

Medieval Lighthouses

Part 13 - The Pre-Industrial Age

by Dr Ken Trethewey

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By now It should have become clear that the development and use of lighted aids to navigation was entirely associated with a somewhat vague measure of a country's 'degree of civilization'. The creation of the Hanseatic League proved to be an enormous stimulus to their provision and the good trading relations between different countries of northern Europe was a positive influence.

We have seen how an extensive network of lightstructures had been established by the Romans with the primary aim of improvements to their trading capacity with the secondary benefit of improving marine safety - both objectives that were undoubtedly 'civilized' - but that system disintegrated with the fragmentation of the empire.

As a great proportion of lands descended into instability, nothing that could be described as remotely comparable was recreated until the first signs reappeared from the 13th century onwards. We saw that there was a limited approach to saving lives that emerged from the members of Christian communities, but that in the British Islands this took a severe step back when Henry VIII savaged their Institutions in the early 16th century.

Probably the single most important reason preventing progress was the limitation caused by the poor means of creating powerful, reliable light. So it was not until the conditions were suitable for an Industrial Revolution in England that sufficient momentum to commence building a new and lasting lighthouse network was achieved.

It would be easy to dismiss five centuries of development in Europe as insignificant in the cause of safety of navigation. Even at the start of the 13th century, the idea of using lights shown along coastlines at night was deeply embedded in those minds with positive outlooks.

The factors that would ultimately determine whether a light would be set up or not have already

been made clear (see p18), and amongst them are the clues as to why progress was so slow. Once a ship captain was aware that he could look for assistance ashore, his expectation would have been high, only to be dashed when he failed to see the light for many possible reasons. If a light were to be provided, it surely must be done reliably, for its failure was likely to have catastrophic consequences. This was, of course, seized upon by malevolent minds who were known to show false lights with the intention of causing shipwreck and the bonus of illegal salvage. The story of these "Wreckers" is beyond our scope here, but which - along with piracy - should be borne in mind as a severe aggravation throughout these centuries.

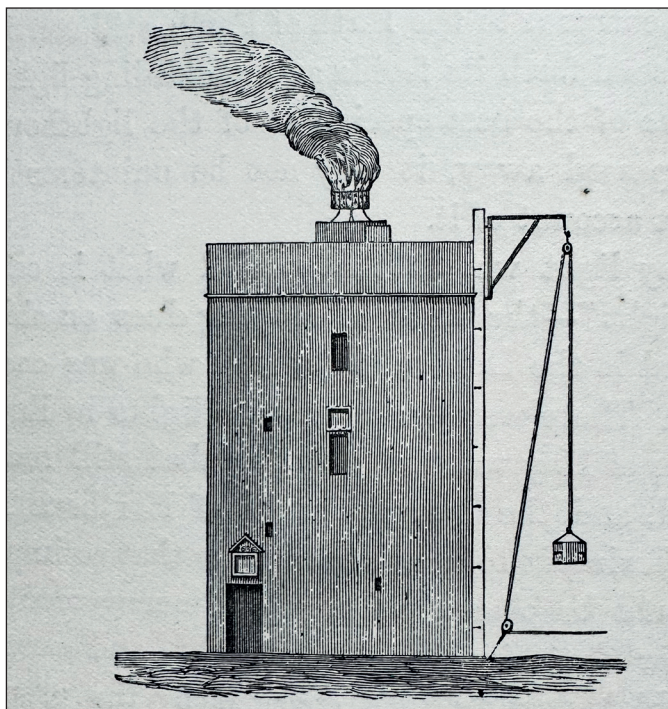
No, once it had been agreed to show a light from a designated location, it was essential for it to be done reliably and in a published way, for the failure to do so was very serious. It is true to say that the provision of resources was an extremely significant element but that was not the factor that would make or break the project. By far the most important factor was to make the light effective (in terms of consistent brightness) and reliable, night after night. This was almost impossible using open fires.

Objectives

The objectives of this chapter are:

1. To describe the conditions that led to the commencement of the Industrial Age in Great Britain.

2. To describe and explain how the evolving economic and industrial landscape led to the creation of the global lighthouse network of the 19th and 20th centuries.



ABOVE: The structure (1636) on the Isle of May in Scotland is typical of the situation at the start of the Age of Industry when fires would become obsolete.²

A Very British Revolution

The start of the Industrial Age (or Industrial Revolution) in Britain in the late 18th century was driven by a mix of economic, social, geographic and technological factors. It was the age of materials - especially metal, and in particular iron, that had been well known about for many centuries, but it was the capacity to produce it in quantity that - to coin a cliché - 'Changed everything!' More fundamentally, it was the use of coal to fuel the furnaces that made the iron,¹ and Britain had plentiful supplies of both.

Many books have been written about this subject by others far more qualified than I. However, I will list the main changes to provide context and support for the arguments advanced in this book.

Besides the possession of natural resources, Britain was making advances in farming in Medieval times. Crop rotation, selective breeding of livestock, and the manufacture of new tools increased food production. This led to population growth and freed up labour from farms, creating a workforce for factories. Access to Capital from a dynamic financial system allowed for investment in new industries and technologies. Wealth from trade and colonial expansion gave entrepreneurs the money to fund factories and machinery.

Meanwhile, Britain's powerful navy had created a global empire with access to other raw materials such as cotton so some of the first factories made textiles with the wool and cotton that was now plentiful. For finished goods markets at home and abroad were set up and a large network of trade routes (supported and protected by sea power) encouraged commerce and innovation.

Britain had developed good political stability and a strong legal system with property rights and patent laws that helped protect investors and inventors. Then, the absence of major wars on British soil during this time allowed economic growth to continue unimpeded.

Britain was able to produce some key inventions, the spinning jenny, water frame and power loom, for example. But by far the most significant was the invention of the steam engine by Watt and Trevithick which gave a large boost to productivity in many ways, especially the transport sector where Britain had created an effective infrastructure using its navigable rivers and canals to move goods more efficiently. Later, the development of railways revolutionized internal trade and movement of resources.

And finally, there was urbanization as efficiency on the land caused people to move to cities for factory work, concentrating labour and fueling industrial growth. Urban centers like Manchester, Birmingham, London and Glasgow became major industrial hubs.

The majority of these changes took place after 1700, a year that will be used as the commencement of Volume 3. Britain wasn't just first to achieve these things, it dominated the early Industrial Revolution. Belgium and Germany were competitors by the mid to late 1800s, with Germany eventually overtaking in areas like chemicals and steel. France remained an important but secondary industrial power, although it made some great innovations in lighthouse technology and competed strongly with Britain as we shall see in the next book. Southern and Eastern Europe industrialized much later and more slowly. And Europe in general was well ahead of the rest of the world. Volume 3 will tell how the network of 'modern' lighthouses around the world was largely created by British and French technology. So the building of lighthouses as we know them today was an integral part of immense changes to "civilization" brought about by the Industrial Revolution.

Charles the second by the grace of God King of England Scotland France & Ireland
Defender of the Faith &c To all to whom these presents shall come greeting Wherby
our late dear & royall father of blessed memory by his Letters patents under his
Seale of England bearing date the 13th day of ~~May~~ April in the thirtieth year
of his Reigne (certifying as therein is recited) Did for the consideration therein expressed
nominate & appoint Gerard Lord Esq^r to maintain & continue the said Light
houses & Lights then & yett erect & being at Winter townesse & Orfordnesse in the Countie
of Norfolke & Suffolke (being five in number) & to allow renew remove & change the
said Light houses or any of them at occasion should require & to receive the Duties & paym^{ts}
thereof according to the intent of the same Letters patents for & during the Termes therein
mentioned & hereafter in these presents expressed And our said late royall father
by the said Letters patents for him his heirs & Successors Did give & graunt unto the said
Gerard Lord the Esq^rs De m^{or} & Assigned free Liberty full power and
Authority that he & he the said Gerard Lord the Esq^rs De m^{or} & Assigned at his & their
owne costs & Charges should & might lawfully maintain continue allow renew
remove & change the said Light houses & Lights as aforesaid And for the great
Charges formerly sustained & borne by Sir John Mordaunt K^t deceased & from him
to him hereafter to be sustained & borne by the said Gerard Lord the Esq^r De m^{or}
Assigned in & about the erecting maintaining altering renewing & dis-
continuing & changing of the said Light houses & Lights erected at Winter townesse
and Orfordnesse aforesaid our late royall father Did for him his heirs & Successors

LEFT: A translation line by line of page 1 of the Licence of 1661 (referring to an earlier one of 1637-8 under Charles I)

- ▶ Charles the Second by the grace of God King of England Scotland France and Ireland
- ▶ Defender of the Faith and c. To all to whom these words shall come greeting. Whereas
- ▶ our late deare royall father of blessed memory by his Letters & patents under his great
- ▶ seals of England bearing date ye 13th day of Aprill in the thirteenth year
- ▶ of his Reigne (...as thereon is notified) Did for the Consideration therein so prossede to
- ▶ nominate and appoint Gerrard Gore Esq to maintaine and routine these wall Light-
- ▶ houses and lights then and yet erect and being at Wintertonness etc and Orfordness in the Countys
- ▶ of Norfolke and Suffolke (being five in number) and to alter renew remove and change the
- ▶ said Light houses or any of them as ... should require and so receive the duties and payments
- ▶ thereof according to the intent of the same Letters and Patents for and during the terme therein
- ▶ mentioned and hereafter in these present and our said late royall father
- ▶ by the said Letters and Patents for him his heirs and successors: Did give and grant unto the said
- ▶ Gerard Gore, his Exe(ecutors) Adm(inistrators) and Assigns ... Liberty Licence power and
- ▶ Authority that ... Gerard Gore Esquire Exe(ecutors) Adm(inistrators) and Assigns at his and their
- ▶ prior costs and charges should and might lawfully maintaine ... routine alter renewe
- ▶ remove and change the said Light houses and Lights as aforesaid And for the greater
- ▶ charged formerly bound by Sir John Meldrum Kt deceased and from tyme
- ▶ to tyme thereafter to be ... and susteyned and borne by the said Gerard Gore his Exe(ecutors)
- ▶ Adm(inistrators) and Assigns in and about the erecting maintaining altering renewing ...
- ▶ removing and exchanging of ye said Light houses and Lights erected at Wintertonness
- ▶ and Orfordness aforesaid our late royall father Did for him his heirs and Successors

The Entrepreneurs

At some point it could be expected that someone with financial acumen might decide to use lighthouses as a money-making opportunity. I have already discussed the elements that were needed for a lighthouse in the currently accepted format to be a successful proposition (see p314). The key was the application of a fee charged on all ships that passed by the light and would therefore benefit from it, a principle that comes under the heading of light dues (see p136).

I have also described at length the charitable, not-for-profit showing of lights by monks and hermits, but there was no reason why a private individual should not treat it as a business. Landowners had been charging travellers to pass across their lands with dedicated gatekeepers installed in toll houses from where the monies could be collected. Why not apply the same principle to the sea? After raising a capital sum to pay for the construction of the lighthouse, the privateer would simply charge ship owners on a scale that varied with the amount of goods being carried. After the capital invested had been repaid, and with running costs under control, healthy profits would ensue.

It was not quite so simple, however. The collection of the toll was difficult and required offices in various ports with agents who would seek payment from the ship masters. Secondly, the monarch had the over-arching authority to agree to the project and must first be approached for a licence or patent. It was an ideal situation for wheeler dealing and insider trading. With such a dispensation tucked under his arm, the entrepreneur was set to run a successful business.

On the facing page is a photograph that shows the first page of such a royal licence awarded by Charles II to Gerard Gore Esquire on the 13th day of April in the thirteenth year of his reign (1661). It authorised Gore to build five lighthouses along the coast of East Anglia.

The Birth Of The Modern Lighthouse

It is logical to argue that the development of the 'modern' system of lighthouses was brought about by the British coal industry and the move towards industrialization.

Coal was being used in Britain as early as the Bronze Age, mainly as surface-collected material for fuel, and the Romans used coal in places like Northumberland and South Wales where there were readily accessible resources that could be dug from the surface layers of the ground. By the 12th century coal use became more widespread in northeast England, particularly around Durham and Northumberland where it was called 'sea coal' because it was collected from beaches. By the 13th century, there was a commercial coal trade, supplying urban centers and monasteries and Newcastle upon Tyne became an early hub for shipping coal south to London. Monasteries like those at Tynemouth and Durham were actually involved in coal extraction on their lands.

As the coal supplies close to the surface became exhausted, miners were forced to dig to greater depths so that by the 15th century underground mining was becoming increasingly important. However, as depth increased so did water ingress so the pace of change was slow until the industrial age when pumps, powered by steam had been invented and manufactured that could remove the water from the mines.

In 1600, a fleet of 200 colliers was needed to supply London with coal. By 1700 the number had increased to 1,000 ships and 10,000 seamen.³ The risks were enormous, whether from severe weather, from shifting sandbanks or from pirates and other malfeasants. Surviving records of the London Trinity House⁴ show in great detail how the business was conducted and how badly mariners were affected by violent attacks from all quarters.

Nevertheless, it was the considerable growth in the number of vessels carrying coal from the Tyne that caused merchants to think seriously about improving efficiency through better marine safety. They set up companies and partnerships to put funding in place, they lobbied their local representatives for support and, when necessary, sought permission from the monarch to start work on lighthouse building.

Scotland too was loud on the sidelines for the route into Edinburgh was threatened by several obstacles. One was the Isle of May, which was given its first coal fire light in 1636. By now, the importance of reliability had been fully realised and accepted and it was only after commitments had been made for resourcing it and recovering the costs had been agreed that it was finally built. Scottish ships were charged two (Scottish) shillings per ton of cargo, whilst foreign ships (including the English) were charge double. But to create the desired reliability, the consumption of coal was enormous. In 1790, the fire burned 400 tons of coal and on a particularly inclement night it would use as much as three tons.⁵ Clearly a better method of illumination was needed. It would be 1782 before Joseph Teulère began installing metal parabolic reflectors with candles and oil lamps at Cordouan making coal fires finally a thing of the past.

Geographically we are first focused on the east coast of England. The results shown in the map on p332 speak for themselves. The North Sea is quite shallow and subject to the irregular formation of sandbanks. These hazards are notoriously affected by storm conditions and could render the sea much shallower than might be expected and lead to shipwreck, loss of life and cargo. It has always been difficult to mark sandbanks with lights. Floating buoys held in position by heavy weights were in use, but could not be lit until much later. Proposals to build lightstructures on sandbanks were made from time to time and I have discussed these at length in *Light on the Forelands* in which I discussed the problems of building on the Goodwin Sands off the east coast of Kent and how it was tackled with bespoke ships carrying lights. The world's first light vessel was moored in sand at the Nore sandbank at the mouth of the Thames Estuary near Sheerness in Kent.⁶ Indeed, for ships approaching the rapidly growing docks of London, the Thames was a serious concern for masters during this period of industrialization because of its shallow waters and there were new designs for lighthouse built on screw piles as a result.⁷ But besides the shifting sandbanks, it was the large mass of East Anglia that formed the biggest obstacle to this increasing north-south traffic flow and so it is hardly surprising that this area should become the focus for a new wave of lighthouse construction. Caister was first, followed by the nearby town of Lowestoft.



ABOVE: There have been a number of lights on the Farne Islands and at the top is a satellite map of the locations. The most famous is the Longstone lighthouse (1826) home to the well known Darling family. The structure is seen as the red and white tower on the left of the lower image. The lighthouse on the right of the lower image is the Inner Farne (1776). Just left of centre in the lower image is a grey stone tower known as a pele. These were built by nobles or monastic communities, mostly for defence against raiding parties. This tower on Inner Farne was built in 1500 by monks from Lindisfarne at the order of the Prior of Durham, Thomas Castell. It may have shown lights from this date, but it was certainly modified to show navigational lights on Inner Farne by means of a royal licence granted to Captain John Blackett in 1776. I have already reported the story of St. Cuthbert's presence on Inner Farne (see p75) and the likelihood of him showing a light. There is no tradition of a light being shown for navigation from the Lindisfarne Abbey but this cannot be ruled out. In the 18th century, lights were periodically shown from Brownsman and Staple Islands, all of which were extinguished at the lighting of Longstone in the 19th century.



ABOVE: An engraving of the lighthouse built by John Smeaton on Spurn Point in 1776.¹² However, 350 years earlier, Spurn is the first documented (1427) example of the 'modern' method of lighthouse construction.¹³

Raverserspurne - Spurn Head

At some time during the ninth or tenth centuries, a Viking longboat came ashore on a shingle bank on the east coast of England.⁸ The boat's captain must have seen a group of ravens there for in his Norse language he named the place *Hrafnsyrr*, which then, like the shifting sands, evolved in time to become Raversersporne, Raverserspur or Raverserspurne. In the 1960s, an academic at the University of Hull⁹ presented the first major study of the geography of this complex region of Yorkshire. In it he reported how the long peninsula of shifting stones and sand had changed its shape and position substantially over many centuries. His data have allowed us to develop a well formed picture of the history of this unusual site.¹⁰

The Vikings soon saw how wonderful the waters behind the spit were as a way into the heartland of northern England and thus developed the cities of Hull and York. As the sea traffic grew, the difficulties of navigating the shallows became more evident and with them the need to alleviate the dangers.

The fraternity of Hull would have been looking for ideas when a Christian man came up with something positive. I have already mentioned the name of Richard Reedbarowe (see p150). We are fortunate to have preserved his application for permission to build a lighthouse at Raverserspurne - now perhaps named as Ravenser. It was 1427 and the sixth year

of the reign of Henry VI when permission for his project was obtained from Parliament. It has been concluded from his wording that he had already begun the building, but unfortunately there is no evidence that the lighthouse was ever finished or that the light was ever shown here.¹¹ This is a very disappointing outcome for pharologists because it would have been confirmed as the first of its kind.

His application began:

"To the wyse Commones of this present Parlement. Besekith your povre bedeman, Richard Reedbarowe, Heremyte of the Chapell of our Lady and Seint Anne atte Raversersporne ..."

Here he declares himself to be a hermit associated with a Christian community in this remote location. A most important element of the application is his request for the right to charge passing ships so as to help pay for the maintenance of the light. The intention is clear: this was to be a charitable enterprise and that profit was not involved. I have already indicated that this idea was probably used at Youghal in Ireland (see p105), but this is the first occasion that we have a formal record of the methodology that would be used for the building of lighthouses over the coming centuries. Here was an Ecclesiastical lighthouse in transition to the new age of lighthouses as a business. The significance of these events should not be underplayed.

The Angells of Spurn

Trinity Brethren from all of the Houses were necessarily involved when lighthouses first appeared on the coast of Britain, but it took a surprising amount of time for them to fully appreciate their responsibilities. When Richard Reedbarrow began to build a lighthouse on Spurn in 1427 and Henry VI gave his permission for a charge to be made on passing ships to pay for it, this was before the Hull fraternity was deeply concerned with mariners and their affairs. Nevertheless, a man appointed to administer the funds that would accrue from the benefits offered by the Spurn lighthouse was one of the twenty-four ship masters who in 1456 was involved in the step that made it into a Seamen's Guild. But having been awarded his patent Reedbarrow disappeared from history. Hague noted how a description of Edward IV's landing on Spurn in 1471 had made no mention of it.¹⁴

In 1590, when Reedbarrow's light - if it was ever shown - was a distant memory, the Hull Brethren proposed the construction of another lighthouse on Spurn but none was built. Curiously we now begin to find significant resistance to the building of lighthouses amongst the very people whom we might expect to be strongly in favour. For most of the 17th century they set themselves against lighthouses and defeated proposals for lights at Spurn in 1618, 1638 and 1657. In 1632 they called lights "unuseful and needless" and in 1657 "an inconvenience and a mischief". From 1660 onwards there were more applications to Parliament for erecting a lighthouse at Spurn. Though dubious about the value of lighthouses, the Guild had some thoughts of building lighthouses themselves, but by now had recognized the way they were being used to make profits for speculators and, being of a not-for-profit mind, they strongly opposed applications from private individuals.

Lighthouses alone were not the entire solution, for there were other obstacles to safe navigation that were highly desirable and the Hull Trinity house always had the final say. The chart of Captain Greenville Collins in 1693 shows two lighthouses on Spurn Point and buoys on Clee Ness and Burcom sandbank, but nothing on the Den. A lighthouse in these early days was often an iron basket burning coal, hoisted on a swape, that had to be lowered and replenished with fuel as required. This was

to be the case in Smeaton's first designs, shown opposite.

Finally, a patent was issued in 1675 to the Joseph Angell family, despite the fact that the land where the lighthouse was to be built belonged to Lord Dunbar. Land originally owned by the Angell family had been washed away by the sea, but in 1609 two Angell brothers had obtained newly created land at Spurn Point, together with the fishing rights around its coast.¹⁵

In time, the land was bequeathed to a Justinian Angell. Following numerous wrecks along this stretch of coastline he applied for a Patent to erect a lighthouse and enlisted the help of his cousin Joseph to obtain signatures from shipowners and merchants for the petition. However, Joseph Angell decided to build a lighthouse and to display a light before the petition was sent to the Lords of the Privy Council. He then bribed members of Trinity House with £80 per year, disguising it as an annual subscription to the Corporation's Charities. Not surprisingly, the Corporation offered no objection.

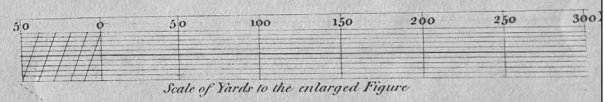
So, in November 1675, the Privy Council for Charles II issued a Patent for the Spurn Point lighthouse which authorised Justinian Angell to collect by compulsory contribution one quarter penny (farthing) per ton from all passing ships. These levies were to be collected at the vessels' port of destination by the revenue officers. In 1678 the Patent was amended with the levy raised to a halfpenny per ton from English ships and one penny from foreign vessels.¹⁶

Justinian Angell died in 1680 and left the Spurn Point Patent and all its rights to his wife and son John, but by 1690 Lord Dunbar was waging war against the Angell family over the disputed land ownership. One night Dunbar sent his men to wreck the lighthouse and in the process they took the keeper prisoner. The matter went to the court of William III who ordered that the keeper should be released and the land returned to the Angell family. John Angell died in 1750 and his son, also John, assumed the management of the Spurn light.

In 1751 the land agents for the Crown, were instructed by the Privy Council of George III to establish, once and for all, the ownership of Spurn Point. Whether John Angell bribed the land surveyors is not known but he managed to establish the land as his own, perhaps by moving the land markers while the surveyors were at the local inn.

50 0 100 200 300 400 500 600 Yards

Scale of Yards to the general Plan.



290

A satellite image of Spurn Point (2025). The peninsula is significantly more extensive to the southwest than in the time of Smeaton. The extent of the brown areas surrounding the land is an excellent indication of how the peninsula is constantly changing. The estimated position of Angell's lighthouse is marked by the red pin as a medieval light. Smeaton's (High) lighthouse is marked with the white pin and is now gone without trace. The yellow pin is the final Low lighthouse, still in existence. The current lighthouse INSET BOTTOM is marked by the purple pin, 68 yds (62 m) northeast of the Smeaton tower's location. Reedbarrowe's light of 1427 was calculated to be about half a mile southeast of Angell's.

Spurn Head 1674

1 mile

Spurn Head Low

Spurn Head High Spurn High (Smeaton)

Spurn Point







ABOVE: Lights (red pins) and major trading centres (pink balloons) of East Anglia (Norfolk, Suffolk and Essex) that were important during the medieval period.

Progress On The East Coast

Flamborough Head is a prominent chalk headland on the North Sea coast, east of Bridlington, Yorkshire. Here is a good example of the changing philosophy in the 17th century. A tower was built here to serve as a lighthouse in 1674 by Sir John Clayton, a London entrepreneur. About 24 metres (80 ft) high, it was constructed of chalk and limestone quarried locally. The tower still stands inland today, although not at the cliff edge as we might expect. Still trapped by the inadequacies of light production, the idea was to put an open coal fire at the top, in an iron basket. However, no keeper service or fuel supply was ever arranged. As a result, the fire was never regularly lit and it became known as a lighthouse that never shone.

So why was it built but never used? Sir John Clayton had been given a patent from King Charles II to erect a chain of lighthouses - of which this was to be one - on the east coast and to collect tolls from passing ships, but he failed to get the necessary ongoing funding or toll collection system. Without income, he could not maintain a supply of fuel or the keepers to tend the fire. So the tower remained an unused stone shell for centuries.

Meanwhile, in East Anglia, there was a pressing need to provide assistance in waters where extensive sandbanks and shifting sands caused a continual problem. As the 16th century turned into its successor, a builder called Thomas Bushell was finding it hard to keep his two navigational lights working properly.¹⁸ At some point in the late 1500s he had erected two wooden¹⁹ structures with lanterns containing candles close to a small village called Caistor²⁰ on the east Norfolk coast. It is hard to imagine how candles²¹ could have been of any assistance to passing ships, for this was not a port with wharves for vessels to come alongside: this was a way point for the passing coal carriers from Tynemouth. However, it is recorded that Caistor lights became the first to be added to the inventory of the London Trinity House, who had until then, been concerned with other matters, like the provision of pilots and the mooring of (unlighted) buoys.²² So it appears that poor Bushell was providing an unsatisfactory service when in the early 1600s Trinity House took over the site.²³ It was the beginning of a concentrated period of new lighthouse building, with Trinity House deciding which of many proposals should go ahead.

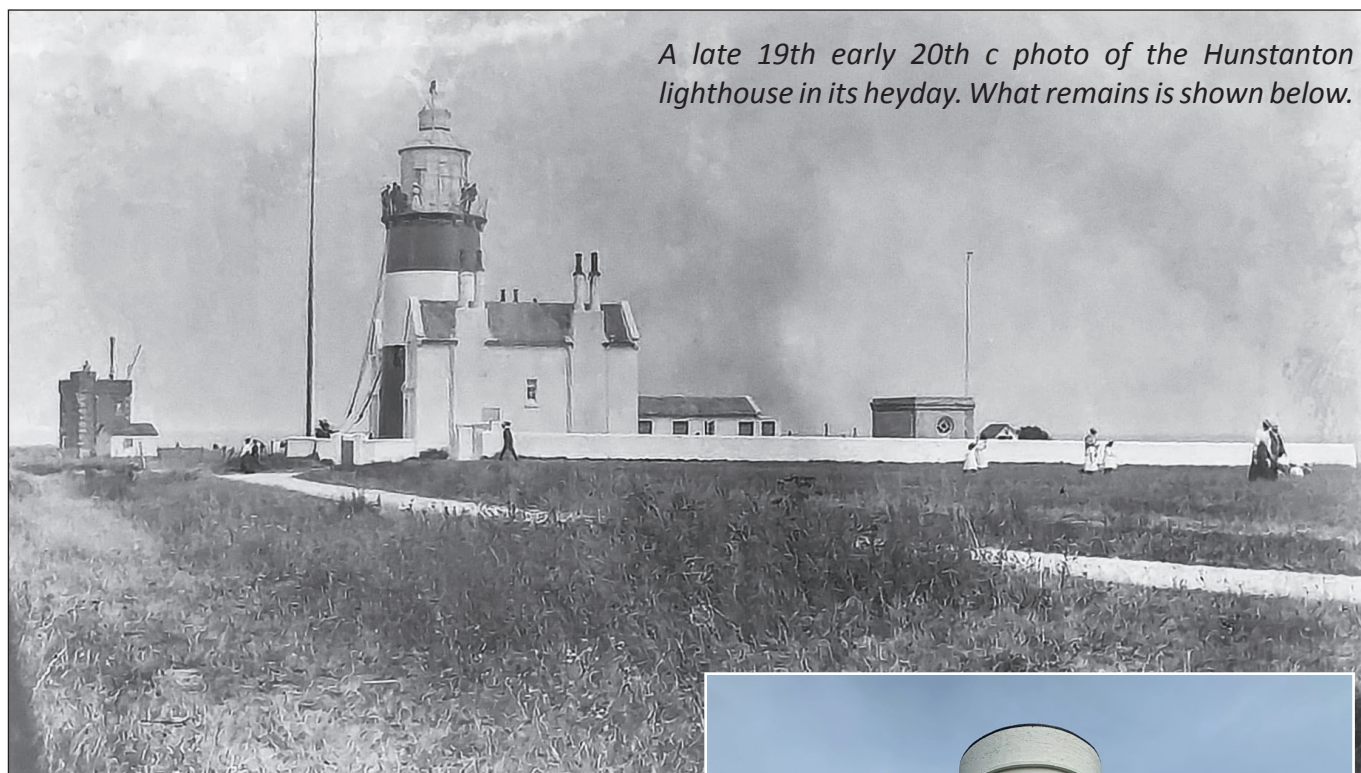


ABOVE: The old tower at Flamborough Head (1674).

We do not know the precise reason for the change at Caistor, but it would almost certainly involve a poor financial return leading to the lights being erratically displayed or simply not at all. In any case, it was now time for a new phase of improvements to navigational aids. The tide had finally turned - pun intended.

A final relevant point to make is that Thomas Bushell had never asked for the monarch's permission to carry out his plan. We shall learn elsewhere much more about the context of these activities along the coast at Winterton.

East Anglia had become more than just a stretch of coastline to be watched by passing ships with coal in their bowels. We don't think of Kings Lynn as having much significance as a port but we saw earlier how it had become an important place of commerce for the Hanseatic League (see p130). Records tell of a hermit who erected a 'beacon' at Lynn Cross around 1550 to assist shipping steering towards the port of Lynn. This was probably not lit and therefore not an ecclesiastical light or any other form of light. Ships for Lynn²⁴ and Boston would make use of lights at Hunstanton, of which more will be said below.



A late 19th early 20th c photo of the Hunstanton lighthouse in its heyday. What remains is shown below.

Hunstanton

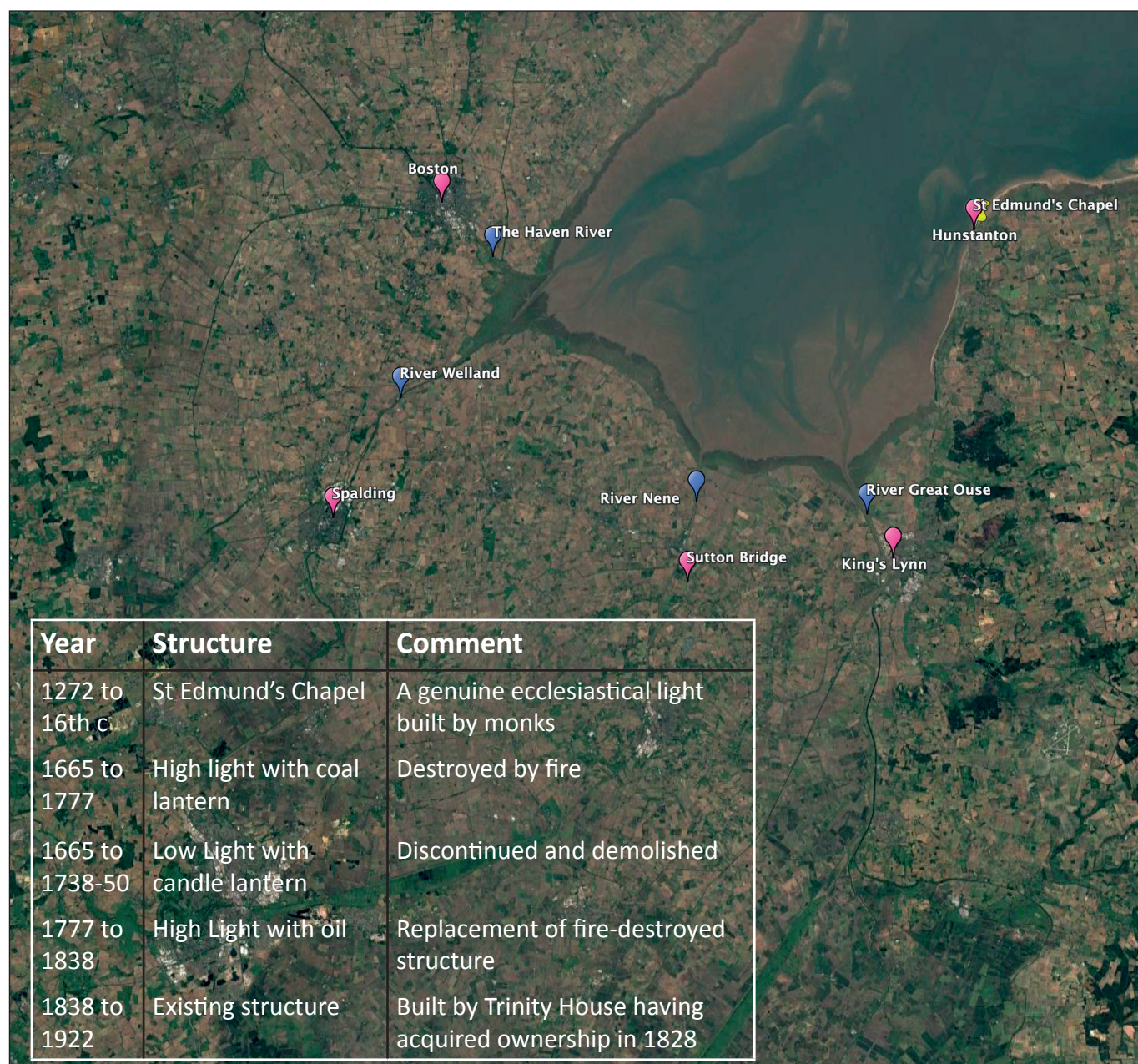
The southern part of the east coast of England is particularly flat and the lands adjacent to the North Sea are called East Anglia and the Fens. Besides a great distribution of sandbanks in the shallow waters, the fertile arable land has led to much deposition of silt at the numerous places where the modestly flowing rivers enter the area of the sea known as the Wash. A number of small towns emerged at river sites that were good for shipping and other marine activity. We have already seen how towns such as Kings Lynn became popular trading centres, especially in the times of the Hanseatic League so there was clearly a lot of activity in these difficult waters. Navigational aids were always essential here, but the difficulties of manoeuvring through the many channels were complicated.

We might have thought there would be many lights to guide shipping, but in fact there was only one site used during the medieval period and that was close to the village of Hunstanton. In my chapter on Ecclesiastical lights, I told the story (see p99) of a confirmed light shown from St Edmond's Chapel. Having been destroyed, local merchants recognized the need for a replacement light to guide ships through the Wash. A petition to the King was advanced and Trinity House was asked for its advice. The response was positive, but the



Brethren²⁵ viewed the light more as a local asset away from the north-south traffic flow and saw no reason why passing ships should be subject to the payment of dues. This of course greatly affected the economics of the project.

Having previously protested that they did not have a monopoly on lighthouse building, it was curious that Trinity House should be in favour of a private project. It is suggested that the Master, Sir William Batten was considering a private venture of his own at Harwich and did not want to set a precedent with the Corporation's opposition on



ABOVE: A satellite map of the Wash showing its extensive mud flats and the numerous waterways leading into it. The Table INSET lists the five structures that have been used for lights, including two leading lights. The existing historic remains are shown on the FACING PAGE. There are no other remains of earlier structures.

principle. We might call that a secret conflict of interest. It mattered not, however, for in 1665 the King awarded a Patent to a court insider, John Knight²⁶ and two lighthouses were in place that year.

The choice of leading lights is worthy of comment for these were substantial structures, the rear being a coal-fired high light and the front a lantern with candles. Furthermore, the rear light was almost certainly enclosed within a glazed lantern, making it one of the earliest in this 'modern' style.²⁷

There has been no explicit reason found for the alignment of these leading lights²⁸ and the difficulties of reaching any of the ports inshore

are far more than a simple course laid out at Hunstanton. Changing geography caused the low light to become redundant and it was dispensed with sometime during the period 1738-50. In 1777 the High light, still using coal, was totally destroyed by fire²⁹ and the current owner, Edward Everard, was forced to completely rebuild it. Ownership of the lighthouse passed through nine consecutive private owners until it was finally acquired by Trinity House in 1837, being only one of five remaining in England and Wales. A new station was constructed in 1838, of which the present remains, seen on the facing page, have been converted into a private dwelling.

The Winterton Saga

It is sad to report that Winterton-on-Sea has almost no material evidence remaining of a curious dispute that took place between Trinity House and a private lighthouse project. Although there is, indeed, a fine-looking lighthouse at Winterton - a conversion of a later tower into a private dwelling - this tells nothing of the arguments that took place just as the story of the modern lighthouse was on its first page.

As already indicated, East Anglia was causing problems to merchants and mariners in their business of shipping coals from Newcastle and for a time in the early 1600s the spotlight fell upon the village of Winterton and the sandbanks that lay close inshore. Trinity House had just begun to realise its responsibilities in the building of lighthouses and were minded to build three lights - one of which would be in the village and two more that would provide a lead into the channel. At the same time, an entrepreneur called Sir John Meldrum was also planning to build two lights for the same purpose, but in a different position. Trinity House believed that they had been given a monopoly to build lighthouses by Elizabeth, but Meldrum had received a patent from the King James I.³⁰ This quandary caused much concern with Trinity House who questioned the Privy Council about their rights to a monopoly. In mid-February, 1617, it had appeared that Trinity House had not wanted any lights at Winterton:

*"Dun [An Admiralty Judge] wishes to be satisfied about the need for lights at or near Winterton. A motion has been made to them by masters trading that way and contradicted by others who would have to contribute towards the charges. Trinity House, from their experience, considered that there was at present no need since there are already lights and buoys not far away at Caister; and also in view of the small profit in the trade to Newcastle, additional charges should be avoided."*³¹

But by 5th March, Trinity House were instructing two men to take charge of a building project:

"They are to go without delay to Winterton and select a suitable site near Winterton Ness for a turret or watchhouse in which

*to maintain a light of sea coals for guiding ships from the sea into the roads, And sites for two other Lighthouses for leading marks. They are then to arrange for the supply of materials and make contracts with workmen for building the Lighthouses, so far as the £60 allocated to them for that purpose permits. If more money is needed, any which is taken up in the country will be repaid in London. They are to pay Mr Ames of Yarmouth for candles or wages delivered to him Wrong by him to Wilson, keeper of the lights at Caistor. Accounts are to be rendered on their return. The keeping of lights at Caistor and Stampport is to be inspected and they are to employ men and boats as needed to help in sounding the channels and sands."*³²

On 4 June, they were urgently seeking legal advice about their supposed monopoly because Sir William Erskine (with Meldrum) was in competition.

Mr Secretary Lake instructed him in April to consult other counsel about the King's power in erecting Lighthouses and whether the statute of 8 Elizabeth [c. 13] so incorporates the power and sets the trust in such erecting in Trinity House that the King without straining the prerogative may not perform the same or delegate his power. The present Lord keeper, as attorney general, has already partly resolved the question in his report. Having heard the council of Trinity House and also Sir William Erskine, who has petitioned the King about erecting a lighthouse at Winterton Ness, opinion is given that (A) Lighthouses or sea marks within the meaning of the statute; (B) by the statute Trinity House possess authority and trust to provide Lighthouses if they will; (C) Trinity House cannot transfer this authority. But the grant to Trinity House does not inhibit the Crown under common law because its provisions are in the affirmative, allowing Trinity House to erect Lighthouses but not excluding the King from doing so; Since the passing of the statute both he and the late Queen have authorised the erection of some Lighthouses. So although authority is vested in Trinity House as persons of skill, if they fail to do so, the King is not restrained from providing Lighthouses in all necessary places. The question of convenience as

opposed to law is for [Privy Council] to judge. Note: a petition about this business delivered to the Privy Council on 18 February 1618 with inconveniences are entered below.

Clearly they did NOT have exclusive rights if the King chose to exercise his royal prerogative.

It is unclear from the correspondence if, by February 1618, Erskine and Meldrum's plans had been carried out. Trinity House were still complaining.

*"The inconveniences of the King's grant if Erskine erects lights: (A) The grantees are unskilled and those whom they employ are less qualified than the masters of Trinity House to place Lighthouses. (B) There are sufficient Lighthouses already erected at or near Winterton Ness. (C) multiplicity of Lighthouses and seamarks confounds pilots, thereby endangering ships, goods and lives. (D) the contribution offered by traders to Trinity House to erect and maintain lights at Winterton Ness is only six pence per 20 chaldrons and no collections have yet been made. But the imposition approved by the King is believed to be three shillings, four pence on 20 chaldrons. (E) The discontent caused by so great a levy on so poor a trade is left for consideration. (F) many ships will cease trading, thereby diminishing coal supplies and raising prices in the city and the country."*³³

By April 1621, the lights were in place.

"Instructions of Trinity House to Mr. Geere and Mr Cook: They are to go to Lowestoft, Caistor and Winterton, inspect the keeping of the lights and buoys there, and reform all defects or abuses. If the number of candles in the lanterns is insufficient, one or two more maybe added. The channels are to be sounded, and the sighting of the buoys considered and changed if necessary. A gentleman living near the Lighthouse is to be appointed to oversee the keeping of the lights. The channels at Stampport are to be sounded and a new buoy laid, if necessary, with the aid of two or three of the most sufficient seamen thereabouts. At Yarmouth Messrs. Greenwood, Lucas and Lad are to be called to account for duties received, and new agreements made for future collections according to customs. Geere

*and Cook are given full power to confirm or replace keepers of lights and buoys, and to increase charges for wages and candles, using the advice of others in the area, as necessary. They are given £20 to cover expenses, and if further money is needed, Trinity House will honour their bills of consignment."*³⁴

Curiously, it seems that Erskine and Meldrum's lights were in place also.

Lessons Learned?

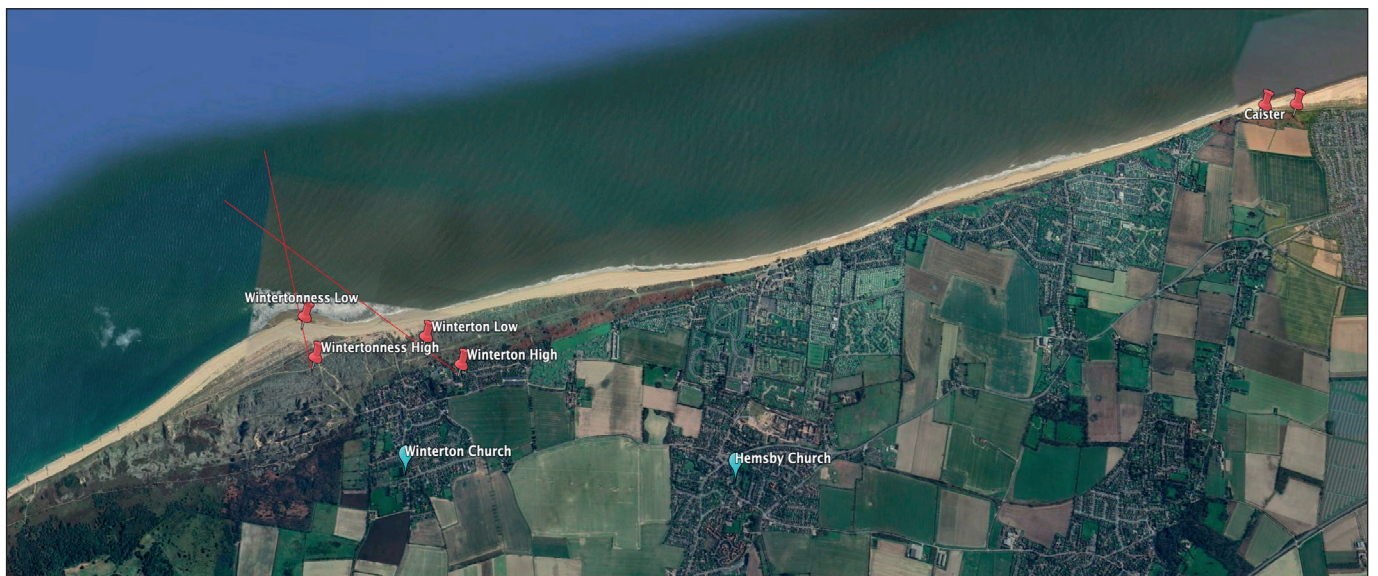
So what can we discern from these kinds of situations in which elements of politics, finance and significant conflicts of interests were constantly in play? With the growing realization of the value of effective navigational aids by all parties, we find continual friction amongst the stakeholders. Not least of which was an obvious disdain shown by those who felt they knew all there was to know on the subject - the elders of Trinity House - towards those they felt were amateurs - the entrepreneurs. In fairness, the Elder Brethren undoubtedly felt they were protecting the industry from unnecessary taxation that would result from the building of lighthouses they deemed to be of minor significance, but there is no doubt that those who possessed an extraordinary degree of power and influence caused a serious impediment to faster progress.

Then there were the usual human frailties demonstrated when those with privileged information indulged in what might be called today 'insider trading.' All human nature was on display in this subject, as much as anywhere else. There is no doubt that those with access to the monarch were able to manipulate matters in such a way as to bequeath long-lasting wealth to successive generations who had done nothing to deserve it. We will also come across instances in which overt corruption was accepted as part of life then, as it is also today, with little effort to conceal it.

But we always return to the idea that the greatest impediment to the development of a new 'modern' network of lighthouses was the lack of technological development. The story of this next phase of pharology will be told in my third volume, and we will have to remain, for now, in the environment in which great human effort was needed to light and maintain unreliable, fuel-heavy fires.



ABOVE: The situation that arose at Winterton was complicated. It appears that there were, at one time, two pairs of competing leading lights, both intended to warn of a large sandbank offshore. At the top we see a part of a sea chart of 1690 reproduced by Stevenson.³⁵ We note the various features: sandbank along the top; Winterton Church centre bottom with one pair of lights on the left marking the Ness and a second pair just above the church seeming to mark a channel inside the sandbank that is labelled as Hemsby Hole. For reference we also have Hemsby Church marked. Usefully we also see two lights at Caistor (see p293). The satellite map BELOW has been adjusted to match the old chart as closely as possible. LEFT is the only remaining structure, now a beautifully restored private house.

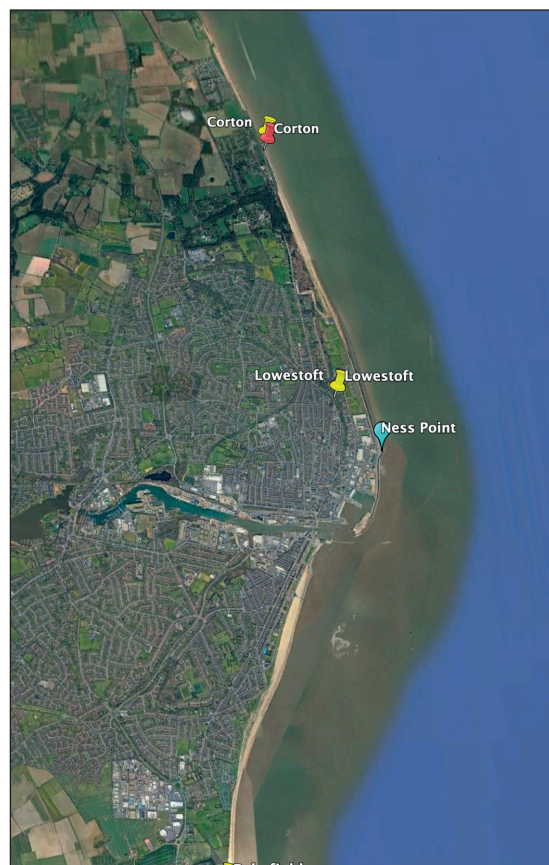


Lowestoft

Like Hunstanton, Lowestoft too has a complicated history. I begin by saying that this was the first instance of Trinity House building a lighthouse, despite being specifically given the authority to do so by Queen Elizabeth I a hundred years earlier. Geographically, Lowestoft is situated at the most easterly point of England³⁶ at a place where much of the rain that falls upon central East Anglia reaches the sea. It is obvious that it should have always had a close association with travel by sea and especially the fishing industry. Like the rest of the coast in this region, the sea is shallow and riddled with sandbanks, so it is logical that once the idea of helping mariners with lights gained a foothold in the minds of the sailors there should be a strong demand for lightstructures. And it has been the need to provide a safe course to steer into port that led to the adoption of leading lights. Overall, we can identify no fewer than *five* pairs of such lights at high and low locations leading ships into Lowestoft Harbour, rather than specifically directing them along the sea lanes between Newcastle and London. When replacements or upgrades were necessary, work was generally done on both at the same time and so the years of change for the Lowestoft lights are given as 1609, 1628, 1676, 1730 and 1866.

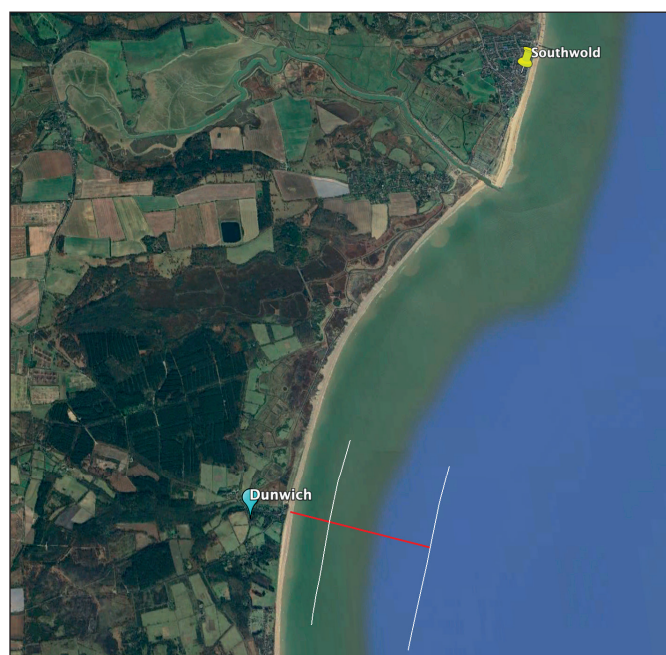
You might ask why it was necessary to have so many lights? The answer lies in the nature of the geography and the longevity of the structures themselves. These coastlines are notoriously prone to erosion and this is the source of the sands lying offshore. The erosion of the coast of Suffolk is of such magnitude that it has been the subject of many studies.³⁷ One of the earliest maps of Suffolk in 1575 showed Easton Ness, just north of Southwold as the dominant promontory of East Anglia,³⁸ but it eroded away leaving Lowestoft Ness as the most easterly point.³⁹ Further south, Dunwich may once have been the most easterly point, but it has been one of the most rapidly eroding locations.⁴⁰ The coastline here is estimated to have advanced inland by over a mile since Roman times when there was actually a useful harbour that encouraged significant population here. A recent study concluded that a half kilometre of shoreline had been lost in the past 500 years.⁴¹

With so much change taking place both onshore and offshore, any project to provide navigational aids was always subject to constant change and is



ABOVE: A satellite map of the Lowestoft area. Ness Point has been the most easterly point of England for some 500 years, now protected from erosion by a concrete sea wall. Nevertheless, during unprotected times, Lowestoft has required many changes of lightstructures due to erosion.

BELOW: Dunwich lies south of Lowestoft and north of Harwich. The coastline has suffered particularly badly here. The two lines indicate the land lost, (left) over the past 500 and (right) 2,000 years.



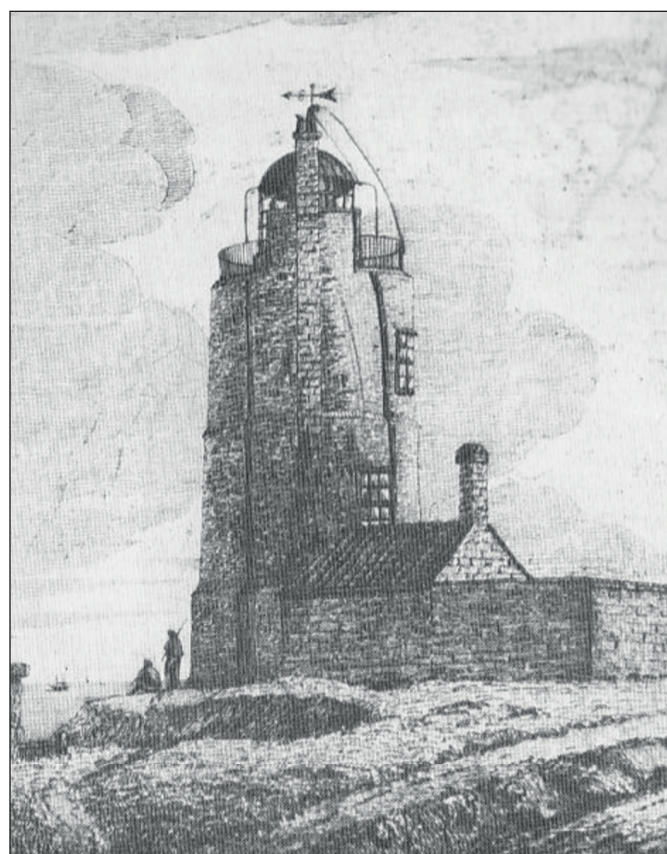


ABOVE: An engraving of the Lowestoft High Light of 1676 and BELOW a not-too-dissimilar depiction of the same structure. It was one of the few built during the time of Samuel Pepys at Trinity House. It lasted until 1874 when it was replaced at the same location by the current lighthouse, the coal light replaced by oil-burning technology.

the main reason why there have been so many lightstructures along this coast. The leading lights need occasional relocation to deal with the ever-moving safe channel.⁴² Then, of course, unless strongly built structures are made at great expense, the use of cheaper designs and building materials means that their lifetimes will be limited and will need to be re-constructed from time to time.

We often find mariners speaking of 'Roads' which refer to the invisible safe channels they must steer in order to avoid the sand banks. Roads are important in many locations around the North Sea and in particular close to the east coast of England, but especially so here in East Anglia.

We are poorly informed as to the precise designs of the numerous lightstructures of East Anglia, especially those prior to 1700. Images used here are entirely taken from the Industrial period. By far the best research has been done by Long.

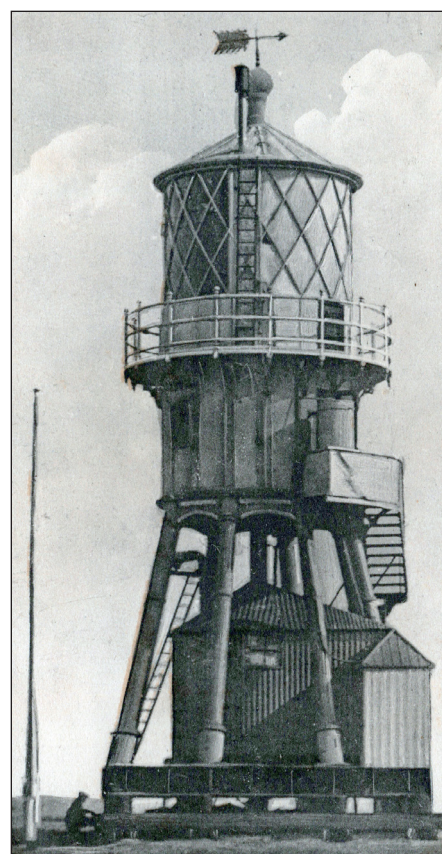




ABOVE: The Lowestoft Low light (4) of 1730, an essentially timber framework, with an enclosed lantern of square-pane glass. BELOW: The Lowestoft Low Light (5) of 1866 made of cast and wrought iron, its lantern glass having rhomboid (diamond) geometry.

We can be confident that these structures were built to provide safe steerage, an objective that requires the alignment of two lights. These are referred to as a Front and Rear or High and Low light, both pairs of terms being sufficient to identify them since the rear light is always higher than the front. With so much expected change to both the coastline and the sandbanks offshore, the need to make the front light more of a temporary arrangement was always anticipated. A sandbank could change its size, shape and position substantially in a couple of seasons if there were a number of powerful storms. Most often, it was a move of the front light that was necessary, so rear lights could be more substantial, whilst front lights needed to be somewhat expendable. Their structures were less massive, made of timber framework and frequently topped with an enclosed lantern.

Where rear lights typically burned coal, front lights had candles - the only two lighting methods available until designs of oil lamps were improved. And with the use of candles, an enclosure to the lantern was essential, a feature that waxed and waned in favour for coal fires over the years. There were clear benefits on either side for a coal fire to be either enclosed or open to the elements and the implementation of the light was not settled throughout the times using coal as a fuel. Once better lamps using oil flames had been accepted, they were always enclosed in a lantern.





ABOVE: The final lighthouse that existed at Orfordness in 2017 before it gave way to the encroaching sea. Attempts to preserve the structure by slowing the rate of erosion with black rubber mats along the shore eventually proved inadequate. Decommissioned in 2013, the structure was finally demolished in the summer of 2020.

Orfordness

One of the most complex histories is to be found at a remote location in Suffolk called Orfordness. Situated to the southeast of the small village of Orford lies a constantly evolving geographical feature sculpted by the sea since the ice melted eleven thousand years ago. As the River Alde entered the sea at Aldeburgh it found itself diverted by a shifting bank of shingle and sand to a new exit at the Spit of the shingle some fourteen km to the southwest. In the path of the river lay the long, narrow, boomerang-shaped spit known as Orfordness. It is a situation broadly similar to the geography of the Humber estuary and Spurn Point. Here, it is not the shingle spit that was in need of a mark but the protuberance of the Ness. As we have seen at numerous other locations, attempts to provide leading lights that showed mariners the course to steer in order to avoid this treacherous coastline running from east of northeast to west of southwest were constantly frustrated by a combination of the lack of constant foundations and a lack of investment on the part of the owners.

The story begins as yet another part of the demands for aids to navigation by those with interests in the shipping lanes of the western North Sea. It was probably the most well known of the lighthouse entrepreneurs, Sir John Meldrum who initiated action.⁴³ No doubt, the serious tragedy that occurred in 1627 when a severe storm caused the wrecking of 32 ships on the Ness with the loss of many lives lay painfully in the memories of local inhabitants. So in 1637 Meldrum was granted a licence from Charles I for lights at Orfordness, just one year after he had successfully petitioned to build lights at North and South Foreland. Perhaps he felt that he had too much on his plate, for before he started work he almost immediately sold his interest to Alderman Gerard Gore. Gore's father was Sir John Gore, Lord Mayor of London from 1624-5 who had built up a considerable estate with including shipping interests. Gerard was his eldest son and inherited everything. Thus it is Gore's name who is associated with the building of these first lights.



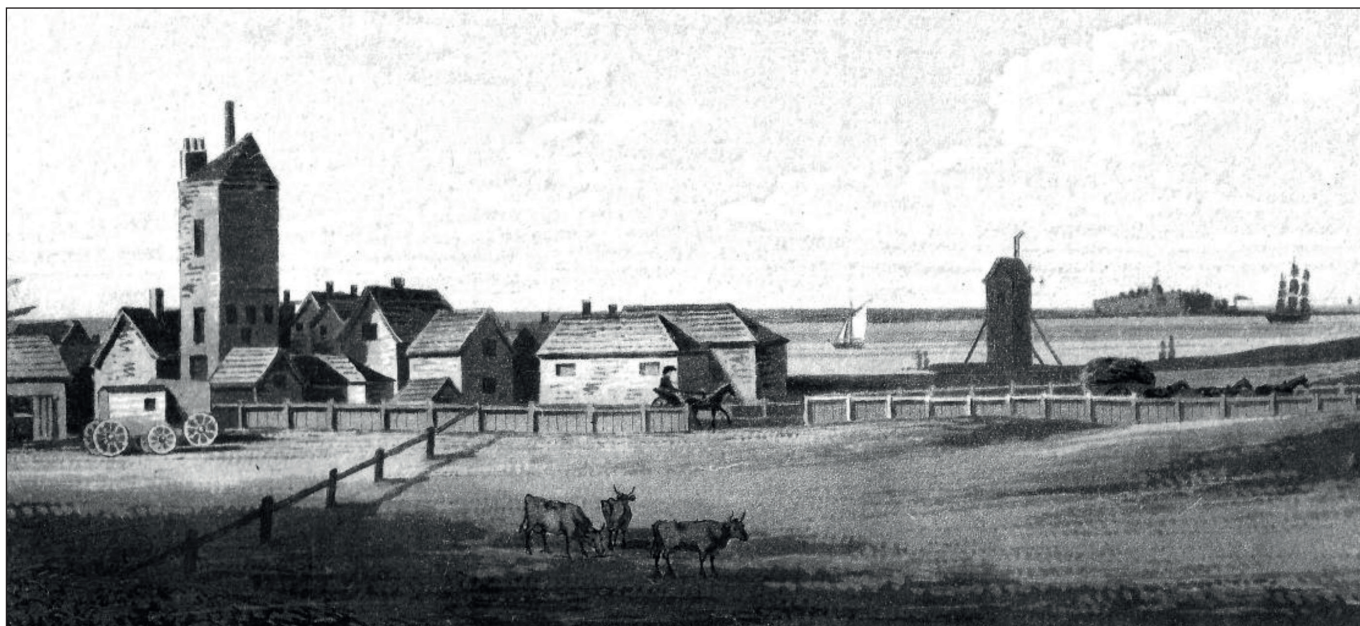
In these earliest of times, any names of the light keepers are precious for in the strongly class-structured English Society, ordinary people were rarely mentioned by name in records. It is also a pity that names were often recorded only when they did something wrong. For example, there is a record of a female light keeper of the first pair of lights who was dismissed by Gore in 1648 for incompetence. When the first keeper died, his job was taken by John Bradshaw who also died shortly afterwards. His wife was allowed to continue in the post, but it appears she could not maintain the two lights reliably each night.

The history of these lights continued for almost two centuries as a story of constant provision and loss as various causes necessitated action. With all except two of the structures made of wood and having poor foundations, if they were not washed away in storms, they might be burned down. There were times when the front light needed to be moved because of shifting shoreline, and then times when, because of the move, the lights were too close together in height. We can count no fewer than eight structures being built to serve as the Front (Low) light, and three structures built as the High light. Of these, the second of the three later became the ninth Front light when paired with a new (third) High light that remained in service until quite recently.

So, for almost exactly two hundred years the lights were in private hands until Parliamentary decisions in 1836 caused Trinity House to pay the last owner, Lord Braybrooke compensation of £13,414 for the Orfordness lighthouses. Even Trinity House were powerless to prevent nature's intentions and, rather than become one of our fine preserved lighthouses, the final existing tower succumbed to total erasure in 2020.



ABOVE: A satellite image of Orfordness showing the course of the River Alde as it is diverted southwest by the presence of the Ness. Lighthouses were built on the very point of the Ness, and these pages list the large number of attempts that were made to provide a course to steer running from east-northeast to west-southwest. No images have been discovered that illustrate these structures, although much can be inferred by knowledge of contemporary activities elsewhere. Neither can any accurate locations be identified because all have been consumed by the sea. It is not at all clear exactly what course the lights were intended to mark. Long indicates⁴⁴ a course between two offshore sandbanks to the northeast labelled Sizewell Bank and Aldeburgh Napes. We should accept this as well researched, though the benefit to ships is unclear. The line indicates the direction of north-northeast and south-southwest. Just one item of information can be gleaned from the mid 19th century publications by Findlay in which he gives the positions of the final pair of leading lights, 1439 yards (1316 m) apart, with the Rear Light being south of the Front Light, but on the line east-northeast to west-southwest. This is more appropriate to avoidance of the long shingle bank on the south side of the Ness. The structure shown on the facing page was the third High or Rear light and is shown by the red pin. It was paired with the second structure, now lost. Its likely position is shown as the white pin on the map above. We can never be sure of the exact details of these structures. All of the medieval structures were of wood and lost permanently to the sea by one means or another.⁴⁵



ABOVE: *The two 'misleading' lights of Harwich, built by Sir William Batten in 1665.*

Harwich

In the 1650s and 60s, England and Holland were intermittently at war with each other, mainly through economic competition, naval power, and colonial ambition. With barely 100 miles of the southern North Sea between them the two competing nations were too close for each others' comfort and came into frequent confrontation.

Harwich was regarded as one of the few excellent safe havens on the east coast and during these times became a significant base port for the Navy. But, as with the other ports of East Anglia, it too suffered from awkward locations of sand and shingle banks in its approaches. By the 17th century, it had become clear that leading lights were necessary and a project to secure a healthy pension fund occurred to an unprincipled member of the British elite.

The full story of the Harwich lighthouses is long and extends beyond the scope of this book about Medieval Lights.⁴⁶ A large part of the early history is to be found in the intriguing accounts of Samuel Pepys, a friend and colleague of an influential scoundrel called Sir William Batten. For a period, with both men in powerful positions at Trinity House, Pepys was privy to the inside story of how a Royal licence was obtained by Batten to be his personal project, rather than a publicly owned facility. Once again, we find that, despite having the full authority to order the building of two lights at

Harwich, Trinity House not only agreed to Batten's private application, but actually considered it an excellent proposal. The result was a very poor outcome for the mariners and citizens of Harwich for it led to the private ownership of what were generally considered to be poor navigational aids into Harwich for the ensuing 170 years. Batten's front structure was of wood with a rope-hoisted lantern containing a single candle. The rear light was a coal fire burning atop a taller stone building originally built to be the Town Gate. Clearly Batten was motivated to keep his expenses as small as possible.

A further aspect to the proceedings was that Trinity House had been persuaded not to participate in what was to be a purely local harbour project. In reality, the licence made it clear that the lights were to be of significance to both passing and local shipping, a fact that made the light dues (and the profits thereby) even more valuable than they might have been. We might suspect that some behind-the-scenes lobbying had taken place.

Having secured an extremely lucrative deal⁴⁷ from the King, Batten died soon after, leaving extremely valuable nest eggs to all of the chicks that would be born into his family thereafter. With the explosion of trade that was about to take place, the shares in his project passed down through the generations to many who cared little about the public benefit of what had become known ironically as the "Misleading Lights of Harwich."



ABOVE: Another engraving dated 1730 showing the first high lighthouse (centre) at Harwich built over the town gate in 1665.⁴⁹ It remained in use until it was replaced on a nearby site in 1817 by the tower BELOW.

The lights would remain in private ownership until 1837, by which time Parliament had decreed that all lights should be brought into the ownership of Trinity House. The compensation due to the shareholders who still had many years left on their licence was £160,000 - the third largest sum paid by Trinity House to comply with the Law.⁴⁸

During the seventeen decades of inefficiency and incompetence that followed the building of the Harwich lighthouses, the programme of repair and upgrade came to life only rarely. Two more structures were set up on the foreshore in 1727 and 1817, the first of which had its inventory of candles increased from one to six! The third structure was finally given Argand lamps and reflectors, a lighting method that was also adopted for a new rear (high) lighthouse also built in 1817 by a descendant of Batten's by marriage. Both structures remain today, although they were rendered redundant in 1863 having fallen victim to the changing nature of the approaches to the harbour. The service of the two Harwich lights was terminated in November of that year when two new leading lights were set up on the foreshore farther south at Dovercourt. (See the map on p309.)

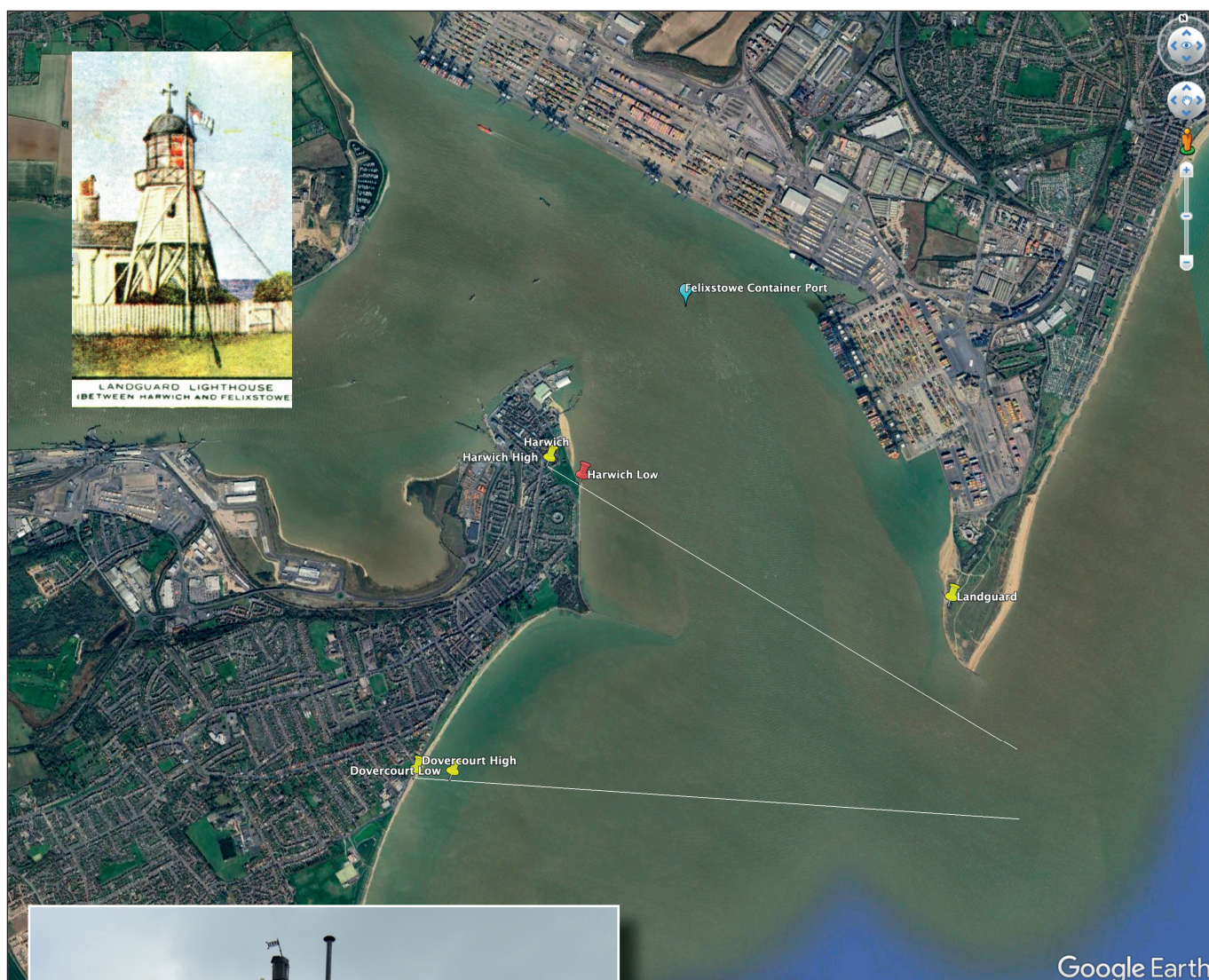




ABOVE: The second front (low) lighthouse at Harwich of 1727. [John Constable, Tate Gallery]

BELOW: The third Harwich front lighthouse of 1817 with added Victorian shelter disguised as a museum.





ABOVE: A satellite image of Dovercourt, Harwich and Felixstowe. The pair of leading lights that for so long indicated the channel into Harwich were eventually rendered useless because of the growth of shingle banks on Landguard Point. They were replaced by the two lights at Dovercourt, themselves taken out of service in 1917. Today, almost all activity is at the major east coast container port of Felixstowe. Landguard Point also hosted a lighthouse from 1861 to 1925 when it was destroyed by fire.

LEFT: The two nineteenth century leading lights here shown were in use in 2017 at Dovercourt in Essex. Made of cast and wrought iron, their designs are probably very similar to the structures made of wood that were used along this coastline from 1600 onwards.

Notes

1 Iron does not exist naturally in the Earth, although in extremely rare cases some iron is found on the ground having been deposited from meteorites. Iron is extracted from the ground as a non-metallic oxide and the oxygen must be chemically separated from the iron to obtain metal. This can only be done with extreme heat and that is where coal comes in. A well-designed furnace is fed with oxide and carbon derived from coal. The carbon combines with the oxygen to make carbon dioxide leaving the iron in liquid form. This can be cooled and solidified into a metal called cast iron. Desired shapes can then be re-formed with further heat and heavy mechanical working. Crudely this is the material called wrought iron. This technical process is further improved by controlling the amount of carbon that is left behind and when the carbon is reduced to a sufficiently low level we arrive at the alloy we call steel. Iron is never pure; it is always an alloy of iron and carbon and some other elements. These words have summarized very succinctly what took many decades to develop in the 19th and 20th centuries.

2 Stevenson, David: *Life of Robert Stevenson* (1858) p54.

3 Long, p1.

4 There are few surviving records due to major fires and wartime damage. However, a wonderful collection has been edited by G. G. Harris (see the bibliography).

5 Hague and Christie, p33.

6 A man named Robert Hamblin, a former merchant captain, received permission to place a lightship there in 1732.

7 The Maplin Sands Lighthouse, located at the mouth of the River Thames on Maplin Sands, Essex, England, was constructed beginning in 1838 and became operational in 1841. This lighthouse was notable for being the first to utilize the screw-pile design, an innovation by Irish engineer Alexander Mitchell. The design involved screwing piles into the sandy or muddy seabed to provide a stable foundation, a method that proved effective for offshore structures in such conditions. The construction was overseen by James Walker of Trinity House, who recommended Mitchell's design for this project. The lighthouse remained in operation until 1931, when it was abandoned due to erosion undermining its structure, leading to its collapse the following year.

8 On p4 of his book, de Boer quotes the arrival of the Norseman Egil in 950.

9 G de Boer MA. Interested readers should acquire this wonderfully documented book.

10 This well formed knowledge is too extensive to be included in this book focused on medieval lights.

11 The licence was for a period of ten years and there is nothing to prove that it was ever extended or repeated. It may be that the lighthouse itself was never completed or that Reedbarrow died before finishing his project.

12 Smeaton, John: *A Narrative of the Building of the Edystone Lighthouse* (1792), plate 23.

13 This image is an engraving by J Rogers after a drawing by H. Gastineau of 1829. Whilst being a beautiful image it is unfortunate that has been many times printed laterally reversed, a simple mistake to make when printing in early times. I have taken the liberty of showing it here as it ought to have appeared. Those who have visited the site will recognize the orientation at once.

14 Hague and Christie, p18-19.

15 The laws and rights of owners of land that was gained or lost by the action of the sea introduced much argument in the English courts system and is far too complicated to be reported here. Suffice to say that there were many long and protracted arguments in the courts that involved the ownership of the land on Spurn and the Angells were involved in a good deal of it.

16 Hague and Christie, p36-7.

17 Sharp-eyed readers will notice the variation in spellings. In older texts the name is generally spelled Caistor, whilst today, the accepted spelling is with an 'e'. It is also recognized as being 'on Sea'.

18 There are no images yet found for these lights. They might have been shown from inside structures - which would have made them lighthouses, or they might simply have been lanterns hanging from structures. However, they were apparently in service for around two hundred years and it is hard to imagine wooden structures lasting that long without many rebuilds. Logic tells us that they must have been built of stone for much of that time and I will consider them to be (historic) lighthouses according to my definitions. We are also in doubt about the use of them as leading lights. They were undoubtedly built to assist the coaling ships as they passed by, and the builder may have been influenced by two towers he had seen at North Shields from where the coal ships were departing. However, unlike the function at North Shields where a steering line was being indicated by the two lights, there is no indication of why a leading light here might have been necessary. We should also compare the lights of a similar period at Winterton and Wintertonness, for two lights were also used at the latter site and may have been part of some as yet unknown pattern. It is also possible that two lights were used simply to distinguish the site at Caistor from other single lights nearby. There is no archaeological evidence presently found, although

the location of one has been reported. It is regrettable that so little evidence is available for two(?) such long-lived structures.

19 According to Stevenson, p97. See also note 1 above.

20 The location is today known as Caister on Sea.

21 Candles were used in the Eddystone lighthouses of Winstanley (1698), Rudyerd (1708) and Smeaton (1756). Stevenson p97 reports that the candles used at Caistor from 1628 there were three candles that were one third of a pound weight each and implied that prior to that there had been even fewer used. Stevenson also reports that in 1607, candles were also in use for two lights at Lowestoft.

22 See earlier material about Trinity House on p134. Formed in 1514, it's original purpose did not include the building or management of lighthouses which were not yet being built.

23 UK Parliament Select Committee on Means of improving and maintaining Foreign Trade Report (Lights, Harbour Dues and Pilotage), Minutes of Evidence, Appendix. Report from the Select Committee appointed to consider of the means of improving and maintaining the foreign trade of the country. Lights, harbour dues, and pilotage. 1822 (591) V.107, 327. Also Whormby, p16.

24 The town was only later honoured by the addition of the prefix, Kings.

25 The members of the Board of Trinity House have always been called 'Brethren', the most senior being the 'Elder' and the junior members being called 'Younger'.

26 The ownership of the lights was almost immediately signed over to a man called Edward Bodham, whose wife happened to be Knight's sister. There was clearly some 'insider trading' afoot.

27 The glazing of this lantern in 1665 is to be compared to the glazing by Trinity House of Lowestoft in 1677, Scilly in 1680 and South Foreland in 1719.

28 As with other lights in positions of changing geography, their service lifetimes were limited. In this case, the lighthouse was later replaced with a lightship.

29 The use of wood in structures and coal for lighting was always a serious risk. There have been many such instances of lighthouses being destroyed by fire caused by sparks from embers or careless work by sleepy light keepers.

30 James I had previously been James VI of Scotland and he had inherited the throne from Elizabeth in 1603.

31 Harris, §85.

32 Harris, §98.

33 Harris, §116, 18 Feb 1618.

34 Harris, §172 folio 62V dated 9 April 1621

35 Stevenson, p108.

36 The most easterly point has been Ness Point in Lowestoft since around 1500.

37 Ferretti, Liz: Suffolk's Changing Coast. <https://coastandheaths-nl.org.uk/wp-content/uploads/2021/09/Suffolks-Changing-Coast.pdf>.

38 Long, p88.

39 This might too have eroded away more if it had not been protected by a concrete sea wall built in the early 20th century.

40 Anon: Environment Agency, 2006. <https://coastalmonitoring.org>

41 Ferretti, p11.

42 We find in many cases that Low Lights are indeed moveable to obviate the need for occasional rebuilding.

43 Meldrum was patentee for North and South Foreland as well as Winterton and Orfordness. See Light on the Forelands, p56.

44 Long, p55.

45 A brave attempt was made by Long (p63) to unravel the details of these structures. Sadly, there is no reference to his source of information, although the author is extremely credible and his conclusions should be trusted.

46 Again, the reader is referred to Long's excellent narrative pp136-158 in which he presents all of the details of this story of political intrigue.

47 The license was for 61 years in the first instance and was successfully extended on two more occasions afterwards.

48 The Law came into effect at the start of 1837. The £160,000 compensation was exceeded only by that of £300,000 to purchase the Spurn lights and £444,000 to buy out the shareholders of the Skerries lighthouse.

49 Sheppard, Robert: The history and antiquities of Harwich and Dovercourt, topographical, dynastical and political (1730).