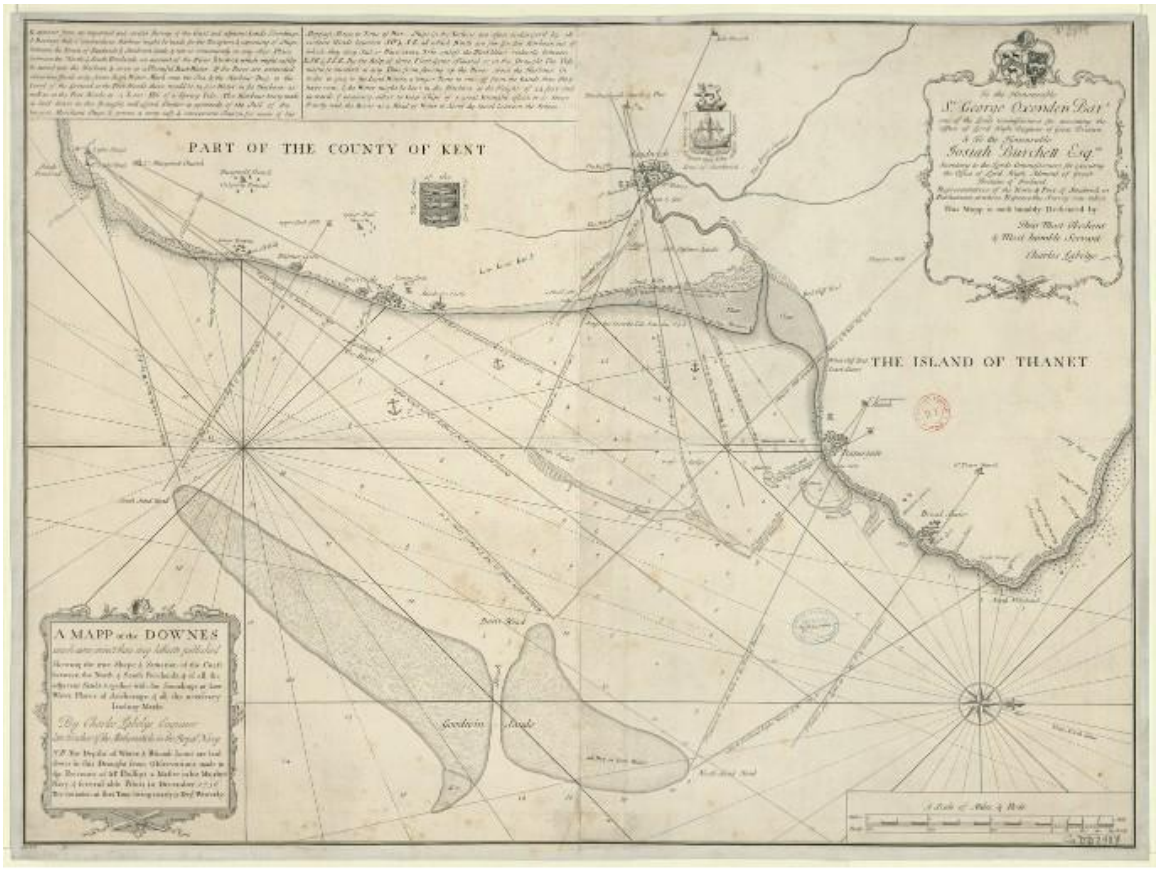
This proposed project with its artificial channel and twin piers finds some parallel with the succession of cut channels and piers of Rye, and of Great Yarmouth and Southwold/Walberswick on the dynamic coastlines of Norfolk and Suffolk.

Additional points worthy of mention are that the townsmen intended to carry out at least some of the labour themselves as well as providing sufficient men to oversee the works. It was also considered that 8,000 acres of land would be drained and improved by the scheme and that the owners of this land may with good reason be made contributors to the charges, rather in the same manner, and at a similar date, as at Great Yarmouth.

Charles Labelye

Charles Labelye produced a map in 1736 which showed his proposals for a cut from the town to the coast in Sandwich Bay (Labelye 1736). Labelye's map shows a twin pier

arrangement though whether these were intended to be built in stone or timber is uncertain.



Source gallica.bnf.fr / Bibliothèque nationale de France

Figure 3, Charles Labelye's 1736 map of the Downes. Sandwich is located in the upper central part of the map with a channel extending to the sea where twin piers can be discerned. North is to the right. (source: Bibliotheque nationale de France)

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Case study 17: Dover

Summary of previous work

As the premier gateway to England from the continent the port of Dover has always loomed large in the town's medieval and post-medieval history. Indeed, with the exception of the port of London, Dover's port has arguably played a greater role in the affairs of the nation than any other. Unsurprisingly then the historic port of Dover has been well studied and there are a number of learned publications that have considered its development, both generally and in more specific terms with relation to environmental issues, as an early post-medieval managerial exercise and even with reference to mathematical practitioners.

The starting point for most researchers giving consideration to the great Tudor works at Dover Harbour is Reginald Scot's note on the construction of Dover Harbour that appeared in a number of editions of Holinshed's Chronicles (Scot 1587). Although Scot attempted to summarise earlier works at Dover his detailed knowledge of the contemporary Tudor construction programme in many ways provides a unique insight into that harbour building enterprise. J. Lyon's two volume 'History of the Town and Port of Dover' of 1813 recounted a history of the development of Dover's harbour from its earliest records up until the early 19th century in 46 pages (Lyon 1813). This represents one of the earlier of the detailed histories of the port. Earlier works providing a history of the town, such as that of Edward Hasted provide brief outlines of the port's history but tend to tend to be of limited detail (Hasted 1800). An early 20th century article outlining the history of Dover harbour, with some previously unpublished plans, was presented by W. Minet in 1922 (Minet 1922). A further article considering 16th century harbour plans was published by Alec MacDonald in 1938 (MacDonald 1938).

Of all the works dealing with the general developmental histories of Dover's port there are two that stand out as landmark publications. The earlier of these is Alec Hasenson's 'The History of Dover Harbour' which runs to some 480 pages. Whilst much of the work is concerned with the later, post timber-built piers it contains much of relevance to this thesis and is a work of considerable depth and scope (Hasenson 1980). Not long post-

dating Hasenson's work is the thoroughly referenced summary examination of the development of the earlier post-medieval harbour in volume IV 1485-1660 (Part II) in 'The History of the King's Works' series (Colvin 1982). There have been some more populist publications looking at the developmental history of the port such as 'Dover Harbour, Royal gateway' by Derek Leach (Leach 2005). Whilst providing neat summaries these publications appear to draw almost exclusively upon more scholarly work and provide little new information.

More specifically focussed considerations of Dover's port are Stephen Johnston's 'Making mathematical practice: gentlemen, practitioners and artisans in Elizabethan England', Eric Ash's 'A perfect and absolute work; expertise, authority, and the rebuilding of Dover Harbor, 1579-1583' and David Mock's 'The Elizabethan Privy Council and the repair of Dover Harbor' (Johnston 1994; Ash 2000; Mock 2004). Johnston's work, a PhD thesis of 1994, essentially considered aspects of the process of design at Dover in the 16th century, particularly with regard to mathematical practice and practitioners. Ash's study largely focussed on managerial strategies in the late 16th century rebuilding of Dover's harbour, particularly in light of the environmental difficulties at the site. The most recent contribution is Chapter 2, entitled 'Expert Mediation and the Rebuilding of Dover Harbour' of Eric Ash's 2004 Book 'Power, Knowledge and Expertise in Elizabethan England' (Ash 2004). This again is largely devoted to the managerial exercises of the Elizabethan harbour works at both the local and national - Privy Council, levels and the nature of the articulation between them.

In light of the plethora of earlier studies and given the scale and scope of archival material relating to the port – consideration and analysis of which would warrant a thesis in its own right, these notes are essentially drawn from these previous studies with the only admixture being a handful of additional readily available documentary sources and pictorial images. However, the latter in particular do add a technical constructional dimension that has previously been relatively little considered. In terms of historical understanding there undoubtedly remains considerable potential in Dover harbour, particularly with regard to technical aspects of the piers and harbour and to a lesser degree with the nature, organisation and hierarchies of the workforce and their overseers. The principal sources through which future study could be advanced are pictorial, cartographic and documentary. Such would undoubtedly be a mammoth task.

Town background

The first occupation on a dense scale of the area of modern Dover occurred in the period of Roman occupation. Known as Portus Dubris, Roman Dover boasted two lighthouses, served as a port and was a base for the naval forces of the Classis Britannica and was thoroughly integrated into the network of Roman roads. A succession of Roman forts were constructed at Dubris which also contained a civil town of some size. Whilst pre-Roman occupation of the locality is less well understood the area does seem to have formed a focus of settlement. Providing the shortest route across the English Channel the site of Dover was certainly utilised for port-like functions at this earlier date. The 1992 discovery of a large sea-going Bronze Age boat in a former river channel within the town extend port-like functions back to a very early date (Clark 2004).

The 5th century end of Roman occupation is unlikely to have resulted in abandonment of Dover's port functions. The early Anglo-Saxon kingdom of Kent maintained extensive connections with the continent and it was from this direction that conversion to Christianity within the kingdom during the late 6th century began; this conversion being particularly early within an overall English context. The likelihood of continuity of occupation in the locale after the later Roman period is suggested by a number of remains including the Buckland cemetery which contained graves dating from the 5th century onwards (Parfitt and Anderson 1994). A Priory was established at Dover in the early 7th century and some time before the Norman Conquest the town was known as a port and settlement of some significance (Jessup 1966). Dover was one of the five founding members of the confederation of Cinque Ports which appears likely, on the basis of entries within the Domesday Survey, to have been founded shortly before the Conquest. More specifically, the evidence for this is the record of the burgesses of Dover each year providing Edward the Confessor with twenty ships for fifteen days (Darby and Campbell 1962, 546). As one of the pre-eminent members of the Cinque Ports Dover's jurisdiction extended over that of the more junior member of Margate (Lewis 1848, 84).

In the Domesday Survey entries for Kent Dover was the first listed settlement. Although burnt by William's forces the town is said to have contained four churches and two mills. Whatever the deprivations of conquest Dover appears to have rapidly recovered and prospered as by 1086 the town was valued at three times its worth of 1066. The entry contains references to burgesses, a guildhall and describes the town as a borough.

Interestingly, there is also reference to a mill at the entrance to the harbour that had been built since 1066 and that was reported to be causing damage to shipping (Darby and Campbell 1962, 546). A large castle, possibly the successor to an Anglo-Saxon work, was constructed and this came to be extensively re-modelled and developed in the medieval period. Proximity to the continent and increases in overseas communication and trade ensured the expansion of the town. A number of hospital's, including the Maison Dieu were built. One of the functions of these establishments was the welfare of pilgrims arriving in England. Cross-channel travel by pilgrims and others from and to Dover was frequent. Passenger ships were known as 'passagers' and it was periodically stated by Parliament that pilgrims were only to pass out of the realm via Dover (Knocker 1876, cxxxix – cxl). There are extensive records detailing the town's governance under a mayor and jurats (councillors) (Knocker 1876).

Given its location as the shortest and quickest route across the Channel, defensive considerations have always loomed large in Dover's history. As noted, extensive developments of the castle's and town's defences were carried out throughout the medieval period and subsequently under Henry VIII and Elizabeth. Further momentum for defensive improvements and modernisation was provided by a series of political events since that time up to the Napoleonic Wars. Later still, defensive works and innovations would continue to be carried out until the end of the Second World War.

Although for long enjoying degrees of self governance the town's strategic location has throughout the medieval and post-medieval periods necessitated the investment of government resources, direct and indirect, in the development and maintenance of the port and defences. One reason for the direction of state resources and effort at Dover was the blocked, or partially blocked, state of the other harbours along the eastern part of the south coast. The port of Dover then was effectively perceived as a national object and not the exclusive prerogative of the town. Not for nothing was Dover known as the 'key to the kingdom' (Lewis 1848, 79).

Environmental and topographical aspects

The town of Dover is located at the head of a valley, in an indentation within the tall chalk cliffs. The cliffs reach heights of around 120m with that to the south-west of the

valley being known as Archcliffe and that to the north-east as Castle Cliff (O.S.). Recent rates of erosion of the cliffs between Dover and nearby Folkestone are stated as up to 0.75m per year (Harris 1996, 82). However, given reductions in the supply of foreshore shingle along this stretch of coast past rates may have been slower (DDC). The valley, which has given rise to the small bay of Dover, is resultant upon the action of the River Dour which rises some seven miles inland (DDC 2012). The maximum tidal range at Dover is fractionally over 7m.

The majority of the eastern part of the shoreline along England's south coast is composed of shingle (gravel) and movement of the shingle by waves and currents is predominantly unilinear, in a west to east direction (Jennings, S. and Smyth, C. (1990). There is a tidal current up the English Channel from the south-west, but also a further tidal current from the North Sea flowing in the opposite direction. These opposing currents converge near Dover Bay. This serves to create a series of tidal eddies, slows the waters and permits sediment in suspension to fall to the seabed. Because of the funnel-like shape of the channel the ebb tide flows more slowly than the flood and consequently sediment scour is less effective than sediment supply. This effect is heightened by the prevailing winds which are also from the south-west. As a direct consequence of these particular marine environmental conditions Dover has historically been a very difficult place in which to build a workable harbour, the tendency has always being for it to choke up with sediment. Similar conditions have also hampered English ports to the west of Dover, the fates of Wichelsea, Rye and Camber being the best known examples.

The net effect of the particular environmental conditions at Dover in relation to its harbours has been one of considerable silting following in the wake of harbour works projecting from the shore. Many of the works were rendered unusable after short periods of time and resulted in the need to build more works further off-shore. Such a repeated pattern of seaward development owing to sedimentation accumulation has been observed at a number of pier sites within the larger study, perhaps the clearest example being Scarborough. The Dover case however, is one of far greater scale and was driven primarily by the vast resources unflinchingly invested in harbour infrastructure by the state in response to the extreme environmental conditions. This can be seen as a demonstration of the need to build and maintain nationally important infrastructure, whatever the cost.

Figure 1, Location of Dover and its proximity to the continent

Outline of historical port development at Dover

This outline of harbour development up until the end of the Elizabethan works is principally derived from the detailed and excellent 'Dover Harbour' section of 'The History of the King's Works'; (Colvin 1982). Where other sources are used these are referenced.

It has commonly been assumed that the Roman port at Dover occupied what would have been the small estuary of the River Dour, much of which would have lain towards the heart of the modern town (Knocker 1876). We can be fairly certain that this was the case at earlier times as the Bronze Age Dover boat was discovered in a former river channel in the heart of the town (Clark 2004). We do not presently know what infrastructure in terms of hards, wharfs, jetties, etc, accompanied these early ports, if any.

The first record of harbour works relate to the early years of the 16th century (Figure 2). The harbour and its adjacent open road were known as the *'Wyke'* (possibly derived from the Anglo-Saxon Wic?) and the earliest accounts for this date to 1510. These accounts record masons work on an existing structure though accounts of 1513-15 also refer to timber work. Various further works are recorded at the Wyke until 1529. The earliest accounts of 1510 do refer to a 'pere' though its material and form of construction are not

entirely clear. These early 16th century accounts were made by the individual responsible for the construction, John Clerk, who was Master of the Maison Dieu. Given that Dover was a nexus of communication in the pilgrim trade and that the Maison Dieu functioned principally for the hospitality of pilgrims it may be reasonable to assume that these early harbour works were largely rooted in that particular context. Whilst these form the earliest references to harbour works the suggestions that earlier works did exist is interesting and it is possible that these had built by the town alone.

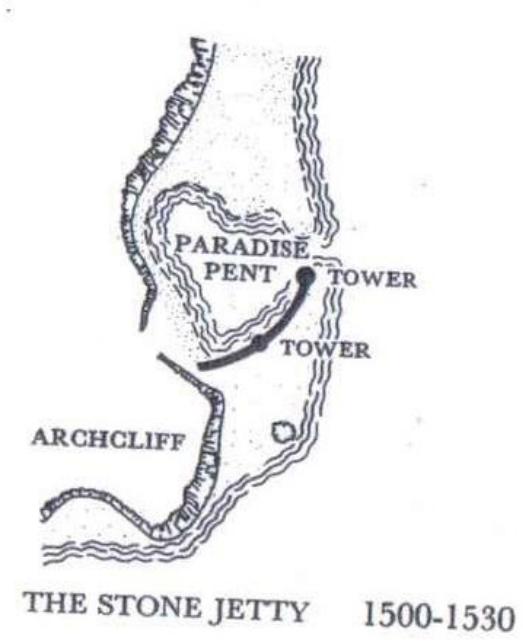

Figure 2, Modern plan of the first recorded pier works at Dover (from Colvin (ed) 1982)

These early harbour works are depicted in a magnificent painting, by an unknown artist, that is presently housed in the Royal Collection and dated to around 1520-1540, (Figure 3). The painting commemorates the embarkation of the English party to the 1520 conference in northern France known as the 'Field of Cloth of Gold'. Given the potentially slightly later date of the painting there must be some caution against over-ready acceptance of the entirety of the depicted detail. The painting shows two stone-built towers, which are attested in the documentation, whilst the pier linking the towers to each other is also of stone. Elements of the harbour works are clearly to be seen founded on rock.

Figure 3, The Embarkation of Henry VIII at Dover, c. 1520-1540 (Royal Collection Trust)

The Wyke, or ‘Paradise’ as it was also known owing to its early success, soon began to suffer specific problems which were recorded in the early 1530s. Sediment, which had previously been carried unhindered along the coast, began to accumulate against the south-eastern side of the pier, this eventually rounding its head and blocking the harbour mouth. In effect, the harbour caused both an obstruction against the movement of shingle, against which it piled up, and a protected area in its lee into which the shingle became lodged once it had rounded the pier. The situation was so bad after southerly storms that it was often necessary to dig a channel through the sediment in order to provide ingress and egress. Thus endeth the first recorded pier and harbour works at Dover.

In 1532 one of the Members of Parliament for Dover enlisted the aid of the King and Council to resolve the issue of the harbour. Sergeants of the ‘plomery’ and ‘carpentrye’ were despatched to view and report back to the council. The intention was to construct a haven within the valley of the Dour, but the project failed to materialise. Figure 4 depicts these proposals which included the employment of timber seacoast piers protecting inner harbours, the water level in whose basins was to be regulated and scoured by sluices.

Figure 4, 'A plot for the making of the haven of Dover', 1532. The earliest Henrician scheme that did not come to fruition. (British Library: Cotton Augustus L.i, f.19)

In 1533 the mayor and jurats of Dover petitioned the king for aid with their port stressing the economic argument for the town and its broader usefulness in the defence and security of the realm. A plan for the harbour was drawn up by a local churchman, John Thompson, whose scheme envisaged a harbour within the bay but re-using the earlier works. Using money from the crown work on Thompson's scheme began in 1535. Thompson, who was by this time Master of the Maison Dieu, was appointed as surveyor of the works. A paymaster and four overseers (formerly mariners) were also appointed from the start whilst a controller was also appointed the following year. Funding of the project and its officers was controlled by Thomas Cromwell until his fall in 1540 when the Privy Council took over this role. Whilst the crown was the funder, management of the works was largely left in local hands. However, the king himself did take an active interest and visited the works on at least five occasions and elements of the work are said to have originated as his own initiative. Henry's harbour works at Dover were spread over sixteen years although detailed statistics for the number of people employed are only available for the first year and a half. These are depicted in Figure 5. The highest number employed at any one time during this span was an incredible 540 people. This number is believed to have dropped to under 100 for the following two years, before steeply rising and then falling again until 1551. This was clearly public works on a massive scale and created a number of logistical problems especially with regards to victual supply. A number of

labourers deserted the works, others refused to work for less than 6d per day – though the ringleaders were imprisoned and resistance overcome.

WORKMEN AT DOVER HARBOUR, JULY 1535 to DECEMBER 1536

Day and Month

	18 VII	*31 VII*	*21 VIII*	*11 IX*	*2 X*	*31 X*	*27 XI*	*18 XII*	*15 I*	*12 II*	*11 III*	*8 IV*	*6 V*	*3 VI*	*1 VII*	*29 VII*	*26 VIII*	*23 IX*	*21 X*	*18 XI*	*16 XII*
Pays	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Carpenters	15	12		X	9	6	9	12	X	12	12	11	X	12	X	12	11	12	11	X	
Shipwrights							X		X	4					X						
Sawyers	X		2	4	4	4	4	6	X	6	4	6	4	6	X	7	6	6	8	4	
Coopers		5										X	2	2	X				2		
Tunmen												6	10	9		14	12	13	12	10	
Mariners		41	X	62	66	70	87	121	131	93		86								4	
Tidemen													146	104	110+	116	137	128	106		
Hoymen															6?		4	4	4+	4	
Labourers	86	132	104	200	217	260	290	367	640?	413	340	336	300	306	273	302	336	345	312	60	
Clerks	X	X	X	X	X	X	X	10	15	12	11	13	14	14	15	15	15	15	15	11	
Overseers		X	X	X	X	X	X	X	X	X	4	4	4	4	4	4	4	4	4	X	
Purveyors	X		X	X	X		X	X		X	X	2	2	2	X	2	2	2	2		
Min. no. of men*	101	190	106	266	296	340	390	516	786?	540	371	464	482	459	408	472	527	529	476	93	
Carts									X	4	6?		12?	13	15	12	13	16	15	X	
Boats												9	10	10	11	12	13	13	12		
Cost of pay to nearest £	65	207	87	155	221	156	171	245	397	313	297	268	293	258?	284	300+	361	280+	263	72+	

Figure 5, Table showing 'Workmen at Dover Harbour July 1535 – December 1536 (from: Colvin (ed) 1982)

There is only limited information on the supply of materials during the Henrician works though this did include rope, pitch, tar and tools with the main need being for timber and iron. In particular timber was required to build the piers, make the tuns and boats and for 'dragtrees' (presumably a primitive earthmover) to clear the shingle. Huge quantities of oak were utilised with this certainly coming from east and central Kent, whilst sources in Sussex and the Weald are also referred to during the later Elizabethan works (Cal. S. P. Dom. 1582). Supply of timber could prove difficult, it being recorded in 1538 that *"The west pier goes meanly forward for want of timber, which is difficult to get"* (L. & P. Henry VIII 1538a). Iron was needed for chains and tools and it was also utilised for iron bolts which held together the piers timber-work. There is also reference to the use of elm (L. & P. Henry VIII, 1535a). Iron often came from further afield than the timber and the smiths working it were paid by the piece rather than by wage.

One difficulty was the raising of the enormous sums of money to pay for the works. Some funding came via Acts of Subsidy, some from forced loans. There were proposals to use

the tax gained on the travel of persons crossing the channel and for the enforced work by beggars and prisoners supported by offerings collected at communion, though the outcome of these suggestions is not known. It has been calculated that between 1535 – 1551 expenditure on the harbour works was at least £51,045

Some near contemporary descriptions are available for the timber-built piers of Thompson's scheme. These were described as two rows of clusters of close-spaced piles set within a purpose laid bedding of rocks. The timber verticals were joined together with iron bolts and the interior of the pier in-filled with ballast. There are a number of references to this, particularly in the published Letters and Papers of Henry VIII. Such a foundation into which piles could be set was necessary because of the depth of water and the high tidal range at Dover.

The Henrician harbour works did not follow one fixed plan but rather developed and adapted (Figure 6). The first task at the beginning of the works in 1535 was the clearing of the Paradise of its clogging beach material (See for example L. & P. Henry VIII 1535b). This was followed in the same year by the construction of a south pier some 24 feet wide and ballasted with stone. A mole of stone was built seaward of this whilst work then commenced on a north pier. An additional work was the commencement of a south-western jetty – whose construction was only completed in 1537-8. Nature however, was not long in catching up, the whole cycle kick-started by the new south pier. Sediment again accumulated along the pier back and around the head eventually causing a blockage of the mouth. Quickly built attempts to prevent the movement of shingle with additional works failed to halt its progress. It was recognised "*that as the peere was built out, so the banckes of beach also beganne to growe, and lay farder out as the peere was farder built"* in other words beach followed pier in an unremitting cycle.

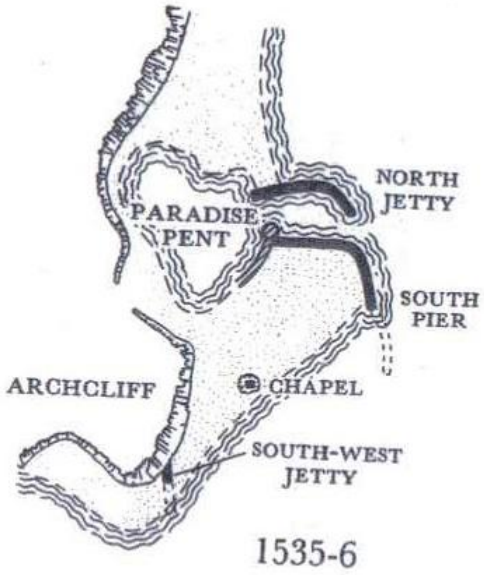

Figure 6, Modern plan of the Henrician pier works at Dover 1535-6 (from Colvin (ed) 1982)

The surveyor and paymaster fell to blaming each other for the failure though there was still hope in certain quarters that if the south pier could be constructed as far as the low water mark the process could be halted and all would be well. Work therefore continued to both south and north piers as well as in the re-clearing of the harbour between. By mid 1536 the south pier was 500 feet in length, the north 380 feet and a rock mole (perhaps submerged at high water) by the south pier was 250 feet in length; it was claimed that a ship of 140-160 tons could now enter at high tide and that the problem of sedimentation had been removed. Despite these considerable proportions it was in fact a tidal harbour.

Further works began in 1537 (Figure 7) with the extension of the southern pier towards the south and the construction of a further pier/jetty out to the east from this. The reasons for these further works appear to have been twofold. Firstly, to extend to overcome the harbours' tidal limitations and, secondly, to fend off future threats of sedimentation. The eastern jetty was intended to create calm water at the harbour mouth by protecting it from the currents and southerly winds. A further role was probably intended to be the prevention of the accumulation of sediment within the harbour. A role in preventing the accumulation of beach in the harbour seems also to have been intended for the south-western jetty that was completed during the 1537-8 works. The same role applied to a

number of rock groynes that were probably added as afterthoughts. Despite these efforts the works failed in their principal intended purpose of sedimentation prevention and large scale cleansing once again became necessary.

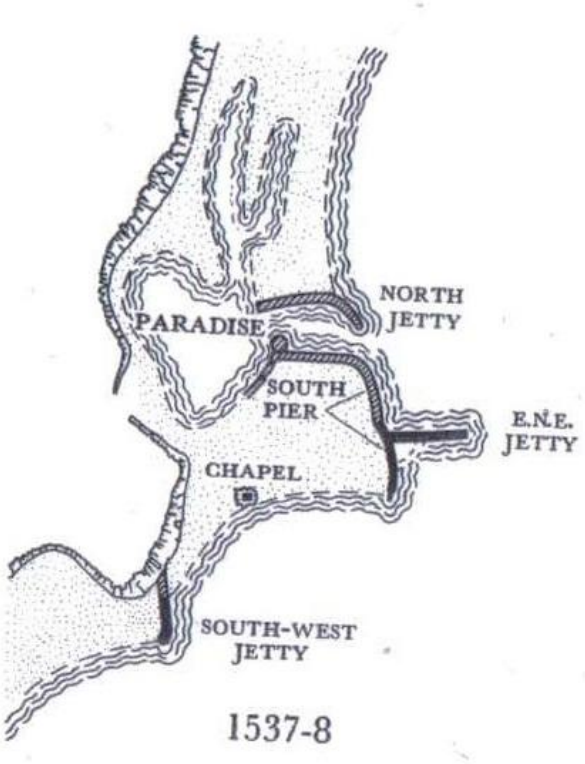

Figure 7, Modern plan of the Henrician pier works at Dover 1537-8 (from Colvin (ed) 1982)

Between 1539-40 further works were built on the already elaborate construction that had originally been the south pier and its additions (Figure 8). These were comprised of a right angled jetty at the eastern end of the earlier southern works and a northern projection from this with a wide head devised to mount a crane. Additional works were comprised of short north – south aligned groyne-like structures to the southern side of the south pier. Again, the principal intention was to create a configuration of works intended to prevent sedimentation that would leave the harbour accessible at all states of tide. Again, the works failed in their intent and the only way the harbour could be kept open was by regular dredging works.

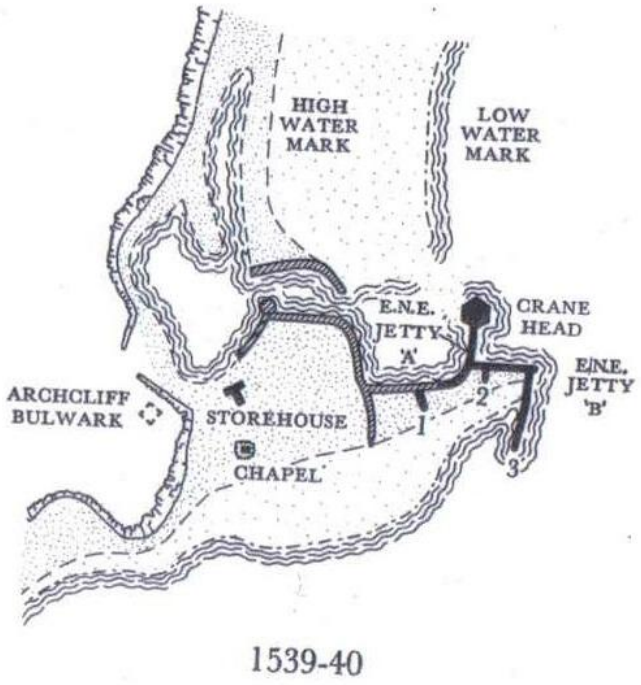

Figure 8, Modern plan of the Henrician pier works at Dover 1539-40 (from Colvin (ed) 1982)

There followed the most ambitious of all the Henrician harbour works at Dover (Figure 9). The scheme was to be comprised of two massive piers, one heading eastwards from the south pier works (the King's Pier), the other heading southwards from just north of the River Dour. Of these two only the southern was actually built, and this to a length of over 1,000 feet – in excess of 300m. The technical problems were enormous as the timber for the pier would only be available in finite lengths. Consequently, and as before, a foundation would be needed. This foundation however was required to be 3 ½ fathoms deep (nearly 6.5m) at low water. Elaborations to the King's Pier were projections from its southern side known as Greenway's Ledge and the Black Bulwark. The former was intended to restrict the continuing accumulation of beach, the latter a defensive work. Whilst creating a harbour accessible at all states of tide for a short time by the early 1550s the harbour was beset by the recurring problem of accumulation of beach. Had the north pier been built is possible that the success may have been greater.

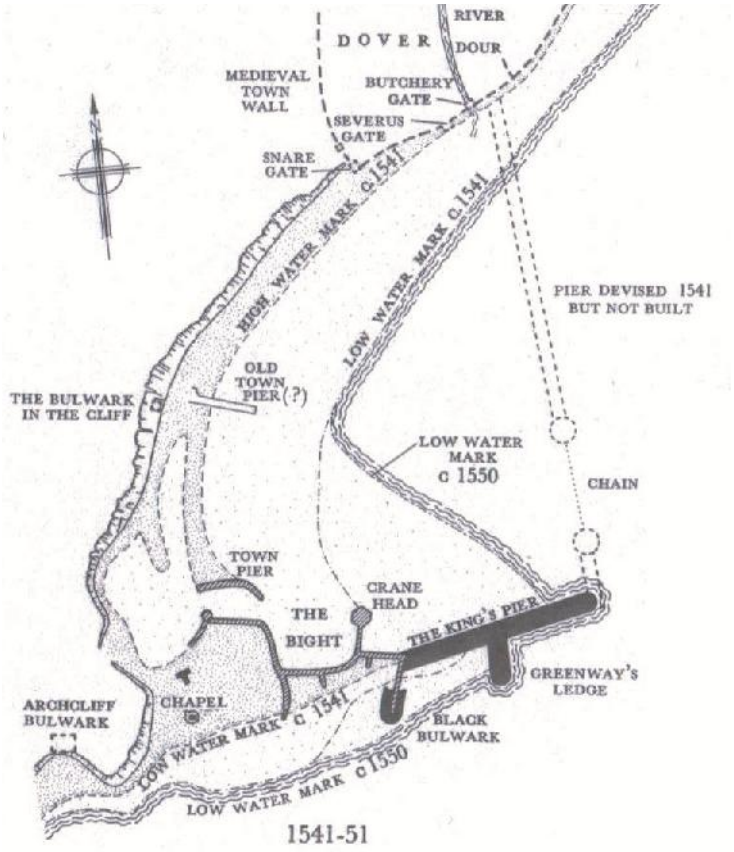

Figure 9, Modern plan of the Henrician pier works at Dover 1541-51 (from Colvin (ed) 1982)

As a large harbour accessible at all states of the tide, time and time again the Henrician works failed to produce a successful result and always for the same reasons. Firstly, construction was reliant on stone foundations, often of huge scale, upon which timber piers could be built and these were pushing the limits of contemporary technology. Secondly, the strong local marine environment presented unique and incredibly difficult conditions. The second point not only caused rapid decay of the timber piers - necessitating a great deal of near continuous repair work but ensured that the flow of shingle always rounded the pier works and entered the harbour. Each stage of the Henrician works became necessary because of the failure of its predecessor. The series of reproduced plans highlight this fact with the latest approved addition for the most part simply being tacked onto the earlier works, the whole resulting in a Heath Robinsonesque dogs dinner. In 1556 the responsibility for the harbour was passed back into the hands of the town. The majestic Henrician failures at Dover had however produced two unintended

and valuable outcomes. One was the creation of a large area of valuable waterfront land. The other, more importantly, was the creation of conditions that enabled a succeeding generation of Elizabethan harbour builders to accomplish their goal where the previous efforts had failed.

In the late 1550s the harbour at Dover was in a parlous, though working, state. At low tide it was little more than a shallow lagoon bounded by a shingle bank to its north side and through which the Dour cut a series of shifting channels. A number of appeals for assistance were made to the Privy Council by the mayor and jurats and Lord Warden of the Cinque Ports. The famous navigator William Borough was appointed to report and a body of commissioners set up under Lord Cobham and, following breaches in some of the earlier works, Flemmings were recruited to construct two new groynes. Plans were drawn up to create a harbour utilising the outcomes and remains of the earlier Henrician works (Figure 10). As such the intention was to stabilize the long shingle bank that had formed to the east of the Dour and to utilize the lagoon through which the river flowed as a basin. The flow of the Dour was to be controlled by sluices thereby flushing the basin clear of sediment. In addition to Borough, the engineers John Trew, Fernando Poyntz and the mathematician Thomas Digges came to be associated with the Elizabethan project.

Whilst the crown would play a major and controlling part in the exercise it was not, unlike Henry, prepared to fund the works from its own resources. Money was raised through a variety of means. In 1579 Dover was given a monopoly on the export of grain from the southern ports, this later being extended to certain other commodities, whilst in 1581 a tax was levied on ships entering English ports for a period of seven years

The principal elements of the Elizabethan scheme were firstly a long wall atop the shingle bank and a cross-wall extending from its southern end westwards to the land, thereby creating an upper basin known as the Great Pent. The Dour flowed through this and water levels in this basin were to be regulated by a sluice arrangement within the cross-wall. Whilst there was general agreement over the basic form of the scheme argument raged over the method of construction of the walls. Continuous walling of stone was too costly, some advocated timber walling, others a mere piling up of the shingle intermixed with mud from the lagoon. A further party favoured the use of earth and chalk rammed together with an outer covering of mud beaten into the sides and against which were affixed a revetment of faggots anchored with withies. This latter method had long been

proved effective in reclaimed land at Romney Marsh and its proven track record led to its successful adoption at Dover. Construction of this first part of the works began, and was finished in 1583. The form and precise location of the harbour entry was again subject to much debate and came to involve the opinions of notable navigators such as Martin Frobisher and John Hawkins. It was eventually settled that this would be to the south-east of the Pent where a lower harbour known as the Great Paradise would be created. This was to be formed by an angled extension of the wall delimiting the eastern side of the Great Pent and a re-working of the Henrician south pier constructions, the harbour mouth itself being cut through The King's Pier. The final elements of the Elizabethan harbour were a series of groynes, designed primarily to prevent erosion of the works.

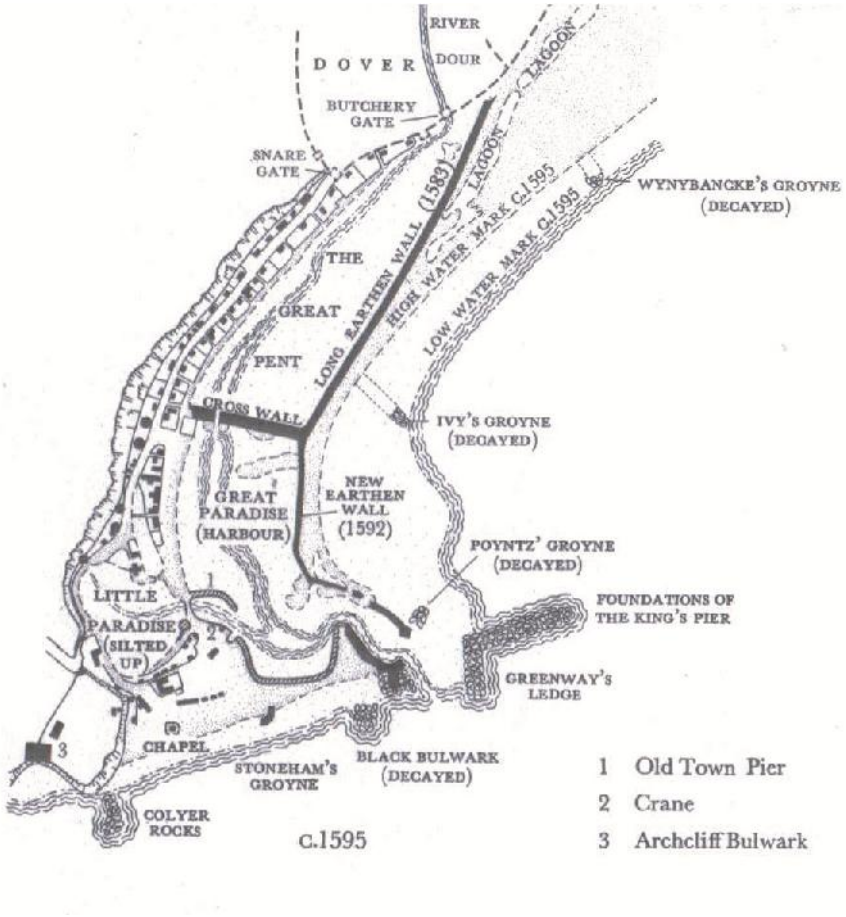

Figure 10, Modern plan of the Elizabethan pier works at Dover c.1595 (from Colvin (ed) 1982)

Technology

Documentary evidence

Although there is a wealth of documentary evidence relating to the 16th century harbour constructions that survives in a number of archival sources the volume of this primary source material is far too considerable to be examined and transcribed in this case study which forms a small part of a greater regional study. Accordingly, the only documentary evidence for the technological form of Dover's 16th century piers utilised here is that which has already been transcribed and used in previous studies.

Some near contemporary descriptions are available for the timber-built piers of the Henrician scheme. These piers were referred to by the seemingly interchangeable terms of both pier and jetty. It is believed that all the piers and jetties built during Henry VIII's state sponsored scheme were timber-built. They were described as

"compiled of two rowes of maine posts, or great piles of five or six and twentie foot long, set at each side clost together, which were let downe and put in certeine holes hewed in the great rocks, laid for that purpose: but some of those piles were shod with iron, and driven into the maine rocke of chalk, with a great engine called a ram. These posts and piles were combined and held together with iron bolts, and were filled with mightie stones of chalk as also with beach, and other earth: but the bottome (i.e. foundation) consisted altogether of great rockes of stone, which if they had not beene brought thither by a speciall devise, must needs have beene extreame chargeable: for manie of them were of twentie tun a piece, and few under" (Scot, in Holinshed, quoted in: Colvin 1982, 736-7).

What is described here are two rows of clusters of close-spaced piles set within holes of a purpose laid bedding of rocks. Some of these piles, shod with iron, appear to have been driven below the bedding and into bedrock below, presumably for additional stability. The posts and piles were then joined together with iron bolts and the pier in-filled with ballast. It was necessary to provide a bedding, or foundation, into which piles could be set because of the depth of water and the high tidal range at Dover. In other words the relative shortness of the timber (20') could to some degree be overcome by the provision of such a bedding. The stone foundation material was brought from the foot of Dover Castle and from Folksetone and was transported via the use of large floats, or casks. The method was to attach the floats to the rocks with chains at low tide and upon the rising tide tow the floats and rocks to the site for deposition and there release them. This system is said to have been invented by a local fisherman named Young who was rewarded for

his ingenuity by the king with a pension of 4d per day for life (Lyon 1813, 155-6). Finer manoeuvrability could be gained at the deposition site by the use of cranes. The use of such a foundation for timber-built piers has not been recorded at any of the other pier sites on the eastern coast and it may only have been Henry's open coffers that enabled such utilisation at Dover. Much repair work to what were fairly new piers is recorded during the ongoing harbour works. Much of this was attributed to corrosion of the bolts used in jointing timbers, a factor noted again during the 17th century (Cal. S. P. Dom. 1652). There is some record pointing towards foundation weaknesses and one does wonder if there was sometimes a tendency for this material to settle or move (L. & P. Henry VIII, 1538b). It may be envisaged that the effects this would introduce on the timber pier it supported would have been potentially severe structural weaknesses or even collapse.

During the Elizabethan works the seawall and sluice-wall of the Great Pent were not constructed of timber. However, timber-built piers were employed at the mouth of the Great Paradise. The use of tuns to transport and drop stones was also employed in the Elizabethan works with workmen from Scarborough, where the system had lately been employed, brought in for this task (Cal. S. P. Dom. 1584a).

There is little evidence to suggest that any works of substance, other than repairs and minor improvements, took place at Dover harbour for many years after the Elizabethan works. However, subsequent works did include the 17th century replacement of the cross-wall of the Great Pent (Leach 2005, 30), whilst within the 1660s a further cross-wall was also built creating a second pent in front of the first (Ash 2000, 262). Sometimes repair work was urgent, as for example in 1646 when breaches within both the north and south piers are recorded (J. H. L. 1646). The same problem was referred to in both 1648 and 1649 and indeed periodically thereafter (Cal. S. P. Dom. 1648; Cal. S. P. Dom. 1649a). The form of the harbour continued to see little change throughout the remainder of the 17th century. It also continued to deteriorate and it is said that by 1699 only small boats could enter the harbour at all states of the tide with larger vessels only able to do so at high springs (Leach 2005). This was due to the deposition of sediment particularly between the pier heads and this issue finds frequent mention in State Papers. One consequence of this was the frequent use of lighters for the transference of both people and goods.

Dover's underlying problems had always been the accumulation of shingle, especially near the harbour mouth, though the problems of silting within its internal basins had to some limited degree been overcome with the use of sluices for scouring. It was recognised that the problem with the shingle could only be truly overcome with a long pier, or piers. During the 18th and 19th centuries various plans were submitted for such long piers but most works at the harbour were confined to far less ambitious improvements and this included the gradual replacement of timber quays with ones of stone within the harbour itself. The engineer John Smeaton produced a report on Dover's harbour in 1769 detailing its state, failings and how these could be resolved. Smeaton described the harbour mouth as consisting of two piers composed chiefly of wooden piles filled with rough heavy stones (Smeaton 1769). Extensive repairs and some replacement of these piers is recorded in the 18th and 19th centuries though their essential form remained largely unchanged (Lyon 1813, 187-8). The timber-built seacoast piers at the harbour mouth were to survive well into the 2nd half of the 19th century when one of the many of the grandiose schemes that had for so long been proposed for Dover finally came to fruition in 1871.

This new harbour with massive arcing piers and constructed of modern materials completely altered the form of the port and in its fundamentals still comprises the principle outer works of the present harbour. Finally, the harbour's perennial core problem of shingle was also overcome by this scheme. It has succeeded where others failed, principally because the present massive piers extend the best part of 1km from the shore. Their success is owed to their being constructed in deep water, effectively within an environmental zone beyond that closer to the shore and where accumulation is prevented by ongoing movement (Ash 2000, 262). With hindsight it is possible to see that this technical accomplishment would not have been possible much prior to this date, only becoming so in the later 19th century with the advent of new materials, technologies and techniques. As such we can also see that all of Dover's harbour works prior to this were in reality a forced compromise between what it was desirable to do and what it was actually possible to do.

A number of reports were prepared by the foremost Georgian and Victorian engineers prior to the construction of the existing harbour and included the likes of Smeaton, Rennie, Cubitt and Walker (HCPPO). These shed interesting light on contemporary knowledge of the prevailing environmental conditions. It is quite clear that the regimes of

tide, current and wind and their influence on sedimentation were well understood. Sediment content within specific volumes of water taken in specific conditions and at different locations, as well as measurements of sediment accretion against existing structures, were all recorded. Detailed bathymetric surveys were carried out and the predicted environmental outcomes of specific features and schemes assessed. Thorough examination of historical records of earlier harbour works and the problems that came to be associated with them was also carried out. When the decision to construct the vast new harbour was made, it was done so with a degree of confidence inspired by the prolonged and detailed scientific labours that preceded it.

Cartographic and pictorial evidence

A number of contemporary plats were prepared for both the Henrician and Elizabethan harbour works at Dover. All previous studies that have utilised this source in assessing the development at the port are agreed that some of these are simply proposals, elements of which may or may not have been built, whilst a number of others depict a mixture of both existing and proposed works. As such, not all of the detail shown in the plats that are reproduced below necessarily existed. Where this is known to be the case comment is made to that effect.

What is probably the most detailed of the Henrician plans of Dover dates is by Richard Cavendish from 1541- 44. Cavendish held a senior management position within the works and had previously carried out works for the crown at Tournai and was later Comptroller of Boulogne (Colvin 1982, 743). This drawing, (Figure 11, Figure 12 detail) shows completed and proposed works though is complicated by additional details drawn at a later date. It does nonetheless give a good technical impression of the general character of the piers. The pier walls are steep-sided and the toe of which lies fully within the foundation of laid stone. There is a low parapet to the top of the walls and the walkways along the top appear to be formed of the ballast material rather than of timber. Regularly spaced upright timbers are present to the pier walls, which presumably form bay divisions, whilst the timberwork between these is of horizontally lain planks. Short groyne-like structures extend from the outer faces of the piers. These are of similar construction to the piers and again sit on a rocky foundation material.

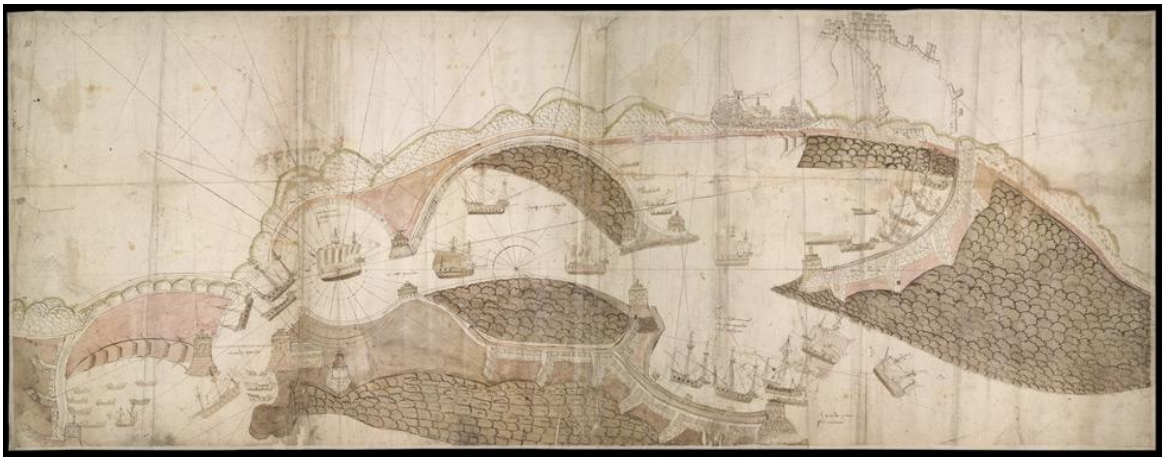

*Figure 11, A grounde platt for Dovour, by Richard Cavendish 1541-44. Source: British Library Cotton Augustus I.ii, f.10 *Note that the works to the right represent intended works.*

Figure 12, Detail of: A grounde platt for Dovour, by Richard Cavendish 1541-44. Source: British Library Cotton Augustus I.ii, f.10

A Truer summary depiction of Dover harbour as it was around the late 1530s is shown in a copy of a drawing said to date to 1543, though probably in fact created a few years prior to this (Figure 13). The south pier works are shown in the foreground, behind which lies the north pier. The cluster of ships lie within the lagoon known as the Paradise. The harbour's topographic setting with regard to the town and Archcliffe (centre and left) is clearly shown. Technically this drawing provides little more information than Cavendish's plan save for the uni-direction bracing seemingly evident to the exterior of each bay.

The technical form of the piers depicted in Cavendish's plan and that of c. 1543 appears to be of earth-fast frame type.

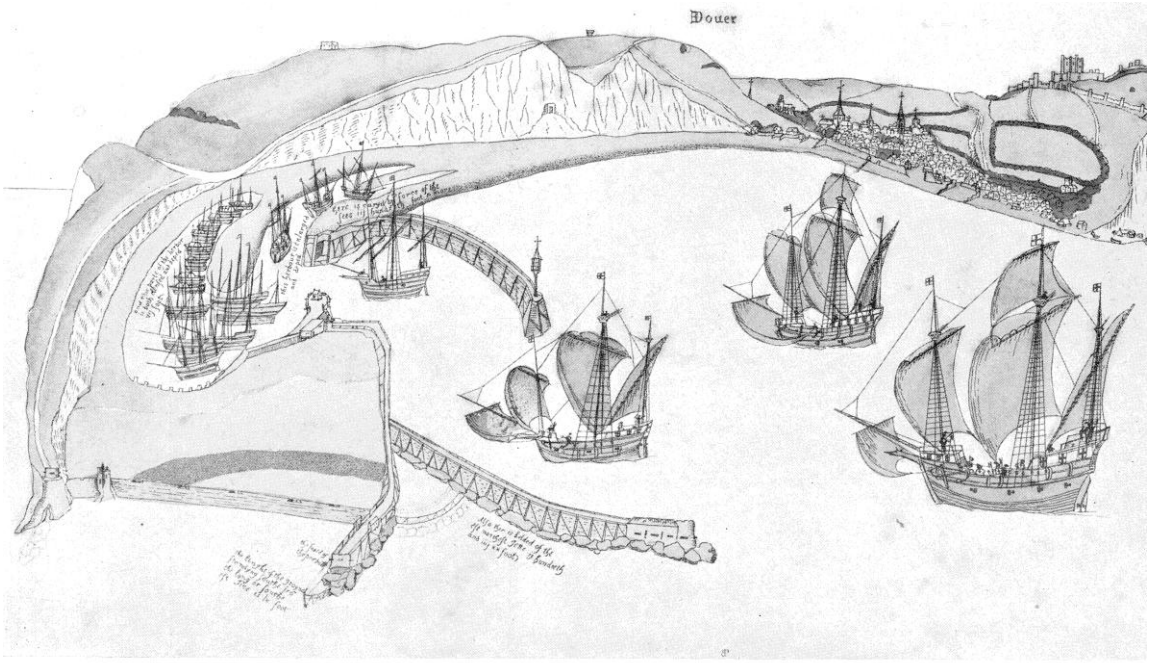

Figure 13, Dover c.1543. Source: Minet, W. 1922.

The Flemish artist Anton Wyngaerde, who is most famous for his panoramic views of European cities, also drew a view of the southern part of Dover harbour as seen from the sea, (Figures 14, 15). Wyngaerde is believed to have been in England in 1544 and between 1558-9 and his view of Dover is widely stated as dating to this latter visit (http://www.thefamousartists.com/anton-van-den-wyngaerde). However, different sources propose slightly different dates for Wyngaerde's visits to England and it is not possible to be entirely precise in this matter. Wyngaerde's drawings are renowned for their fine detail

and air of accuracy and there are no real grounds for believing that his view of Dover does not fit into that mould. The harbour elements shown in Wyngaerde's view date principally to what is believed to have been present in the 1540s and given that it is thought that he was in England at that time there is a distinct possibility that this is indeed the date of the drawing. Some support for this may be the pier works evident in the lower left of the picture which appear to be very much ongoing, though it could admittedly be argued that this represents later repair works. Whatever the case, some technical detail is apparent in Wyngaerde's drawing. The southern (left) end of the pier is shown as an empty shell yet to be filled with ballast. What are almost certainly principal vertical timbers are visible and these are laterally connected to one another by large tie-beams. To the outer face of the pier walls some vertical timbers are present whilst between these are what is likely to be horizontal planking. With regards to technical form the pier depicted by Wyngaerde, this appears, owing to the presence of what look to be principal posts, to have been of earth-fast frame type. The presence of vertical, as opposed to horizontal planking within a pier of this type is unusual but does find comparison with the early 20th century timber piers at Southwold.

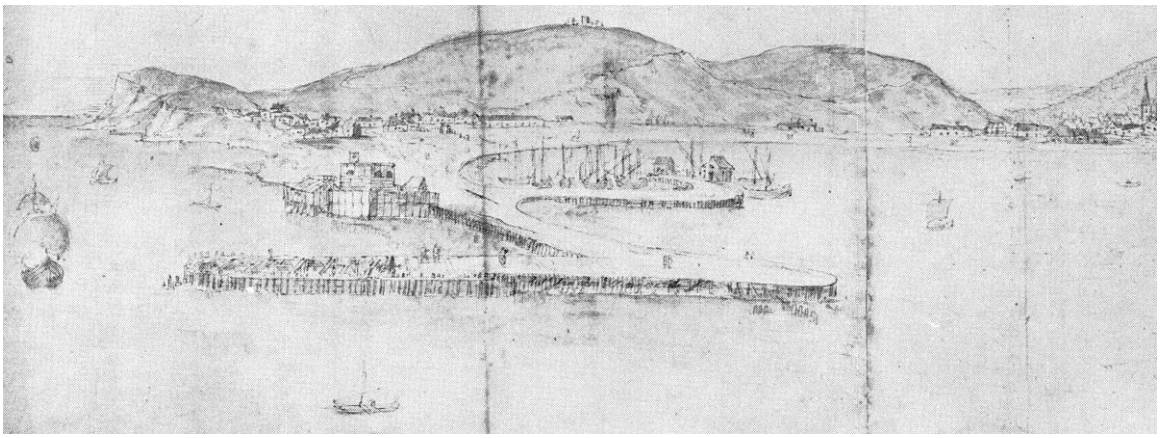

Figure 14, Extract of 'Anton Wyngaerde's 'Dover from the Sea' showing the southern pier works, with ongoing construction/repair of right angled jetty – timber pier on a stone foundation which was originally constructed around 1539-40. (from: Minet 1922)

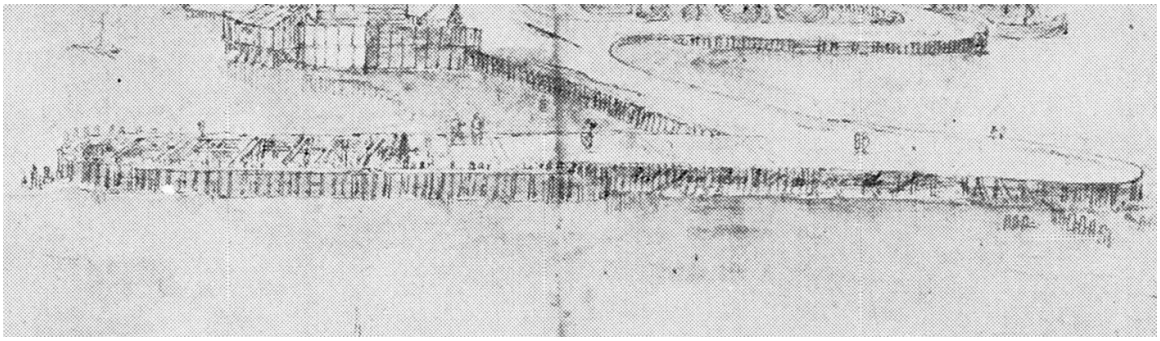

Figure 15, Finer extract of 'Anton Wyngaerde's 'Dover from the Sea' (from: Minet 1922)

The best known elements of the Elizabethan works at Dover, the seaward wall and cross-wall of the Great Pent were constructed of a mix of earth and stone rather than timber. However, timber-built pier elements also formed parts of the work. These can be seen in Figure 16 dated to 1595, a date by which the Elizabethan works had more or less been completed. Interesting details to the surface of the north pier, and parts of the south pier, are visible in this plan, which in addition to showing lateral tie-beams also shows two internal rows of longitudinal timbers, (Figure 17). The created lattice-like effect, within what are probably earth-fast piers bears some similarity to the internal framework of Great Yarmouth's 16th century piers.

Figure 16, Dover harbour in 1595. Source: Brit Lib Cott Aug I.i.46. Thomas Digges. This drawing neatly summarises the form of the successfully built Elizabethan harbour.

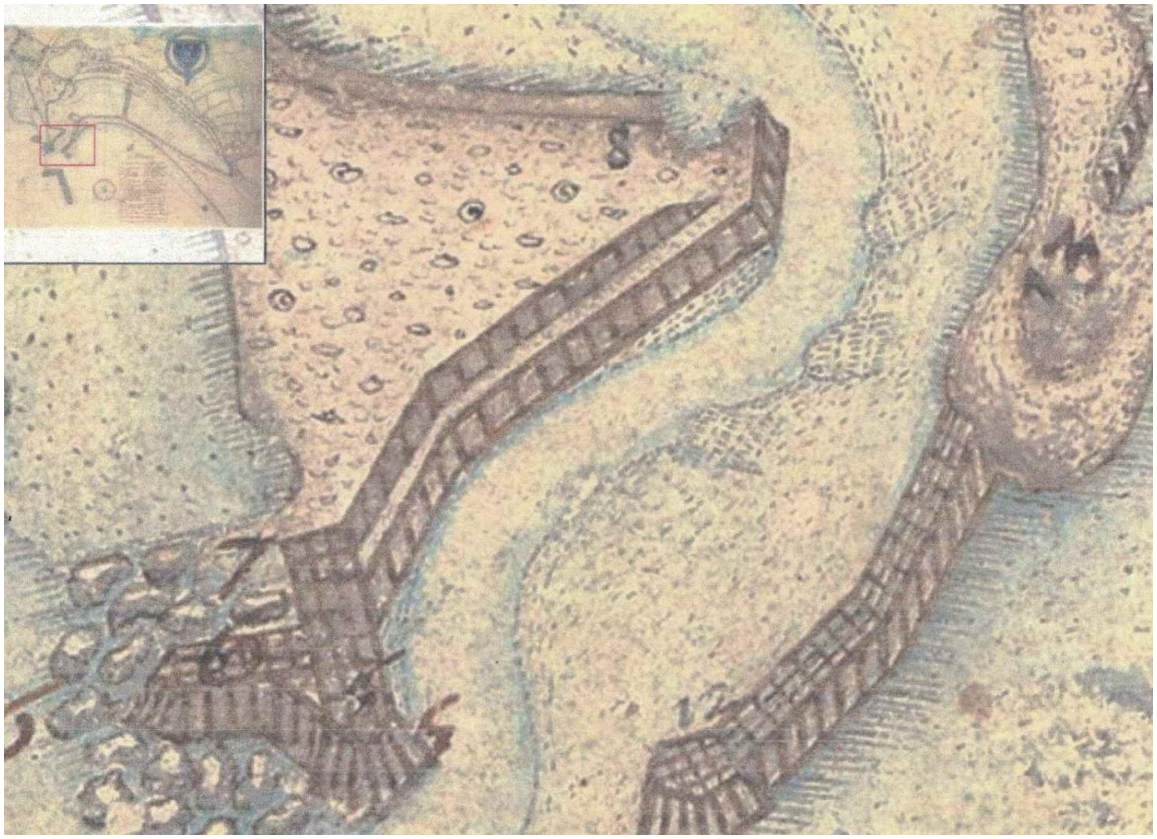

Figure 17, Detail of: Dover harbour in 1595. Source: Brit Lib Cott Aug I.i.46. Thomas Digges.

The essential elements of the Elizabethan harbour, the Pent, upper harbour and original Paradise, were all accessed from the sea by the twin piers. Outside of these piers lay a large mole-like pier that remained largely unchanged in basic plan-form until the 2nd half of the 19th century. Maps of the town and harbour of 1661 and 1769 demonstrate this quite clearly (Figures 18 and 19). It is interesting to note however, that whereas the seaward mole is depicted as a right angled arrangements of rock in 1595 by 1661 the feature is shown to have a timber-built pier superstructure and to be of slightly different plan-form. The use of the structure as a mooring is implied in the 1661 depiction. In all likelihood it provided a deep water mooring for larger ships unable to gain entry to the harbour under certain conditions, with cargoes and passengers being transferred by lighter. The entirety of this feature is absent in the map of 1769. The mole aside, the most significant changes to the harbour are internal re-arrangements that do not involve the seacoast piers. One aspect of these changes is the increased density of buildings, mostly on reclaimed land. Such buildings could however be subject to damage or destruction by

storm, there being a number of references to this from the 17th century (e.g. Cal. S. P. Dom. 1674).

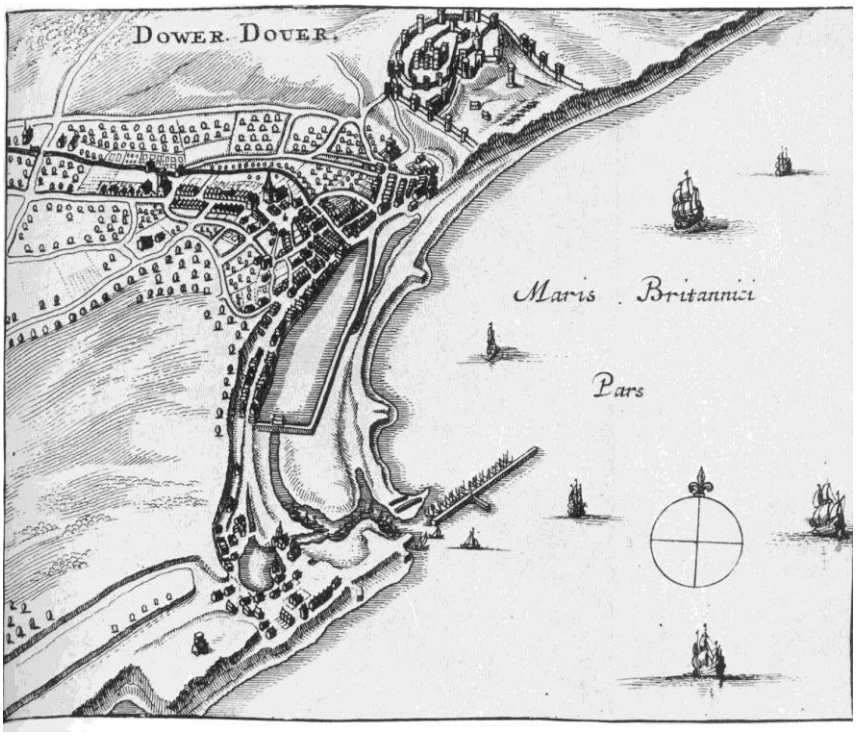

Figure 18, Plan of Dover Harbour in 1661, by Rutger Hermannides

Figure19, Plan of Dover Harbour in 1769, by Andrews, Drury and Herbert.

A highly detailed view of Dover's harbour dating to 1825 again demonstrates that the core elements of the Elizabethan plan remained (Figure 20). The cross-wall of the Pent, which was not originally timber-built, is known to have been renewed on more than one occasion and in the 1825 view appears to be of timber. Internal detailing within the harbour can again be seen to have been further developed. Perhaps the greatest of all changes is in the much increased density of buildings on reclaimed ground. Many of the buildings close to the waterfront in the later post-medieval period are known to have been the houses and warehouses of merchants.

Figure 20, View of Dover Harbour looking south-west, 1825 (National Maritime Museum PUO 982)

There are a number of 19th century depictions of the timber-built piers that formed the entrance to the harbour. The earliest two of these (Figures 21 and 22) provide some technical details of the walls and walkways of both piers. The walkways can be seen to be of longitudinally lain planks whilst in that view of the south pier of Figure 21 parts of the

internal stone ballast of the pier can also be seen. In both views the walls of the piers are shown to rise up above the level of the walkways thereby forming a safety parapet capped off with large baulks of timber. Bracing between the parapet and walkway is also evident in Figure 21. The walls of the piers are shown to be comprised of steeply angled timbers which John Smeaton described in the 18th century as piles. Although it cannot be certainly determined from the pictorial evidence it is probable that these piles were of square section rather than of rectangular, particularly so given their location at the pier heads where some of the most powerful effects of the sea may be anticipated. Horizontal rails can be seen to be present to the walls. At the head of the south pier a small, tall, timber-built lookout is shown. The flag apparatus affixed to this was used to signal when access to the harbour was possible by vessels of larger draught.

A number of timber-built jetties and wharfs internal to the harbour survived until well into the 19th century (Figure 23).

Figure 21, View of the head of the south pier, early 19th century looking south-east (National Maritime Museum PU 7779)

Figure 22, View of the pier heads at the entrance to Dover Harbour in 1851, looking south (National Maritime Museum PUO 982)

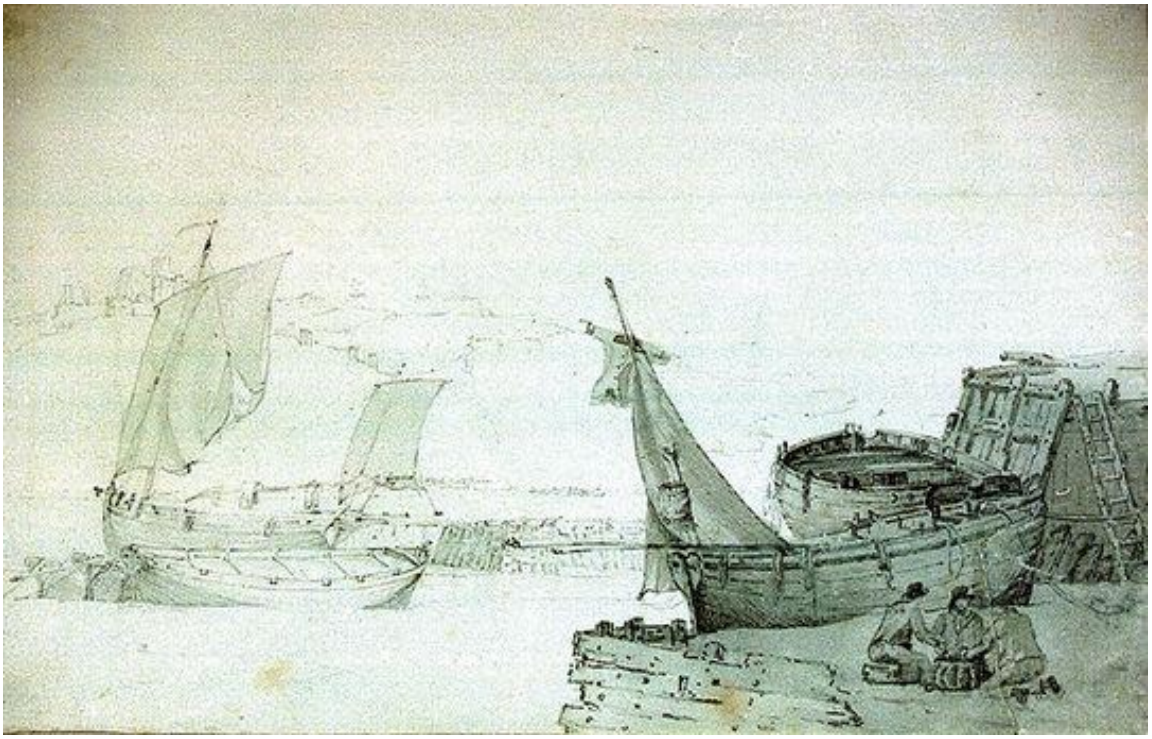

Figure 23, View of the harbour interior in 1800, by Nicholas Pocock, looking north-west. The pier-like structures are timber-built wharfes. (National Maritime Museum PU 8795)

Figures 24 and 25 are views of the timber-built entrance piers as seen from seaward and recorded by artists in the later 19th century not long before the piers became obsolete and Dover's new harbour was built. The detail of these depictions is broadly similar to those of the earlier 19th century.

Figure 24, View of the pier heads at the entrance to the harbour in the 2nd half of the 19th century, by William Wyllie, looking north. (National Maritime Museum PU 9038)

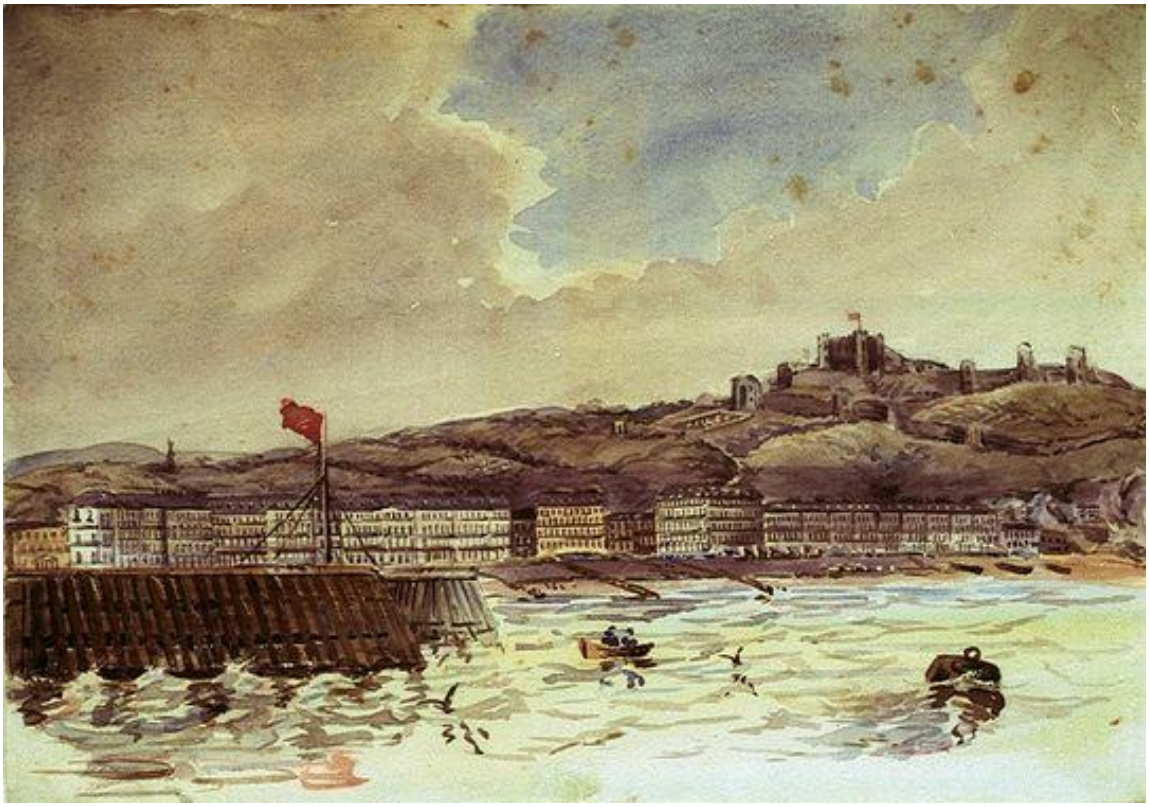

Figure 25, View of the pier heads at the entrance to the harbour in the mid- late 19th century, looking north. (National Maritime Museum PU 9038)

Associated defensive works

Throughout the history of settlement at Dover the coastal town's proximity to the continent has always ensured that defensive considerations loomed large. The most famous of these defensive structures is undoubtedly the castle which has dominated the town since at least the Norman Conquest. The documented 16th century and later harbours however have been located below the cliffs of the Western Heights and as such were too distant from the castle for it to provide sufficient protection.

As we have seen the earliest documented pier built by the Master of the Maison Dieu, which although of stone rather than timber, was modelled with two stone towers in what was then a fully up to date design. Around the same date the town's corporation built additional bulwarks at Archcliffe and possibly elsewhere. Early on in the state sponsored Henrician harbour works bulwarks and ramparts, sometimes called blockhouses, with great and small artillery are referred to. Three were built in 1539 – 1540 on lands close to

the harbour's landward end. Around 1542 a fourth defensive bulwark, which became known as the Black Bulwark, was added. This was located on the southern side of the south pier and was constructed of bolted timber two storeys tall and founded on a mass of rocks forming a platform in the sea.

Although the defensive works were periodically repaired their number had been reduced to two towards the end of Elizabeth's reign. No new defences are known to have been associated with the Elizabethan harbour works.

A boom is said in 1635 to have been previously used at Dover to regulate the ingress and egress of ships (Cal. S. P. Dom. 1635).

Material remains

The story of the development of the post-medieval Dover Harbour is largely one dominated by successive shifts of harbour infrastructure to seaward as a result of sedimentation along the shoreline and within the harbour. One by-product of this tendency was the reclamation of substantial areas of land at the foot of the cliffs and valley, much of which came to be built upon. Another corollary was obviously that what had formerly been harbour came to be buried. There must exist therefore the potential for harbour remains, possibly including the remains of piers, to lie buried beneath what is now land. Searches of online data-bases such as the Archaeology Data Service, English Heritage's Pastscape and Canterbury Archaeological Trust's online Gazetteer refer to the historic port but do not provide indications or references to any remains that may have been encountered in the recent, or more distant, past (ADS; Pastscape; CAT). A rudimentary superimposition of the harbour development maps of Dover from The History of the King's Works onto modern base maps suggests that at least parts of the piers forming the mouth of the harbour are likely to lie under structures relating to the modern harbour as is the wall of the Great Pent and parts of the Paradise havens. Whether some of the newer works will have destroyed the former is uncertain. Those parts of the earlier harbours lying in the present basins may have some potential for survival though a periodic dredging regime has for a long time been in place.

Specialists and workers

As the foremost harbour building operation of the Tudor age it is unsurprising that many great statesmen and engineering/technical practitioners of the times played roles in the harbour works. The role and inclusion of experts at Dover was a circumstance actively sought and encouraged by the crown and Privy Council. The recognition that it was perhaps only these individuals who could resolve the problems associated with the port was no doubt seen as a means of protecting the state's enormous investment.

On the state managerial side Henry VIII himself was deeply involved, visiting the site on at least five occasions, making suggestions and demanding to be kept informed of progress through the viewing of plats and personal communication. Thomas Cromwell and certain members of the Privy Council were also enmeshed in the project. On a personal level Elizabeth I's approach was more hands-off though important members of her Council, including Walsingham and Burghley did, to varying degrees, become involved. In both Tudor projects the crown was responsible for facilitating funding. In the former case money was directly channelled through the crowns coffers, with much of the money being raised through specific Acts of Subsidy. In the latter project the crown merely enabled funds to be raised and given directly to the town by securing Parliament's enactment of legislation. This legislation included the granting monopolies to the port and access to money raised via a tax on shipping nationally.

At least one entry in the Letters and Papers of Henry VIII indicate that 'masters to make the port at Dover' were searched for in France and seemingly in Spain also (L. & P. Henry VIII, 1537). The management of the Elizabethan project and its use of experts has been considered at some length by Eric Ash. (Ash 2000; Ash 2004). The Privy Council effectively assumed overall guiding responsibility, and in light of the costly Henrician works, had particular concerns to achieve both a successful technical outcome and keep costs to a minimum. To some degree this was achieved by seeking advice, opinions and suggestions from experienced engineers from both England and the Low Countries and this was of especial significance when it came to making judgements between rival proposals. The role of the project's Surveyor Thomas Digges as a mediator between the council and those engaged in the works, is considered by Ash to be central to the successful outcome. It was Digges more than any other who possessed the skill and knowledge to be involved in all aspects of the work and whose judgment, in his reporting

to the council, was considered to be sound. Digges was a wealthy landowner and in a position to refuse to accept his Dover salary, though this act perhaps reinforced perception of him as a trustworthy man with no axes to grind. At the local level considerable authority was divested to a permanent commission, a number of whose members had experience in navigation and fortification. Digges was also a member of this body which, ultimately, acted at the will of the Privy Council. The principal management differences between the Henrician and Elizabethan works were that the Elizabethan established a local commission whilst at the same time ensuring that the Privy Council exerted its influence to a considerable degree.

On the technical side we have already seen that the Master of the Maison Dieu *John Thompson* was responsible for elements of the Henrician piers at Dover. He went on to receive an appointment at the harbour of GreatYarmouth in 1548 for the construction of the town's 6th haven, this apparently being owed to his recommendation by some members of the Privy Council and in particular the Duke of Norfolk (Skempton 2002, 124). Already an elderly man, Thompson died within a year or two of taking up his post at Yarmouth and before the haven was finished (Swinden 1772, 400). Another Master of the Maison Dieu, *John Clerk*, was also heavily involved in works at the early stone pier at Dover (Skempton 2002, 142).

Sir Richard Cavendish was a military engineer and sometime Comptroller of the works at Dover during the Henrician campaign. Cavendish drew at least one of the platts of Dover harbour. In the later 1540s he took up a succession of technical posts in the English possessions in France (Skempton 2002, 123-124).

John Trew had some experience of harbour works before becaming involved with the Elizabethan Dover scheme. Trew carried out repairs to parts of the earlier harbour works and was central to much of the design process for the new works (Skempton 2002, 724-6).

Thomas Digges, a mathematician, Member of Parliament and expert on surveying, was recruited as General Surveyor of Dover Harbour during the Elizabethan works. He carried out a number of surveys of the harbour and its topography and was influential in decision making regarding the technical and spatial form of the harbour. The major role in this greatest of engineering successes of Elizabeth's reign has frequently been ascribed to Digges acumen (Skempton 2002, 181-3).

Sir Richard Lee has been described as the most famous military engineer of his time *"spending forty years on virtually every military structure built in England, Scotland and France from the reign of Henry VIII to Elizabeth I"* (Skempton 2002, 401-3). Lee's role at Dover however was limited to inspection of the harbour works in 1553.

John Rogers has already been considered within the wider thesis as one of the engineers who put forward proposals for a mid 16th century pier scheme for Sandwich's haven. Rogers role at Dover was very minor, simply being asked to report of the works there (Skempton 2002, 581-4).

Willam Borough was originally a mariner but came to be consulted on Dover's harbour during both of the Tudor building campaigns. He came to be heavily involved with the designs and produced at least one platt. Appointed Master of Trinity House in 1585 Borough took part in the 1587 expedition to Cadiz under Francis Drake, commanded a ship against the Spanish Armada and became Comptroller of the Navy (Skempton 2002, 63-65)

Humphrey Bradley acted as a consultant on the Elizabethan project. Born and raised in the Netherlands of an English father and Dutch mother he was recruited as part of an initiative by Francis Walsingham on behalf of the Privy Council to seek assistance from experts in the Low Countries. The recruitment of experts from this region for harbour works in England was already a well worn path and would continue to remain so. Bradley's expertise probably lay in the area of water control and sluices. Although he may have returned to the Netherlands after his work at Dover Bradley did go on to play a major role in a number of land drainage projects elsewhere in England (Skempton 2002, 67-69).

Ives Paul was a military engineer with much experience of fortifications gained during service in the Low Countries during the 1570s. His role in the Elizabethan works at Dover was fairly minor, being responsible for the new groynes (Skempton 2002, 355-6).

Sir Francis Drake, *John Hawkins* and *Admiral Sir William Winter* evaluated the Elizabethan works on behalf of the council in 1581 (Mock 2004). The opinions of masters and mariners was also sought at a meeting in Dover in 1584. More particularly, it was because of their expertise in seamanship that their knowledge was sought on the navigational issues concerning a location for a harbour mouth. Two of the nation's

greatest mariners, *John Hawkins* and *Martin Frobisher* became involved in this debate. That Hawkins and Frobisher were in disagreement over the matter perhaps highlights the fact that the contemporary knowledge base was such that on certain matters at least it was simply not possible to come up with definitively correct answers.

Later engineers

Sir Bernard de Gomme originated from the Low Countries and was brought to England by Prince Rupert at the start of the Civil Wars. De Gomme rose to become the royalist's principal military engineer. Experienced in military engineering in both England and the Netherlands he was also an expert on land drainage and land reclamation. De Gomme was instructed in 1661 to advise on repairs to Dover's harbour (Skempton 2002, 175-6). He was also responsible for replacing the cross-wall of the Great Pent with one of timber in-filled with stone (Skempton 2002, 604).

Sir Henry Sheeres was primarily a military engineer with some experience of harbour works. Sheeres reported on the decayed state of what was still essentially the Elizabethan harbour at Dover in 1682. Following on from this report Sheeres was instructed to formulate a plan for its improvements, though these were considered, in a personal remark by Charles II, to be too costly. A few works along the lines of Sheres proposals were carried out in the early years of the 18th century (Skempton 2002, 603-5).

We are lucky that lists concerning the numbers and nature of workers engaged on the Henrician harbour works have already been published and are reproduced here as Figure 5. Examination of the minimum numbers of men involved reveals the enormity of what was one of the great infrastructure works of the age. Whereas the pier building works at Bridlington seldom exceeded totals of forty men at Dover this was commonly around the four to five hundred mark.

At the more managerial end of the project, and no doubt ranking below the General Surveyor and experts, we find overseers, purveyors and clerks. The overseers were responsible for the organisation and execution of specific parts of the works whilst the purveyors responsibility lay largely with the logistics of supply and use. The clerks role may have been more varied but included record and account keeping.

Carpenters, labourers and sawyers have been recorded at timber-built pier building projects elsewhere in England and their inclusion at Dover engenders no surprises. When we consider the numbers of these individuals involved what does stand out is the sheer numbers of labourers involved. The reasons for this perhaps relate to two particular factors. Firstly, the sheer scale of the project will have required that all constituent structural elements relating to the piers will have had to have been moved considerable distances; the 'transportation' being more so at Dover than at pier sites of more modest scale. Secondly, owing to the finite lengths in which timber en-masse is available the construction of timber piers in deep water could only be achieved by the laying of massive stone foundations. That such foundations appear unique at Dover and have not been recorded elsewhere merely highlights the scale of the works and the requirement for them to be built in deep water. The upshot of this method of construction on foundations will have required the employment of labourers to in creating those foundations, this simply being a task that did not occur at other pier sites.

The transportation of stone for the pier foundations and the technology employed in this required a specific set of workers that would include the listed coopers, tunmen, mariners, hoymen and shipwrights. Coopers fabricated the tuns used in the flotation transport of large stones whilst tumen were presumably engaged in the task of the securing of the stone to the tuns with chains and the release of the stones in their desired locations. Mariners and hoymen (a hoy being a particular type of ship) operated the craft moving the stones. The precise role of the listed tidemen is not entirely certain. Payments made to workers by the tide are recorded at a number of pier sites and were necessary owing to certain works only being capable of being executed at lower states of the tide. A tides-man, or tides-men, are variously defined as people whose are employed during only certain states of the tide or as officers whose role was to prevent seaborne contraband transactions (OED online). In the context of the Dover works the former definition is likely to be nearer the mark.

Beyond all this there will have been other been other groups of unrecorded workers who benefitted as a spin-off of the project. This may have included those felling and converting trees and as well as carters involved in the transportation of this commodity. Vast quantities of iron were utilised in the works, particularly bolts as well as other equipment and tools. This demand must have resulted in a requirement for increased production, most probably in the iron works of the Weald. Smiths fabricating the iron into

finished products are not included within the lists and we know that these tradesmen were in fact operating in the role of providers paid by the piece not included in the workmen lists. Providers of food, ale, accommodation and other services no doubt also benefitted from the presence of a large workforce. Security of employment for the majority of workers was probably slender. In 1535, for example, we are informed that sixty men were discharged. Some were said to be idle, the sin of the remainder was to be old (L. & P. Henry VIII, 1535c). It is known that men could be impressed to work on Dover's harbour during the Tudor campaigns of construction and the same still held true in the mid 17th century when *"boatmen, carpenters, etc."* are referred to in this context (Cal. S. P. Dom. 1653).

It appears certain that a detailed examination of the surviving records concerning those employed at the harbour works could produce interesting results regarding organisation, management and worker practices.

Ownership, control and funding

The earliest recorded pier works at Dover by the Master of the Maison Dieu appear to have been funded by that body. References to an existing 'pere' within Thompson's accounts may relate to earlier harbour works by the town of Dover.

The massive, costly and developing programme of Henrician harbour works received its initial impetus from petitioning representatives of the town. However, once adopted by the Privy Council and king the entire momentum, funding and even some of the developing form of the works was shouldered by these central authorities and their representatives. King Henry made at least five visits to the ongoing works, received correspondence and plats and maintained an influential interest in the project over a period of many years. Elements of the works are even known to have been adopted in line with his suggestions. Thomas Cromwell both encouraged and berated the high officials entrusted with its construction whilst other members of the Council likewise concerned themselves in its affairs. In many ways the crown's role at Dover mirrored that at the Yorkshire pier sites of Bridlington, Flamborough and Hornsea. Upon seizure by the crown during the reformation considerable sums were invested in these other ports with high governmental officers and their agents being actively engaged in the process. But

whereas the principal may have been similar, the thousands of pounds invested in the Yorkshire sites proved to be tens of thousands at Dover. Some of this money came from Acts of Subsidy passed by Parliament, some perhaps derived from the spoils of reformation seizure. This may also have been the case with timber, certainly seized woodlands in Yorkshire provided much of the timber used at the pier sites there. Whilst the works in Henry's reign were effectively a national project funded by the state much everyday management and decision making was ceded by crown and council to local officials.

Responsibility for Dover's harbour was transferred to the town authorities in 1556. There were no major construction works at the decaying harbour site until the early 1580s, largely because the town could not afford to do so despite cross-channel passage monopolies granted to the town by Edward VI and a brief for collection issued under Mary (Hasenson 1980). An indication of the inability of the harbour to accept vessels of large burden may be provided by the legal rights granted to Dover by Mary giving them powers to control all manner of boats carrying goods and people between ships lying at deep water anchor and the shore (Leach 2005, 31).

With the support of the Lord Warden of the Cinque Ports the aid of the crown was again sought in the latter 16th century (Mock 2004). The crown was happy to facilitate and play a major and influential role in the exercise, but Elizabeth's government unlike that of her fathers, was not prepared to fund the works from its own resources. When it came to matters of money the crown was a facilitator rather than a contributor and the project became something of a collaborative exercise between crown and local officials (Mock 2004). Thus, in 1579 Dover was given a monopoly on the export of grain from the southern ports, this later being extended to certain other commodities, whilst in 1581 a tax was levied on ships entering English ports for a period of seven years. Additional funds came from fines upon alehouses whilst contributions from the clergy were also sought (Cal. S. P. Dom. 1580).

The significant difference between the funding of the Henrician and Elizabethan projects was that whereas in the former money was simply sent from the royal coffers at the request of local officers that of the Elizabethan was altogether more regulated with monies from the 1581 Act being placed in a trust administered by the Royal Customer and disbursed only on the instruction of the Lord Treasurer after an appointed overseeing

commission had applied for the money (Ash 2004, 365-6). Supervision of the works was largely left to the town though with the Privy Council seeking the recruitment of capable engineers, ensuring that progress reports were made to them and frequently seeking the advice from those with knowledge. The council's long-standing role can best be explained in terms of the national importance of the works and a desire that value for money be obtained for the capital raising measures put in place by Parliament for the projects benefit. In certain respects we can see Elizabeth's, policy at Dover mirroring that at the seized Yorkshire ports she inherited. Here again Elizabeth's government wanted harbour works carried but was not prepared to spend crown money in doing so, preferring instead, in these other instances, to have this done by crown lessees.

Control of Dover harbour remained in the hands of the overseeing commissioners until 1603 when it was returned, once again, to the town (Hasendon 1980). However, following investigations by a committee enquiring into how money raised for Dover's harbour by a system of passing tolls was being used, a charter of 1606 vested the harbour's control in a body of *"eleven discreet men"*; this body being known as the Guardian, or Warden, and Assistants of the Harbour of Dover (Leach 2005, 28). This body, which always included representatives of the town, remained in control of the affairs of the port until 1861, whilst the town also managed to preserve its privileges of free harbourage and the right to licence boatmen. An interesting clause within the charter stated that any reclaimed land, including that to the seaward side of the Pent and including the area of the original harbour now known as Little Paradise should belong to the Harbour Board. This proved to provide a source of income for the board as houses built for rent were constructed on parts of this land. Town interest at the harbour was also demonstrated in 1676 when, to the sound of a drum, the townspeople turned out to clear the harbour mouth of shingle (Leach 2005, 28). Such communal labour on port infrastructure has been attested at a number of east coast pier sites.

The intermittent collection of monies by periodic Acts for passing tolls operated to Dover's benefit from 1581 until the abolition of both Board and tolls in 1861 (Hasenson 1980). During the Interregnum monies *"out of the compositions of delinquents"* i.e. from the fines imposed on wealthy royalists on the losing side during the Civil Wars (Cal. S. P. Dom. 1649b).

An unusual windfall for the harbour was the legacy of a Henry Matson in 1720 who instructed that his entire estate be used for its benefit (Leach 2005).

Miscellaneous

Storehouses relating to the harbour were almost certainly present during the Henrician works and are specifically referred to during those of Elizabeth (Cal. S. P. Dom. 1584b). In 1638 it was proposed *"that a room shall be made and maintained on Dover Pier for serving the Customs"* (HMC 1892).

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Case study 18: Folkestone

"it forms a kind of harbour" (Edward Hasted 1799)

Summary of previous work

The town was first described in a significant level of detail by Charles Seymour in his 'New topographical, historical and commercial survey of the cities, towns and villages of the County of Kent' published in 1776 (Seymour 1776). Seymour records the town's thriving fishing industry and the presence of a customs house and its principal officers, but makes no reference to any piers. Volume 8 of Edward Hasted's 'The history and topographical survey of the County of Kent' of 1799 does provide some contemporary detail of Folkestone's harbour (Hasted 1799). Hasted describes two 'jettee heads', one to the east side of the town, the other to the west as well as the parliamentary Act of 1766 that provided the means of funding for these structures. According to Hasted the area between the 'jettees' is said to *"form a kind of harbour"*. Samuel Lewis's 'Topographical dictionary of England' of 1848 considered the town in four brief pages, though the few paragraphs devoted to a consideration do provide an accurate outline history of the town (Lewis 1848, 244-8).

The first really detailed history of the town was S. J. Mackie's 'Descriptive and historical account of Folkestone and its neighbourhood' with a first edition being published in 1856 and a second, expanded edition of 1883 (Mackie 1856; 1883). Mackie transcribed a number of town documents and corporation records, the latter of which do not survive before the 16th century. Mackie recounts the earliest evidence for a harbour in the mid 16th century, provides the earliest reference for the 'stade' and gives a brief description of the two jettees. W. A. Scott Robertson and Canon R. C. Jenkins both explored the town records of Folkestone and published material from these that are of direct relevance to the harbour (Scott Robertson 1876, civ-cxxvii; Jenkins 1876, lxix-lxxxv). This included references to 16th century harbour proposals, to community efforts to clear the harbour of accumulated sediment in the 16th century and to a petition of 1629, from the community to the crown, seeking authority *"for building a peare"*. The next significant history of the town, 'Folkestone – the story of a town', was published in 1973 by C. H. Bishop (Bishop, 1973). Bishop provides much useful information on the physical, economic and political

development of the town as well as sections relating to membership within the Cinque Ports. The same writer also provided information extracted from the town records relating to the harbour in the 17th and 18th centuries over and above that detailed by Scott Robertson and Jenkins. The latest work of direct relevance to this study is 'The story of Folkestone' by Ann Nevill. Based largely on published sources though incorporating material from old newspapers together with local archival material, this work ably recounts significant aspects of the town's history but adds little to the story of the timber-built piers.

Background: town, membership and governance

Folkestone was not one of the original members of the Cinque Ports, but became affiliated as a limb of Dover some time before it was incorporated under a mayor and jurats in 1313 (Burrows 1888, 232). The Cinque Ports was a confederation of maritime towns on the south-east coast of England that was first positively recorded around 1155 though appears likely to have origins prior to the Norman Conquest. For some centuries the Ports were required to supply ships and crews for 14 days service each year when notified by the king, with service beyond this being paid for. As such, the Ports formed the core of medieval England's naval forces. In return for this service the Ports were exempted from most taxes and trading dues, a valuable privilege resented by many other towns. Portsmen were also permitted to carry canopies over the king and queen at coronation processions and afterwards, at banquet, to sit at the right hand of the king. Although not en-nobled the freemen of the Ports were commonly called 'Barons' and had the right of pleading and being tried only within their own courts. Although often a largely figurehead role, the confederation of Ports was headed by a Lord Warden. Another of their privileges was a regulating role in the Great Yarmouth herring fair, to which they sent bailiffs each year, and which formed one of the causes of the regular outbreaks of violence that occurred between the men of the Ports and those of Great Yarmouth. The importance of the Ports declined significantly in the later medieval and post-medieval periods.

The important member and limb towns of the Cinque Ports, including Folkestone, were, or became, chartered and shared many similarities of internal governance. The town's first charter of incorporation dates to 1313 when it was constituted of a Mayor, Jurats and

Commonality (Jenkins 1876, lxx). Governance of Folkestone was carried out by the mayor, assisted by 12 jurats, this being enlarged to 24 in 1545 (the nearest recent equivalent of a jurat would be an alderman). Both mayor and jurats were drawn from, and elected by, the ranks of freemen. A small number of officials, including a Bailiff and Collectors were appointed though these were later replaced by a single Chamberlain. The corporation had the right to hold its own courts, including for capital offences, whilst the townsmen were exempted from attendance at the Shire and Hundred courts (Bishop 1973, 35). Meetings and assemblies were normally held at the town's guildhall. According to Burrows and Bishop, merchant guilds appear to be unknown within the Cinque Ports (Bishop 1973, 51). Instead the institutions of the Ports took their place principally through confederation wide assessments of taxation and courts. Freedom of one of the Ports meant admission to the freedom of them all.

A grant for a weekly market in the town is first recorded in 1205. A second weekly market was granted in 1349 and in 1390 a further weekly market and annual fair were instituted. All were obtained by successive Lords of the Hundred and Barony (Bishop 1973, 34). Quarrying of ragstone was a major Folkestone industry throughout much of the medieval and post-medieval periods with this stone being transported across much of the south-east, including for use at Dover harbour in the 16th century (ADS 465903). These quarries again belonged to the Lord (Bishop 1973, 34). The lordship also exercised rights at the foreshore and held rights to tolls here, a situation that prevailed until the 19th century.

Rights and powers in Folkestone were effectively shared by both the corporation and Lord of the Hundred and Barony. It might be anticipated that such duality of control would lead to some degree of conflict. Indeed according to both Jenkins and Bishop the corporation in its early days was little more than a local body required to enforce lordly edicts and only with time did it come to assert its independence (Jenkins 1876, lxix-lxx; Bishop 1973, 35).

According to a survey of 1565 Folkestone possessed at this time only 120 inhabited houses, slightly over half of the male population was engaged in fishing and 25 vessels of various sizes belonged to the town. The town also served as a crossing point to the continent and was engaged in some cross-channel trade (Hasted 1799, 152-188). The 1671 Hearth Tax list 497 hearths in the township, this perhaps equating to a population of

around 2000 (hereshistorykent). By the mid 19th century the population of the town was fractionally under 4000 (Lewis 1848, 244).

Technology

Documentary sources

Folkestone is recorded as a port long before the earliest mentions of a pier or system of jettees, e.g. (Cal. Pat. Rolls 1318; Cal. Pat. Rolls 1364). This is typical for most pier towns and there is little reason to believe that Folkestone developed its system of piers before the post-medieval period.

The earliest references to a harbour at Folkestone are to be found in the town accounts transcribed by Mackie. The earliest of these dates to 1543 and concerns *"expences uppon vewyng of the harber"*. At around the same time there is also mention of inspection of the harbour by the Master of the Maison dieu at Dover, who had built the first pier at Dover. Mackie's transcriptions of accounts relating to the keeping of a watch, refer to both the *"harborow"* and *"stade"* in the later 16th century (Mackie 1856, 27, 48). Additionally, Mackie finds reference to the harbour in 1574 when the mayor, jurats and commons of the town agreed that money that *"was lett of the building of our harbour shall remain and be given over to the use of the town"* (Mackie 1883, 268; Folkestone Wardens Accounts).

These mid – late 16th century references to a harbour at Folkestone are of some interest and whilst the use term harbour need not necessarily imply the presence of piers, the absence of the term pier, by the same token, need not rule out their presence. The stade at Folkestone, which finds parallels at Hastings and Aldborough, was an area of gently sloping ground immediately above the high water level upon which boats were drawn. Capstans, for the hauling up of vessels, were located on the stade and there may well have been other ancillary structures such as stores, which are well documented at Hastings. Both stades and piers were intended to provide security from the sea and whilst enclosed piers occasionally had slipways for taking vessels out of water, a stade appears generally to have been provided in the absence of a pier. At Hastings the available evidence suggests that the stade may have been built subsequent to the demise of the pier whilst at Aldborough there never was a pier. At Folkestone however, it is known that from the 17th century there was a small timber-built pier-like 'jettee' system used in combination with

the stade, though it is not known precisely when this dual arrangement originated. It is noteworthy that 16th century cartographic sources, of which owing to the town's close proximity to Dover there are a number of detailed examples, do not show a pier at Folkestone though this absence of depiction cannot be held as proof absolute of absence.

It is also known that in the later 16th century the town was seeking the assistance of the Lord Warden of the Cinque Ports for its haven and possibly even petitioning the crown (Jenkins 1876, lxxvii). The state papers also record a letter from Thomas Digges, (who played a pivotal role in the works at Dover harbour) to Privy Councillor Walsingham. Within this letter it is stated that the proposed mole at Folkestone, the suggestion of Sir Richard Greynvile (probably the renowned Elizabethan sea captain and explorer), *"could not be erected for less than 100,000L"* (Cal. S.P.Dom. 1584). Again, neither of these sources provide proof of an existing system of piers.

The evidence considered so far indicates with certainty that Folkestone tried on a number of occasions to gain support for a harbour scheme that required expenditure beyond the means of the town itself. It is also clear that in addition to the stade the town possessed what was termed a harbour. That this harbour was a product of human endeavour, i.e. comprised of a structure or structures, is likely as the town appears to have been expending money on it.

Firmer evidence for a pier-like system at Folkestone is to be found in 17th century documentation. The mayor, jurats and commons of Folkestone petitioned the crown in 1629 for permission to build a *"peare and harbour"*; a request that was speedily approved (Cal. S.P. Dom. 1629a). Significantly, a further entry in the same month within the State Papers Domestic indicates that an old pier, presumably derelict in light of the town's petition to build a new one, was already in existence. This entry states that two named individuals *"had with others assisted to take up the timber of the old pier or head"* (Cal. S.P. Dom. 1629b). Amongst Jenkins' transcriptions of the town records there is an entry of 1635 that required every householder to provide free labour for the clearing of *"beach"* from the harbour (Jenkins 1876, lxxxiii). Clearly then, by the early 17th century a system of pier-like structures together with a stade were in use at Folkestone and this was a system that may have originated in the 16th century.

An order from the corporation of 1654 suggests that any pier/s that may have been built with the approval of the crown in 1629 were only partially effective and had now become

the subject of occasional thefts of materials *"the heads now standing and remayning by the seaside were made and erected with an intent to have a harbour for boates and shippes in the same place: and that after the same heads were so made, it fell out that the work could not take the effect, yet notwithstanding, the said heads, by daylie experience, it is found, are very usefull and helpfull to preserve the stade of the said towne: and that of late time divers persons, not well considering the use and benefit of them, have taken away many stones, rockes and other materials from the same, which in time of necessity must inevitablie be the overthrow of the said stade"* (Mackie 1856, 63). As a consequence of the removal of materials, offenders were to be fined 10s. What this entry does show is that the harbour then existing was comprised of at least two piers or heads and that although this arrangement may not have created the harbour ideal originally envisaged they did at least provide protection from the sea for the stade and town. Further, given that we already have information regarding timber it is probable that the *"stones and rockes"* relate to internal ballast of timber shell piers.

A spate of *"rough tydes and great tempests"* in 1699 led to a corporation order for the populace to carry out emergency works, in particular bringing *"rocks and stones from the stade and quarrys in Folkestone aforesaid to the northern peere head of the said decayed harbour and therewith to repaire and amend the said northern peere head"* (AM1/2 1699). Although we cannot be entirely certain to what precise use the stone was to be put it is likely that it was either as internal pier ballast or as rock armour around the head.

An early indication of the multi-jettee system of piers that was to develop at Folkestone is given in 1703 when, due to *"the rage of the sea"*, it was intended, upon expert advice, *"that the fixing of 3 works between high & low water mks to be made with timber and stones"* would provide security for the stade, church and town (AM1/2 1703). It was anticipated that the cost of these three structures would total around £600. Such a costing gives a good clue to the relatively small scale of the structures. The petition of the town for a Bill to be brought into Parliament with the aim of providing assistance in protecting the town from the sea describe just *"Large jettees or Heads, one at the East, and the other at the West end of the town"* i.e. to either side of the stade (J H C 1766, 544). This petition ultimately resulted in an Act of Parliament that provided funding for the defensive jettees and it is from this date until the earlier 19th century that a series of 'Jettee Books', that provide a number of significant structural details, survive. There are two principal types of Jettee Books, Commissioners Minutes (Fo/AUj1/1, 1767-1819) and

Treasurer's Account Books (FUj1/1; FUj1/2). The latter are primarily concerned with fiscal income and expenditure. There also exist various vouchers and bills, mostly relating to minor works.

Under the Act of Parliament a body of commissioners, with funds provided by local duties on coals, were responsible for building and maintaining a system of jettees, the principal purpose of which was to defend the lower town, parish church and stade from coastal erosion.

An insight into the workings of the commissioners is provided by their minutes. The commissioners met regularly, normally in the town guildhall. One of their roles was to carry out surveys of the jettees and give directions respecting their repair, and when occasion demanded, order the construction of new jettees. Periodic maintenance was the general fare of the commissioner's dealings. This entailed the regular purchase of generally small quantities of timber, ordered to specific sizes and types, though there is occasional reference to old timber for re-use. The only named timber species are oak and, occasionally mentioned, elm. There is occasional reference to a storehouse although this appeared to belong to an individual rather than the commissioners themselves. There are several references within the commissioners minutes to contracts with carpenters to supply timber, with this awarding of such contracts being determined by the submission of competitive tenders. The following agreement for a timber supply, of 1786, is typical:

"This day Jn Neve of Tenterden carpenter agreed with the Trustees to deliver at Folkestone the following Posts Cells Braces and Planks undermentioned according to the Dimensions and Scantlings following at the price or sum of two shillings and two pence half penny by the solid and cubical foot viz

40	*posts*	*thirteen foot long*	*11 by 8inches*
12	*do*	*12 feet long*	*10 by 8*
14	*do*	*11*	*10 by 8*
14	*cells*	*15*	*10 by 7*
12	*do*	*13*	*10 by 7*
14	*do*	*11*	*10 by 7*
14	*braces*	*14*	*8 by 7*
16	*do*	*12*	*8 by 7*

44 do 9 7 by 6

20 do 8 7 by 6

The whole to be square free from sap and shake

Also 1900 feet of 3 inch oak Plank each Plank to be 12 feet long

170 of 3 inch oak Plank each Plank to be 18 long

330 of 3 inch oak Plank each plank to be 24 long"

Such timber appears always to have been purchased in the near locality. That it was always possible to do so may relate to the fact that none of the recorded timbers were exceptionally large. Were particularly large timbers have been involved it is possible that sources further afield may have been necessary, as was generally the case with most timber-built piers. In one instance, at least, there is reference to a pair of braces and a pair of posts. A degree of prefabrication may be implied by the reference to the use of a field belonging to the mayor for *"framing"* There are occasional references to ironwork, most commonly bolts which were usually purchased by the hundredweight (Fo/AUj1/1).

The Treasurer's Account Books do not provide a great deal of information of direct relevance to the jettees though the sale of old materials and the payments of small sums to particular individuals is recorded (FUj1/2). At least some of these payments relate to works at the jettees, in one instance being paid to men for *"drawing timber"* – probably withdrawing driven posts/piles (FUj1/1).

The precise technical form of the jettees is open to some speculation, but informed suggestions made in conjunction with the pictorial evidence can be forwarded. All the jettee sources list only four types of timber: posts, cells (occasionally sells) braces and 3 inch plank. The posts are likely to have been vertically set driven piles, probably arranged in opposed pairs. The cells/sells would appear likely to equate with a type of sill/s: "*a strong horizontal timber serving as the foundation of a wall or other structure"* (OED online). However, rather than serving as basal foundations it is perhaps more likely that in this instance they functioned as horizontal timbers secured to the inner sides of the posts. The depiction, Figure 4, also show horizontal timbers to extend along the top of the jettees. The braces are likely to have formed lateral ties whilst the 3 inch (76mm) plank would appear to have been affixed to the inner sides of the posts and have functioned as a facing for the jettees. Whether or not the jettees had a decking is uncertain. There is very

little direct reference to stone infill within the jettee books though such is well described at earlier dates. However, mention of the use of several horses within a number of bills may relate to the carriage of stone to the jettees. That stone does not occur as a cost like timber could conceivably relate to either the use of readily available materials from the foreshore or else to free access to the nearby quarries of the Lord of the Barony and Hundred.

There appears always to have been a minimum of two jettees, one to either side of the stade, and occasionally others beside. The small scale of the jettees themselves is indicated by several items of information. Firstly, their cost is very small compared to the thousands of pounds expended at conventional pier sites. As late as 1799 for example an entirely new jettee was *"computed will cost upward of £500"* (Fo/AUj1/1). Secondly, there is documentary evidence from the earliest years of the 18th century, as well as a plan of 1806 which suggests that the jetteess generally extended as far as the low water mark, rather than into deeper water beyond (AM1/2 1703). Thirdly, the length of the timber posts, which are believed to have formed the vertical members of the jetties, were never more than 13 feet (3.96m) long. Given that a significant proportion of this length was likely to be driven into the ground it is probable that only 9 feet (2.74m), or less, stood above ground level.

This latter factor raises an equally important issue. If we assume that only around 9 feet of jettee projected above the high water level, and given that the mean spring tidal range in this locality is between 6 – 7m, then any parts of the jettees towards the low mean water level must have been submerged at high water. This point is unique in relation to the conventional timber-built pier sites so far considered and must surely highlight that the jettees were related as much, if not more, to a need for anti-erosion measures than to providing a safe haven for vessels within pier walls. In the sense that the jettees provided safety to shipping this was surely by safeguarding the stade.

Cartographic and Pictorial sources

Folkestone appears on a number of historic maps, including at least three of the 16th century and many more of the 18th and 19th centuries. None of those maps that pre-date the later 18th century depict the jettees/piers of Folkestone. There remains nonetheless, incontrovertible documentary evidence to indicate that the system of jettees at Folkestone

existed by at latest the earlier 17th century, and quite possibly before that date. The reason for this absence of depiction on maps is likely to relate overwhelmingly to the smallness of scale, both of the maps and the structures themselves. Even a late 17th century map of the town and its hinterland does not indicate them. The first cartographic depiction of what is almost certainly a jettee is in a plan of 1782 (Figure1). This structure appears to be around 150 feet (46m) long and located to the west of the local stream, the Pent.

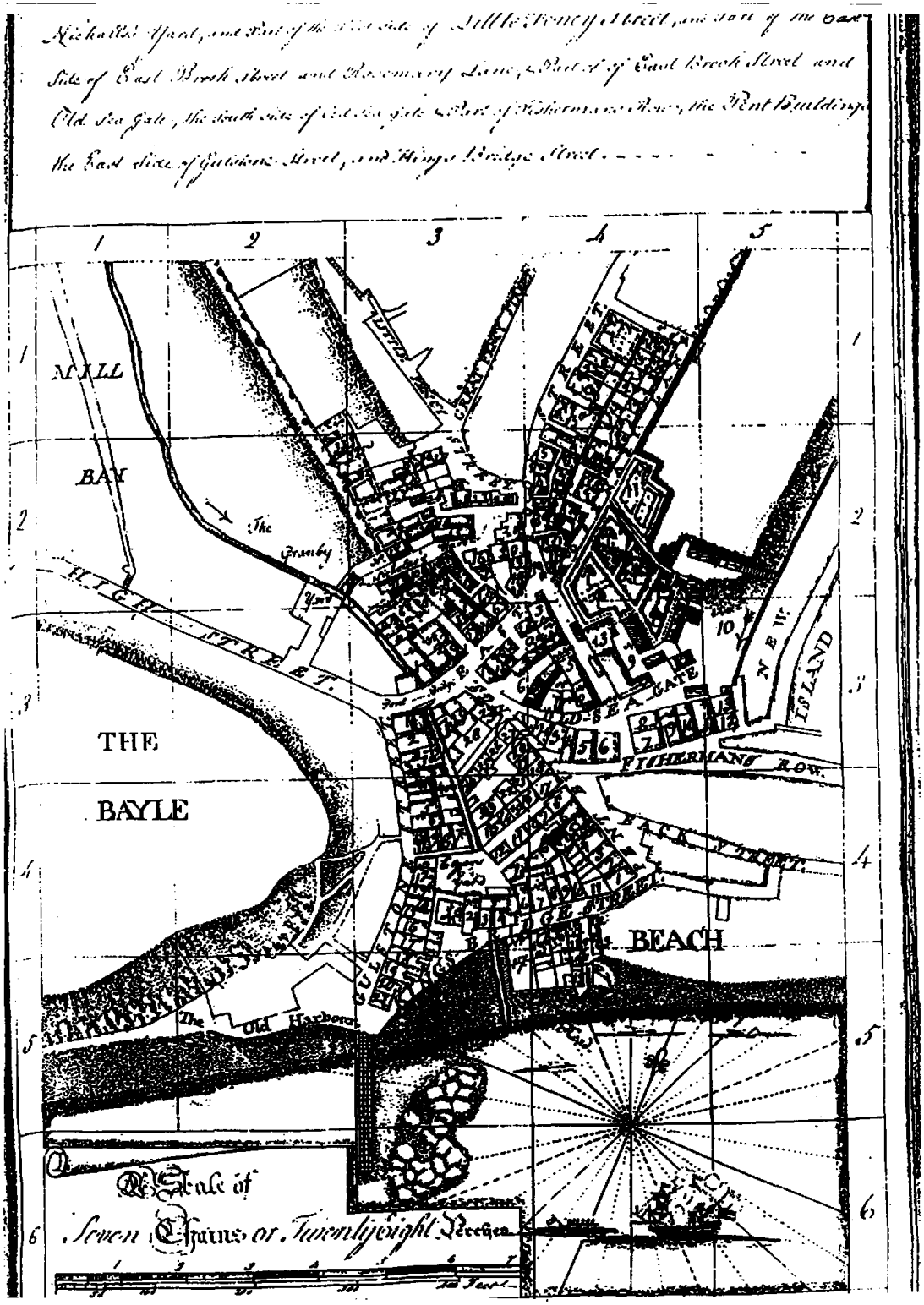

Figure 5. Earl of Radnor Estate Maps (map 7) of Folkestone town by John Powell, 1782.

Figure 1, John Powell's map of 1782. North is to top. Note the jettee, or jettee-like

structure, to the west of the stade area and reef of bedrock. Reproduced from Wilson 2001.

A more detailed picture of the jettee system is shown in a plan dating to around 1806 by the renowned later 18th – earlier 19th century engineer William Jessop, (Figure 2). This plan shows one of the proposals for a large stone harbour at the town and illustrates the then existing arrangements on the foreshore, including three jettees as well as the outflow of the Pent. The jettee to the east of the Pent and that to its immediate west are indicated by what appear to be double rows of posts. The jettee to the extreme west is depicted as a single row. All the jettees appear to be of short length, not even extending quite to the low water mark.

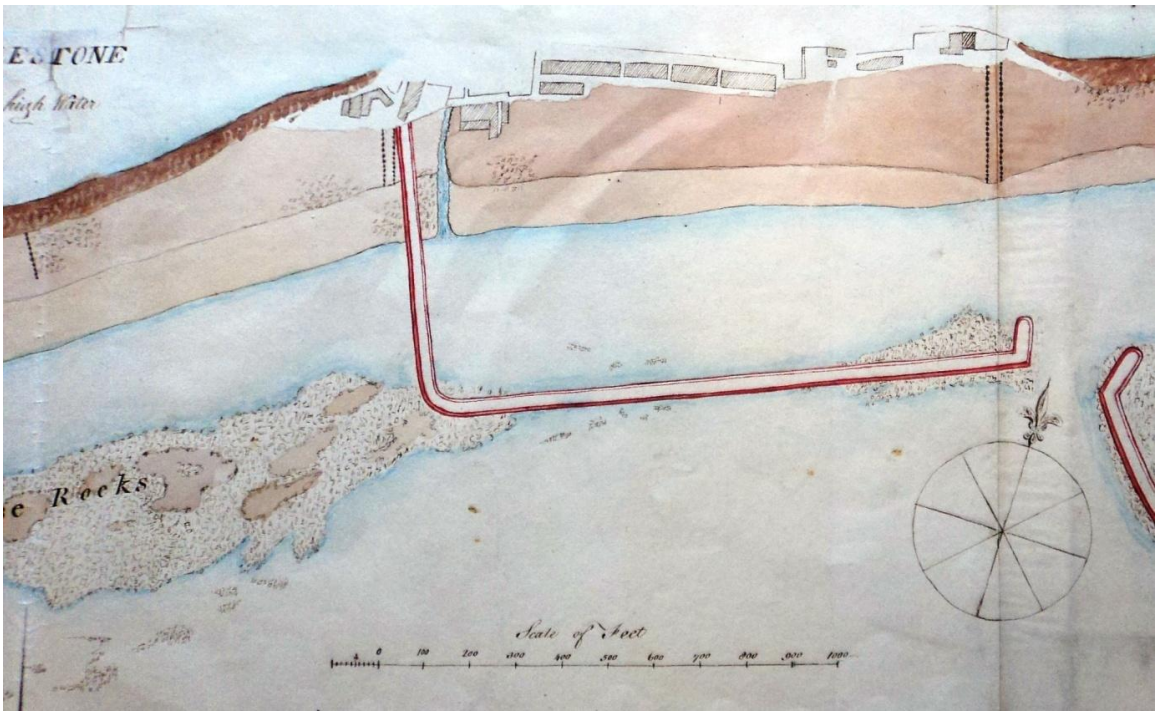

Figure 2, Extract of part of one of William Jessop's plans, c. 1806, for a stone harbour at Folkestone, north is indicated. Three timber 'jettees' can be seen, two comprised of double rows of timber and a third, of a single line of timber to the left (west). The Stade lies between the double row jettees. Note the outlet of the River Pent immediately to the east of the westernmost double row jettee. (Folkestone Public Library)

Only two pictorial sources have been located that depict the Folkestone jettees. One of these, an engraving showing Folkestone from the sea in Hasted's History of Kent, is from such a distance that little can be discerned save for a jettee on the shore to the west side of the stade (Figure 3). This depiction provides little information save to emphasise the small scale of the jettees. An altogether clearer idea of the nature of the Folkestone jettees is provided by a picture reproduced in Bishop's history and said to be taken from a painting of around 1785 (Figure 4). This view shows the stade, foreshore and lower part of the town, with jettees to either side of the stade. Identifiable elements of the jettees include posts with horizontal planking behind, whilst an upper horizontal timber (sell?) is also present. Again, this illustration provides real clues to the small scale of the jettees. A considerable concordance of the physical characteristics of the jettees to that of a shoreline revetment is evident in a view of 1790 (Figure 5). Such similarity of pier structure to that of shoreline revetment was also the case at Margate in the earlier 18th century.

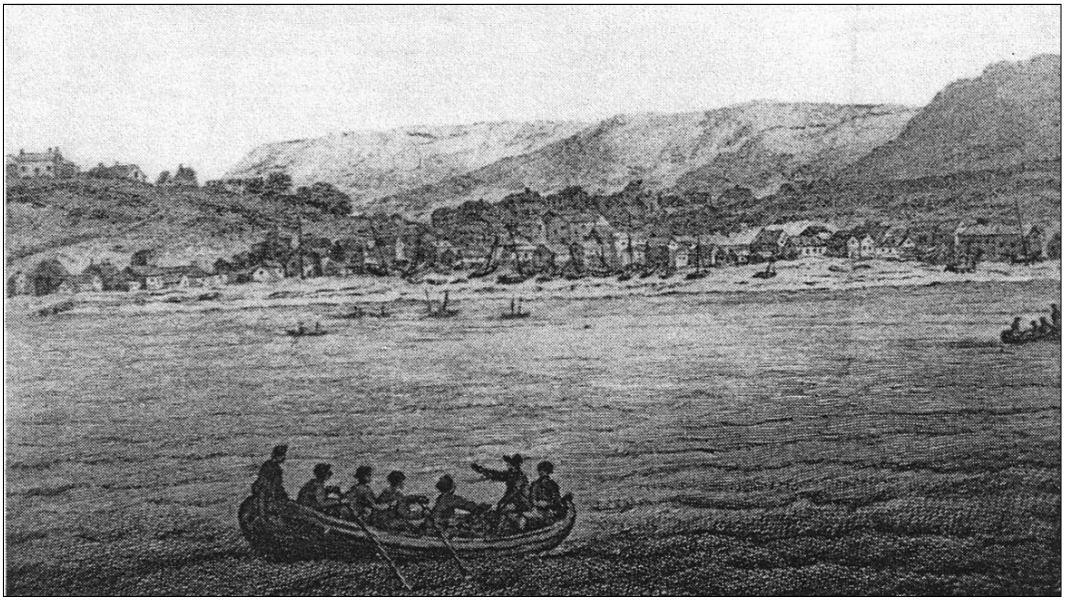

Figure 3, The stade at Folkestone. A jettee can just be discerned to the extreme left (west). Detail of an engraving c. 1790, in Hasteds History of Kent.

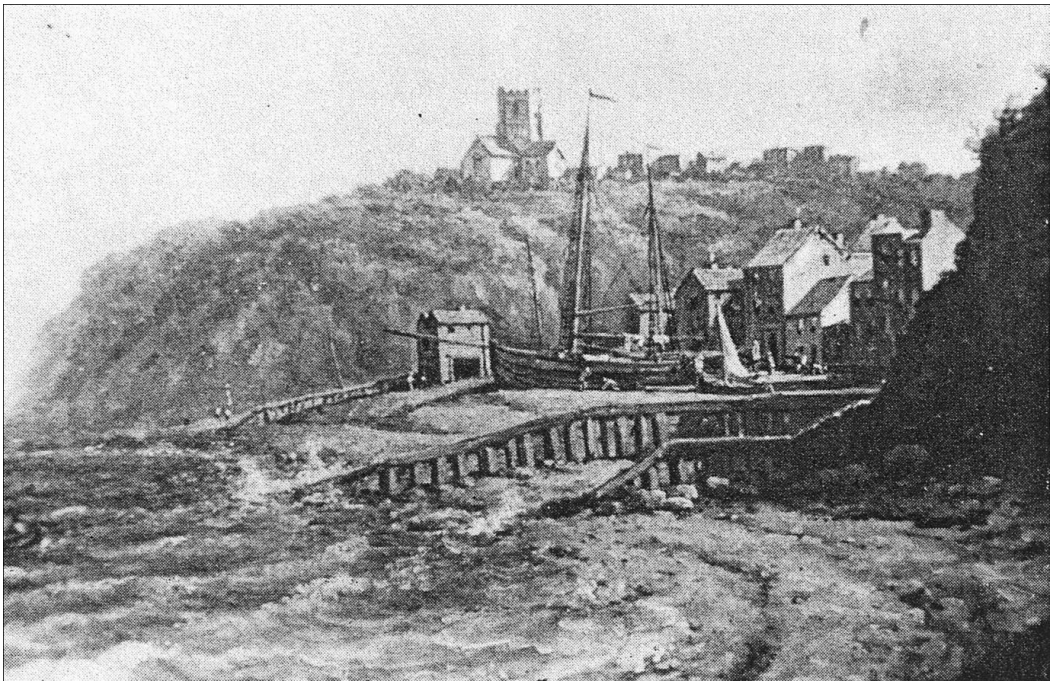

Figure 4, West Cliff and the Stade c. 1785 showing jettees (reproduced from Bishop 1973)

Figure 5, View near the Stade, looking east. Note the timber revetting work that is seemingly comprised of posts with horizontal planking behind. Watercolour of 1790 (British Library: kotp XVI, 55e)

Environmental context

The town of Folkestone lies just over 10km to the south-west of Dover and marginally under 50km to the north-east of Hastings. The town is situated at the head of a small valley close to the foreshore (Figure 6). The valley contains a stream known as the Pent which flows through the town and into the sea. Until the 19th century this stream was largely open though today, most of it is culverted.

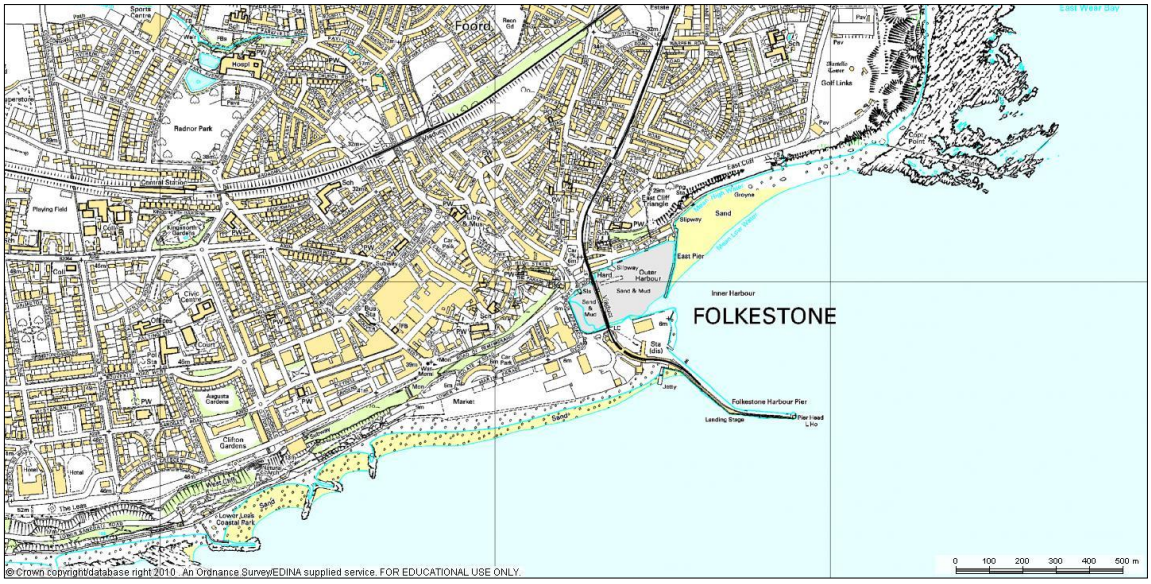

Figure 6, Folkestone and its existing harbour (map source: Edina)

The shoreline along this stretch of eastern end of the south coast is composed of sand and shingle with movement of this sediment by waves and currents in a unilinear, west to east direction. Since the 19th century a substantial area of land to the south and west of the harbour has been reclaimed from the sea.

The evolution of the gravel coastline of East Sussex has been studied by S. Jennings and C. Smyth (Jennings, S. and Smyth, C. (1990). These authors argue that the gravel beaches of this region are not a product of continuous cliff retreat and release of flint but that their source is primarily derived from sediment transferred during the later stages of the last glaciation, via rivers and glaciers onto what was then the exposed sea floor of the channel. Subsequently, it is argued that rising sea levels progressively moved this sediment shoreward. Concurrent with this may have been a re-working of more elevated river terrace deposits as the sea levels rose.

The jettees/piers of Folksetone performed a role in minimising the effects of coastal erosion that is historically well attested. In 1703, due to *"the rage of the sea"*, it was intended, upon expert advice, *"that the fixing of 3 works between high & low water mks to be made with timber and stones"* would provide security for the stade, church and town (AM1/2 1703). Considerable damage to these structures is recorded in 1724 and a programme of repair put in place (Mackie 1856 , 63-73; AM1/3 1725). A Parliamentary Act of 1766 explicitly states that *"the continual flowing of the tide and raging of the sea"* threatened to wash away the parish church, lower part of the town and the beach (stade) upon which the fishermen drew up their boats (Parliamentary Archives HL/PO/PU/1/1766/6G3n47). It is said that the lower part of the town and beach had been preserved from the sea *"by two large jettees or heads one at the east and the other at the west end of the said town"*. At this time these jettees were described as *"ruinous and out of repair"* and it was held that *"should they to go utterly to decay"* then the beach and lower part of the town would be carried away by the sea. Indeed this was not the first time in which coastal erosion, which threatened the church and stade, is recorded as a petition to build a pier by the town in 1629 makes clear (Cal. S.P. Dom. 1629a). On this occasion it was even stated that *"the sea hath fetched in and carried awaie their ancient stade or station where their vessels were used to be layd up in safeity"*. Further reference to the protection afforded the stade and town is provided by the entry in the corporation records of 1654 (Bishop1973, 59).

Along the eastern side of the south coast of England it is the deposition of sediment, rather than isolated areas of erosion, that have presented the harbours of the area with their problems (Ash, 2000, 244). Indeed at Folkestone it was not just erosion, but also an inflow of sediment choking up the harbour that, on occasion at least, presented problems to the town. The calling out of the populace to clear such obstruction, perhaps the result of a breach of one of the jettees, is recorded in an entry in the town records of 1635 (Jenkins 1876, lxxxiii).

"Rough tydes and great tempests" could also cause damage that required the populace to be summoned to make repairs. One such order, issued in 1699 when there were fears for the loss of the stade, commanded that the people convey *"rocks and stones from the stade and quarrys in Folkestone aforesaid to the northern peere head of the said decayed harbour and therewith to repaire and amend the said northern peere head"* (AM1/2 1699).

Excavation work in the lower part of the town has led to some consideration of the slightly shifting course of the Pent stream and the evolution of the area of the land in this part of the lower town (Wilson 2001). It appears that there was a small tidal inlet close to the mouth of the Pent. On the western side this was lined by a north-west – south-east aligned revetment comprised of oak piles with oak planks pegged to these. Most of the piles were of square section and at least two had iron shoes. Some of the timbers bore carpenters marks suggesting an element of prefabrication. Dendrochronological examination indicates that the timbers were felled for use around 1625-1655. It was suggested in the reporting on this work that the timber structure may have formed part of a quayside. The tidal inlet, with stade to its east side, is depicted in a plan of the town of 1698 (Figure 7). It was perhaps a build-up of sediment within this inlet that led to the call-out of the town's population in 1635 to clear out the obstruction (Jenkins 1876, lxxxiii). A plan of 1782 of the same area shows some significant topographic changes to the lower town/foreshore (Figure 1). In particular, a substantial part of the inlet to the east of the Pent had been built on, whilst to the west of the Pent a pier like structure around 150 feet (46m) long, doubtless one of the jettees, can be seen to extend into the sea.

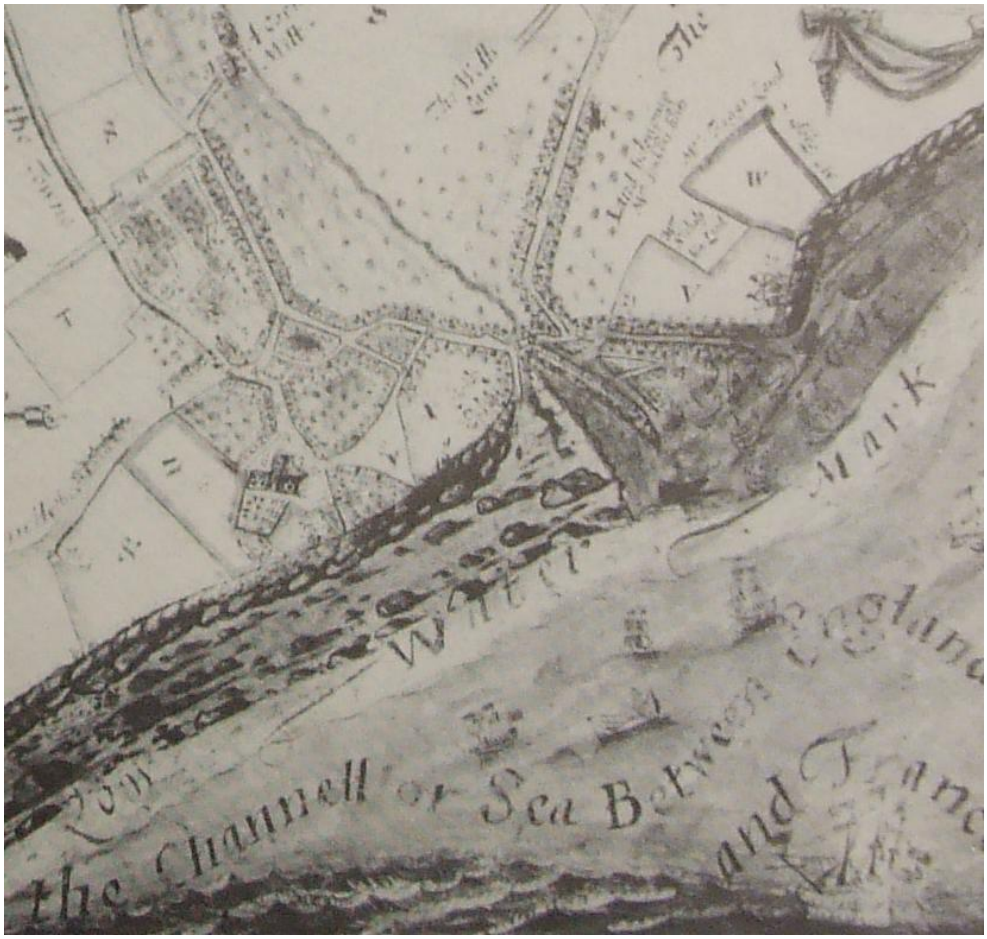

Figure 7, Abraham Walter's plan of the Folkestone and the shoreline of 1698. The triangular shaped tidal inlet with stade to the east side may have been accessible by vessels at this time. The post and plank revetment appears to have been located on the western side of the inlet. North is to top.

The name of the stream 'Pent' is an interesting one. At the 16th century Dover harbour 'The Pent' was the name given to a large body of water within the harbour that was retained by a wall fitted with a sluice (Johnston 1994). The Oxford English Dictionary gives one definition of the word pent as *"A place in which water is pent up; a reservoir or enclosed pool"*, a definition said to be regional, in particular of south-eastern England. Derived from the same source are the widely used terms penstock and pentrough which again relate to the regulated flow and retaining of water by water powered mills. As an adjective the word did, and still does, refer to being shut up within narrow limits or held back under pressure. One may wonder then if the name of Folkestone's stream could have been derived from a use to which it was once put, namely the holding back of a body of

stream water and the regulated release of such water. The damming up of streams out-flowing through harbours is attested at a number of timber-built pier sites, including Bridlington and Dover, the intention being to use it to scour away build-ups of unwanted sediment. In light of the known call-out of the populace to clear obstructions from the harbour in 1635 it may be that such was the case at Folkestone (Jenkins 1876, lxxxiii). It is conceivable that the pile and plank earlier 17th century 'possible quayside' found at the western edge of the Pent may even have formed part of a lining to the edge of an area utilised for retaining a body of water.

Ownership, control and funding

According to local anecdote the Corporation of Folkestone is said to have tried to secure the aid of the crown in the refurbishment of their haven in 1573. Although no documentary evidence for this is known, it is supported by a record in the Assembly Minute Book that near that date the mayor and town clerk visited the Lord Warden of the Cinque ports *"to speak to our Lord Warden about the suit of our haven"* (Jenkins 1876, lxxvii). This, and later, references indicate that harbour initiatives at the town were always related directly to the corporation.

The town's petition to the crown in 1629 for the building of a pier at their own expenses was conditioned with the further request that they be granted *"like rights dutyes benefitts and priviledges as other places of harbour have obteyned and doe enjoy from the roiall bountie of your Majestie or your Majesties predecessors"* (Cal. S.P. Dom. 1629a). Whilst the town was prepared to invest its own resources in its pier it clearly wanted and required an income from that pier in order to maintain it.

Community labour in the maintenance of the harbour is indicated in certain transcriptions of the town records. In 1635 for example an entry states that it was ordered that *"towards cleaning and expulsing of the beach from the haven or harbour, from henceforth upon the call or beat of the drum, or any sufficient warning, all and every householder within the said town and liberty, either by themselves, or by some other fit and able person, shall repair to the said harbour, furnished with shovels or other fitting and meet tools or instruments, for the cleansing, scouring, and expulsing of the said beach out of the said haven, and to bestow their best endeavours, labours and pains to that end, and to abide*

and continue their said labour, as the Mayor or his deputy shall conceive to be fitting and meet" (Jenkins 1876, lxxxiii). Failure to perform this task resulted in a fine of 6d. A further order for community labour at the decayed pier was issued in 1699 (AM1/2 1699). In this latter case we are informed that, by order of civic seniority, members of the community were to act as supervisors of the works.

Further voluntary action by a segment of the community in the maintaining of a harbour at Folkestone, albeit one rooted in self interest is evident in 1703 when three jettees were built. On this occasion the fishermen offered to make a contribution of 6d in the pound of the value of their catch (AM1/2 1703; AM1/3 1723; AM1/3 1725; Bishop 1973, 79). These payments of the fishermen, and other inhabitants of the town, continued until 1766 (J.H.C. 1766, 544). Although the harbour was effectively community property the lord of the barony and hundred held certain rights on the shore and it was often necessary to seek his leave, as well as his consent to use stone taken from his quarries.

An Act of Parliament of 1766 *"for the support and preservation of the parish church of Folkestone and the lower part of the town of Folkestone"* provides some interesting information on the nature of the ownership, control and funding of the jettees in the mid 18th century (Parliamentary Archives HL/PO/PU/1/1766/6G3n47). The Act states that the jettees *"have been from time to time kept in repair by the ffishermen and other inhabitants of the said town by a voluntary subscription"*. By this time the *"jettees or heads are become very ruinous and much out of repair"* and *"the ffishermen of the said town by many unsuccessful ffishing seasons are become very poor and neither they nor the other inhabitants of the said town who are burthened with numerous poor people are able to raise so large a sum of money as will be needful to be expended in erecting a good and substantial jettee or jettees"*. The purpose of this Act of 1766 was to shift the financial liability for the jettees. It did this by providing funding derived from a levy on coal brought into, or through, the town. The monies were to be paid to the Mayor, Jurats and Commonality of the town. The Earl of Radnor, as Lord of the Barony and Hunderd of Folkestone, still had *"rights to harbour duties, customs tolls and profits of ffairs and markets there"* and retained under the Act the right to appoint the collector/s for the levy on the coals. An additional post, that of Treasurer, was required by the Act, with this postholder being appointed by the corporation. The town authorities, or any nine of them, were to meet no less than once a year at the Guildhall. Here they were required to call before them the collector/s and Treasurer/s and examine the accounts, which were also to

be open for inspection by the Earl of Radnor. Further, the Act enabled the corporation to borrow money (at rates of interest not exceeding 4.5 %) upon the credit of the rates or duties. All monies were required to be applied towards defending the church, lower part of the town and beach *"in repairing the old or erecting new jettees or heads at the east and west end of the town and in doing such other works as they shall think necessary"*. Following this Act, a series of 'Jettee Books' detailing minutes and financial matters were kept.

Miscellaneous

Experts and workforce

There are a number of instances in the 17th century in which it is recorded that the corporation issued orders commanding the populace of the town to turn out to perform community labour at the pier (Jenkins 1876, lxxxiii; AM1/2 1699). The penalty for failing to do so was a fine. It is likely that the bulk of the work carried out by the inhabitants was labouring, certainly this was the case in 1635 when shovels were the order of the day in removing *"beach"* that was blocking the harbour. In the call-out of 1699 we are informed that, by order of civic seniority, members of the community were to act as supervisors of the works.

In 1703 it was intended to fix three works of timber and stone between the high and low water marks and that this would provide security for the stade, church and town (AM1/2 1703). This decision was arrived at following the survey of a Mr W. Markwick *"whose judgm-t in such affaires hath been well approved by the Lords of Romney Marsh"*. Markwick was the engineer of Romney Marsh and here we see the bringing in of an expert upon local recommendation. At a later date in the 19th century we can detect a more layman-like involvement in the routine matter of inspection of existing works when we are told that the mayor and two other persons *"made a Survey of the Jettees at the East End of the Town pursuant to the order of the last Meeting and that in their Opinion they think it is highly necessary that a new Jettee should be erected which is computed will cost upward of £500"* (Fo/AUj1/1). The skilled task of superintending such works was undertaken by carpenters (Fo/AUj1/1).

In the later 18th and earlier 19th century the jettee accounts provide us with further information. It is apparent that timber was bought, after tender, from timber merchants and carpenters (Fo/AUj1/1). Further, although most recorded payments for services to individuals do not state their jobs, there are references to certain named carpenters. A number of the bills for works dating to the early years of the 19th century specify the numbers of men, and occasionally boys, at work on the jettees and this is typically specified by as a 'tide' or number of 'tides'. It also appears that there were normally less than half a dozen men at work on any one occasion (Fo/FUj2/2).

Material remains

The potential for material remains of the jettee system to survive at Folkestone is not entirely certain. It may be that basal parts of piles (posts) may survive buried at depth, including under the reclaimed land to the west of the existing harbour.

Related fortifications

A castle at Folkestone is mentioned in a charter of 1137 though no physical evidence for this have been found (ADS 465828). An artillery fort known as Sandgate Castle was built in 1539-40 to the west side of the town (ADS 465722). This formed part of a chain of coastal defences constructed as a response to the threat of invasion from overseas. Owing to Folkestone's proximity to the French coast this fort was maintained and periodically remodelled until the later 19th century. A series of three Martello Towers were built on what are now the eastern outskirts of Folkestone in the early years of the 19th century during the Napoleonic Wars (ADS 465768). The Henrician and later fortifications relate to the then requirement for protection of vital and vulnerable places. There are occasional references in the municipal records of ordnance for the defence of the town from the 16th century onwards (Jenkins 1876, lxxxiii; Bishop 1973, 49). At least some of the ordnance was to be mounted on the cliffs adjacent to the town rather than at Sandgate. Related to such matters is the 'watch' kept at the harbour and coast, the keeping of this normally being the responsibility of the corporation. It is also known that around the same time as Sandgate was built a series of trenches and butts were built in and around the town (Bishop 1973, 46).

Concluding remarks

On most, if not all, counts, that the stone filled timber jettees of Folkestone, fall broadly within the definition of 'timber-built seacoast piers' adopted within this study. In comparison to the overwhelming bulk of such piers elsewhere within the study area the Folkestone jettees were very small and relatively cheap to build. Whereas in the 18th century timber piers elsewhere normally cost thousands of pounds to build the Folkestone jettees were built for mere hundreds of pounds. The harbour functions of the piers themselves may also have differed. For Folkestone the piers were primarily to prevent erosion, particularly to the Stade which formed the core area of the town's maritime activity. A stade, such as that at Folkestone (see Hastings for another case-study example) was the normal accompaniment for a maritime seacoast town of some significance that lacked a pier or system of piers. Normally though, seacoast ports possessed either a Stade or pier/s alone, not the two in tandem. In this sense Folkestone appears as a rarity. Studies elsewhere have demonstrated that within northern Europe hard-standings or stades are present in the archaeological record before the widespread appearance of formal port facilities in the medieval period. However, there is no secure evidence to suggest that the arrangement of a stade with small projecting piers (perhaps even partially submerged at high tide) forms a typological 'missing link' between stade/hard standing and pier arrangements. Rather, it is suggested here that this arrangement at Folkestone is a response to a number of economic, administrative and environmental factors.

Folkestone did of course want a proper pier harbour, witness its repeated attempts to gain such. In this respect this 'middling sized town' was always hampered by its close proximity to Dover whose primacy as a port ensured that it, and not nearby towns, was the magnet for state funding. The town itself, alone, lacked the necessary resources to fund such whilst an edge of ownership/control uncertainty was ever present owing to the foreshore rights claimed by the Lord of the Barony and Hundred. On the surface at least, circumstances appear to have historically doomed Folkestone to possess no more than a stade. That the town possessed jettees appears to be linked to the vulnerability of its stade, and indeed the lower part of the town, to coastal erosion. Without these small jettees or piers there would have been no stade nor lower town.

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Case study 19: Rye

Summary of previous work

There are a number of general histories of Rye, most of which refer to some extent to the town's port, and of which Geoffrey Bagley's 'The Ancient Town of Rye' is a good exemplar (Bagley 1966). A thoroughly researched work on Rye is that section dealing with the town in volume 9 of the Victoria County History of Sussex (VCH 1937). More specialised works dealing with particular themes and time periods include a study of the local fishing industry, Tudor Rye and Rye in the 17th century and the 16th – 17th century maritime economy (Dulley 1969; Mayhew 1987; Hipkin 1995; Hipkin 1998/9). A considerable amount of historical documentation relating to the Corporation of Rye during the 16th and 17th centuries and extending to some 247 pages has been published by the Historical Manuscripts Commission (HMC 1892, 1-247). There has been relatively little archaeological fieldwork carried out at the town until recently and much of this has been of very modest scale. Summaries of this fieldwork have been documented in a Historic Character Assessment of Rye, which also considered the many historic buildings which still exist in the town, together with the town's wider topographic setting (Harris 2009).

Of more direct pertinence to the later post-medieval piers at Rye is John Smeaton's contemporary report on works at the port and a variety of other, sometimes near contemporary, sources (Smeaton 1763; Meryon 1841). There are also useful summaries of the engineers who contributed to these works by the historian of civil engineering, Alec Skempton (Skempton 2002).

Town background

The history of Rye has recently been subject to lengthy consideration in a publication of 2009 and the bulk of this section has been drawn from that source (Harris 2009). Where other sources have been utilised they are referred to. There is only limited archaeological evidence pointing towards occupation at Rye in the prehistoric, Romano-British and early

– mid Anglo-Saxon periods. It seems probable that Rye developed in the 11th century and is likely to equate to the new borough of 'Rameslie' mentioned in the Domesday Survey of 1086 (Beresford and Finberg 1973). The town was unambiguously a borough in the 12th century and during the anarchy of Stephen's reign housed a mint. During Henry II's reign Rye became a one of the Cinque Ports as a limb of Hastings (Vidler 1934, 248, VCH 1937, 34-9). As a borough within the Cinque Ports Rye had its own mayor and a body of jurat's, or councillors.

The town prospered as a base for fishermen, as a centre for markets and a fair, as a port engaging in regional and continental trade and from 1264 sent representatives to Parliament. The town's maritime significance is highlighted by the fact that in the 13th century Rye was a royal dockyard and shipyard, building and housing royal galleys. The town's proximity to the continent had its drawbacks and it suffered from a number of French incursions in the 14th century. This combined with environmental changes led to a period of economic decline though its fortunes did somewhat recover in the later 15th and 16th centuries. Deteriorating conditions of the harbour, the loss of English possessions in France and the shift of patterns of trade – largely due to the growing dominance of London as a port, led the town into a prolonged decline from which it would never recover as a prominent port.

The Corporation Records are informative of everyday in Rye. Large parts of the 16th and 17th century records relate to processes of everyday town governance – including matters as diverse as the driving out of witches from the town and relations with the authorities of continental ports, but there are also significant amounts referring to the harbour and trade. It is clear that a considerable number of people from the Low Countries and France were often present in the town, sometimes staying months and some seemingly permanent residents. Most were protestant refugees described as members of the French Church (HMC 1892). During the post-medieval period Rye continued to serve as a minor port and base for fishermen.

There is no secure archaeological or documentary evidence that suggests that the medieval or earlier post-medieval port possessed seacoast piers, indeed for much of that time the town's port was located at the head of estuary systems with the inland wharfs being located adjacent to the town's periphery. Efforts to improve Rye's port were made

in the 18th century and it is within that century that the only evidence for timber-built seacoast piers emerges. This is considered in the section on Technology below.

In economic terms the mercantile town of Rye rose and fell according to the health of its maritime trade, this to a considerable extent being dependent upon the good order, or otherwise, of its harbour and the channels leading from this to the sea. The problems in maintaining this harbour were founded in regional environmental problems, a struggle with sedimentation. There was however an added twist, namely that of the interests of the landowning classes. It was the large scale intaking of marshland and the erection of earth walls preventing the ingress of tidal waters onto this reclaimed land that led, through the reduction of scouring water, to the narrowing and silting of the watercourses to the sea. It was these watercourses which formed Rye's harbour. In the protracted struggle between the landowning and mercantile interests it was to be the landowners who would prevail.

Environmental and topographical aspects

Rye sits atop a low hill which rises above lower lying ground to all sides and has a maximum elevation of around 22.5m OD. This location is at the junction of the High Weald to the north and the Walland and Romney Marshes to the south, east and north-east. The town is also located at the junction of three rivers. The River Brede which approaches from the south, the River Tillingham approaching from the west and the River Rother which approaches from the north. The latter of these flows in a south-easterly direction to reach the sea at Rye Bay some 3.5km away. The town and its suburbs lie on a succession of sedimentary rocks, principally sandstones siltstones and mudstones whilst much of the surrounding land is reclaimed marshland comprised of tidal flat deposits of clay, silt and sand (BGS).

The coastline adjacent to Rye, and elsewhere along the eastern part of the southern England's coast, is composed of shingle (gravel) and movement of the shingle by waves and currents is predominantly unilinear, in a west to east direction (Jennings and Smyth 1990). The tidal range in this area is ubiquitously large and at Rye can exceed 8m. This stretch of coastline has historically been a very difficult place in which to build a workable harbour, the tendency always being for them to choke up with sediment as the nearby ports of Winchelsea, Camber and Dover, in addition to Rye, readily attest.

Figure 1, Location of Rye and its proximity to the continent (source: Google Earth)

The coastline to the south and east of Rye has been subject to very considerable geomorphological transformations over the last two millennia. There have been a number of studies examining the development of this part of the southern coastline, the most recent and detailed of which is Yates and Triplet's 'Changes in Rye Bay' (Yates and Triplet 2000). Around 300-400 AD the line of Rye Bay was somewhat to the seaward of its present position and was comprised of a shingle barrier that may, or not, have survived to the 11th century. Breaches of the barrier resulted in the creation of a broad estuary that was enlarged by a succession of 13th century storms. Subsequent to these events there has been a process of sediment accumulation and a long history of land reclamation within the marshes that has resulted in the coastline extending in a southerly direction and the tidal inlets to the sea becoming little more than narrow channels. Although Rye has a continuous history of maritime activity from the 11th century to the present day these coastal changes have impacted directly on the town's fortunes, the picture predominantly being one of relative decline from the 14th century. The geomorphological development of the coastline can be illustrated in the historic maps, Figures 2 - 7 below.

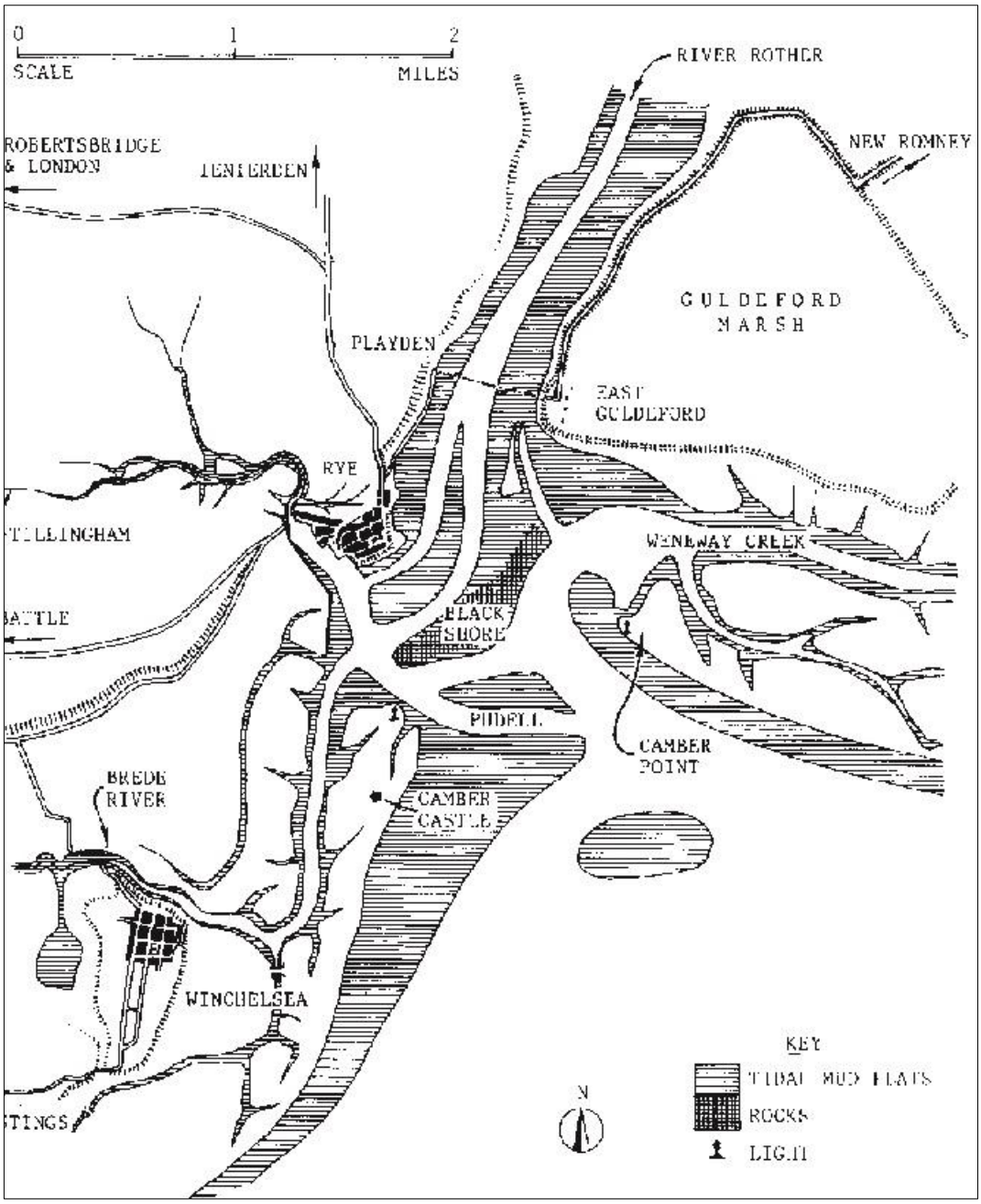

Figure 2, Map based on those by Prowze 1572 and Symondson 1594. Tidal flats are shown shaded. From: (Yates and Triplet, 2000)

Figure 3, Dugdale's map of 1662. Rye is to the centre lower left. From: (Yates and Triplet, 2000)

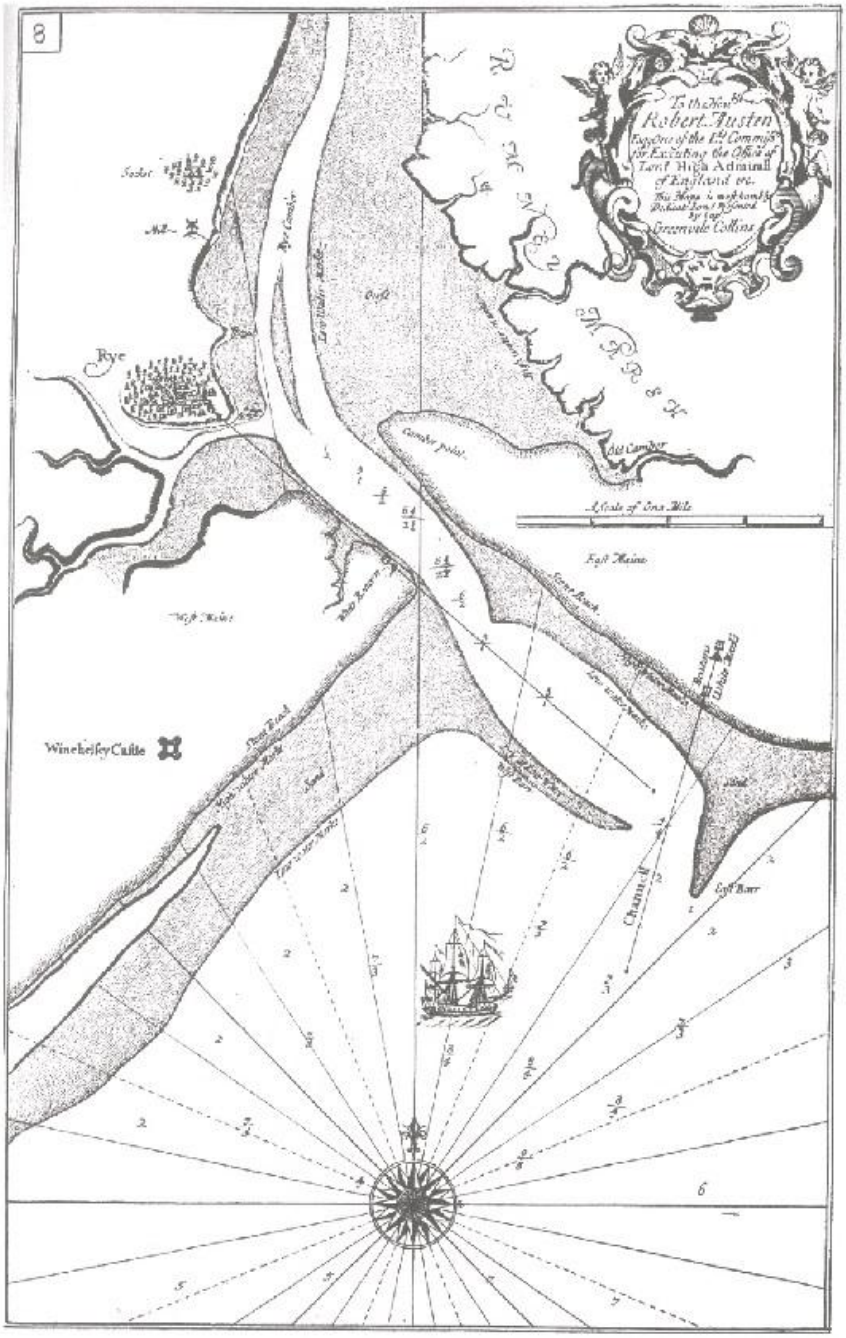

Figure 4, Greenville Collins chart of 1682. From: (Yates and Triplet, 2000)

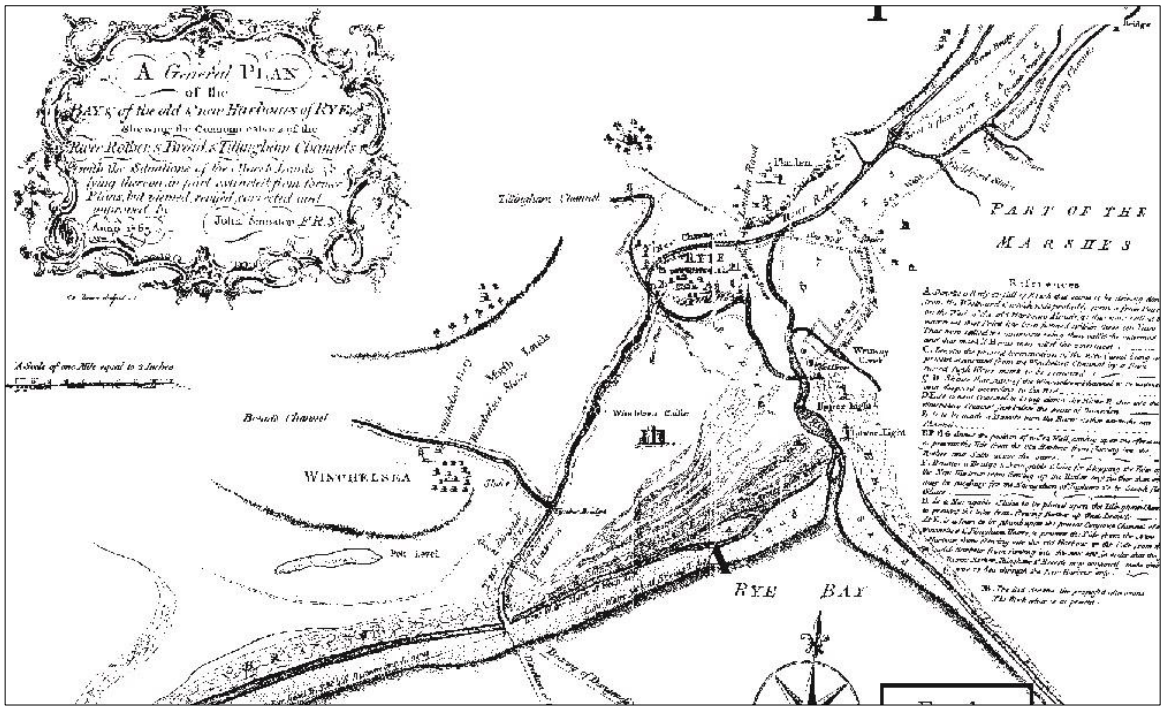

Figure 5, John Smeaton's map of 1763. The new harbour is at the mouth of the channel extending south-west from Rye. From: (Yates and Triplet, 2000)

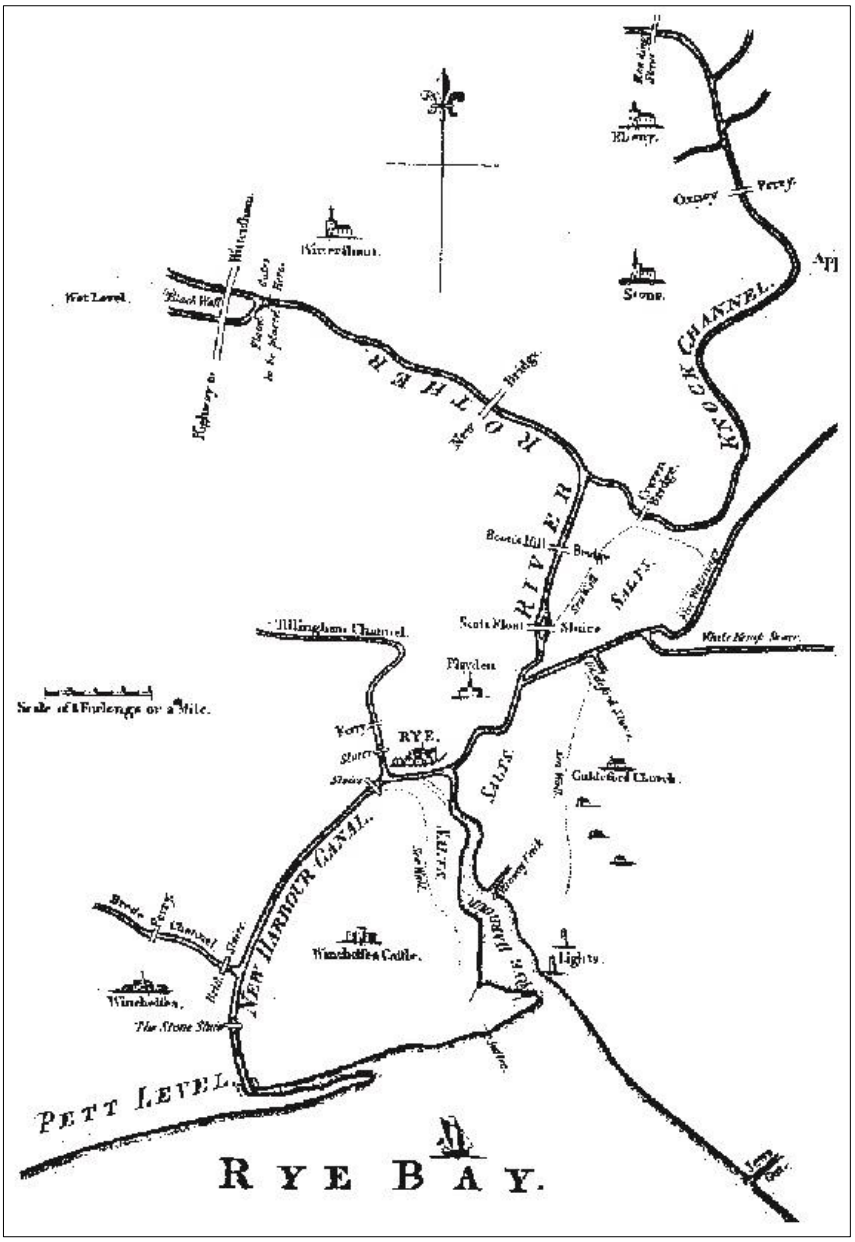

Figure 6, Jackson's map of 1797. Note how a spit of shingle has already developed across the site of the new harbour mouth and piers (to lower left). From: (Yates and Triplet, 2000)

Figure 7, Aerial photograph showing Rye and its present proximity to the coastline. Areas of post-medieval sediment accretion to seaward of the town are readily apparent. The present harbour is situated along the banks of the River Rother. The location of the 18th century pier was at the extreme lower left. (source Google Earth)

Outline of historical port development at Rye

Technology

Documentary evidence

The port of Rye has always been estuarine with its wharf infrastructure being located on waterways adjacent to the town and the main quay lying on its western side (VCH 1937, 39). There is a solitary reference to a pier in 1670 but this seems likely to relate to a riverine structure rather than a seacoast pier (Cal. S. P. Dom. 1637). Were this to have been a seacoast pier the inevitability of heavy construction and maintenance costs in what at the time was a small and not an especially prosperous town would almost certainly have generated greater documentation in the form of appeals for assistance. We might also have anticipated that any such seacoast pier would have been referred to in a description of Rye harbour later in the century (Anon 1677). Historically, timber appears

commonly to have been utilised in Rye's harbours, though this was for lining and revetting channels and for the construction of wharfs.

One of the problems facing the tidal waterways around Rye was a lack of scour on the ebb tide, this largely being due to land reclamation. Reclamation of land by enclosing with sea-banks, much unauthorised, was being be-moaned as early as the 17th century and the impact of this, together with regulation of water levels by sluices, was recognised (Anon 1677). The principal effect of reclamation was to reduce the volume of water entering the waterways at high tide and thus also the egress, the outward flow of which had a scouring effect. In essence, less water equated with less scour, which in turn resulted in sedimentation of the waterways.

A proposal was made in 1593 to cut a new channel from Rye in a south-south-westerly direction to the sea just to the east of Wichelsea. This scheme was dismissed by the town as it was considered that it would benefit Winchelsea rather than Rye (Bendall 1995). A similar scheme was proposed following an admiralty survey in 1698, but again came to naught. Such a scheme was finally adopted in the early 18th century (Collard 1985). An Act of Parliament of 1724, which vested authority over the port in a body of Harbour Commissioners and raised sums of money through passing tolls, enabled a new harbour to be constructed along the broad lines of the earlier suggestions. The route of this harbour from Rye to the sea was via a channel running south-south-west, Figure 8. Parts of the channel were entirely new cuts, other parts canalisation of existing waterway, whilst regulation of water flows and heights was via a system of sluices. Of crucial importance was the plan to merge the Rivers Brede, Rother and Tillingham into one channel.

Figure 8, Aerial photograph showing the area of the mouth of the new 18th century harbour. The line of the cut can be seen to the left of the area of pasture.

The mouth of the new harbour was to be formed of two pier heads some 120 feet apart. Construction of the piers commenced in 1728 and they were built of Portland Stone on a timber grillage foundation to a design by the engineer John Perry (Skempton 2002, 522). The entire project proved to be a protracted and very costly operation and the uncompleted works ceased in 1748 when the supply of funds was exhausted (ASE 2008). Much of the work on the ground was supervised by an associate of Perry's, Edward Rubie. Shortly after construction of the piers the eastwards drift of shingle accumulated against the western pier and in order to prevent a blockage it was ordered to heighten this structure by 8 feet with timber and to extend it for 210 feet with timber and also to build groynes adjacent to it (Meryon 1841; Smeaton 1763). Detailed contemporary descriptions of the timber extensions to the pier have not been located though material remains indicate that they were of a timber shell and probably in-filled with shingle. More than anything the 18th century piers and their timber extensions at Rye were an attempt to slow down and minimize the effects of sediment drift. They would not prove very successful in addressing this very specific environmental problem.

The engineer John Smeaton was brought in to try to resolve the difficulties at Rye (Smeaton 1763). Smeaton recognised that the principal historical problems of the harbour were twofold. Firstly, the silting of the inland waterways as a result of the enclosure of former marshland, and secondly, the building up of a shoal of shingle from the westward

across the outflow of the harbour. The former problem was a result of human intervention, the latter a natural process. To some degree the second problem was exacerbated by the first as it was recognised that a plentiful outflow of scouring water would reduce the impact of the shingle. One outcome of this unsatisfactory state of affairs was a narrowing of the channel to the sea. A number of Smeaton's recommendations were carried out and after a series of further delays, modifications and pier extensions to combat encroaching shingle, some of which were built in timber, the harbour finally opened in 1787. This after 63 years of building and at a cost of around £200,000. In the same year parts of the shingle barrier close to the harbour mouth were breached and the Commissioners of Levels petitioned for closure of the new harbour and this was agreed by the Harbour Commissioners. That closure was so easily achieved after a mere four months of operation appears owed to the landed interests being represented exclusively in the former body and being in the majority on the latter! The historical map Figures 6 and 9 shows clearly the problems of sediment drift. It also shows that by this date the shingle had completely rounded the piers for some distance and that by this date the piers did not provide a sheltered haven or harbour, they merely provided access up river.

Rye's harbour of today is situated in a location more northerly than that of the 18th century harbour. This location, along the banks of the River Rother, broadly equates to its earlier position.

Cartographic and pictorial evidence

Only one map Figure 9, dating to 1779, has been found that depicts piers at Rye. However, the scale of this is such that it provides no meaningful detail and it is not even possible to distinguish which are the stone elements and which are those of timber extensions.

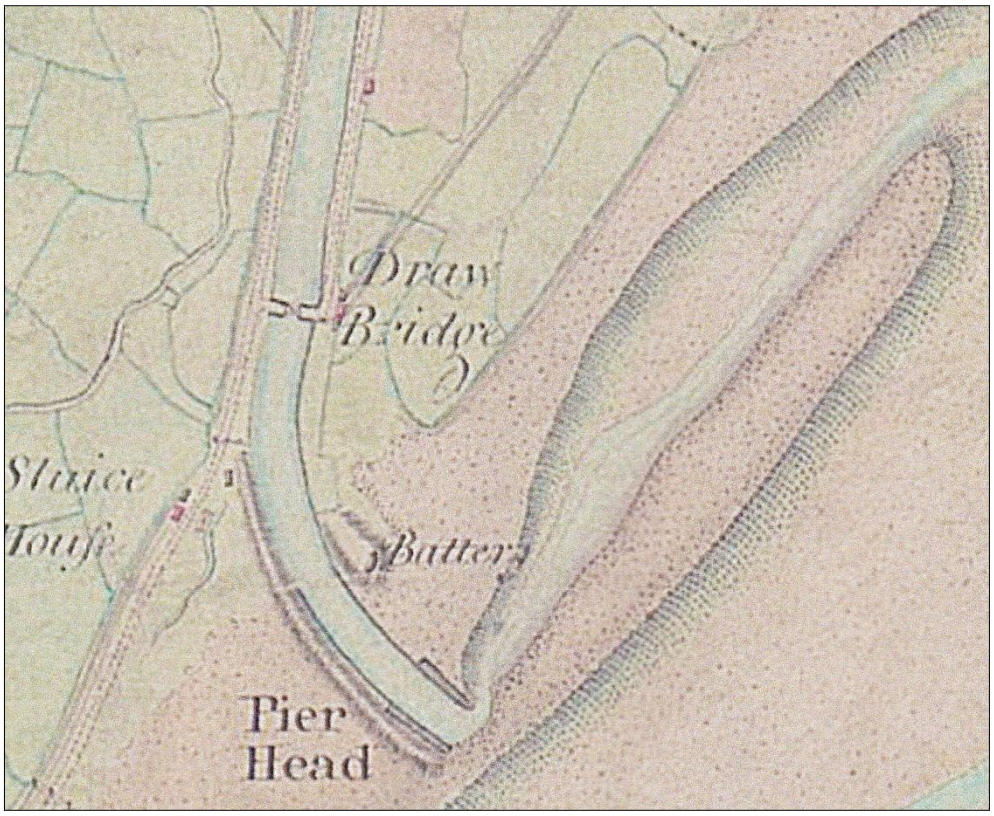

Figure 9, Extract of map of part of Sussex coast of 1799 showing the piers. Note the accretion of sediment spit to north-east. North is to top. (British Library: OSD 104 (PT1)

6

Miscellaneous

Associated defensive works

The medieval town of Rye was walled and incorporated substantial gateways and large towers within its circuit. Additionally there were a number of castles in the locality including the nearby Camber Castle that lies between Rye and Winchelsea. The heavily fortified character of the area was owed principally to proximity to the continent and perceived threats therefrom. However, piers were only present at Rye harbour from the 18th century, although a number of defensive works were contemporary with these. Threats from Napoleon dominated Europe resulted in the construction of a variety of military works. One of the most impressive of these was the Royal Military Canal, a 19 mile long navigable dyke that skirts past Rye and effectively turned Romney Marsh into an island, Begun in 1804 the primary intention of the canal was to form a defensive line

in case of invasion, though it did also come to be used for the movement of goods (RMC). Around the same time a string of Martello Towers was built along the coast, the nearest to the piers being just a short distance south-west of the harbour mouth. Both the canal and towers were not completed until 1809-10, by which time the threat had largely receded. It is said that at the height of the Napoleonic threat only a number of ad hoc forts and minor gun batteries were in place (Kimber, undated). This seems certain to have included the 'Battery' shown on the 1799 map of this part of Sussex (Figure 9).

Material remains and their interpretation

Remains of both stone and timber piers of the failed 18th century harbour are present adjacent to the existing shoreline (Figures 10, 11, 12). These surviving remains are of well constructed Portland Stone and extensions of timber. Of the latter both east and west piers are comprised of regularly spaced vertically driven piles of square section, mostly spaced less than 1m apart and for the most part arranged in three parallel rows. Whilst no detailed contemporary documents or depictions of the timber piers are known, they were clearly of earth-fast frame type and suggestions regarding certain specifics of their form can be made on the basis of surviving material remains. Given the relatively close spacing of the vertical piles, in all probability the remainder of the walls were comprised of either horizontal, or vertical, planking affixed to the piles by longitudinal wales. The inner rows of piles suggest the likely presence of both cross-waling and cross-braces for the purposes of lateral stability. The presence of an unlimited supply of shingle raises the likelihood that this was utilised as an internal ballast within the piers.

*Figure 10, View of the mouth of the 18th century harbour between two pier extensions of timber, looking south-east (later groynes also present) *Photograph from ASE 2008.*

*Figure 11, View of the mouth of the 18th century harbour between two pier extensions of timber, looking south. Note stone pier head in foreground. (later groynes also present) *Photograph from ASE 2008.*

*Figure 12, View of the head of the north-east pier of the 18th century harbour, looking South-east *Photograph from Rye Museum website.*

Specialists and workers

John Perry carried out much of the design work on the new 18th century harbour whilst Edward Rubie was responsible for elements of the works on site. Both were 18th century engineers who enjoyed some limited renown within their fields of work (Skempton 2002, vol. 1). By far the greatest engineer to be involved was John Smeaton, though his was largely an advisory capacity (Smeaton 1763). We know little of the workforces involved but this must have included masons on the stone piers and carpenters and labourers on those of timber.

Ownership/control/funding

The medieval and earlier post-medieval Port of Rye was under the control of the Town authorities. No seacoast piers are attested at this time.

An Act of Parliament of 1724 entitled *"An Act for completing the repairs of the Harbour of Dover in the County of Kent, and for Restoring the Harbour of Rye, in the County of Sussex, to its ancient goodness"*, saw the transference of powers over the port of Rye from the town authorities to a body of Harbour Commissioners (Stautes 1765, 131-2). The Act supplied some income for harbour works by way of a passing toll on ships. The commissioners appointed by the Act were, the Mayor of Rye and five persons who were five jurats of the corporation of Rye. There were also twelve proprietors and owners of lands lying in the upper levels, in the county of Sussex, and twelve owners and proprietors of lands in the Walland Marsh. The combination of town mercantile and landed interests within the body of commissioners was owed to both parties having an interest in the port. The town's interest related to the port being fundamental to trade and to the fishermen. The interest of the landed party, which was always predominant, was in maintaining the lands and sea-banks they had won from the marshes and in the need for ongoing drainage. As we have seen, these interests were conflicting and extremely difficult to reconcile. The construction of the 18th century harbour, which was characterised by slowness and procrastination, was carried out under their auspicies. This new harbour was closed almost as soon as it was built; a victim of the landed interests within the Commissioners of Levels who petitioned for its closure. That this could be accomplished so easily was owed to the dominant body within both Commissioners of Levels and Harbour Commissioners being that with an interest in land.

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Case study 20: Hastings

Summary of previous work

Significant information regarding the material remains of Hastings pier was described anonymously 'By An Inhabitant' in a historical guide to the town published in 1797 (Anonymous 1797, 57). Passing reference to the pier is made in W. G. Moss's work of 1824 which also provides us with the first known depiction of the material remains (Moss 1824, 126-7). Lewis's Topographical Dictionary of England of 1848 again makes passing comment, without reference to sources, to the pier and provides a brief description of surviving material remains (Lewis 1848, 435-451). On the documentary side, the Historical Manuscripts Commission summarised the scope and contents of the manuscripts of the corporation of Hastings, which were then in the custody of the town (HMC 1892, 354-364). Their report included a number of extracts from the town records concerning the pier. Drawing on previously published sources along with reference to a single state paper, volume 9 of the Victoria County History of Sussex of 1937 succinctly summarised the then known history of the Hastings historic pier (VCH 1937, 12). Various elements of the history of Hastings have been written upon in a number of volumes of the journal Sussex Archaeological Collections. The most relevant of these is Cooper and Ross's article of 1862 which recounted a number of the corporation records concerned with the pier and reproduced a woodcut of pier remains as they were purported to exist in 1832 (Cooper and Ross 1862). The foremost historian of Hastings, and one time curator of the town's museum J Manwaring Baines, wrote extensively on all aspects of the town, including the pier, in a number of publications. Manwaring Baines drew extensively on the historic records of the town, upon a number of state papers and was familiar with the pictorial evidence reproduced in these notes. His principal works are the pamphlet 'Hastings and its harbours' of 1946 (which despite its promising title was largely concerned with later harbour schemes which never materialised) and Historic Hastings of 1963 (2nd edition) which provides an in-depth study of many aspects of the town, including the pier (Manwaring Baines 1946, Manwaring Baines 1963).

The sources

The works detailed above have formed the first point of enquiry of this study and provided a useful overview. The majority of the sources used by these earlier works, although often poorly referenced, have largely been re-examined and new information has also been located. Most of the documentary evidence is drawn from the first two volumes of the 'Corporation Record Books' of Hastings now housed in the East Sussex Record Office (ESRO C/A (a) 1 and 2). The first volume covers the period 1595-1620, the second 1620-1735. Concerned mostly with the arrangements and decrees of the Assembly of the town, these contain some significant pieces of information of relevance to the research beyond the case study of Hastings. The records of the town prior to 1595 are missing, and have been so since at least the 19th century (HMC 1892, 354). Consequently, there is scant documentary evidence for the pier before this date and what there is is drawn almost exclusively from state papers: State Papers Domestic, Elizabeth, Acts of the Privy Council and the Cecil Papers. Within these earlier state papers all the information relates to a time after the mid 16th century. This itself is a point of some interest and may suggest (but no more than that) that there was no pier at the town prior to the 16th century. The earliest reference to the pier is a single entry within a town clerks notebook of the mid 16th century (Manwaring Baines 1963,106-7). It has not proved possible to locate this document thus far and it is possibly even lost. The town records of Hastings were formerly held by the town until the later 20th century when nearly all the records were transferred to the East Sussex record Office. Catalogue data for these records indicates that some documents were 'lost on transfer'. Whether or not the clerks book formed part of such loss is not known. All other documentary sources in this case study are published and appear in the bibliography. All information on the material remains, which are now sealed by part of the Parade and beyond that by several metres of shingle, has been drawn from earlier publications and pictorial/photographic evidence; this includes the place-name 'pier rocks'.

Background: town, membership and governance

Hastings was one of the original and major members of the Cinque Ports, a confederation of maritime towns on the south-east coast of England that was first positively recorded

around 1155 though may have originated in the later pre-conquest period. For some centuries the Ports were required to supply ships and crews for 14 days service each year when notified by the king, with service beyond this being paid for. As such, the Ports formed the core of medieval England's naval forces. In return for this service the Ports were exempted from most taxes and trading dues, a valuable privilege resented by many other towns, and permitted to carry canopies over the king and queen at coronation processions and afterwards, at banquet, to sit at the right hand of the king. Although not en-nobled the freemen of the Ports were called 'Barons' and had the right of pleading and being tried only within their own courts. Although often a largely figurehead role, the confederation of Ports was headed by a Lord Warden. Another of their privileges was a regulating role in the Great Yarmouth herring fair, to which they sent bailiffs each year, and which formed one of the causes of the periodic outbreaks of violence that occurred between the men of the Ports and those of Great Yarmouth. The importance of the Ports declined significantly in the later medieval and post-medieval periods.

The important member towns of the Cinque Ports, including Hastings, were chartered and shared many similarities of internal governance. Government of Hastings was carried out by a bailiff, later a mayor, assisted by 12 jurats (the nearest recent modern equivalent would be an alderman). The jurats were drawn from the ranks of freemen and only a jurat could become the town's chief officer. The numbers of freemen were restricted and only they had the right to attend and vote at meetings of the Town Assembly and Hundred Court. Freedom of one of the Ports also bestowed freedom of the others.

The principal documentary source of information on Hastings pier comes from the corporation record books that detail the decrees of the Assembly. The term 'bretheren' was commonly applied to the elite who were entitled to be members of the assembly. The freedom of action which forms a recurring pattern in the history of the Ports, be that engaging in de-facto war with Great Yarmouth, certain cities of the continent and even on one occasion allying themselves to the French (until bribed by the king to attack their former friends), may owe much to their relative independence as a confederation. Only two of the Port's settlements had mediate lords between themselves and the king and so their governance was largely their own affair. They enjoyed many immunities and privileges and the tight-knit nature of the 'brotherhood' provided a large family which would protect the freeman if need be against the demands of any other town or person.

Coastal geomorphology of Hastings

Much of the shoreline along this stretch of coast is composed of shingle (gravel) with some sand lower down the foreshore. Movement of the shingle by waves and currents is unilinear, in a west to east direction.

The evolution of the gravel coastline of East Sussex has been studied by S. Jennings and C. Smyth (Jennings and Smyth 1990). The following information in this paragraph has been abstracted from this source. The authors argue that the gravel beaches are not a product of continuous cliff retreat and release of flint, there being no evidence for such rates of erosion of the cliffs. Instead, it is argued that the source of the gravel is primarily derived from sediment transferred during the later stages of the last glaciation, rivers and glaciers transporting large quantities of sediment onto the then exposed sea floor of the channel. Subsequently, during the early Holocene, rising sea levels progressively moved sediment shoreward, infilling former river channels. Concurrent with this may have been a re-working of more elevated river terrace deposits as the sea levels rose. A stabilisation of sea levels occurred around 5,000 BP and from this time it is suggested that sediment will have begun to be transferred to shore. It is further suggested by the authors that the transference of sediment to the shore largely ceased around 300 BP once its supply was exhausted. The cessation of the offshore – onshore regime resulted in movement of sediment becoming one almost entirely of movement alongshore. Another outcome of these processes is said to be a deepening of the nearshore zone. As a result of all this the shoreline is becoming progressively depleted of the gravels which historically have to some degree served to dissipate wave action and minimized cliff erosion. The tops of the chalk cliffs of Sussex are presently retreating at a rate of 0.3m – 0.5m per year (higher in some areas) and the authors claim that broadly similar rates of erosion are likely to have been the case since 300 BP when the offshore sediment supply was exhausted.

At Bulverhythe immediately to the west of Hastings public information boards state that the loss of shingle outstrips the supply and that the beach is getting lower at this point. Groynes of timber, stone, and concrete have been built along the coastline and these slow down the movement of shingle. Some shingle has even been dredged from the channel and pumped onto the shore. The area in which the Hastings pier remains lie buried is beneath extensions to the seafront parade, and possibly under beach shingle to the south of this. Although today this area lies beyond the high water mark this appears to be due to

a build-up of shingle against and between groynes and extensions to the parade, all the product of human intervention. It seems reasonable to assume that erosion and/or deposit build-up in the area of the pier, between the early post-medieval to modern periods, has not been rapid. This may be borne out by the fact that, until covered over, the pier remains were visible in the inter-tidal zone. The prevailing coastal regime would indicate that the eastern side of the pier was the sheltered side which formed the haven whilst shingle and sediment will have accumulated against the western side.

It may be that the geomorphological changes argued by Jennings and Smyth, in particular the alleged increases in erosion from 300 BP, would have had little impact on the success/failure of the pier at Hastings. Firstly, the evidence in the paragraph above would suggest that erosion at Hastings (prior to the concrete etc of the promenade today) was not at a catastrophic rate and I have not encountered records for the town that mention coastal erosion as a problem. The loss of the pier may be more likely to relate to the rise of Dover as the pre-eminent port of the south coast as a result of prolonged and massive investment coupled with a progressive decline of the Cinque Ports, politically and economically. By the 18th century Hastings was little more than a glorified fishing village.

Documentary sources

The earliest reference to the pier at Hastings is in 1546 when money for its repair is mentioned (Manwaring Baines 1963,106-7), the latest in 1635 when it was in 'decaie'. Although evidence is presently lacking it is entirely possible that the there was a pier at the town from the earlier 16th century, possibly even earlier than this. Letters Patent granted in 1578 state that the *"town hath of long time had a pier or harbour made of timber and other things set and placed in the sea"* (Hughes & Larkin 1969, 426-431). The very last pier related reference is from 1656-7 when notice was given by the common crier that anyone who had saved any of the piers timber, planks or bolts should bring these to the pier wardens for their salvage (Cooper & Ross 1892, 96).

Technology

A request to further a design by Edward Durrant, the mayor of Hastings, for a harbour at the town is recorded in 1562 (Cal. S.P. Dom. 1562). This followed a request for assistance by the mayor to the lord Warden who in his turn wrote to Secretary Cecil. The Wardens letter to Cecil is of interest in that it says that Durrant *"is able both by divers resons and by demonstracons by platt or otherwise to infourm you how it may be brought to effect"* Cooper & Ross 1862, 83). The reference to a design and a platt are points of some significance regarding a planning or design process. It is not known if this proposal ever got beyond a 'design'. A proposed new harbour is also mentioned with reference to a brief for collection in 1579 (ACP 1579a). Assuming the latter proposal was in fact built, a ruinous pier of 1596, which is known to have been of timber, could relate to this.

The first entry concerning the pier in the earliest surviving Corporation Record Book was an insertion near the front written in 1597 and provides such a multi-layered insight into pier building, the builders and attitudes/opinions that is presented in full:

"Memorand that about the .2. of march 1595 The peere of hastings was begonne to be reedified by certen westerne men sent for of purpose from the Cobb of Lyme. And by them was built a huge woorke wthout thold pere full south al of huge rocks artificially pyled edglong one close by another of a great hight but wthout any Tymber yet to mens iudgemt unremoveable it grew to so huge a pile But not wthstanding the first winter flow overthrew it in a moment and dispersed the huge rocks lyke thin plancks And so that cost was lost But the next yere after other woorkmen of better knowledge as was thought were called thence and by consent the lyke peice of woorke was begun to be againe built wth the like huge rocks And for more surety by advise of the Mr (master) *workman it was thought best (because they iudged the decay of the formr was for want of some tymber) to lay the foundacon of thys new woorke wthin the tymber woorke of theold peere and so to continue wth tymber braces and barres crosse dog & such like to the top. And this woork was wth singular industry and arte brought above the full and by all ? hall outyde? 1597 well nere finished vis xxx foote high & C foote long at least, bewtyfull to beholde huge invincible and unremoveable in the iudgmt of all the beholders Amounting to a great charge, wherunto the whole shire & divs beholders were contributaryes of benevolence beside the Townes great expences But behold when men were most secure and thought the woorke to be ppetuall, on all Sts daie 1597 appeared the mighty force of god, who wth the finger of his hand at one great & exceding high spring tyde wth a southeast wynd overthrew this huge woorke in lesse than an hower to the great terro & abashmt of all*

beholders, to the great discredit of the like woorke hereafter wth the contry & to the manifest undoing of the Towne wch by reason therof was left greatly indetted By theis psesidents let the posterity (for whoeme I recoed this) beware they never attempt to build them a pere wth rocks only wthout a myghty frame of Tymber to be seled & then balasted wth rocks Alwayes remembring that about such woorke Tymber must not be spared" (ESRO C/A(a) 1, both sides p 12)

This document indicates that the existing pier was of timber and that the experiment with an adjacent stone pier was a failure, as was the following pier, which was over 100 feet (30.5m) long and 30 feet (9.14m) tall and built within the timberwork of the original pier, and which employed at least some timber. There is reference to timber for bracing and *"barres crosse dog"* which may be referring to tie-beams. The information relating to experts and funding is considered elsewhere below. The writers final sentiments about how a pier should be built i.e. with a sealed frame of timber and ballasted with stone, are of especial interest.

An entry of 25th July 1596 instructing men of the town to perform community labour to *"make repair to the said peere"* must relate to the works of the second ill-fated pier detailed above (ESRO C/A (a) 1 p 15). An order from the Assembly of 29th August 1596 that work on *"the new Peere began this sommer"* must likewise relate to the same pier (ESRO C/A (a) 1 p 16), as must entries in similar vain for 20th February, 17th April, 26th June and 28th August of the following year (ESRO C/A (a) 1 p 24, 26, 32, 34). The sale of lands by the town recorded on 13th April 1598 was employed towards payments of the town's debts, including *"xlviii li vi s iiii d to divs psons about the peere charges"* which presumably relates to the catastrophes suffered by the town (ESRO C/A (a) 1 p 39).

The town records do not mention the pier again until 14th April 1611 when it is stated *"Peere to be repaired"* and within the same entry there is reference to the intention to *"buying of Tymber"* (ESRO C/A (a) 1 p 151). This reference leads to the conclusion that despite the ravages of 1597 a pier, whatever its condition, must have been rebuilt, or more likely repaired. Later in the same year the Assembly assented to the purchase of "C (100) *toonnes of tymber"* and made reference to a *"carpenter and other skilfull workmen"* (ESRO C/A (a) 1 p 154). There are references in the town records concerning money for the pier, which presumably indicates ongoing maintenance works at least, though it is not

until 26th May 1617 that money spent *"to the use of & towards the better maintennce & repacons of the peere"* is specifically mentioned (ESRO C/A (a) 1 p 200).

The town records next mention the pier on 29th July 1621 when work is ordered to cease for the year, with work intended to be resumed the following spring, and the workmen be dismissed. It is also mentioned that *"the carpenters have fixed the head* (the seaward end of the pier) *wch is alreddy framed unto that new woorke wch is sett downe"* (ESRO C/A (a) 2 p 2). A reference for the following year refers to the *"finishing of the woork now in hand about the new peer"* and makes mention of debts owed for timber and iron (presumably for pile shoes, spikes and bolts) as well as the workmen's wages (ESRO C/A (a) 2 p 9). This work may in part have been funded with money raised by a brief for collection issued by the crown. The brief was circulated in a printed form and actually describes the work as a *"Peere into the sea with Timber and Rocks"* and that *"the said Peere for want of reparations is fallen down and quite destroyed"* (Sovereign 1620).

There was again no mention of the pier until 22nd January 1635 when the Assembly was called specifically *"to consider of the decaie of the peere of this Towne"* together with a proposal to make suite to the crown for the making of a new haven at the site of the former priory to the west of the existing pier. To this end it was intended to obtain the services of an able surveyor to offer an opinion of the feasibility of the same (ESRO C/A (a) 2 p 4). As earlier as the 20th February 1635 a *"dutch Ingenier"* reported favourably on the proposals (ESRO C/A (a) 2 p 9). These references are the last to the pier and it is probable that shortly after this date the pier at Hastings ceased to exist.

Material remains and depictions

The historic pier appears on East Sussex HER records (HER # MES869). This lists a few of the references to the pier but holds no further information on the material remains themselves. Our earliest description of the material remains was published anonymously in 1797 (Anonymous 1797, 57). This source states that *"Very large pieces of timber, the remains of the pier are still to be seen at particular times, at low water, when the tide has swept away the beach, covered by enormous rocks which were brought there to form the foundation; and three or four long rows of piles are visible every day at half ebb, which shew the direction in which the pier ran"*. Samuel Lewis stated in the mid 19th century

that *"the piles and stones of the south pier are daily visible and extend from the west of the fort in a south-eastern direction"* (Lewis, 1848, 435-441). At a later date, 1932, a Mr J. E. Ray reported in the Notes and Queries section of the regional archaeological journal that *"During the work of extending the Parade at Hastings a line of timber piles was discovered opposite the west end of George Street, extending in a south-easterly direction"* (Ray 1932, 206). Mr Ray attributed the piles to part of an old harbour destroyed in the Reign of Elizabeth I.

The earliest depiction of what appear likely to be the pier remains (Figure 1) were published as one of a series of plates to accompany Moss's history of the town (Moss, 1824, 126-7). This shows parts of two lines of posts and is entitled as *"view from the pier rocks"*. By far the most informative source for the physical remains comes from an engraving of 1857 and a photograph dating to around 1870 (Figures 2, 3) (Manwaring Baines 1946). The former of these, entitled *"the rocks"*, depicts two rows of piles between which, and partly over, lie a mass of large boulders. This spread of boulders is reminiscent of some of the pier remains at Flamborough and those of Filey. The size of the boulders is considerable, perhaps with echoes of the *"huge rocks"* of the documented piers of 1595 and 1596/7. Although the documentary sources make it clear that there have been many episodes of pier building and pier repair it is entirely plausible that the stone ballast within the successive piers has been re-used time and again – i.e. the pier rocks of 1857 may have formed the ballast of 16th century piers as well as the final pier of the 1630s. The place-name 'pier rocks' also accords with pier related place-names evident at Flamborough and Filey.

The photograph of the pier remains of c1870 is particularly informative in that it shows at least five rows of piles – though some of these may correlate with other rows. A number of large rocks, relating to the ballast, are also to be seen in the right foreground. The piles show three aspects of especial interest. Firstly, and despite any correlation that can be made, the multiple rows argue for at least two or more phases of construction. Secondly, whilst one row of piles appears vertically set the others appear set at an angle. Whilst it could be argued that some of this angling could be accounted for by destructive collapse, it is clear that whole rows of piles lie at exactly the same angle and this is best explained by their having originally being driven so. Assuming this latter to be the case, we appear to have multi-phase timber pier remains, some of which were constructed with vertically driven walls and others with angled walls. Thirdly, the rows of piles all appear to be set

and driven edge to edge, no doubt strengthened within by the *"braces"* and *"crosse dogs"* of the documentary sources.

It is noticeable that whilst the three images of the pier remains show the same types of features, timber piles and stone ballast, it is not possible to identify common elements. Whilst some of this may be due to variable levels of exposure linked to different levels of scour of the shingle, it may also owe to the remains consisting of a number of discreet multi-phase entities.

It is known that at least one other depiction, an oil painting of the earlier 19th century showing the material remains does, or did, exist. This privately owned piece was loaned for display in a 'Local Antiquities Exhibition' held in 1909 and appears in a catalogue listing for the exhibition drawn up by the curator of Hastings Museum (Ruskin Butterfield 1909, 12-13). The painting is described as showing parts of Hastings including *"the rough piles on the beach* (which) *represent the remains of the jetty of Queen Elizabeth's time"*. The present whereabouts of this painting are unknown.

A plan of the piers, the only one located in this study, was published in 1862 (Cooper & Ross 1862, 94). This plan (Figure 4) is said to be a woodcut showing the remains as they existed in 1832. A structure labelled 'old pier' is shown extending seawards to the south-east for a distance of around 300 feet (91.4m). From this extends another structure again labelled 'old pier' around 90 feet (27.4m) long, whilst beyond this extends another structure labelled new pier of 1597 for a length of a little over 80 feet (24.4m). The width of the piers is generally shown as being in the region of 15-24 feet (4.57m-7.32m). Although the evidence upon which this plan was based is not stated it is assumed that this was the timber piles and rocks. If this were the case it reinforces the documentary and photographic evidence for multi-phase pier building. It does not however, confirm the accuracy, interpretation or structural sequencing suggested by this plan.

With the exception of the woodcut print detailed above all the evidence, documentary (where reference is always to a pier, singular) and material remains, point to a single pier arrangement. It is possible that the small pier-like projections in the woodcut represent different phases of pier development, or perhaps even to later groynes.

The precise location of the pier remains is not known with absolute certainty. Mr Ray reported remains to lie in the area of the parade opposite the west end of George Street

(Ray 1932, 206). The ADS give a grid reference for the remains in the 1870s photograph as centring on NGR TQ 8243 0936, which lies around up to 200m to the east (ADS(1)). As Ray was a probable witness to the remains I have opted to indicate the remains in Figure 5 in a position more in accordance with his observations.

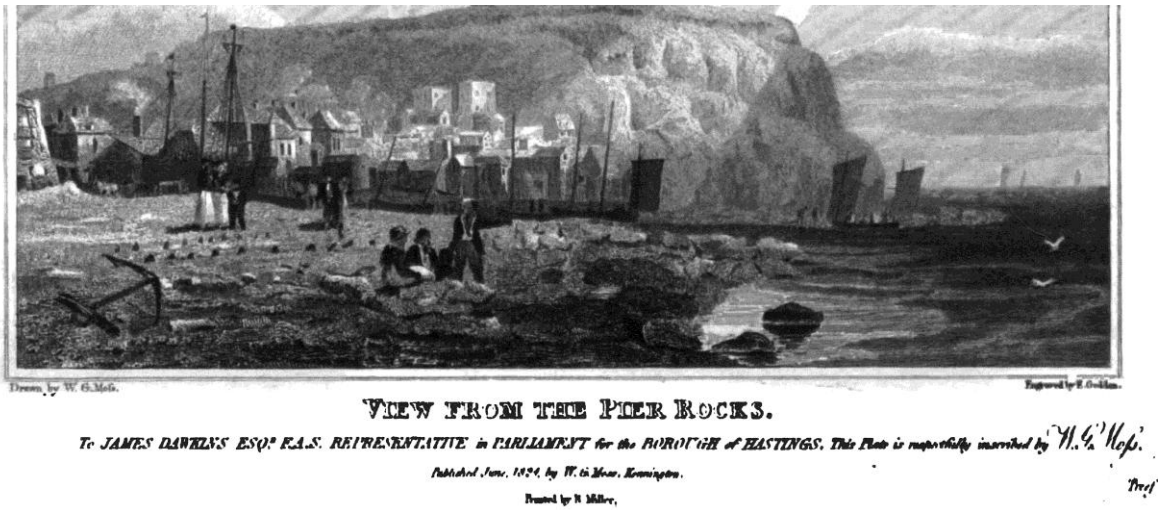
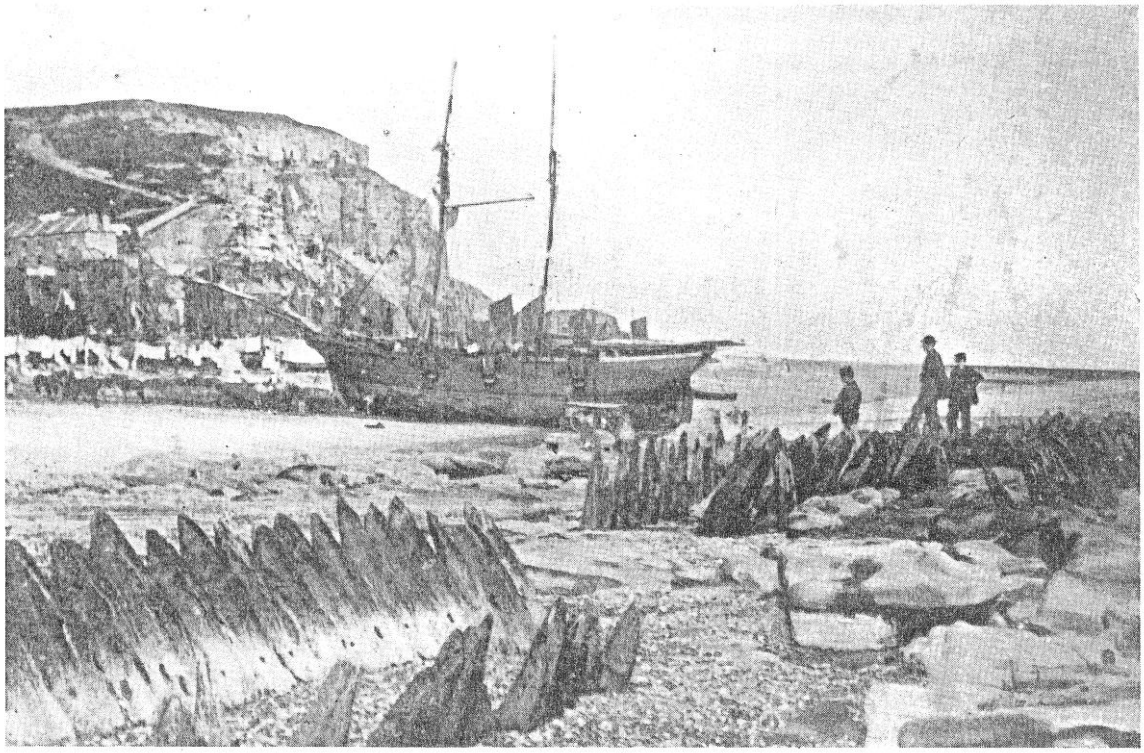


Figure 1, Probable pier remains in area of Pier Rocks: (Moss, 1824, 126-7)

BEACH SCENE, 1857, *drawn by W. McConnell for the "Illustrated Times"*

Figure 2, Pier remains in 1857, reproduced from: (Manwaring Baines, J. 1963)



WOODEN PILES OF THE ELIZABETHAN HARBOUR, *c.*1870

Figure 3, Photograph of c1870, from: (Manwaring Baines, J. 1946)

The accompanying woodcut shows the old harbour, and the new work of 1597: as they existed in 1832.

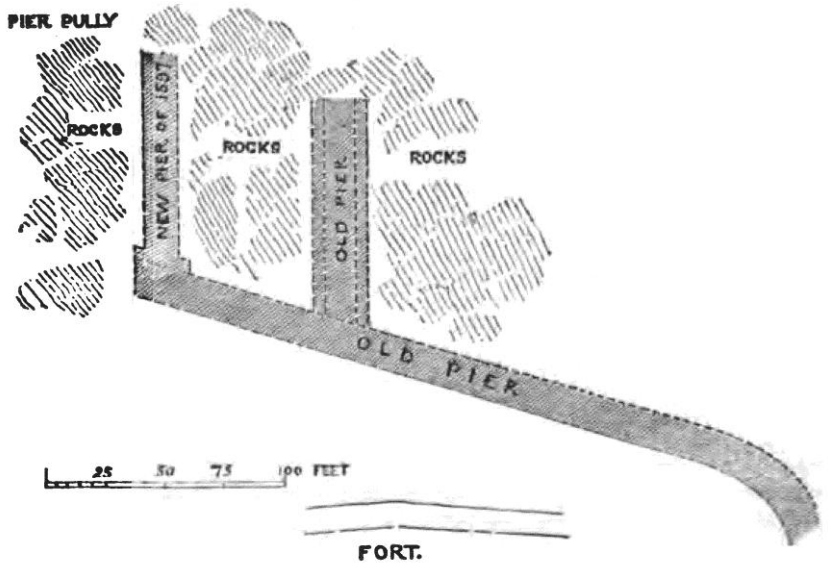


Figure 4, Plan of pier remains, from (Cooper & Ross 1862, 94) (North to bottom)

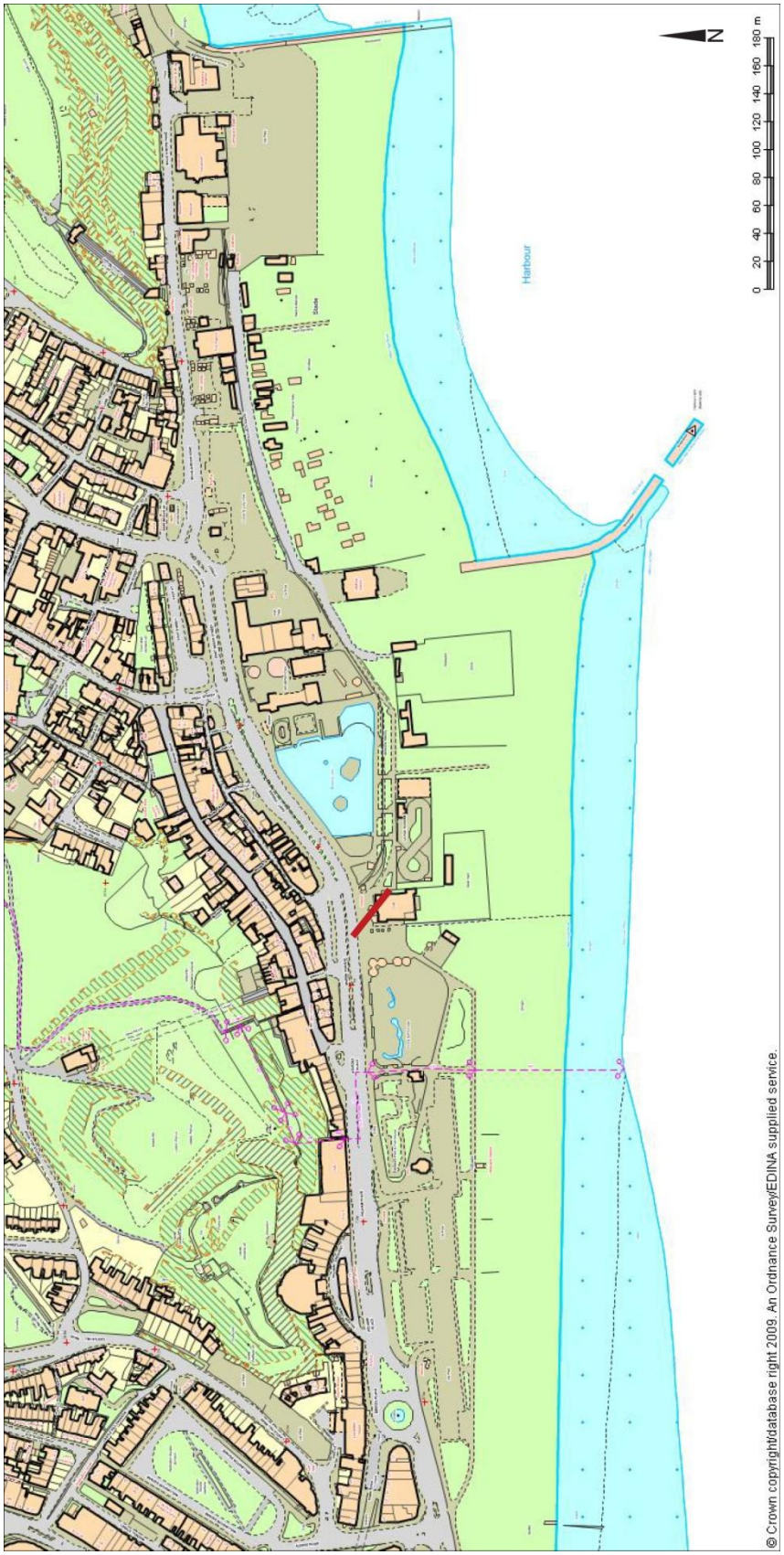


Figure 5, Plan of part of Hastings sea-front, approximate position of pier remains indicated by red line (map source: Edina)

The use of experts, workers and related matters

The earliest reference to technical experts at the pier is in 1578 when Letters Patent note that the opinions of *"divers artificers very cunning and skilful in that kind of faculty"* had been obtained for the proposed new haven at Hastings (Hughes & Larkin 1969, 426-431). The reference to *"artificers"* (plural) may suggest that these were master carpenters, perhaps with previous experience of pier building though they could even have been engineer/s? The building of the ill-fated piers of 1595 and 1596-7 are recorded as firstly carried out by men from Lyme (Regis) and secondly by other workmen *"called hence"* (ESRO C/A(a) 1, both sides p 12). Excluding an instance of impressed labour at the haven of Great Yarmouth these mark the first recorded instances of workforces, as opposed to individual expert masters or engineers, being brought in specifically to construct piers (the pier at Lyme is known to have been timber-built earlier in the 16th century and it may be that it was replaced in stone some time prior to the Hastings pier of 1596 – hence their employment here building the first failed pier, as presumed experts?). The importation of experts to Hastings to build a pier in stone where no earlier experience of the technology existed locally is understandable. Quite why a workforce was imported for the second of the piers, which clearly incorporated quantities of timber is less certain, unless this was of some variant form again unfamiliar locally. An alternative explanation may be that for what amounted to a more or less complete pier re-build there were insufficient carpenters, sawyers, labourers and blacksmiths locally available to carry out the task. It is evident that the entirety of the workforce was not actually drawn from elsewhere as the townsmen were also called on to perform community labour at the pier and *"to doe as they shalbe there appointed"*, presumably unskilled labour (ESRO C/A (a) 1, p 15).

A Master Workman is referred to at the 1596-7 pier and it seems reasonable to assume that this individual was in charge of the workforce, the day to day running of the project and in this particular instance definitely had some input in the technical aspects of the structure: see above (ESRO C/A(a) 1, both sides p 12) . The same Master would seem likely to have been instructing the men of the town called to perform labour at the pier *"to doe as they shalbe there appointed"* (ESRO C/A (a) 1, p 15).

There is some need to exercise caution over the use of terms into which it is today easy to read in a purely technical context. The Letters Patent of 1578 for a collection for the pier detail the six individuals ordained, appointed and constituted *"surveyors of the said*

work" who were comprised of three Lords and at least two Hastings Jurats (Hughes & Larkin, 1969 426-431). It would seem improbable that six people would be appointed to a senior technical post and perhaps equally difficult to envisage their three Lordships genuinely being responsible for seeing the practical work through. During the construction of the same pier of 1596-7 it is stated that the workmen at the pier are to *"continue their labor so long as it shalbe thought expedient by the survey & direction of Mr Maio (Mr/Master Mayor) & his brethren"* (ESRO C/A (a) 1 p 16). In this context we are perhaps best regarding the term 'survey' as the means by which the governing elite of the town arrived at a decision about when work was to stop. This may in fact be on financial or other grounds and need not exclude the professional opinions of the Master workman. Several months later there is reference to two surveyors of the work, both freemen and possibly jurats, whose responsibilities also included collection of the proceeds of a scott (local tax) levied for the benefit of the pier (see below). We should perhaps regard the term surveyor as a fluid word not bound by a single rigidly defined meaning. The final reference to a surveyor of the pier is in July 1621 and in this particular instance the individual was playing a role in the purchase of timber (ESRO C/A (a) 2, p 4). At a slightly later date there was some usage of the term surveyor in the sense of its more modern meaning. On 22nd January 1635 *"an able surveyor"* was sought by the town to examine the feasibility of a new site for the haven (ESRO C/A (a) 2, p 4). Such an individual was found *"one Henrick Cranhalls, a dutch Ingenier"* (ESRO C/A (a) 2, p 9).

In a constructional sense the term 'comptroller' may have held slightly more meaning as an entry for 28th August 1597 reads *"The survey of the work of the pere is by this Assembly comitted to Mr fferrys until Allhallows die next who as comptroller shall command & controll not only the woorkmen therof but also the wholl towne by wards & companys as hath byn accustomed"* (ESRO C/A (a) 1, p34). Fferrys was himself a jurat, perhaps even with a technical/construction background?

Another way in which the Assembly involved itself with the works of the pier was the audit of the accounts. In 1621, for example, six individuals were appointed to *"audit the Accounts of the peere"* (ESRO C/A (a) 2, p 4).

An interesting reference to the pier of 1596-7 is that of 20th February 1597 (ESRO C/A (a) 1 p 24). This reads "*At this Assembly it is decreed That the woorke of the Peere shalbe contynued for this sommer by Robt hill and his Company"*. Can we really read this as

meaning that the pier work was to be continued by Robert Hill and his company, or enterprise? More likely it refers to company in the sense in which it was used in the document cited in the paragraph before last.

On 14th April 1611 a Richard Waller was appointed to prosecute the business of repairs to the pier *"wh advise of M- Maye & his brethren"* (all members of the Assembly) (ESRO C/A (a) 1, p 154). It is uncertain if Waller was appointed for his professional technical abilities as a craftsmen, or as a bureaucratic overseer for the Assembly. In the same year the Assembly member Mr Maye was made responsible for major pier repairs and these were to be made *"wth advise of his brethren, Wm ffawtby carpenter and other skilful workmen & discret fishermen"*. It is unlikely that Maye was of a pier building background, and as a municipal appointee was expected to take the advice of those who were. As a matter of interest an entry on the same page informs us that Mr Maye was also appointed in the same year to represent the town at the Yarmouth fair, where the great twin piers are unlikely to have escaped his notice. The final entry of the same page is *"And Willm ff---thr sen(ior) is appointed Surveyor & Mr woorkman of the woorke of the Pere"*. This is perhaps more likely to be a reference to a technical expert.

In 1613 a member of the gentry came up with proposals to build a new haven at Hastings and this received the support of the Assembly. To this end it was intended *"to procure psons of skill & experience in such woorke to survey the same"* (ESRO C/A (a) 1, p 170). At a slightly later date the Letters Patent of 1620 for a public collection towards the pier makes refers to knowledgeable men who also provide costings *"by the opinion of men experienced in these affairs will amount to the sum of £2000 and upwards"* (Sovereign 1620).

Of the craftsmen involved in pier building at Hastings we are told very little, only carpenters being mentioned. Smiths can be implied by the reference to ironwork. The men of the town called out by wards to work at the pier are likely to have been acting as labourers.

Ownership, control and funding

The documentary sources indicate that the pier at Hastings was always the property of the corporation. Historic responsibility for its funding was clearly set out in Letters Patent of 1578 where it was noted that the pier *"hath been always maintained at the great and importable charges of the said town of Hastings"* (Hughes & Larkin 1969, 426-431). This responsibility for the pier and other maritime infrastructure was accommodated within the structure of local government. Two pier wardens were elected each year on the Monday after the third Sunday after Easter. The pier wardens were responsible for the maintenance of the Stade, pier and lighthouses and also collected money from duties at the pier and from the Yarmouth herring voyage (ESRO Hastings notes) Curiously, the title 'pier warden' continued in use at Hastings into the modern era, despite the lack of a pier since the mid 17th century. After the demise of the pier the principal piece of infrastructure occupying their attention was the Stade, the area, where in the absence of a pier, vessels were hauled up and down the shore by capstans. Pier wardens are known to have held office at a number of pier sites and also Bulverhythe immediately to the west of Hastings. At Bulverhythe their role is again believed to have related to beach launched vessels as no evidence for a pier has been found here.

As at all pier sites, costs for building and maintenance were considerable, and the town appears often to have struggled to raise sufficient funds. There are a number of references during the last decade of the 16th century and the first two decades of the 17th century in the town records to the *"pier stock"*, e.g. (ESRO C/A(a)1, p 151, 154; ESRO C/A(a)2, p 9) which appears to have been a fund of money held by the corporation and devoted entirely to the use of the pier. Frequently the reserves within this stock were insufficient and additional money had to be drawn from elsewhere. Sometimes this 'elsewhere' was from within the corporation itself. Accordingly, we hear of additional money *"to be supplyed by order of a comon Assembly"* (ESRO C/A (a)1, p 151), and *"shalbe borne & paid viz out of the Peere stock L li and xii li x s residue out of the Chamber of the towne"* (ESRO C/A(a)1, p 154). On one occasion money was borrowed from the chamberlain; seemingly the post rather than the man (ESRO C/A(a)1, p 32). Such 'internal shuffling' of monies within a number of departments or funds finds parallels within modern institutions, businesses and organs of governance.

The influence of powerful individuals was also used by the town to further its attempts to fund the pier, although not always successfully as in 1562 (Cal. S.P. Dom. 1562). The role played by such friends in the successful appeal to the crown in 1578 is not known.

The Letters Patent of 1620 for a brief for public collection towards Hastings pier inform us that the patent was issued as a response to a petition by the inhabitants of the town and that the town had the support of Edward Zouch, a member of the Council and Lord Warden of the Cinque Ports, together with various members of the nobility and gentry (including the High Sheriff of Surrey and Sussex) as well as local Justices of the Peace (Sovereign 1620). It seems that from the earliest stage of the town's suite assistance from higher sources was sought as it is reported that the Assembly sent the mayor and two others to the Lord Warden to procure his aid in obtaining the Letters Patent (Cooper & Ross 1862, 89).

Perhaps fitting into this category was Sir Thomas Flover. In 1613 Flover intended to make suite to the crown to grant assent for the making of a haven for the town after persons of skill and experience had surveyed the site. The town gave their thanks and did *"promise & bynd themselves not only to enterteyne this his good intent, And therin to joyne wth him in petition to his ma(tie) & his highnes Counsell, or in any other effectuall course by him to be proposed And in this his proiect & purpose not to forsake & leave him to ioyne them selves to any other, or otherwise to discover his counsels courses proiects procedings or intents to any other wthout his privity or consent"* (ESRO C/A(a)1, p 170). The wording of this entry in the corporation records sounds rather cloak and dagger and is peppered with legalistic terms and perhaps hints that there may be more happening behind the scenes than has been committed by pen to paper. What exactly Flover's motives were and where the funding was to come from are not known. This project is not heard of again and appears to have got no further than this proposal.

That the financial costs of maintaining a pier had proved too much of a burden for Hastings is stated in the Letters Patent of 1620 "*to their great charge and ympoverishing made out a Peere into the sea with Timber & Rocks, that their ships in any stormes might ride safe under the pere, but the cost and charge of making and repairing the same from time to time hath been so great a burthensome ..... and driven away many of the best and wealthiest men, to seat themselves so that to this day not only the said Peere for want of reparations is fallen downe and quite destroyed"* (Sovereign 1620).

Money and resources were raised by a variety of means:

Shott (and other local taxation)

The first reference to local taxation specifically for funds for the pier is on 29th August 1596 when, faced with insufficient funds for the pier, the Assembly agreed to *"a common charge of the Towne"* (ESRO C/A9A01, p 16). This charge may relate to the shott for *"xL li or upwards not exceeding L li to be ympose upon the better sorte of the Inhabitants of the towne"* (ESRO C/A(a)1, p 24). An entry of 17th April 1597 regarding collection of *"the shott lately graunted"* may again relate to the same particular charge (ESRO C/A(a)1, p 24). In 1611, and again for the use of the pier, the Assembly *"graunted a shott of L li to be patly assessed upon all Inhabitants of this towne after their abilities"* (ESRO C/A(a)1, p 154). A slightly different tack was adopted on 26th May 1617 when the Assembly decreed that a shilling for every ton of beer drawn was *"hensforth for ever paie unto the use of this towne and towards the common charge"* and that *"half of the said profit of xii d upon the toonn of beere so drawen & sold for this next following yere only to the use of & towards the better maintennce & repacons of the peere"* (ESRO C/A(a)1, p 200). There is mention of a shott in aid of the pier was in 1622 when any shortfall of debt repayment by the town for monies raised for pier work was to be raised by a *"genall shott"* (ESRO C/A(a)2, p 9). The final reference for a shott for the haven is in 1637 (HMC 1892, 362).

County assessments

The entry in the town records describing the ill-fated piers of the 1590s say of the second of these piers that *"Amounting to a great charge, whereunto the whole shire & divs beholders were contributary-es of benevolence besides the Townes great expences"* (ESRO C/A(a) 1, p 12). The reference to 'the shire' as contributors would suggest the likelihood of this being by assessment. In August of 1596 there is reference to *"the contribucon mony of the shire"* which seems very likely to be money raised by assessment (ESRO C/A(a)1, p 16).

Pier tolls

A fiscal entry in the town records of 12th July 1615 records duties of *"iiii d upon a toonne of yron laden at the peere"* and makes reference to *"pere wardens"* who were responsible for collecting the monies (ESRO C/A(a)1, p185).

Sale of lands

In 1598 there appears in the town records *"Md that the clif lands were sold to Mr James Hobson this yere for CL xli wch mony was ymployed towards paymt of the Townes detts Viz xx li to Tho Aueston, xxiiii li xiii s iiii d to John Rhodes & xlviii li vi s iiii d to divs psons about the peere charges"* (ESRO C/A(a)1, p 39). At least the last of these sums relates directly to the pier. It is possible that the first two sums, paid to individuals, was repayment of money privately lent for use at the pier.

Customs levies?

On 29th July 1621 the corporation records state that *"Nathaniell Lasher is Appointed to travell to Chichester ther to conferr wth the mayor Aldermen & other offecers concerning the favoring of the customes & subsedyes of this port from the kings ma(tie) according to his highnes gracious pleasure & according to their L-s in that behalf"* (ESRO C/A(a)2, p 4). It is not entirely certain what the implications of this entry are. However, it is part of a larger entry referring to the pier and may relate to the town trying to obtain some financial benefit from customs duties.

Private loans, also including from the parish church, and chamberlain

It is recorded in July 1596 that the town was in debt owing to the charges of the pier and therefore was *"xx li borrowed of All Sts Church towards the Pere"* (ESRO C/A(a) 1, p 15). Less than a year later the Assembly acknowledged that *"the towne standeth indetted to the woorkmen therof in divers great somes"* (ESRO C/A(a)1, p 32). Accordingly *"xx li (was) borrowed of the Town to the Pere"*, this money coming from the chamberlain. In order to obtain a speedy supply of money for finishing works at the pier in 1622 the Assembly agreed that *"mony shalbe borrowed of such psons as will and can be procured & intreated to lend"* and *"that such psons shalbe timely repaid their sevall somes so lent"* (ESRO C/A(a)2, p 9). It may be that such repayment was intended to be funded by the money raised from the brief for collection issued in the same year.

Community labour

The first reference to labour by members of the community at the pier was in 1596 when it was recorded that *"yt is also agreed for the better stewarding of the woork at the Pere that all men by wards when they shalbe thereunto called & commanded shall make* ?*put repair to the said peere to doe as they shalbe appointed according to anncyent use in the like"* and that all *"upon such calling shall faile to come accordingly shall forfeit to the*

use and benefit of the said pere vi d for evry tyme" (ESRO C/A(a) 1, p 15). There is further reference to community labour at the pier in the following year by *"the wholl towne by wards & companys as hath byn accustomed"* (ESRO C/A(a)1, p 34). The latest record for community labour at the pier is in 1611 when it was ordered *"that inhabitants refusing to labour at the pier are to forfeit 12 d"* (HMC 1892, 360).

Appeals to the crown and briefs for collection

The first recorded appeal to the crown in 1562 does not appear to have resulted favourably (Cooper & Ross 1862, 83). Assistance from the crown for the pier of Hastings is first known to have been received in 1578 when Letters Patent were granted for a collection (Hughes & Larkin 1969, 426-431; ACP 1578). It is known that the town petitioned for a licence for collections for the *"repair of the pier of their harbour, destroyed by a great tempest"* (Cal. S.P. Dom. 1590). This petition appears to have been unsuccessful. A reference to *"benevolence granted by the contry"* in 1596 may relate to another appeal for assistance to the crown (ESRO C/A(a) 1, p 15). Following an appeal to the crown Letters Patent for a collection were again issued in 1620 (Sovereign 1620; ACP 1621-2). When the town was considering the building of a new haven in 1635, at the new priory site, the town intended *"to make suite his ma(tie) or otherwise for obteyning meanes to make the said haven"* (ESRO C/A(a)2, p 4). In the same year the corporation intended to set money aside for two individuals to pursue the suite further, though this came to nothing (ESRO C/A(a)2, p 9).

Profits of Great Yarmouth voyages

When the town borrowed £20 from the parish church in 1596 the Assembly declared that repayment would follow the next supply of money. This was expected to be either *"benevolence granted by the contry* (perhaps an appeal to the county or crown) *or the pffitt of the yarmuth vyage"*. There is also reference to money from the Great Yarmouth voyage in August of the same year (ESRO C/A(a)1, p16). Shortly after this date there is a reference to *"half a share of Scarborough vyage"* (ESRO C/A(a)1, p 24). Quite what the Scarborough voyage entailed is not certain, but may perhaps relate to the earlier part of the herring season?

Shares – fishermen

In August 1596 it is reported that the fishermen of Hastings had granted *"wholl shares"* towards the pier (ESRO C/A(a)1, p16). The precise meaning of this contribution is not presently known but may relate to the activity above.

A number of Hastings wills, mostly of the mid 16th century, have been published (SRS 1937, 273-296). This volume provides a number of instances to people leaving money for the maintenance of local infrastructure such as highways and town walls, but not to the pier. It is possible that this apparent absence may relate to a lack of study in this particular area. The pier is mentioned in at least one will, of 1550-51, where reference is made to *"ii shoppes at the peare"* (SRS 1937, 279). Shoppe was, and still is, a local term for a fishermans storage hut which, in the later post-medieval period at least were/are tall tower-like wooden sheds located at the top end of the Stade. In light of the use of the term 'at' rather than 'on' it may be that these shoppes were located on ground to the landward end of the pier, i.e. the same spatial relationship as between Stade and shoppes. The reference would seem to imply direct use of the pier by fishermen.

Misappropriation of funds

The crown authorised a collection in 1578 throughout the realm to assist in the building of a haven at Hastings. Money was collected but seems to have been embezzelled, or as Camden put it *"quickly converted into private purses, and the public good neglected"* (William Camden, quoted in : Manwaring Baines 1946, 6). An arrest warrant of the Lord Warden was sent to the Bailiffs and Jurats to arrest John Jeffery of Hastings in 1581 (Cal. SP Dom 1581a). The warrant may relate to this embezzellment as Jeffrey, a Jurat of Hastings, was one of the collectors of money and a surveyor of the work, mentioned by name in the Letters patent for the collection (Hughes & Larkin 1969, 426-431). The town replied quickly to the effect that Jeffrey was not to be found in the town (Cal. SP Dom 1581b). There are a number of entries in the Acts of the Privy Council for 1579 which seem certain to relate to these events. It is firstly reported that such money as was gathered in Kent was done so *"uppon pretence that the same should be employed for the haven of Dover"* (ACP 1579b). In November it appears that various sums of the collected money was still in the hands of a number of people, perhaps Jeffrey was one of these?

(ACP 1579c). Finally, in 1580 the Council ordered that certain workmen, who had been employed at the haven and were dismissed without wages, should be paid (ACP 1580a).

Miscellaneous

Why

The Letters Patent of 1578 detail at some length why the *"pier or harbour made of timber"* was important, both locally and nationally (Hughes & Larkin 1969, 426-431). These can be briefly summarised as:

*Has a defensive military significance

*A safe bolt-hole from pirates

*A haven of safety for merchants and travellers

*It was to the benefit of the fishing industry

*It was said the new work will do much for *"the defence of our realm and to the profit of the commonwealth of the same"*. A decline in trade in the area was suggested as being due to the decline of the port.

The letters Patent of 1620 also sets out reasons why the pier at Hastings is important (Sovereign 1620). These reasons broadly mirror those given in 1578.

Timber and related

The precise sources of the timber employed at Hastings pier referred to in a number of documents are not known, nor are there details concerning species and conversion/preparation. However, three documents relating to timber supply in this part of Sussex are of some oblique interest.

The first of these dates to 1548-9 and bemoans the iron mills in the area, the implication being that these are consuming large quantities of timber. The document states that the *"towns of Hastings and Rye which are at a daily charge in making of 'jutties' and piers for defences of safeguard against the seas shall not be able to have in the country nigh by*

reason of the iron mills timber sufficient to maintain their piers and 'jutties" (Cecil Papers 1915, 8-27).

The second document is of 1580-1 and is a letter to the two Barons of Rye representing the town in parliament. The letter calls for a bill to be drawn up for the preservation of the woods in several parishes around the town as the woodland in the area is said to have been despoiled by a number of 'glass houses'. The letter states that timber from these woods was used in Hastings (in addition to other places) and that amongst its uses the timber was employed to *"maintain piers, harbours, groynes, jetties, capstans to wind up shipping, provisions for sluices, etc."* (ESRO RYE/47/24/13).

The third reference is a complaint to the Privy Council by the towns of Hastings, Rye and Winchelsea expressing concerns for the supply of wood and fuel owing to the building of a new iron works near the town (ACP 1580b).

It is not certain if these complaints were finding an audience at the highest political and legal levels as a result of real local problems with timber supply or because the power of the Ports, waning but still present, had ready access to important post-holders who were obliged to listen.

Fort

There was a fort at Hastings and this was located adjacent to the site of the pier. It was re-built in the mid 18th century, some time after the pier ceased to exist (ADS(2). Quite when the first battery was built at this location, and if this was at all contemporary with the pier, is uncertain. The state papers make reference in 1603 to *"four brass pieces at Hastings"* which were claimed by the townsmen (Cal. S.P. Dom. 1603). It is probable that these pieces formed, or were part of, a battery for coastal defence. How the disposition of these pieces related to the pier is not known.

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