1.2 Broad Character: Industry

1.2.1 Character Type: Extractive Industry (Minerals)
Regional Perspective: East Anglia

INTRODUCTION: DEFINING/DISTINGUISHING ATTRIBUTES

The marine aggregates extraction industry is particularly significant in the East Anglian region. Of the 20 million tonnes of material extracted each year in the UK, around half originates from east coast sites (http://hubpages.com/hub/Coastal-Erosion-in-East-Anglia) with the largest area of active dredging located just off the coast of Great Yarmouth. This is accompanied by a number of smaller zones between Felixstowe and Clacton and a small area off Southwold which is outside territorial waters. The sediment in the area is mainly coarse sand and gravel, with large areas of pure gravel, making it particularly viable for this activity. Overall larger licensed areas are present but not all are currently in use. Dredging activity is related to market demand, therefore activity can be sporadic and difficult to predict (Rogers 1997).

Onshore, aggregate quarrying occurs throughout East Anglia. In the absence of hard rock within the solid geology, this generally also comprises extraction of sand and gravel. River valleys are often good sources of this material and quarries currently exist along the River Waveney and at Nacton adjacent to the Orwell.

Sand and gravel is extracted for onshore construction including concrete, mortar and asphalt, general fill, roadstone, and drainage, construction of harbours and coastal risk management (Cohen 2009, 11) both within the UK and in Europe where offshore dredging restrictions apply.

As a result of the natural geology good building stone is scarce in East Anglia although there is an abundance of flint. The exception to this in the coastal area is in parts of Suffolk where hard Coralline Crag has been sporadically quarried (Williamson 2006, 17). In addition a type of limestone known as Septaria occurs in narrow bands or nodules within the London Clay. Because this was used for building in the past it is sometimes still quarried for use in restoration work.

Clay is naturally abundant in the region and is still extracted, particularly in Suffolk. Aldeburgh Brickworks still has two areas of quarry covering 5.05 and 2.6 ha of land. Smaller quarries exist at South Cove, Gisleham and Chilesford, along the coastal belt.

Another naturally occurring mineral in this area is copperas, also known as green vitriol. This is a form of ferrous sulphate extracted from iron-pyrite rich nodules. These occur naturally within Eocene clay deposits and can be found off the coast of Essex in the London Clay (http://www.eng-h.gov.uk/archcom/projects/summarys/html97_8/2059.htm). These are often loose nodules, although some quarrying has taken place in the past.

There are no coalfields or metal ores in East Anglia and therefore no active mines although flint was mined in the past (see below).

HISTORICAL PROCESSES; COMPONENTS, FEATURES AND VARIABILITY

East Anglia was not always bereft of mines. In early prehistory flint was the only material available in Southern Britain for making edge tools and was mined and exported on some scale from East Anglia (Williamson 2006, 17). This is best exemplified by Grimes Graves in Norfolk, an extensive series of over 400 pits, the deepest of which reach down over 30 feet. The reason for such depths was the desire to reach the three bands of flint – the topstone, wallstone and floorstone. Floorstone is the deepest and by far the finest type of flint, so superior in quality that it was mined to some depth and exported on a large scale. The scale of exploitation of coastal flint is unknown, although coastal routes may have been used to transport the stone.

Flint has been extensively used to construct buildings in the study area since the Roman period and into the medieval and post medieval periods. Good examples of this can be seen at the Roman fort of Burgh Castle, as well as at a number of churches in the area such as the ruined structure at Covehithe.

Flint building at Burgh Castle

The Romans and Normans also obtained septaria stone from the area around Dovercourt. This was quarried from the cliffs or dredged from the seabed and used as a building stone or as a constituent of cement. Buildings constructed using septaria include Orford Castle and the churches at Wrabness on the River Stour, Chlemondiston on the Orwell, Friston on Sea and Clacton (Ashurst and Dimes 1998, 118-119).

The lack of coalfields and metal ores in East Anglia is one reason why the Industrial Revolution concentrated elsewhere (Williamson 2006, 17). However a number of small extraction industries grew up in the post medieval period and now the large container ports such as Harwich and Felixstowe have made it an important region for industry.

Covehithe church showing flint construction

During the large scale conversion of marshes and heaths to arable land which occurred during the so-called 'agricultural revolution' of the 17th to 19th centuries, soil acidity was neutralised by mixing sandy soils with calcareous material. Thus clay or 'marl' was extracted from large pits in the area requiring neutralisation and spread. This occurred in many coastal areas where soil was particularly acidic, specifically including the area around Woodbridge where shelly calcareous crag occurs. The Norden survey of the Stanhope estates in 1600-1601 identified a number of pits including one in a close called 'Marlingfield', however the heyday for marling was the 18th century (Williamson 2005, 64).

Septaria deposits at Beacon Cliff and Cobbolds Point, Felixstowe were re-opened in the 19th century, establishing a profitable cement industry from 1812. Septaria was gathered, broken up and burned in kilns to form fine cement powder. By 1835 there were five factories in Harwich. However as a result of the mining Beacon Hill headland rapidly eroded and Harwich harbour silted up. The works were closed in the 1860s, partly as a result of the damage and partly because of the rise of the Portland Cement industry on the Thames (Essex County Council nd).

Copperas, found as nodules on the coast and in river valleys, was one of the foundations of the modern chemical and pharmaceutical industries (Williams and Brown 1999, 21). It was used in the metallurgical industry and extensively in the textile industry which was so important to this area in the post medieval period. Copperas was used to make chlorine, used as bleaching agent in the 17th and 18th centuries and as a dye fixative for woollens. Other uses include as printers ink, a tanning agent for leather and in the manufacture of gunpowder (http://www.eng-h.gov.uk). The copperas industry is considered to be the first heavily capitalised industry (Williams and Brown 1999, 21).

The industry in this area was centred on Harwich and Ramsey, near Walton and has left its mark on the landscape in terms of place names. For example, the area around Wrabness on the bank of the Stour contains regions known as Copperas Bay and Copperas Wood. A large area of seabed just offshore of Frinton is also known as 'Copperas Ground'.

A coprolite (fossilised animal dung and bones) extraction industry also developed on the Suffolk coast in the 19th century. Coprolite is located between the London clay and the later crag deposits which exist in the region and is phosphate-rich therefore making good fertiliser when processed. Although there was a recorded case of coprolite spreading in 1717 near Levington (Simper 1986) the industry took off in the 19th century when an efficient refining process was discovered which efficiently extracted the phosphates.

Coprolite was initially extracted from eroded seams or from the ubiquitous crag or clay pits where the nodules would be clearly visible. Ultimately pits were purpose dug for coprolite extraction and are often marked on 19th century Ordnance Survey maps. Coprolite pits were often several hundred metres wide and some metres deep and were therefore substantial landscape features. However the pits were short-lived and backfilled once coprolite extraction was complete and are now difficult to locate. These sometimes survive as large but shallow depressions on agricultural fields and can be identified from aerial photography (Berridge 2004).

Map evidence also exists for short-lived tramways leading away from coprolite pits, however once removed from the immediate vicinity it is likely that most coprolite travelled on the waterways of the region. Shipping records from Ipswich indicate that in the late 1800s coprolite was a major import (ibid), presumably originating in the surrounding countryside. Stonner Point in Waldringfield on the banks of the Deben became a centre for coprolite shipping after a quay was built by Thomas Waller of Sutton Hall c. 1850 specifically for this purpose.

The coprolite industry was very profitable for a short while and two major manufacturers existed in the area – Edward Packard and Joseph Fison. The first Packard factory was in Snape on the Deben but moved to Bramford near Ipswich. This was also the site of the Fison factory and the two were amalgamated in the early 20th century, becoming the industrial giant Fisons. The coprolite industry declined in the late 19th century, possibly as a result of the influx of cheap raw materials from abroad although there was some suggestion that the supply had become exhausted (Berridge 2004).

There is little widespread evidence of historic aggregate quarrying in the region but small pits and quarries for the extraction of sand, gravel or clay were common throughout history. Clay was extracted on a larger scale from Boyton Marshes in the 17th and 18th century. In 1933 a gravel company set up a shingle extraction operation on Havergate island however this was found to be unprofitable and was soon abandoned. Around 7.1 million tonnes of aggregates were quarried in 2000, as the need for aggregates has grown (http://www.mineralproducts.org/qua_yourarea02.htm).

Marine aggregate dredging has become progressively more important to supplement quarried aggregates since the 1960s when pressure for development increased. Dredging began off East Anglia in 1973, when 3 million tonnes of material were removed, and has steadily grown ever since with nearly 10 million tonnes of

material being removed in 2001 (http://hubpages.com/hub/Coastal-Erosion-in-East-Anglia). In the south east of England as a whole, 33 % of sand and gravel for construction comes from the seabed and has been used in a number of major developments in the east London corridor, with aggregates delivered straight to the wharves of the Thames (http://www.thecrownestate.co.uk/marine_aggregates).

Other developments which have resulted in large scale aggregate dredging in the region have included the construction of Sizewell B in the late 1980s and more recent beach replenishment schemes.

VALUES AND PERCEPTIONS

The minerals extractive industry has played a part in the East Anglian development, and more so relatively, and as a whole leads to mixed personal feelings. In places where the smaller industries thrived such as the copperas and coprolite industries these aspects have become part of the landscape and the character of those areas. A number of copperas place names exist and there is a Coprolite Street in Ipswich.

The larger and more recent industries of aggregate quarrying and dredging on the other hand have elicited mixed responses from different sectors of the community. Many people believe that the extensive dredging off the East Anglian coast is contributing to increasingly severe coastal erosion. In short it is felt that removal of sandbanks allows larger waves to reach the shore, stripping away material. Another effect of this is that the shore becomes steeper and deposition of new material more difficult (http://hubpages.com/hub/Coastal-Erosion-in-East-Anglia).

In terms of the historic environment, aggregate dredging has been perceived as destructive of past landscapes and features, however various measures are being taken to address or mitigate this, as outlined in the following section.

Onshore quarrying is equally subject to contested viewpoints including from noise and air pollution and further effects on the historic environment.

Aggregate extraction undoubtedly has a strong economic value to the area, employing large numbers of people both offshore, landward and at wharves and docks. In addition the aggregates are essential to the construction industry and therefore to further development.

RESEARCH, AMENITY AND EDUCATION

This character type has a lot of potential for research. In particular, offshore aggregate dredging can provide much archaeological and historical information. This applies to all stages of the dredging process including site location through to sorting on the wharves.

This has been significantly aided by the Aggregates Levy Sustainability Fund (ALSF), conceived to address the environmental costs associated with quarrying or dredging, not already covered by legislation. The fund is distributed for DEFRA by three different bodies including English Heritage. Between 2002-2008 the ALSF funded over 250 projects relating to the historic environment to a value of over £23 m; the anticipated value of projects 2008-2011 is £4.5 m (Flatman and Doeser 2010, 161).

The ALSF has been particularly valuable in terms of funding survey and mapping projects which help identify and manage historic sites and landscapes. In addition it has been key to establishing guidance in the form of 'Marine Aggregates Dredging and the Historic Environment' (2003). This was followed by the 'Marine Aggregate Industry Protocol for the Reporting of Finds of Archaeological Interest', a collaborative project between the British Marine Aggregate Producers Association, English Heritage and the Crown Estate. This has seen wide-scale reporting of archaeological finds and a significant interest in the historic environment within the dredging community. This was accompanied by an awareness programme funded by the ALSF and implemented by Wessex Archaeology including visits from archaeologists to workplaces, a newsletter (Dredged up from the Past) and a training DVD.

To finalise the development of a nationally-applicable method for characterising the historic dimension of England's coastal and marine environment, Historic Seascape Characterisation (HSC), Cornwall Historic Environment Service consolidated a national HSC methodology from the lessons and the experience gained during the five pilot projects of the England's Historic Seascapes Programme undertaken in 2004-07. This was funded by the Marine Aggregates Levy Sustainability Fund and the resulting methodology is provided in the project's "National HSC Method Statement" (2008). The HSC method is relevant to both public awareness raising, and to contextualising marine aggregates extraction licensing.

One of the most significant consequences of the Protocol is the recent find of 75 Palaeolithic tools from Dredging Area 240, approximately 8 miles east of Great Yarmouth. These were discovered on a wharf in Holland during sorting and sourced back to Area 240, following which an ALSF project was initiated to fully explore the area with some interesting results.

The ALSF has also contributed to educating younger audiences in the form of 'Derek the Dredger', a project run by The Hampshire and Wight Trust for Maritime Archaeology. This includes two books which explain the role of both aggregates dredging and maritime archaeology.

Onshore, a great deal of research into flint mining in the area as a whole has been undertaken, mainly as a result of the excavation of Grimes Graves in Norfolk. The site itself is a successful tourist attraction.

There is scope for much more research to be carried out on the lesser industries of coastal East Anglia such as copperas and coprolite which until now have remained the realm of small scale local research. This could be developed into displays and educational material and could tie in with the natural elements such as geological strata and fossils.

CONDITION AND FORCES FOR CHANGE

The extraction industry remains one of the largest industries in East Anglia as a whole, particularly as a result of the offshore dredging, although the intensity of these operations is dictated by the health of the construction industry. Onshore quarrying is not as lucrative but still functions as a viable industry. Very little survives of the smaller 19th century industries within the landscape.

In terms of relict industries, forces of change mainly relates to development, where land containing industrial features is lost to construction or from the masking effects of agriculture.

Current industry is susceptible to a number of forces of change, most significantly economic. Currently the UK is reliant on marine-sourced aggregates to a far higher degree than virtually any other nation in the world (Flatman and Doeser 2010, 164). However dredging is entirely subject to market demands which can change on a regular basis.

Beach replenishment Felixstowe

As outlined above the established relationship between industry and the heritage sector in this industrial field is a positive force for change in relation to safeguarding the historic environment.

RARITY AND VULNERABILITY

Current extraction industries are not rare, however they affect areas of vulnerable historic environment. Dredging of the seabed and quarrying on land effectively destroys any pre-existing historic environment evidence in that area. As such archaeological mitigation is crucial.

It has been noted here that we have lost much of our knowledge of relict industries, the remains of which are mostly abandoned and unrecorded. In some cases such features can also produce features valued for their natural environment characteristics.. For example the cliffs in the area of septaria and copperas extraction are designated as SSSIs.

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