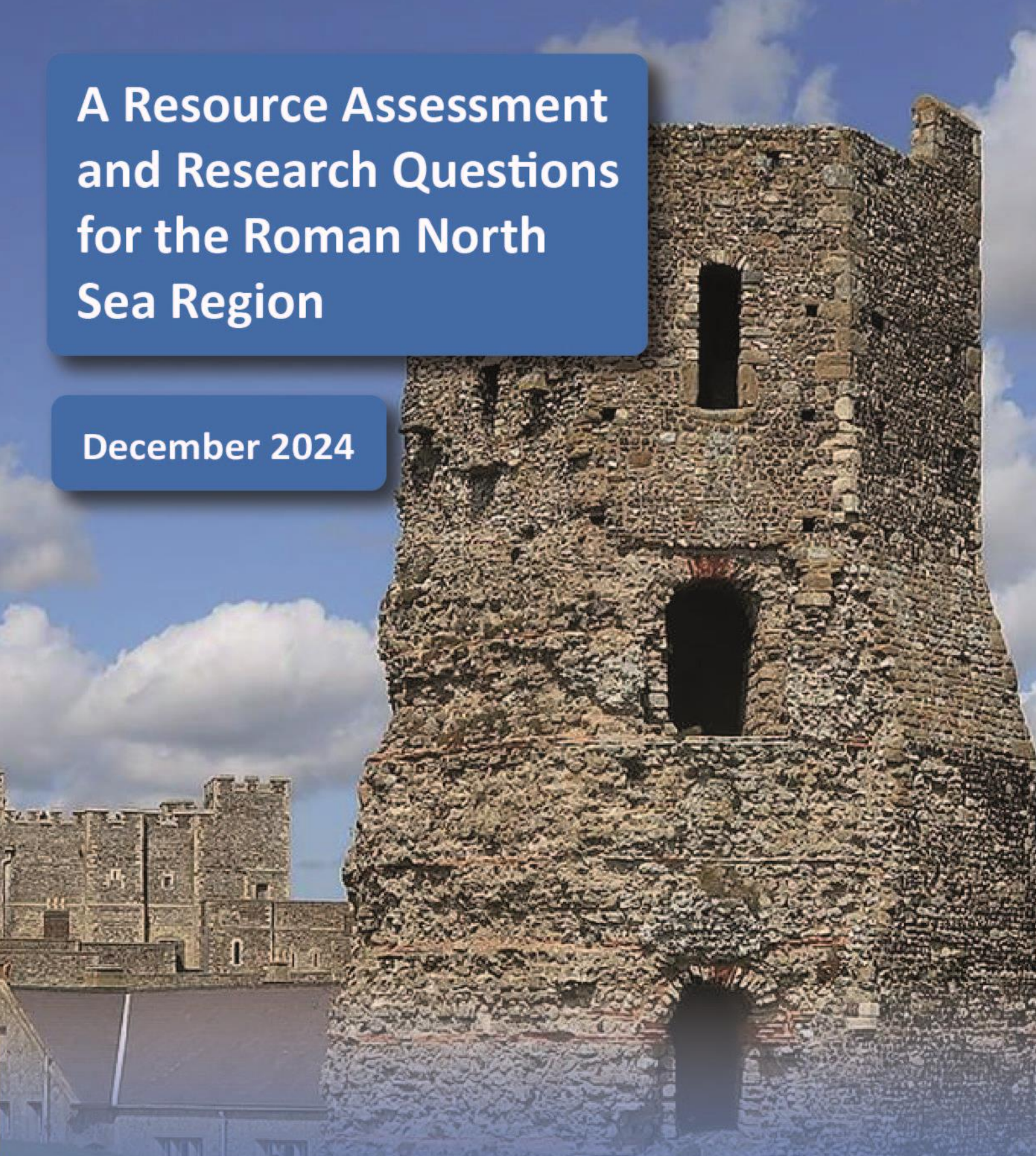
A Resource Assessment and Research Questions for the Roman North Sea Region

December 2024



Acknowledgements

The partners would like to acknowledge the generous support of the Straits Committee Small Projects Initiative. The Straits Initiative is a partnership between regional local government organisations and includes Kent County Council (UK), the Departments of Nord and Pas-de-Calais (France), the Provinces of West- and East-Flanders (Belgium) and the Provinces of Zeeland and Zuid-Holland (Netherlands). It promotes good relations, encourages cross-border discussions on matters of mutual interest and seeks to create opportunities for working together where it is useful to do so. In addition, the project has benefitted from the contribution of several other organisations who, though not formal partners, have brought their expertise to the project, in particular André Styza of the Cercle Histoire/Archéo Bailleul Flandre whose contributions at workshops have been invaluable.

Contents

List of Figures

List of Tables

1 Introduction

1.1 The 'Bridging the North Sea' Project

The 'Bridging the North Sea' Project (BtNS) is a collaboration between archaeologists from a range of heritage institutions across the UK, France, Belgium and the Netherlands. The overall goal of the Project is to study the connectivity that existed within the region during the Roman period. With the improved understanding thereby achieved, the partners seek to increase awareness of this connectivity among both archaeologists and non-archaeologists alike by reviewing the archaeological resource and identifying key research questions, and by developing an interpretation plan that can underpin how this shared history and heritage can be communicated to different audiences.

Membership of the partnership mostly includes organisations operating within the geographical area covered by the Straits Committee Small Projects Initiative. The Straits Initiative is a partnership between regional local government organisations and includes Kent County Council (UK), the Departments of Nord and Pas-de-Calais (France), the Provinces of West- and East-Flanders (Belgium) and the Provinces of Zeeland and South-Holland (Netherlands). It promotes good relations, encourages cross-border discussions on matters of mutual interest and seeks to create opportunities for working together where it is useful to do so. In addition to organisations operating within the Straits Initiative area, however, there are other organisations in the network who have chosen to participate because of a shared interest in the connectivity of the North Sea area, particularly organisations from north-east England (specifically the area around the mouth of the River Tyne which acted as a route to Hadrian's wall in the Roman period). A list of full partners is presented in table 1 in addition to which there are several corresponding organisations assisting with the Project.

The partners in the project are drawn from a wide variety of organisations on both sides of the North Sea. These include universities, museums, archaeological curators, commercial organisations and community groups. All have an interest in studying the Roman period and want to understand their local archaeological resource within its wider regional context. The diverse membership provides a range of perspectives and expertise that the Project can draw upon but also highlights the different audiences that archaeologists must engage with, and the range of uses for archaeological information and material.

Name of partner	Region	Type of organisation	Country
Province of South-Holland (Lead Partner)	Zuid-Holland	Local/Regional government	Netherlands
Hazenberg Archeologie	Zuid-Holland	Private Company	Netherlands
Museum Park Archeon	Zuid-Holland	Foundation	Netherlands
Province of Zeeland	Zeeland	Local/Regional government	Netherlands
Stichting Cultureel Erfgoed Zeeland	Zeeland	Government agency	Netherlands
National Museum of Antiquities	National	Museum	Netherlands
Kent County Council	South-East England	Local/Regional government	UK
Newcastle University	North-East England	University	UK
North-East Museums (formerly Tyne & Wear Archives & Museums).	North-East England	Museums/Archives service	UK
University of Ghent	East-Flanders, West-Flanders	University	Belgium
Province of West-Flanders	West-Flanders	Local/Regional government	Belgium
Romeins Archeologisch Museum Oudenburg	West-Flanders	Museum	Belgium
City of Boulogne-sur-Mer	Pas-de-Calais	Local/Regional government	France
Departement du Nord	Nord	Local/Regional government	France

***Table 1** - Partners in the 'Bridging the North Sea' Project*

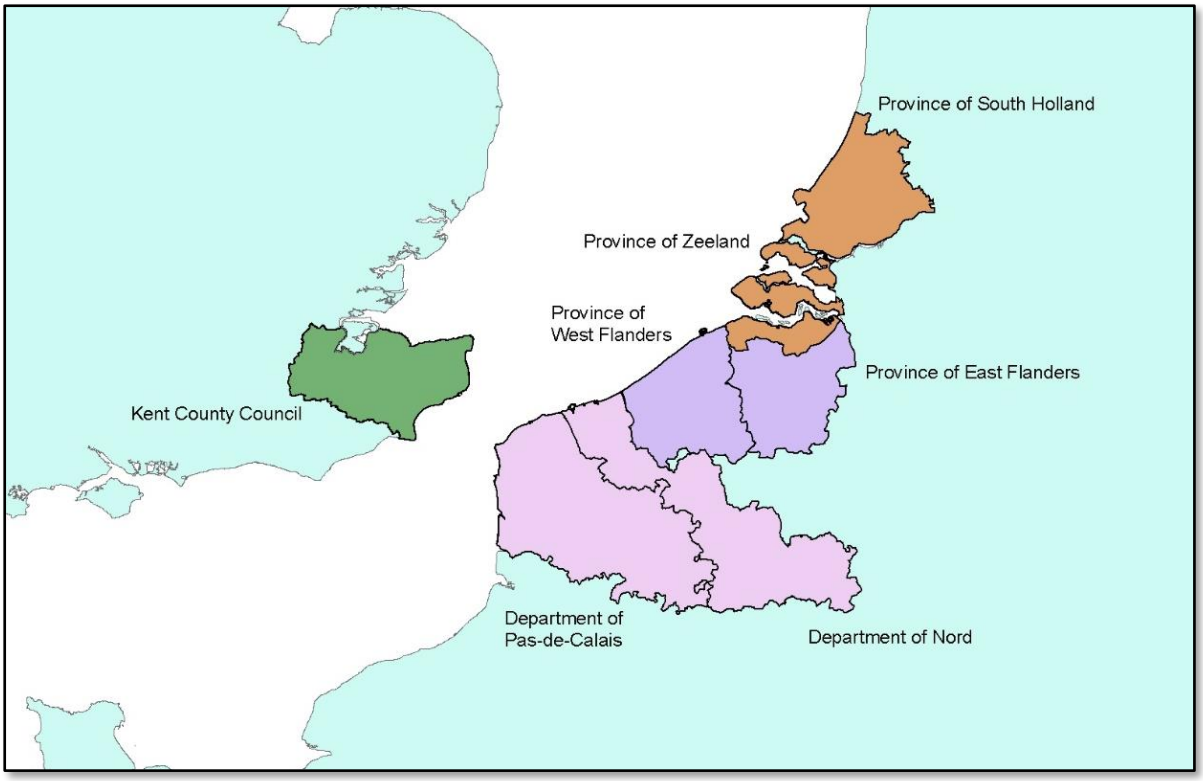


***Figure* 1** - *The member regions of the Straits Small Projects Initiative*

The Project has five main objectives:

- **Action 1**: Building and launching the 'Bridging the North Sea Network'. This involved establishing working groups to deliver the project outputs via a series of workshops.
- **Action 2**: Setting up the 'Bridging the North Sea Network' Communication
    - Platform and associated promotion.
- **Action 3**: Defining Research Themes and producing Research Questions. The main deliverable for this action is this Resource Assessment and Research Questions document.
- **Action 4**: Developing a 'Bridging the North Sea' Interpretation Plan
- **Action 5**: Holding a 'Bridging the North Sea Network' Action Plan 2024-2027 Final Conference.

The 'Bridging the North Sea' Project commenced in January 2023 and will continue until December 2024.

1.2 The Channel/North Sea in the Roman period

Taken overall, the basic geography and environmental conditions of the Bridging the North Sea Project area in the Roman period may appear to be fairly similar to the present day. The coastlines of the region showed some differences to today, but the routes of the major rivers, and sea-levels were broadly comparable. Within this apparent similarity, however, was some variability. Sea-levels rose and fell periodically and these changes were particularly important for low-lying coastal areas in the Bridging the North Sea Project area as falling sea-levels allowed an expansion of settlement and the exploitation of new areas. Rising sea-levels by contrast forced retreats from such areas and, in the opinion of some researchers, also provoked population movement in the late Roman period. These changes clearly affected some parts of the region more than others. The northern Netherlands were particularly subject to coastal change as were some parts of eastern England, in particular Romney Marsh, the north Kent marshes and the Wantsum Channel, and the Fens of East Anglia. Differences of landscape and geology were significant in the Roman period and there were significant differences between, say, the coastal zone of Flanders which is defined as the Roman coastal plan and the bordering sand zone and Kent, the Pas-De-Calais or north-east England.

Climatically the conditions in the Roman period were broadly similar to today although there were local differences. In the Bridging the North Sea Project area a similar range of agricultural products to those cultivated today were grown successfully. Indeed, so successfully that British surpluses supplied the northern empire later in the Roman period. Generally, the empire experienced the Roman Warm Period (or Roman Climate Optimum) from c. 300 BC to AD 300. Within this there was variation. Britain, for example, seems to have been subject to relatively wet and gradually cooling conditions in the early Roman period, and then experienced a change to somewhat cooler and drier conditions in the 4th century.

The Connectivity studied in this Project was based on both natural and constructed arteries running through the study area. The constructed arteries were the roads with their associated infrastructure and the sea lanes that emerged as routes of trade and exchange developed. The natural arteries were the rivers of north-west Europe, in particular the major rivers of the Rhine, Scheldt and Thames, all of which empty into the southern North Sea, and which provided access to the hinterlands of central Europe and central Britain. Alongside these, however, were numerous smaller rivers that allowed trade and exchange as well as providing fertile soils for agriculture, and the even more numerous creeks and tidal gullies that would have allowed production sites to access the main riverine and road transport networks.

Connectivity within the Project area did not of course begin with the arrival of the Roman empire. Communities had been exchanging materials, people and ideas for thousands of years before Rome arrived in north-west Europe. However, during the later Iron Age these connections seem to have intensified significantly with much more evidence for long-distance exchange than in the middle Iron Age (though it should be noted that some of the most important markers of long-distance trade such as coins and *amphorae* only emerged during the late Iron Age). This was particularly the case after Caesar's conquest of *Gaul* and the arrival of Rome at the Channel.

Much of what we know of exchange between Britain and the continent in the late Iron Age comes from classical authors. Strabo wrote in c. AD 18 that "There are only four passages which are habitually used in crossing from the mainland to the island, those which begin at the mouths of the rivers — the Rhenus (Rhine), the Sequana (Seine), the Liger (Loire), and the Garumna (Garonne)" and that exports from Britain included "grain, cattle, gold, silver, and iron" and also "hides, and slaves, and dogs". Other Classical authors (Diodorus Siculus and Pliny) report that tin from Devon and Cornwall was exported to the continent as early as the middle Iron Age. There was a notable influx of gold coin into Britain from northern France which may relate to close ties between French and British groups as well as population growth and increasing conflict in northern *Gaul*. Other imports into Britain included iron items, mostly weapons, wine *amphorae* (mostly the Dr. 1A type) and other pottery. British exports to the continent are rarer. A few potins and other early coins have been found in northern France, Flanders, the Netherlands and the Channel Islands. In south-west England this exchange seems to have been focused on a number of coastal settlements that have produced archaeological evidence for long-distance exchange such as Hengistbury Head in Dorset. In the south-east by contrast there are no comparable sites and exchange may have been more generalized.

The exact nature of the links between Gaulish and British groups is uncertain. Caesar stated that Gaulish tribes had previously raided Britain, even establishing settlements in coastal areas. He further accused British tribes of harbouring Gaulish refugees and supporting Gaulish tribes in the wars with Rome. The increase in coinage in south-east England after Caesar's conquest of *Gaul* has indeed been suggested as representing payments for assistance in the wars. The true nature of the relationship is not fully understood at present, but it is certainly likely that links between Britain and *Gaul* were not simply those of trade and exchange but must have involved semi-official links between local elites, sharing of information and perhaps, from time to time, mutual support.

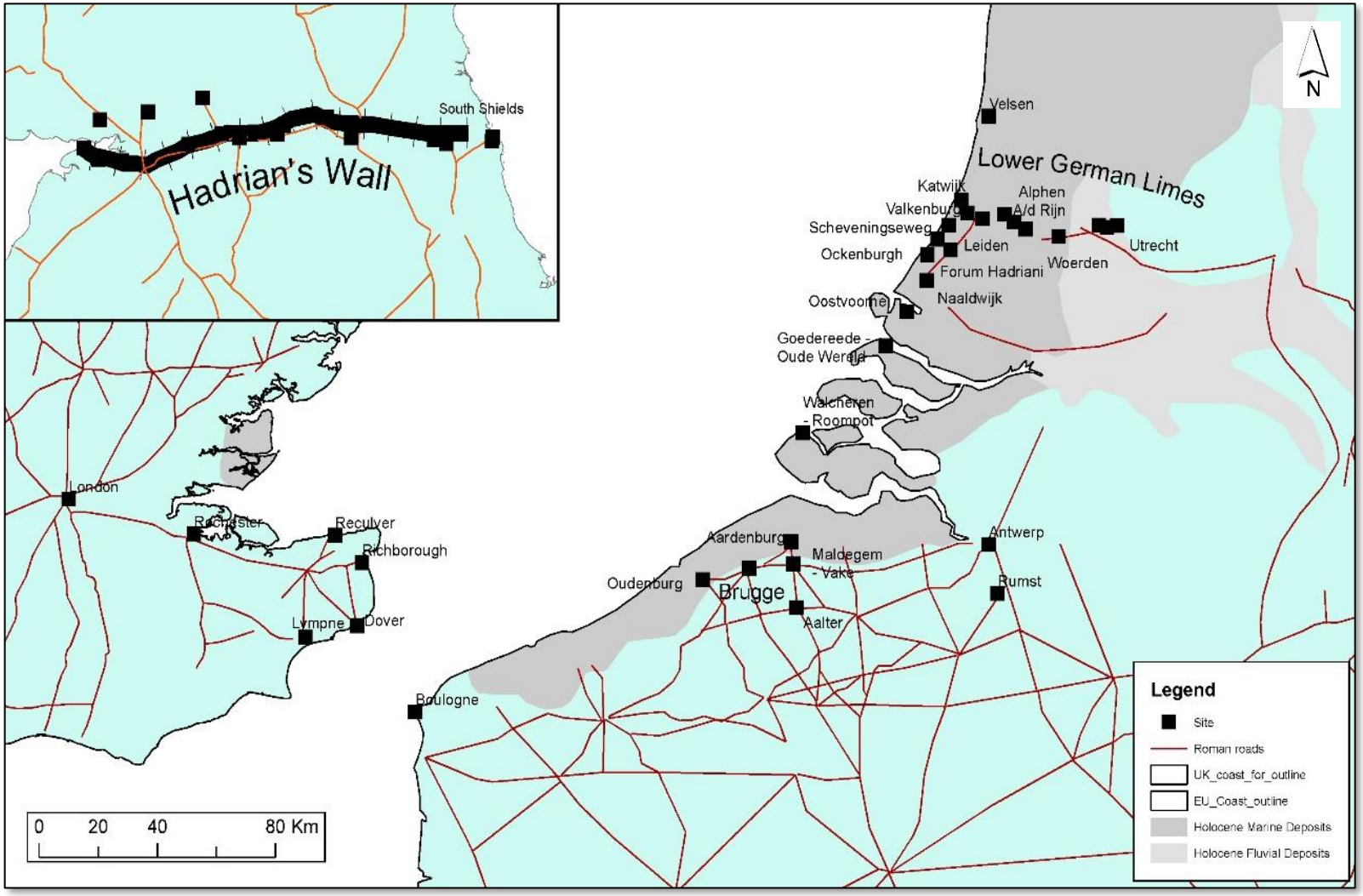


Figure 2 *- The coastal zone of the Roman north-west Roman empire (road network is indicative)*

The Roman empire seized full control of northern *Gaul* during the Gallic Wars waged by Julius Caesar between 58 and 50 BC. In a series of campaigns Rome defeated the northern and western Gaulish tribes and by 50 BC the whole of the Channel coast as far north as the area of the Rhine was under Roman control. During this period, in 55 and 54 BC Caesar led two expeditions to Britain that saw the first penetration of the island by Roman forces and was a forerunner of the subsequent conquest of the 1st century AD. From about 15 BC the Rhine began to be defended by the *Limes Germanicus* and gradually became fixed as the empire's northern boundary. The Netherlands north of the Rhine remained free of Roman direct control but was nonetheless heavily influenced by proximity to the empire and at times the Frisii and tribes further east seem to have paid some sort of tribute, primarily in the form of conscripts for the Roman army.

In AD 43 the emperor Claudius launched the full-scale invasion of Britain. It is not known for certain how many legions were part of the invasion force but by AD 60 four were campaigning across Britain. Over the next few decades, briefly interrupted by the Boudiccan revolt, most of what are now England and Wales were brought under Roman control. Sometime after Rome's initial expeditions into Scotland Hadrian's Wall was built from AD 122 to delimit the empire. Despite further forays, and the construction of the Antonine Wall in AD 142, Hadrian's Wall would continue to mark the limit of empire until the final withdrawal of Rome in the early 5th century (and continued to be used in some way even after that).

The conquest or domination of the Project area by Rome was consolidated in various ways that contributed significantly to the connectivity of the area. These are reviewed in the Coastal Communities chapter but in summary the development of the Roman road network, often building on older antecedents, the establishment of ports, forts and coastal bases for the *Classis Britannica* and *Classis Germanica*, the growth of settlements around these places and the development of links between them and their hinterlands provided a framework for communication between the different areas of the north-west empire that supported and in part supplanted the older Iron Age communications that preceded them. In time, the area comprised *Britannia,* part of *Gallia Belgica* and part of *Germania Inferior.* The *civitas Menapiorum* comprised not only West-Flanders, but also part of the north of France and part of the south of the Netherlands (Zeeland).

Rome's long domination of north-west Europe saw numerous developments, episodes and events that affected the connectivity of the area. Political upheaval caused by dynastic struggles, military conflict, population movement, plagues, changing climate, economic prosperity and decline and to some extent technological change all affected the ease with which people could safely plan and carry out trade and exchange activities. They affected where military personnel were stationed and

how they were paid, and the availability of raw materials, produce and coinage. Table 2 provides a simple timeline for the Bridging the North Sea project area.

58 – 50 BC	*Gallic wars. Roman empire extends to the Channel and Rhine*
55-54 BC	*Caesar's expeditions to Britain*
c. 12 BC	*Classis Germanica created.*
c. AD 9-14	*Construction of German Limes defence system begins*
AD 43	*Emperor Claudius invades Britain. Classis Britannica created.*
AD 60/61	*Boudiccan revolt*
AD 69/70	*Revolt of the Batavi*
AD 70s/80s	*Roman campaigns in Scotland*
AD 122	*Construction of Hadrian's Wall begins*
AD 142	*Antonine Wall constructed*
AD 165-180	*Antonine Plague & Marcomannic Wars*
AD 193-197	*Civil wars: Albinus (governor of Britain) defeated by Septimius Severus*
AD 208-211	*Roman campaigns in Scotland*
AD 260-274	*Britain and northern Gaul part of 'Gallic empire'*
AD 286-296	*Britain (and part of northern Gaul) ruled by Carausius and Allectus*
AD 306	*Constantine proclaimed emperor in Britain*
AD 350-353	*Britain ruled by usurper Magnentius*
AD 383-388	*Britain ruled by usurper Magnus Maximus*
AD 409	*Britain told to look to its own defence. End of Roman rule in Britain*
AD 410-486	*Increasing control of Netherlands and France by Germanic tribes. Effective collapse of western Roman empire.*

Table 2 - *Timeline for the north-west Roman empire in the Bridging the North Sea Project area*

Just as the connectivity of the Bridging the North Sea project area in the Roman period must be seen against that which already existed in the late Iron Age to understand what was new, so the impact of Roman connectivity has to be set against what followed in the sub-Roman period to understand what was durable. Within the limits of this project such an assessment is unfortunately not possible, but the Bridging the North Sea Project does show what can be achieved and a similar project focused on sub-Roman and early medieval north-west Europe is much to be desired.

1.3 The Resource Assessment and Research Questions

To understand connectivity in Roman north-west Europe fully, requires a knowledge of archaeological discoveries across the region. However, the nature of modern archaeological work – mostly in a commercial context - is such that those working in the sector are too often obliged to focus their attention on their own localities, sometimes at the expense of gaining a wider perspective. This has perhaps led to archaeologists taking a somewhat parochial view and fail to recognise and study regional connectivity. It should be emphasized that current borders did not exist at the time and that the continental part of the empire in the BtNS area is now split into France, Belgium and the Netherlands. These are of course artificial borders, and ancient landscapes, communications and communities crossed these lines. To support the study of Roman connectivity, therefore, it is necessary to bring together the relevant information, present it in an easily accessible format and make it widely available. This is the purpose of the Resource Assessment. The Resource Assessment reviews the current state of knowledge of Roman connectivity in the Bridging the North Sea Project area. It thereby provides a basis for future research by identifying areas of strength and weakness in current understanding.

The development of the Resource Assessment was followed by a series of workshops in which a set of key research questions was identified. There are already several research frameworks for the Roman period in the Bridging the North Sea Project area and the intention was not to repeat the work involved in developing them. Rather the Project sought to highlight those research or methodological questions that could only be addressed at the regional scale. To be most informative, the research questions (rather than a ‘framework’) presented in this document should thus be read in conjunction with existing Research Frameworks.

Finally, a caveat should be raised. It should be noted that there is a limit to what can be achieved in a project such as this. The network does not have comprehensive membership of relevant organisations even within those areas covered by the Straits Initiative. There are other archaeological institutions and researchers who are not part of the Project. Similarly, the Project does not have representatives of all regions

relevant to the study of Roman connectivity in north-west Europe. In the UK, for example, there are no representatives of the area between Kent and the north-east of England. These absences are due to the practicalities of the Project - available funding is small and the timetable very tight. The partners were also conscious that this Project is innovative. Although many of the partners have individual contacts in other regions, the network itself did not exist prior to the Project and it was thought wise to keep the network to a manageable number of institutions. It should further be recognised that the individuals representing the partners are often generalists, required in their professional roles to be able to turn their hand to the full range of heritage from the palaeolithic to the Cold War and from archaeological sites to historic buildings and landscapes. Although the Project does contain several admirable specialists in Roman archaeology, for some project workers it has nonetheless been a steep learning curve. The Resource Assessment should perhaps be seen therefore as an exploration of what can be achieved by collaborative working. To strengthen the Resource Assessment into a fully comprehensive document would require further work and a wider range of specialists.

2 Coastal Communities

2.1 Introduction

The north-west Roman empire was a venue for widespread co-operation, communication and exchange. Some of this was consciously arranged by imperial authorities as they moved materials and people across the empire. Other aspects emerged more organically as people in the region lived their lives, either maintaining relationships that preceded the empire, or taking advantage of new opportunities that the imperial context provided. Whether the result of imperial planning or local opportunism these processes took place in a physical, social and economic landscape and both the landscape and the processes of exchange themselves have left visible traces that can still be seen. In large part these traces are seen in archaeological evidence, but they can also be seen in the pattern of settlements, ports and transportation routes that service the Bridging the North Sea area today.

The trade and exchange systems that developed in the Roman period were not limited to the study area of course. Many of the products and people that the systems served had their origins or final destinations far beyond our boundaries, only temporarily passing through the region. Nevertheless, they all impacted on the Bridging the North Sea area. Much as modern ports such as Dover, Boulogne or Rotterdam are shaped by the processes of trade, even though few of the goods traded are made or consumed locally, so the coastal communities of the Roman empire were changed by the exchange routes and processes that crossed or by-passed them, and it is in these coastal communities that the impact of Roman trade and exchange can be seen to be most apparent.
To understand this impact, we must study the evidence. This allows us to assess how Roman exchange processes changed the communities through which they flowed. In places these processes will have called communities into being. In others they will have led to changes in their development, while other communities will have been ended by new processes of trade and exchange. The review below attempts to explore the archaeological evidence offered by the coastal communities of the Bridging the North Sea area. It is not intended to be an exhaustive or comprehensive review but summarises the extent of current knowledge and the nature of the evidence, and identifies some gaps in our understanding that the Research Questions presented at the end of each section can begin to address.

2.2 Coastal Communities sub-themes

2.2.1 Pre-Roman communities

UK (Kent and North-East)

During the late Iron Age there was a transformation in the culture of Britain based on increased contact with continental Europe. This included the adoption of coinage, new wheel-thrown pottery manufacturing technology and styles, new burial rites (for example in the form of warrior burials such as at Deal (Parfitt 1995) or chariot burials in Yorkshire), new landscape use patterns and the emergence of economic centres (*oppida*). All have their origins on the continent, and clearly demonstrate regular and close interaction with continental cultures. In contrast to the early and middle Iron Age, imports are clearly visible in the archaeological record, including coins, *amphorae*, Italian bronze vessels from Aylesford (Evans 1890) and Westhawk Farm (Booth et al. 2008) and pottery including Arretine, early Samian and Gallo-Belgic wares. These contacts across the Channel, as well as others across the Thames estuary, and probably around the coasts of eastern and southern Britain and along its rivers to acquire gold, copper, tin, shale and other commodities, must have required water transport, including sea-going vessels. So far, however, no late Iron Age vessels have been discovered, nor have any structures associated with sea-going trade. Nevertheless, by the end of the Iron Age several settlements had developed in coastal areas that are characterised by pottery imports and coinage such as at Folkestone, Dover (probably) and Faversham, Worth and Richborough (possibly). These may all have been ports. These cultural transformations no doubt eased the adoption of Roman culture in parts of eastern England, but the initial arrival of Rome must nonetheless have been a shocking event. Excavation at Ebbsfleet in east Kent may have discovered an enclosure dating to the Caesarian raids of 55 and 54 BC (Andrews et al. 2015) and the probable invasion site at Richborough and port of Dover show in their rapidly changing forms the dynamic nature of the Roman arrival in Britain. Excavations in north-east England in recent years have revealed extensive traces of pre-Roman settlement similar to the Iron Age settlement of much of eastern England between Yorkshire and the Wash (Hodgson et al. 2012).

Belgium (Flanders)

In proto-historic times the coastal area witnessed an intense maritime influence and tidal dynamic, giving way to the transformation of the landscape from a peat marsh towards an environment dominated by tidal inlets, mudflats and salt marshes. Human occupation in the Iron Age seems to have been restricted to the more stable

parts of the landscape such as dunes (e.g. De Panne in the west of the coastal plain) and the transition zone between the coastal plain and the Pleistocene sand ridge (e.g. Bruges). In the western part of the coastal plain and the area of Veurne more specifically, some evidence seems to point to a more active human presence on the more silted up parts of the landscape where occupation on an artificially raised platform was attested. The dune area also attracted occupation. However, archaeological evidence is currently insufficient to draw firm conclusions about the social and economic structure of the societies living in or near the coastal area. Finds of briquetage pottery indicate that salt-making was of some economic importance. The elites inhabiting the Iron Age hillfort at the Kemmelberg, located further inland in the south of West-Flanders, could have played some controlling role in the production and trade of this valuable coastal resource. From the early Roman period onwards the occupation density increased considerably in the Pleistocene coastal hinterland. It is only from the Flavian period onwards that the human impact on the coastal plain becomes really visible; it clearly became more intense with traces of reclamation, exploitation and permanent habitation.

France (Nord and Pas-de-Calais)

The archaeological discoveries of the last 20 years (particularly those made during what is known in France as ‘preventive archaeology’ or in the UK as development-led archaeology) show that Morinie was not only the inhospitable territory described by Caesar (BG III, 28, 2), covered with marshes and forests, but was also a densely populated region of agriculture (like in Wimille) and salt production (like in Étaples, Sorrus, Ardres-Balinghem,...) for Pas-de-Calais and Pitgam, Steene and Looberghe for Nord...).

During this period, trade relations existed between Britain and the continent, even if the intensity of these exchanges in the decades preceding the conquest remains a matter of debate. According to Cassius Dio [XXXIX, 51], British people and the *Morini* "lived in harmony", and in his own narrative of the Gallic War, Julius Caesar (BG, IV, 20-21) repeatedly refers to the *mercatores*, who alone ventured to land on the British coast. In any case, by the 1st century BC, trade routes with the island of Britain were common. The narrowness of the passage between Morinie and the south-east of the island made it the shortest and, according to Caesar (BG, V,2), the most convenient route for sailing with direct line of sight in good weather.

The location of Caesar's port during his expeditions to Britain (BG IV, 21, 22 & 28 and BG V, 2, 5 & 8; Strabo, IV, 5, 2) remains the subject of much debate, although it now seems likely that the Liane estuary (Boulogne and a number of sites further inland) provided natural shelter for the expedition's ships. However, no new archaeological discoveries have yet been made to support this hypothesis. Indeed, there is a striking contrast between the numerous sites or signs of protohistoric sites

and the paucity of evidence of early Roman penetration, particularly the difference between the artefacts found at sites such as Arras (Actiparc), which bear witness to a military presence in Caesar's time, and the 'rural' sites along the coast.

In July 1989, the construction of a storage base for the SNCF high-speed train at Bree Veld, a district of the municipality of Oxelaëre at the bottom of the Mount of Cassel, made it possible to carry out a survey of almost 45 ha. Crude pottery was found in ditches. This Oxelaëre pottery, with its predominantly cooking pots, is very similar to the characteristic forms of the Final or Late La Tène period in northern France (between the years 100 BC and 0 AD).

Netherlands (South-Holland and Zeeland)

At the end of the Iron Age, just before the arrival of the Romans in the Netherlands, it appears that the settlement of the coastal area south of the Rhine had all but ended. This was most likely caused by the increasing influence of the sea, resulting in regular flooding of the hinterland. Earlier attempts to inhabit the peat area behind the coast seem to have ceased, although increased sedimentation due to the floods in the 1st century BC appeared to offer new opportunities for settlements on the fertile clay plains that gradually became elevated.

At the beginning of the Roman period, a renewed colonization took place in the area south of the Rhine, as evidenced by sites near The Hague and at the mouth of the Rhine towards Leiden. Gradually, the hinterland peat area was also reclaimed. The first Roman visitors to the Rhine delta region found a relatively sparsely populated area with scattered farms surrounded by arable land. These were usually very small settlements with three-bay farms consisting of no more than three houses occupied simultaneously. The size of the farms was about 15 x 5 m with space for approximately 20 head of cattle. Around the settlement, the agricultural area was determined by ditches for water management that could extend for tens to hundreds of metres. The farms were used for about 25-30 years in the same location before possibly seeking other dwelling locations. However, there was a preference for returning to earlier dwelling places. Research has repeatedly shown that multiple cultural levels exist on top of each other. The population density in the area was low even during periods of suitable conditions for settlement in the middle Iron Age and beginning of the late Iron Age. In the different zones, namely the sandy soils along the coast, the peat areas, and the land along the rivers, the population density was not high; one should think more in terms of hundreds rather than thousands of inhabitants per region. Archaeological research at the island of Voorne-Putten between the Meuse and Scheldt has provided a good example of the cultivation of the hinterland peat area. From the beginning of the Iron Age, the sea penetrated this area and small peat streams formed in a freshwater tidal area where farms were established on higher parts, probably from colonists from the higher dune area along

the coast. The marshy environment must have had certain advantages for livestock farming, which could make use of extensive pasture areas. The excavation of these settlements suggests that the advantages of settling in this area must have been significant and permitted an existence that was no less successful than in other landscapes and was based on sheep and cattle farming and the extraction of sea salt.

The economy of these Iron Age communities living along the coast was limited, consisting of farmers subsisting on husbandry, agriculture, and small-scale salt extraction. The inhabitants were probably self-sufficient. The soil conditions and differences in the mineral content of the ground probably dictated the different crops grown. The main crop was wheat, followed by barley and flaxseed. On the sandy soils, the presence of various tillage layers with clear plough marks is very common. Soil cultivation in the peat area is more difficult to demonstrate due to the simple erosion of the top organic layers that have erased part of the archaeological structure.

For livestock farming, cattle were the most important animals, dominating the bone spectrum in excavations. Hides, young cattle, leather and dairy products would have been among the primary means of subsistence. In the dune area, sheep/goats were relatively important. The many finds of spinning whorls and loom weights indicate that the manufacture of woollen fabrics was probably of great importance.

A third source of subsistence would have been the extraction of sea salt. At sites in the dune area and along river mouths, objects for the extraction of this salt have been found. This luxury food and preservative had more than regional significance, as evidenced by the finds of the associated pottery discovered far upstream in settlements. This was probably the most important means of exchange, allowing communities to obtain goods that were almost entirely absent in the coastal area, such as tephrite (a type of basalt lava) for millstones that came from the Eifel.

The production and processing of metals such as iron and bronze also took place but on a small scale and possibly only for local use.

It is likely that differentiation in agricultural products due to the different agricultural conditions facilitated exchange and barter trade. The almost complete absence of artefacts indicative of long-distance trade, however, underscores the largely autarkic lifestyle of the communities in the Dutch coastal area.

2.2.2 Settlement (general)

UK (Kent and North-East)

In the UK there was a diversity of coastal settlement types, that developed in size and complexity throughout the Roman period. The initial arrival of the Roman Empire in Britain was disruptive of existing communities at the invasion points but had relatively minor physical impact elsewhere as efforts were focused on completing the conquest. Subsequently, however, a process of consolidation saw the remodelling of coastal areas as the economic, transportation and military needs of the empire saw the development of new settlement types in line with Roman traditions and imperial expectations. The array and distribution of settlement types varied considerably across Britain – Kent being the closest region to the continent was very different from the east cost of Norfolk or the north of England for example, with a greater density and wealth of settlements. Similarly, different regions experienced different challenges at different times and produced different responses. In the 2nd century, Hadrian's desire to delineate the borders of the empire saw the construction of the immense wall and its related infrastructure straddling northern England, across the centre of Britain from sea to sea. A very different set of fortifications, small, defended sites, the so-called Yorkshire 'Signal Stations', were built between Huntcliff and Filey in the latter part of the 4th century. In southern and eastern England, the crisis of the 3rd century saw the construction of Saxon Shore forts.

Northern England had been occupied by the Romans for four decades prior to the building of Hadrian's Wall. The construction of the Wall brought about immense change, with the late Iron Age / early Roman coastal communities of the Northumberland Plain witnessing massive disruption shortly after its construction. The north-east coastal fort at South Shields (Arbeia) was converted into a supply base by the Emperor Septimius Severus as part of his aborted plan to conquer Scotland. It retained its long rows of granaries long after imperial plans for the conquest were abandoned, serving as an essential staging point for transferring sea born supplies to the military stations along the Tyne.

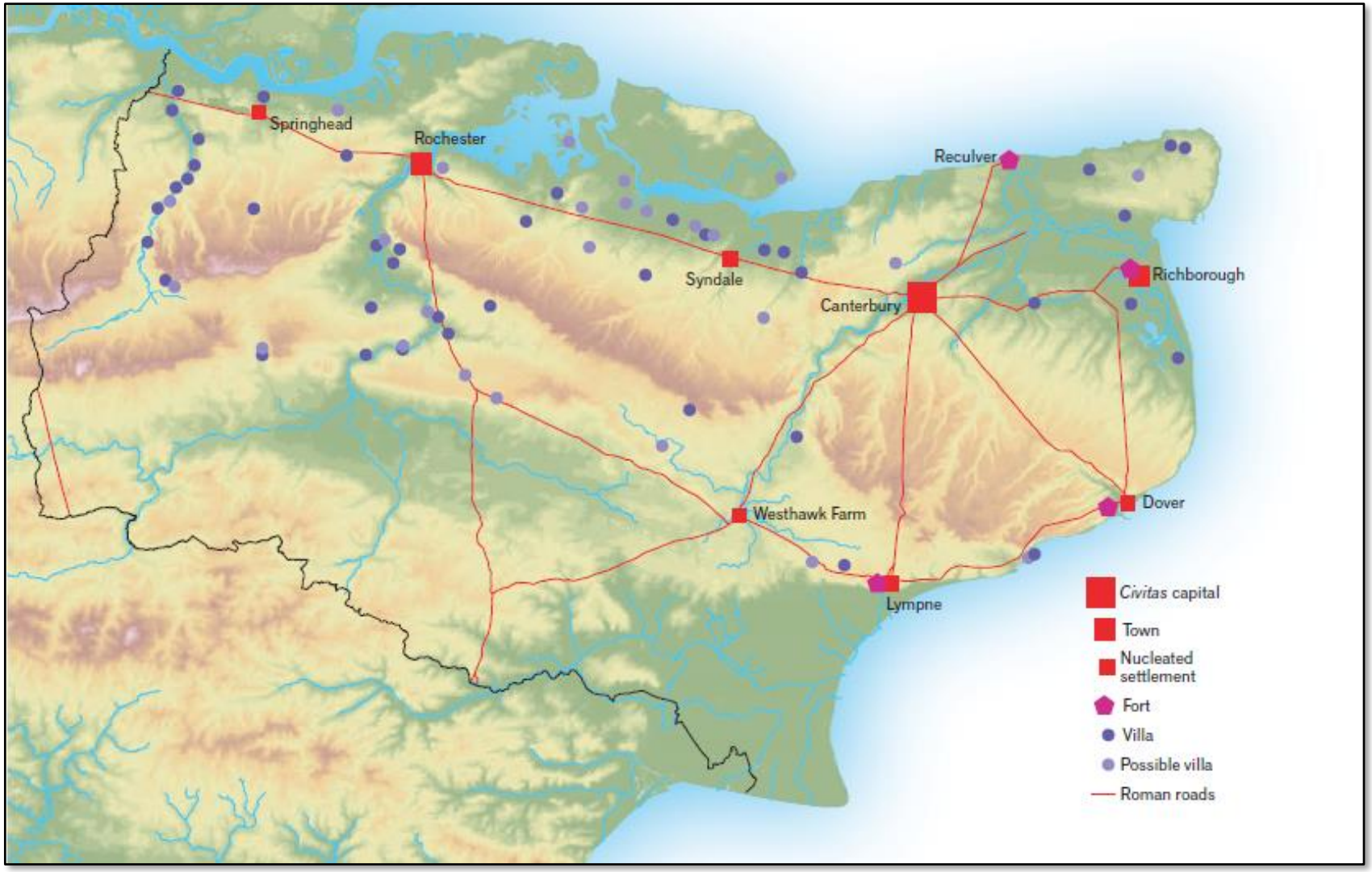


Figure 3 - *Map of Roman Kent showing the location of key sites in the text (Williams et al. 2007)*

Belgium (Flanders)

Since Roman times, the nature of the coastal plain has changed dramatically through large-scale land reclamation and embankment schemes. For example, the Roman coastal fort of Oudenburg is nowadays over 8 km away from the current Belgian coastline. A determining element in the transformation of the coastal plain was the creation of The Polders, a region gained by human interventions from the Middle Ages onwards, 10 to 15 km wide (though in the valley of the IJzer up to more than 30 km wide) and bordered by an almost continuous dune belt (Mostaert 2000, 2). From the Iron Age onwards the coastal plain was a vast tidal region of mudflats with a coastline moving inland, a totally different landscape than the higher sand region, clearly visible on the geomorphological map.

Until quite recently, and because of a lack of structural data, it was supposed that Roman permanent habitation of the coastal plain was absent. Finds pointing to some sort of human activity were explained within the framework of off-site activities such

as salt-making and pastoralism. Academic research and increasing archaeological activity have now profoundly altered this image and produced a dataset which is still limited in scale yet important in its quality and diversity. More permanent Roman occupation forms are indeed attested and represent a variety of occupation types over various parts of the landscape. Furthermore, the Pleistocene sand ridge bordering the Holocene coastal landscape saw dense occupation along the Roman road network lining the coast and connecting it to the hinterland.

In the coastal plain the Roman level is generally situated at a depth of over 0.5 to 2 m deep, covered by clay sediments. As a result, Roman finds were for a long time only discovered as chance discoveries during large extraction activities such as peat extraction. Development-led archaeological research is challenging and requires adapted methods. On the other hand, in undeveloped areas, the stratified position of the Roman level underneath the thick post-Roman marine clay cover has generally favoured a good preservation of the remains, which has opened up many research possibilities.

From the mid-1st century onwards the human occupation of the Flemish coastal plain began, to reach a maximum in the late 2nd and early 3rd century. This happened in line with a general increase and diversification of occupation in northern *Gaul*, but probably also following improving landscape conditions in the 1st century. Several indications point to an increasing tidal activity during the 3rd century and there are no secure late Roman finds in the coastal plain itself.

Figure 4 - The north-west continent under the Romans, c. AD 117. From https://www.canonvanvlaanderen.be/en/interactive-maps/

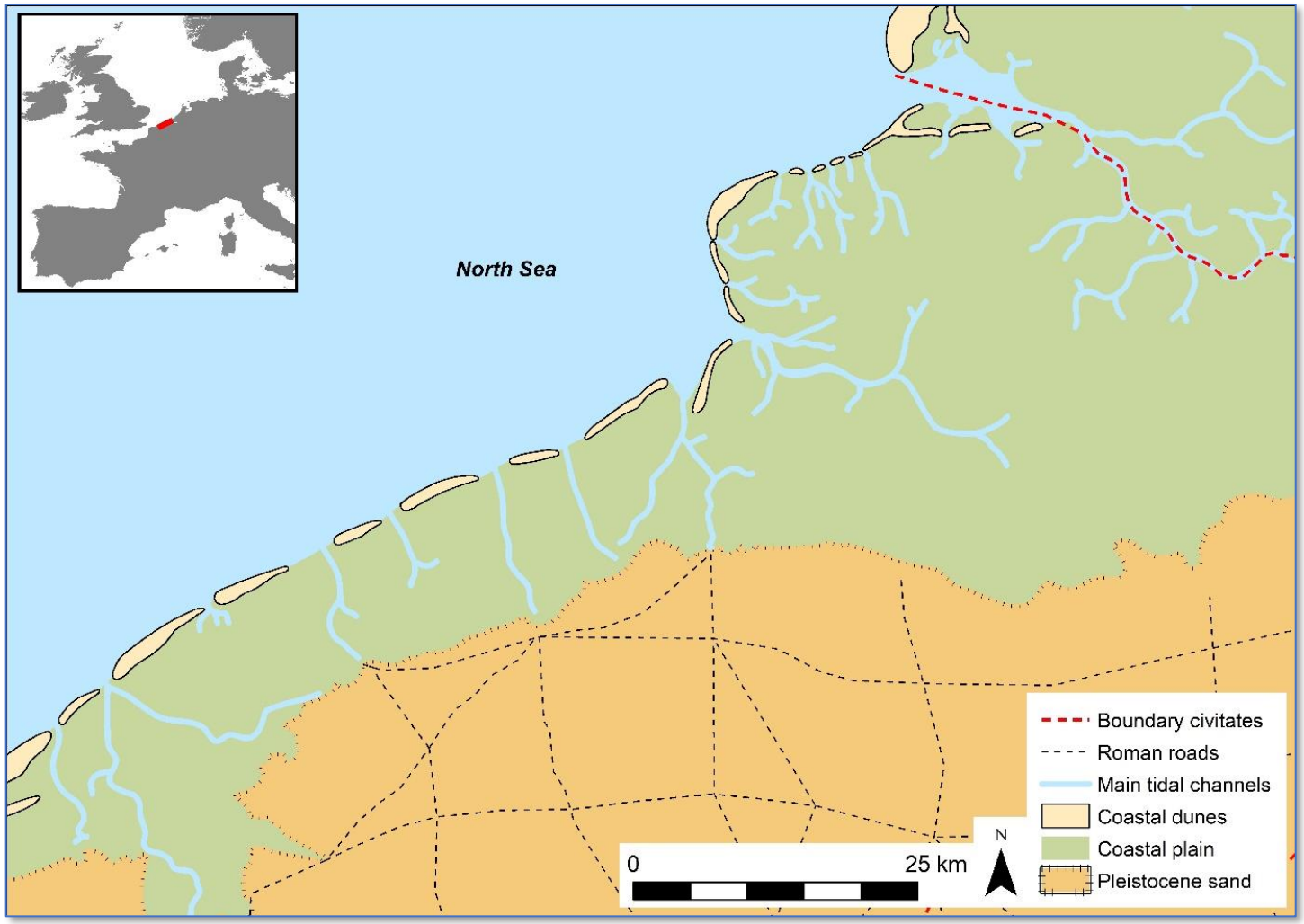


Figure 5 - *Simplified map of the North Menapian territory (e.g. the northern part of the civitas Menapiorum) stretching over West-Flanders and the south of the Netherlands, with the old dunes, the coastal plain consisting of mudflats and marshes cut through by tidal inlets, and the sand inland region (Dekoninck 2023).*

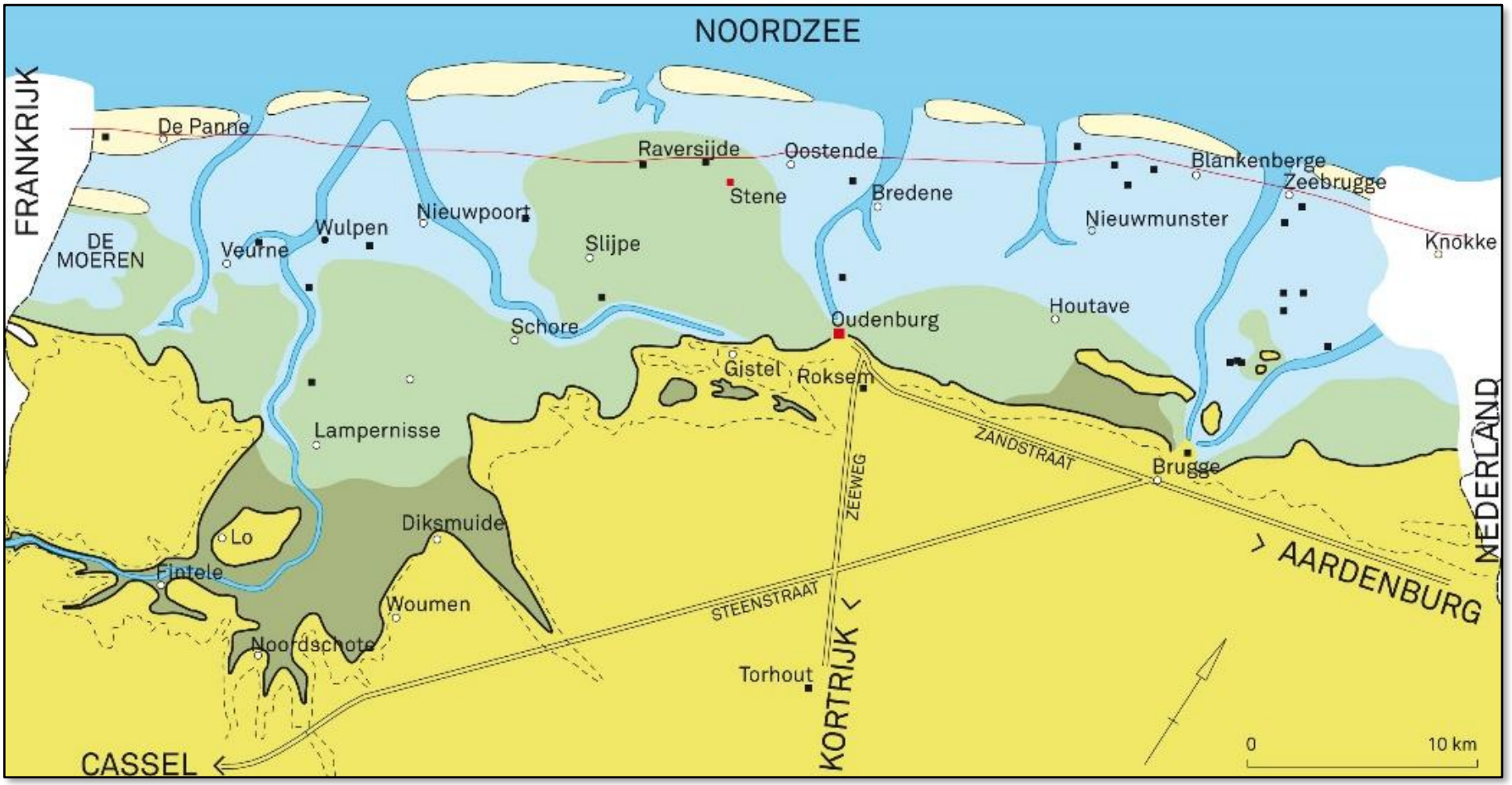


Figure 6 - *Schematic reconstruction of the coastal plain during the mid-Roman period (after Thoen 1987, with additions) with from the north-west to the south-east: dune/beach ridge, tidal flats, marshes and salt meadows, crossed by tidal channels, peat areas (whether or not drawn), and the bordering sand region, with location of the settlement sites and the most important Roman roads. Red line: the current coastline; black line: border of the coastal plain in the Roman period; dotted black line: current border of the coastal region. Situation 2013*

Small settlements or individual farmsteads were located on various locations within the dynamic landscape setting. Dried-out peat soils and naturally sandy elevations outcropping the peat (e.g. Zeebrugge – Achterhaven, Dudzele - Heistlaan) were used for permanent settlement during the first two centuries. The habitation structures identified at Dudzele consisted of timber-framed buildings and some outbuildings like those on the Pleistocene soils. Further north in the Dutch Scheldt estuary these local building traditions seem to have been influenced by house building styles known along the Dutch coast in Germanic territory. On the edge of Wenduine a stabilisation horizon was found, with Roman material, possibly the remains of a farm which developed on a salt marsh.

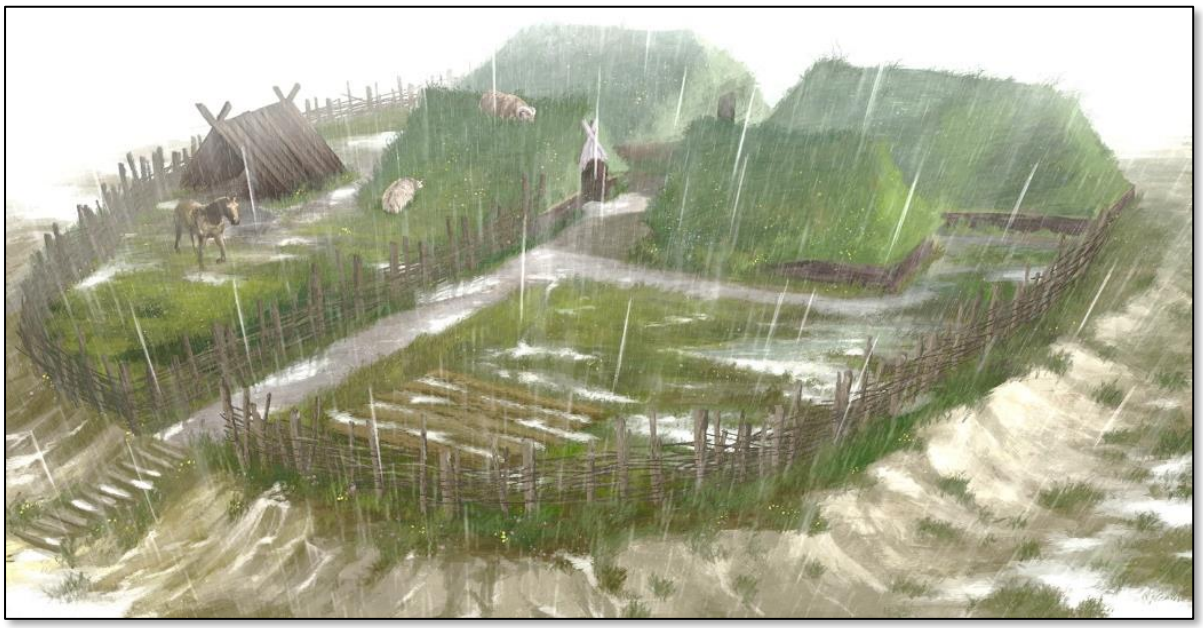


Figure 7 - *Reconstruction drawing of the raised platform of Ramskapelle (© Raakvlak, Verwerft et al. 2019)*

Next to small settlements located on naturally elevated parts of the landscape, artificially raised platforms were also used for habitation. At Stene such a platform was connected to a Roman dyke system, pointing to (local) reclamation of the landscape at the end of the 1st to the first half of the 2nd century. On the clay sod platform of at least 17 m long, 8 m wide and 1 m high the remains of presumably two successive buildings could be discerned. The dyke, also completely erected with clay sods, was built immediately upon the mudflat sediments. The soil, pollen, diatom and botanical analyses have evidenced that the dyke was constructed in a mud flat and salt marsh area that was still under clear marine influence (i.e. on average flooded two times a day). The labour-intensive character of the construction of the dyke and raised platform, the adaptation at several times of the platform, the large posts, and the concentrations of pottery in the debris layers show that this must have been more than a temporary site. The function of the site seems to have been focused on animal farming. At Ramskapelle an isolated platform (*terp*) was found. It

had a surface of 370 m² and consisted of a volume of nearly 600 tons of clay sods, raised 90 cm above the highest tides. The houses were not timber-built but were made of sods, a typical construction method in coastal environments but less-known for the Roman period.

At both Wenduine and Bredene, a nucleated settlement – possibly identifiable as a *vicus* – with one or more related cemeteries, can be supposed based on the character of the Roman finds and their distribution over a large area. At Wenduine Roman finds have been known since the beginning of the 19th century, most of them discovered by chance, during earthwork activities such as peat and clay extraction, building activities and, at the coast, due to sea erosion. Generally, these are seen as finds out of context and as part of large debris layers. The original settlement seems to have started in the Flavian period along the coast, from where it developed to the south into a large, nucleated settlement that was eventually abandoned in the third quarter of the 3rd century. At Bredene archaeological research by trial trenches and coring at the end of the 1970s/early 1980s has evidenced a wide Roman occupation area of over 20ha, of which archaeological layers locally outcrop at the surface whereas elsewhere they are covered by marine sediments. The settlement – also starting in the Flavian period and occupied until well into the 3rd century – appears to have been implanted around a side-arm of the *Bredenegeul*, one of the larger tidal channels intersecting the coastal plain. With hardly any *in situ* structures, more insight into these larger settlements is so far impossible.

At De Panne, at the extreme south-west of the Belgian coastal plain, several Roman sites show that the old dune belt was densely occupied. The Roman site De Panne - Westhoek was discovered at the end of the 19th century after which several surveys followed. Excavations in the 1920s and in 1949-1950 revealed a huge volume of finds, with many imports, but the settlement features could not be properly identified. Since 1980, several discoveries have been made on this dune belt to the south and to the east, by means of surveys, coring and small trial trenches. This large settlement originated from the beginning of the Flavian period and flourished between the end of the 2nd and the middle of the 3rd centuries. A partly uncovered cremation graveyard, excavated in 2002, is also dated to this flourishing period. In the marshes behind the town occupation has also been evidenced, probably more seasonal in nature. The position of this settlement was clearly determined by geographic aspects: the setting between the old dunes, the close proximity of the sea and an old river mouth.

Also on the border of the coastal plain, at Oudenburg, on the sand ridge protruding into the coastal plain near to a tidal channel, a nucleated settlement developed from the Flavian period onwards. Starting at the tip of this promontory it evolved into a flourishing settlement in the course of the 2nd and 3rd centuries, covering the sand ridge to the east. Cremation graveyards – one of which contained over 600 graves –

were also brought to light. This prosperity was largely due to the decision of the Roman army to build a fort at this strategic position in the late 2nd century, as a result of which the settlement transformed into a military *vicus*.

No late Roman sites are known in the coastal plain; this region was most likely too wet for habitation. In the bordering sandy region, civil occupation also reduced considerably, as was the case in the hinterland, although a few sites are known, though without much structural information.

France (Nord and Pas-de-Calais)

The Nord-Pas-de-Calais region owes its vast road network to Roman civilization, as well as its first towns and cities, which were key economic, administrative and political hubs. With Augustus' division of the territory into cities and chief towns, *Gallia Belgica* was divided into four territories: that of the *Atrebati* or *Atrébates* (Arras), that of the *Morini* (Thérouanne), that of the *Ambiani* (Amiens) south of the Canche and that of the *Nervii* (Bavay) east of a line from Bapaume to Douai. These cities depended on the governor of *Gallia Belgica*, who resided in Reims and was a Roman senator.

Roman occupation can be seen in a dense and continuous network of settlements. The Artois region is particularly rich in remains, and most towns are built on ancient foundations (Arras, Bapaume, Béthune, Lens, Bruay-la-Buissière, Hénin-Beaumont, etc.). The discovery of major *vici* and *villae* illustrates the dynamism of agricultural and craft activities.

On the coast, sites in the bay of the Canche, such as Attin and Beutin, were able to take advantage of the economic corridor with the Étaples agglomeration (*Stapula*), and benefitted from trade via the Boulogne/Amiens route to the city of *Ambianum*. It was also a stopover on the coastal shipping routes of the Channel and North Sea.

Above all, the Canche flows through a Romanised area, characterised by several sites on both banks of the river. On the north side of the valley, several settlements have been identified, including a (craft?) quarter at Étaples and a large *villa* with at least seven dwellings at Tubersent. On the southern side of the valley, the presence of the Romans is illustrated by the pottery at La Calotterie, and there is evidence of sites in several places. On the plateau between the Canche and the Authie, a number of remarkable sites bear witness to the Romanisation of the region, including the 2nd and 3rd century agricultural settlement at Wailly-Beaucamp, the *villa* at Ebruyères de Lépine, abandoned at the end of the 3rd century, and the *villa* at Conchabat.

Cassel is mentioned several times, both in texts and on maps. Ptolemy mentions Cassel in his 'Geographia' around 150 AD, the name of the Menapians capital can be found on the Tongeren milestone around 200 AD, in the Antonine Itinerary at the end of the 3rd / early 4th century, and on the Peutinger Table, originally a map from the beginning of our era but updated in the 4th century.

Like most Celtic tribes from eastern Europe, the Menapians arrived in Europe between the 5th and 3rd centuries BC. They originally settled in the vicinity of the Scheldt estuary, on the delta of the Meuse and Rhine rivers, on either side of the Scheldt. Around 56 BC, Julius Caesar tried to attack the Menapians, but his army got bogged down in the marshes and he gave up. Around 55 BC, Julius Caesar returned but gave up because the Menapians resisted a second time. In 53 BC, having defeated and subdued the Nervians, Julius Caesar returned to the Menapians, attacking them in three places. This time, after burning, pillaging and killing the inhabitants, the Menapians sent deputies to negotiate their surrender. By 50 BC, the conquest of *Gaul* was complete.

The Menapians were under constant attack from the Suevi, another Celtic tribe. Around 30 BC, the Menapians rebelled and were defeated by Carinas, a Roman general. Augustus, Caesar's successor and the first emperor, agreed to a request from the Menapians, who were under constant attack from the Suevi, to settle south of the Scheldt and take Cassel, at the southernmost point of their territory, as their capital. Their territory stretched between rivers such as the Aa, the Lys and the Scheldt.

According to the Roman geographer Strabo, the Menapians live in a region of marshes and forests with low, but very dense, vegetation. Despite this, the Menapians were good farmers, using metal tools and knowing how to pass on their knowledge. The farms are often isolated. The cultivated land produced peas, lentils, beans and wheat, and is planted with apple and pear trees that provide fruit. Land used for livestock farming are organised into pens containing pigs, sheep, steers, horses and poultry. They are surrounded by straight ditches (Steene).

Netherlands (South-Holland and Zeeland)

Despite the enormous efforts made by the Roman army to transform the wet, dynamic and in many places inaccessible landscape into a logistical lifeline between the continent and *Britannia*, the Dutch coastal area did not really develop into an economically powerful area.

During their existence, the forts along the *Limes* increasingly attracted civilian settlements outside their gates. These settlements were often located near significant transport routes like the Rhine, playing crucial roles in local trade and

supply networks. Depending on the favorable conditions offered by the forts, these could be larger settlements (several hundred houses) or settlements of modest size (just a few dozen). The residents were partly connected to the military in the fort, but the favorable conditions for conducting trade could also have had their appeal. The military '*vici*' of Zwammerdam, Alphen-*Albaniana*, Leiden-*Matilo* and Valkenburg have been partially researched, and while the composition of the others is not yet known, it can be assumed that each fort had its own extramural settlement.

The only Roman town in the western half of the Netherlands was *Forum Hadriani*, located in the modern town of Voorburg near The Hague in Holland. This was a small town in the Roman province of *Germania Inferior*, possibly founded immediately after the Batavian revolt of 69-70 AD. Originally known as *Municipium Cananefatium*, the town of the *Cananefates* tribe, it was situated at the watershed between the northern and southern branches of the Rhine. After 47 AD, the Corbulo Canal was constructed, potentially making the site a place where ships were transferred between waterways. By the 2nd century, the town received the title of *Forum Hadriani*, meaning 'market of Hadrian' and while it may have been linked to the emperor Hadrian's rule (AD 117-138), it is likely that the town already had market rights as a municipal capital. The old name was still in use during the reign of Emperor Decius (AD 249-251), suggesting that the change was more titular than functional. The town was characterized by the common Roman grid layout and featured typical buildings such as a bathhouse and river port, with several houses having shops at the front and gardens at the back. The town was relatively small, with about a thousand inhabitants.The inhabitants abandoned *Forum Hadriani* around AD 270, coinciding with the disaster that struck *Germania Inferior* in 274 AD. The Gallic Empire's collapse, which occurred around this time, marked the end of the Roman presence in Voorburg, and the town was not rebuilt even when the frontier was restored in the 4th century.

Further south extra-mural settlements are known near Den Haag-Ockenburgh, though the *vicus* existed longer than the equestrian fortlet, and the extra-mural activity zones around the fort of Aardenburg. It should be noted that industrial activity was already taking place in the area before the fort was built.

Dispersed along Corbulo's Canal and in the peat and dune areas of South-Holland and Zeeland were similar activity zones but they probably are better categorized in the smaller units of collective agricultural settlements or farmsteads. Because of this dispersed occupation and activity, the real character of the area is hard to describe. Some important studies in this area should be mentioned:

- Den Haag – Wateringse Veld (Archaeological Service of Municipality of Den Haag) with a western form of *villa* agricultural infrastructure, possibly run by army veterans;
- Midden-Delfland agricultural land-use directed by the Roman administration (diss. Heleen van Londen, University of Amsterdam);
- A general description by Jasper de Bruin of the region in his translated dissertation 'Border Communities at the Edge of the Roman Empire';

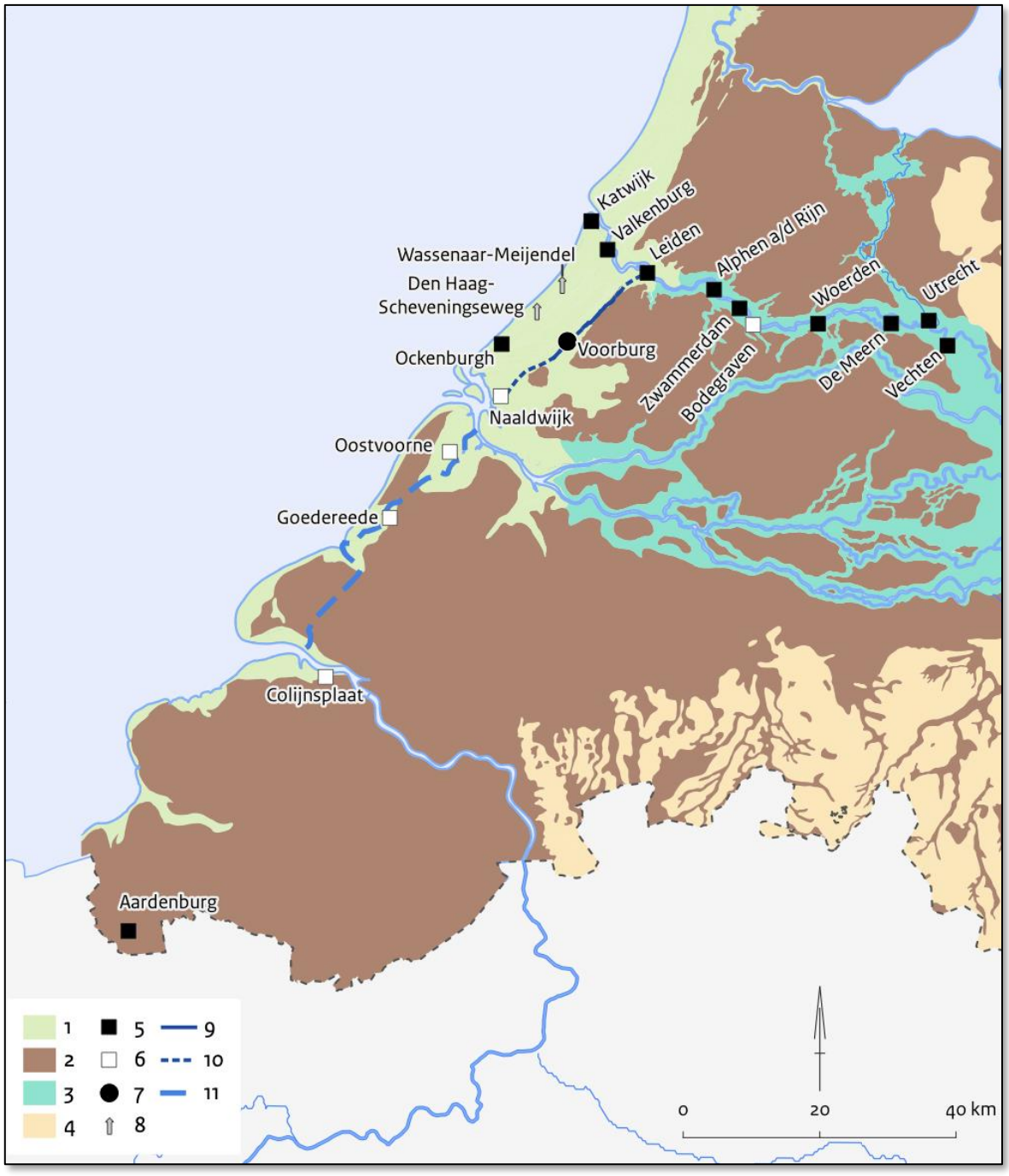


Figure 8 - *Map of Roman South-Holland and Zeeland showing the locations of key zones, sites and connecting routes (Romans on the Waterfront, 2021, fig. 2.4 D)*

In addition to the autonomous development of the return of settlement to the area between the Meuse and Rhine, the arrival of the Romans was an important factor in population increase. In the Dutch coastal zone this caused a change of landscape arrangement and the further spread of settlements. When the Roman army began to increasingly visit the North Sea coast from the beginning of the era, they used several advanced forts with Nijmegen as their base of operations. These forts formed the triangle of Vechten at the junction of the Rhine and the northern Rhine branch the Vecht, Velsen to the north close behind the coastline, and Valkenburg at the mouth of the Rhine. In preparation for the invasion of Britain, Emperor Caligula (AD 37 - 41) had the route along the Rhine reinforced with *castella* and even a legionary camp at Valkenburg. Finally, his successor Claudius completed this work with the successful invasion of the island. In order not to waste any more energy on the annexation of northern *Germania*, he gave up fort Velsen and other small fortifications. Instead, he had the successful General Corbulo establish the south bank of the Rhine as a frontier with auxiliary forts and the *Limes* road and, of course, the Corbulo Canal named after him.

After the Batavian Revolt, the Flavian emperors restored Roman authority in the Germanic provinces and built the Rhine frontier into a well-organized military logistical landscape that served both as a controllable border but also guarded the river as a vital transportation route. Through the Corbulo Cand Canal and a probable continuation of this to the south via *Forum Hadriani*, Naaldwijk and Goedereede, an inland connection was established with the ports at Colijnsplaat (*Ganuenta*) and possibly Domburg, from where the open sea was reached. Besides the Rhine, the Meuse and the Scheldt also formed good connections from the hinterland to the coast and thus to the new province of *Britannia*. Thus, the coastal area of South-Holland and Zeeland grew as an indispensable logistical trade and transshipment zone for the Roman army and also for private trade.

The imperial context of South-Holland and Zeeland in Roman times led to a variety of types of settlement and installations, such as auxiliary forts and a legion camp, military *vici* around them, and hamlets on the Rhine bank between the forts, in the moors and in the dunes. There was even a small city, *Forum Hadriani*. Furthermore, the regions of South-Holland and Zeeland were characterized by rivers and watercourses along which roads often ran. Ports arose at some junctions. Only on the narrow ramparts and creek ridges could small-scale arable farming and horticulture take place. On beach ridges there were probably more opportunities for this. The extensive peat meadows did offer the space for much cultivation in the dry season. To keep the grasslands dry and passable for as long as possible, measures were taken by farmers such as digging drainage ditches and installing culverts through dykes.

Unlike today, the southern part of South-Holland and most of Zeeland consisted not of islands but of vast peat bogs protected by a coastal line of dunes. Creeks ran through the Scheldt peat area. Here, too, small-scale arable farming took place and industrial activities have been discovered in several places in Zeeland, probably related to salt mining and ceramics manufacturing.

From the middle of the 2nd century, the military increasingly organized the guarding of the North Sea coast. Of these coastal defenses, in South-Holland - in the region of The Hague - we seem to have discovered only the underlying system with Scheveningseweg and Ockenburg as the most important sites. It is probable that the original coastal forts have been swallowed by the sea in recent centuries. There are references to some of these forts such as the Brittenburg near Katwijk and the Oude Wereld near Goedereede. However, the remains of these forts have not survived. This is also the case of some coastal forts in Zeeland, for example at Roompot and Oranjezon, where the beaches regularly provide military finds.

The southernmost stretch of the Dutch region is higher, and dry on the sands of the Flemish coastal region. At the place where the Menapian settlement (with artisanal/industrial activities) had good connections with the sea via an inlet and with the road network in *Gallia Belgica*, the Roman army decided to build the fort at Aardenburg. It is likely that this fort succeeded that of Maldegem, a temporary fort erected in AD 172-174 in response of the raids of the Chauci. Together with the fort of Oudenburg (in Belgium), the Aardenburg fort formed the northern segment of the military coastal surveillance of the Channel from the last quarter of the 2nd century until the end of the 3rd century.

2.2.3 Ports

UK (Kent and North-East)

The two most significant ports in Kent were at Richborough and Dover. Richborough was the probable initial site of invasion and became an important supply base thereafter. It became an important link in the Roman trade network, with Canterbury developing as a node from which branches of Watling Street eventually linked to London (*Londinium*), Reculver (*Regulbium*), Richborough (*Portus Ritupis/Rutupiae*), Dover (*Portus Dubris*), Lympne (*Portus Lemanis*) and Rochester (*Durobrivae*). In Kent, archaeological remains of constructed port facilities are rare, however. At Dover the remains of a breakwater and probable quay have been found, together with the remains of two lighthouses (Kent County Council 2020), and port facilities were almost certainly present at Richborough too. Elsewhere, port facilities are presumed rather than evidenced although it may be that, in some places, beaches may have served as landing places and no port facilities were constructed.

Given its status as a supply base and the circumstantial, but compelling, evidence for a Roman era shipwreck or wrecks at the mouth of the Tyne, it is clear that there must have been a port at South Shields. (Bidwell 2001). This is further indicated by the generally accepted identification of the fort as a base in the 4th century for an irregular unit of bargemen from the river Tigris (Numerus Barcariorum Tigrisensium) The tidal river foreshore at Wallsend Roman fort has been partly excavated, but no obvious facilities survived (Bidwell 2018, 147-9).

Belgium (Flanders)

Roman ports are generally supposed to have existed where the major tidal inlets reached the Pleistocene sand ridge, but they have not yet been found except at one place. In the late 19th century, the remains of what has been recently exposed as representing two sea-going vessels from the mid-Roman period were uncovered on the limits of the large tidal inlet *Blankenbergegeul*, at the northern fringes of Bruges. The ships show striking parallels with other sea-going freighters such as the London Blackfriars ship. It remains unclear whether the finds of timber from the ships points to the presence of wrecks or to a quay in which it was reused. But in all cases, it is evidence of the use of tidal inlets for shipping and for maritime connectivity across the North Sea.

It can be assumed that the larger settlements both civil and military in the coastal plain along the major tidal inlets and on the Pleistocene sandy edges had a harbour infrastructure and that smaller settlements were equipped with some waterfront structures to enhance their accessibility. It can also be supposed that the Oudenburg settlement prior to the military presence and later the fort itself were related to a harbour, as one of the navigable tidal channels passed by the sand ridge on which the settlement and later the fort developed.

In the 4th century, when the marine influence in the coastal plain had increased significantly, there are indications that the water reached the north side of the Oudenburg fort. It is suggested that the connection from the tidal inlet to the fort was canalized and that a harbour is to be assumed just outside the north wall of the fort.

France (Nord and Pas-de-Calais)

Although there were probably several harbours along the coast, the importance of Boulogne, both as an official place of embarkation to cross the Channel, and a military port, seems to predominate. That Pliny wrote of the *portus Morinorum Brittanicum* (NH IV, 122), which should probably be identified with Boulogne, shows the importance of cross-Channel relations.

It seems that Étaples (in the Baie de Canche) may have been a trading post, and perhaps also other places like Tardinghen, Wissant or Wimereux/Ambleteuse (bay of the Slack), although their precise roles cannot be determined.

Netherlands (South-Holland and Zeeland)

The most northern port in the Netherlands in Roman times was at Velsen. Strictly, Velsen lies outside the Straits area, but it played a major role in the early phase of the Roman invasion of the Straits region. The first fort at Velsen, almost certainly *Castellum Flevum*, was located on the south bank of the Oer-IJ, the northern arm of the Rhine, close behind the beach ridge of the North Sea coast. The *castellum* could accommodate about 1,000 men. This army camp had an extensive harbour installation with several jetties. Its location along the beach ridge caused the connection to the sea to silt up over a long period. Nevertheless, the *castellum* continued to function for several decades. Velsen was ultimately abandoned when emperor Claudius ordered Corbulo to establish the Rhine *Limes*.

Where the Rhine flowed into the North Sea, the combination of two forts probably formed the seaport for the northern route to *Britannia*. Directly on the coast was *Lugdunum* `Brittenburg' near present-day Katwijk. A few kilometres upstream was the fort Valkenburg, `*Praetorium Agrippinae'*. Of Brittenburg we know only of a late Roman map last seen and recorded in the 16th century. East of the *Castellum Valkenburg* was an industrial and commercial district `De Woerd'. The quay that lay adjacent to it probably formed the actual harbour facility for ships using the northern route across the North Sea. Apart from the quay, though, the harbour facilities have not yet been discovered. Nevertheless, the advantageous location and spatial layout of the area do provide strong evidence for this. The text on the Connectivity theme provides a further discussion of the coastal shipping and North Sea crossing routes.

In the province of South-Holland, the site known as *Forum Hadriani* is known to have served as a principal port of the region. Initially named *Municipium Cananefatium*, it likely emerged soon after the Batavian revolt in AD 69-70, acting as the urban centre for the *Cananefates*, kinsmen to the Batavians. Poised at the critical divide between the Rhine's northern and southern tributaries, its importance was amplified by the Canal of Corbulo, constructed c. 47 AD by General Gnaeus Domitius Corbulo, potentially as a pivotal node for maritime transfers.

By the 2nd century, this community was dubbed *Forum Hadriani*, the 'market of Hadrian'. Though it has been posited that this renaming was due to Emperor Hadrian bestowing market privileges, it is more probable that such rights were inherent to its status as a municipal hub. The change of name more likely reflects the major construction at this time, including the refurbishment of the Canal of Corbulo, which

underscored the town's importance and its role in regional commerce and navigation.

Excavations in 2007 uncovered a river port, likely integrated with the Canal of Corbulo, providing a link with Voorburg to the Rhine in the north (and as such between the North Sea and Germany) and to the south to the Meuse estuary (North Sea) and further on to the southern inland waterway along Goedereede to Colijnsplaat and Domburg. Stamps on roof tiles bearing the insignia of the Roman military and naval forces – mostly *Classis Germanica* - hint at the site's martial and potentially maritime functions. Finds with a provenance from all over the western empire witness trade and transport over long distances.

At the junction of the *Helinium* (Meuse estuary) and Corbulo's Channel was probably the western fleet station of the *Classis Germanica* at Naaldwijk. Numerous roof tiles with the stamp of the fleet have been discovered here. In addition, an inscription from a pedestal of an imperial statue, which itself has not been discovered, mentions the *classis*. The fleet station itself has not been discovered at Naaldwijk but its location near the crossing point to the tribal areas of the *Frisiavones* and the *Menapii* constitutes a strategic location for a marine unit.

Just behind the western dunes of today's island of Goeree-Overflakkee, a relatively large inland port developed at Goedereede a few kilometres behind the now vanished coastal fort at De Oude Waerelt, which provided protection not only for the coast but also for the harbour. The banks of the creeks near Goedereede were reinforced in the 2nd century to make room for warehouses. The finds also testify to long-distance trade. Military finds in the area reinforce the idea that this harbour also played an important role in the military logistics between the southern North Sea/*Britannia* and the Lower German *Limes*.

The major port for the southern route to *Britannia* was near Colijnsplaat. Of the port and the possible fort near it, only loose material such as brick, tuff and wooden posts have been unearthed. The most important discoveries were the approximately 300 altars and fragments dedicated to the local goddess Nehalennia. These were discovered and literally fished up several hundred metres off the shore of the present island of Noord-Beveland in the now widely eroded Oosterschelde, one of the successors to the `Roman' Scheldt on which the seaport of Colijnsplaat was located. The likely Roman name for this port was *Ganuenta*. *Ganuenta* formed an important link between inland navigation to and from the Scheldt, the Meuse and the *Limes* on the one hand with coastal navigation and the crossing to *Britannia* on the other. The people who thanked Nehalennia for the safe transportation of people and goods came from all regions of the north-western Roman Empire.

For Domburg, much the same applies as Colijnsplaat. Altars to Nehalennia have also been found here, though only a few dozen. The situation of Domburg did differ from Colijnsplaat because of its location directly on the coast. Whether Domburg actually functioned as a harbour is not clear. Possibly there was only a temple for Nehalennia.

The last probable port on Dutch territory is that of the fort Aardenburg. With its location on the Rudannâ relatively high on the edge of the Flemish sand area, Aardenburg formed a logistical link between the North Sea and the road network towards *Gallia Belgica*. The port facilities themselves have not yet been discovered but the fort with extensive industrial activity zones around it bear witness to Aardenburg's role in trade, transport and supplying the army from the mid- to late 3rd century.

2.2.4 Forts

UK (Kent and North-East)

Coastal fortifications began to be constructed in Kent as soon as the Romans arrived in AD 43 (although there are suggestions of earlier Caesarian defences close to Richborough too (Andrews et al 2015)). Richborough was quickly defended by significant, but essentially ad-hoc, defences (Bushe-Fox 1949). Similar temporary defences were constructed at Reculver in the mid-1st century. The most significant defences of the early Roman period were at Dover where in the early 2nd century a fort of the *Classis Britannica* was constructed on the west side of a tidal inlet (Philp 1981). *Portus Lemanis* may also have seen a phase of construction at this time (Cunliffe 1980). Subsequently, and alongside similar developments at Richborough, Reculver and *Portus Lemanis*, the Dover fort was rebuilt as part of the Saxon Shore defensive network. At about the same time, the towns of Canterbury and Rochester were also defended with stone walls.

The north-east is dominated by Hadrian’s Wall. However, the pre-Hadrianic network was extensive, if not well understood, at least in the coastal area. Prior to the Wall the Roman frontier line coalesced around the Stanegate, an east-west aligned road running across the centre of the country linking a series of major forts including *Vindolanda*. The Wall itself ran from Wallsend in the east through Newcastle and Benwell and onwards. The fort at South Shields, although not on the line of the Wall, is regarded as the eastern end of that frontier. The forts at South Shields (*Arbeia*) and Wallsend (*Segedunum*) have been extensively excavated over the past 50 years. Wallsend fort was built in the Hadrianic period, and the excavations mean its plan is well understood throughout its 300-year occupation. The remains at South Shields are more extensive. The fort there is situated on the Lawe top, which

overlooks the mouth of the Tyne and the coast. There are strong hints of a Hadrianic fort in the area, but the visible fort dates to the Antonine period. It was extended southwards and remodelled as a supply base as part of Severus' campaigns into Scotland in the early 3rd century AD.

Belgium (Flanders)

In the late 2nd century, an auxiliary fort was built at Oudenburg, on a very strategic position at the promontory of the sand ridge protruding into the coastal plain. The remains were first discovered in the 1950s. Large-scale excavations in the first decade of the 21st century on the fort precinct have resulted in a refined fort chronology running from the late 2nd until the first decades of the 5th century, with five main forts succeeding each other. The combined evidence from the forts at Oudenburg, Aardenburg and along the British coast, indicates that the installation of the first coastal forts is most likely assignable to Commodus (AD 177-192). From that time onwards, the coastal defence seems to have developed rather organically, but on the Continent, the Oudenburg and Aardenburg forts appear to have had a parallel evolution from the late 2nd throughout the 3rd century. The firmly established chronological dating evidence at Oudenburg points to the installation under Postumus (AD 260-269) of a unified cross-Channel coastal defence system, visually expressed by the defensive stone architecture showing specific characteristics. This unification clearly instigated the cross-Channel connection as can be seen in an increase of incoming British material, e.g. Romano-British pottery, whetstones from the Weald and jet items most likely from the Yorkshire coast. Under the breakaway British Empire, the Channel divided the shores on a political level, with both the Oudenburg and Aardenburg fort as part of the official Empire opposite to the British Empire. Although this resulted in a different military evolution of the shores, this seems to have had no impact on the cross-Channel economic connections, evidenced by the Romano-British coarse pottery of which a portion can be securely dated to this period. The reoccupation and renovation of the Oudenburg fort under Constantinus in a way which visually and strategically mirrors the manner in which the British Shore forts were reinforced, testifies to a general building programme along the North Sea and Channel. Moreover, the firmly established start date at Oudenburg of *c.* AD 320-330 may well represent the actual start of the *litus Saxonicum* or 'Saxon Shore' system operating under one command. A clear interruption in the fort's occupation somewhere in-between AD 360/370 and 380 can be related to troop movements to the east by Julianus in AD 361 or by Valentinianus I in the (early) 370s. The subsequent reoccupation of the fort by non-regular troops, can be closely dated to AD 379/380 and can possibly be related to the actions by Magnus Maximus against Gratianus. The army unit stayed in place certainly after AD 411/413 and likely into the second quarter of the 5th century.

France (Nord and Pas-de-Calais)

Boulogne was the headquarters of the Roman fleet, and the fort was built on a promontory overlooking the Liane estuary and the port. It seems that there was an almost checkerboard arrangement of settlement within the enclosure by the middle or second half of the 1st century and the barracks were built after AD 110 (probably under Hadrian). At the end of the 2nd or beginning of the 3rd century, there was a vast campaign to rebuild the military installations, which seemed to be in use until the 4th century, when a new campaign of work was carried out. At this time, it is possible that the encampment was not only intended for military use. In addition, we still have no certainty that Carausius was responsible for restoring the defensive system between AD 290 and 293.

No other fort seems to have been archaeologically documented to date in the region, although the artefacts found in the necropolis at Marquise suggest military occupation, perhaps linked to the presence of army veterans. According to Michel Reddé, however, the continental bases of the *litus saxonicum* in the *Notitia Dignitatum*, can be located as follow in the area near Boulogne :

- The *Equites Dalmatae in Marcis, in litore Saxonico* has not been located;
- The "*classis Sambrica at Quartensi sive Hornensi*", was perhaps based near the mouth of the river Somme (the name of the fleet probably refers to the river itself);
- Finally, the Nervian *Portu Aepatiaci*, was probably located either at Etaples or in Oudenburg, or even on a third site;

Between the Canche and Authie rivers, there is clear evidence of a coastal settlement in the 4th century at Quend and Nempont-Saint-Firmin. At Nempont-Saint-Firmin, the chronology is the same for both the settlement and necropolis with a few items of evidence (weapons, belt elements) pointing to a population settled there overlooking the coast, as at the nearby site of Vron.

Netherlands (South-Holland and Zeeland)

The Lower German *Limes*

The Roman landscape in the province of South-Holland is completely dominated by the Roman *Limes*. The Lower German *Limes* served as the north-eastern boundary of the Roman frontier province of *Germania Inferior* (Lower Germany), extending from the Rhenish Massif in Germany to the North Sea coast in the Netherlands. It functioned for more than 450 years, from the late 1st century BC, as a defensive line

against Germanic tribes. The initial military bases were established in the last decades BC to conquer territories across the Rhine. When this objective was not achieved, the left riverbank was fortified. The frontier consisted of military installations of various types and sizes, along with civil structures and infrastructures built along the river's edge.

The Roman forts along the southern bank of the Rhine in the Netherlands played a crucial role in the defence and control of the Roman Empire's northern frontier and the route to *Britannia*. A brief summary of the forts is presented below (from east to west starting at the border of the province of South-Holland.

- **Bodegraven**: Only in 1995 were the first substantial parts of this fortification uncovered and the fort is the least investigated of the western *Limes* forts. Based on construction timber, stamps on roof tiles, and other data, we can assume that it was already present before the year AD 69;
- ***Nigrum Pullum* (Zwammerdam):** The fort controlled the confluence of the Meije and Rhine rivers and was founded after AD 47. It was destroyed during the Batavian Revolt, rebuilt after AD 80 and saw another reconstruction in stone and brick after AD 175. The site was eventually abandoned and rediscovered in 1971, revealing the foundations of important structures and the discovery of six ships at a nearby quay;
- ***Albaniana* (Alphen aan den Rijn):** Dating back to around AD 40, this fort was part of a defensive line along the Rhine. It underwent significant changes, including a transition from wooden to brick walls, and had a nearby *vicus* where cultural exchanges occurred. The fort was abandoned in the 3rd century during Germanic invasions. Excavations have uncovered extensive remains including barracks, storage, and personal items of soldiers;
- ***Matilo* (Leiden-Roomburg):** The fort was established around AD 69 near the confluence of the Rhine and the canal built by General Corbulo. It underwent several renovations including stone reconstructions of the armoury and walls. It was a key site following the Batavian Rebellion and housed various cohorts and an artillery unit;
- ***Praetorium Agrippinae* (Valkenburg):** Named after the mother of Emperor Caligula, this fort was likely established around AD 40, with multiple building phases identified. It was originally fortified by a palisaded earthen wall and underwent several reconstructions, including being rebuilt in stone around AD 180. The site was abandoned around AD 275 but showed signs of late Roman activity. Excavations have revealed a large civil settlement with living quarters, a cemetery, and a military road reconstruction. The most recent research in 2020 found traces near the later *castellum* of a large legionary camp of nearly 20 ha. It was built and used around the year AD 40 and may be related to the

attempts to conquer *Britannia*. It is one of the largest Roman military structures ever found in the Netherlands;

- ***Lugdunum* (Katwijk):** A naval base and military granary at the Rhine's estuary, known for the bizarre episode where Emperor Caligula commanded his troops to collect seashells in AD 40. The earliest stages of this stronghold dates to between AD 40 and 50. Archaeological evidence is scant, with 16th century drawings indicating a possible granary dating to the 4th century, a possible late phase of the same site. Continuous human occupation and/or the eroding influence of the North Sea makes pinpointing the exact location challenging;

Coastal forts south of the Rhine

- **(Den Haag-Ockenburg):** A small fort of an equestrian unit. The fort functioned from about AD 150 to 180 and served as a link in a coastal defense system between coastal forts, which have disappeared into the sea, and the city of *Forum Hadriani* and the Corbulo canal;
- **Naaldwijk:** A putative fleet station of the *Classis Germanica* (see above);
- **Oostvoorne:** A putative coastal fort;
- **Goedereede-De Oude Waerelt:** A putative coastal fort, last witnessed in the 17th century during a storm in 1618. In reports of that era writers mentioned a "city … immense streets with foundations of large houses … antiquities … bronze coins, one depicted Adrianus, another Antoninus …" This Roman "city" is assumed to be a coastal fort in the line of the Brittenburg at the mouth of the Rhine and the putative forts of Roompot and Walcheren Oranjezon along the coast of Zeeland in the South. Presumably other coastal forts have been washed away by rising sea levels;
- **Roompot:** A putative coastal fort;
- **Walcheren-Oranjezon:** A putative coastal fort;
- **Aardenburg:** A fort on the southernmost stretch of the Dutch 'Bridging the North Sea' region, lying metres higher than its surroundings, dry on the sands of the Flemish coastal region. The fort is placed at the place where the Menapian craft settlement could access the network of roads in *Gallia Belgica*. The fort at Aardenburg, together with that at Oudenburg (in Belgium), formed the northern segment of the military coastal surveillance of the Channel from the late 2nd century until the end of the 3rd century. While the Oudenburg fort developed further into an important stronghold in the 4th to early 5th century as part of the Saxon Shore system, Aardenburg did not;

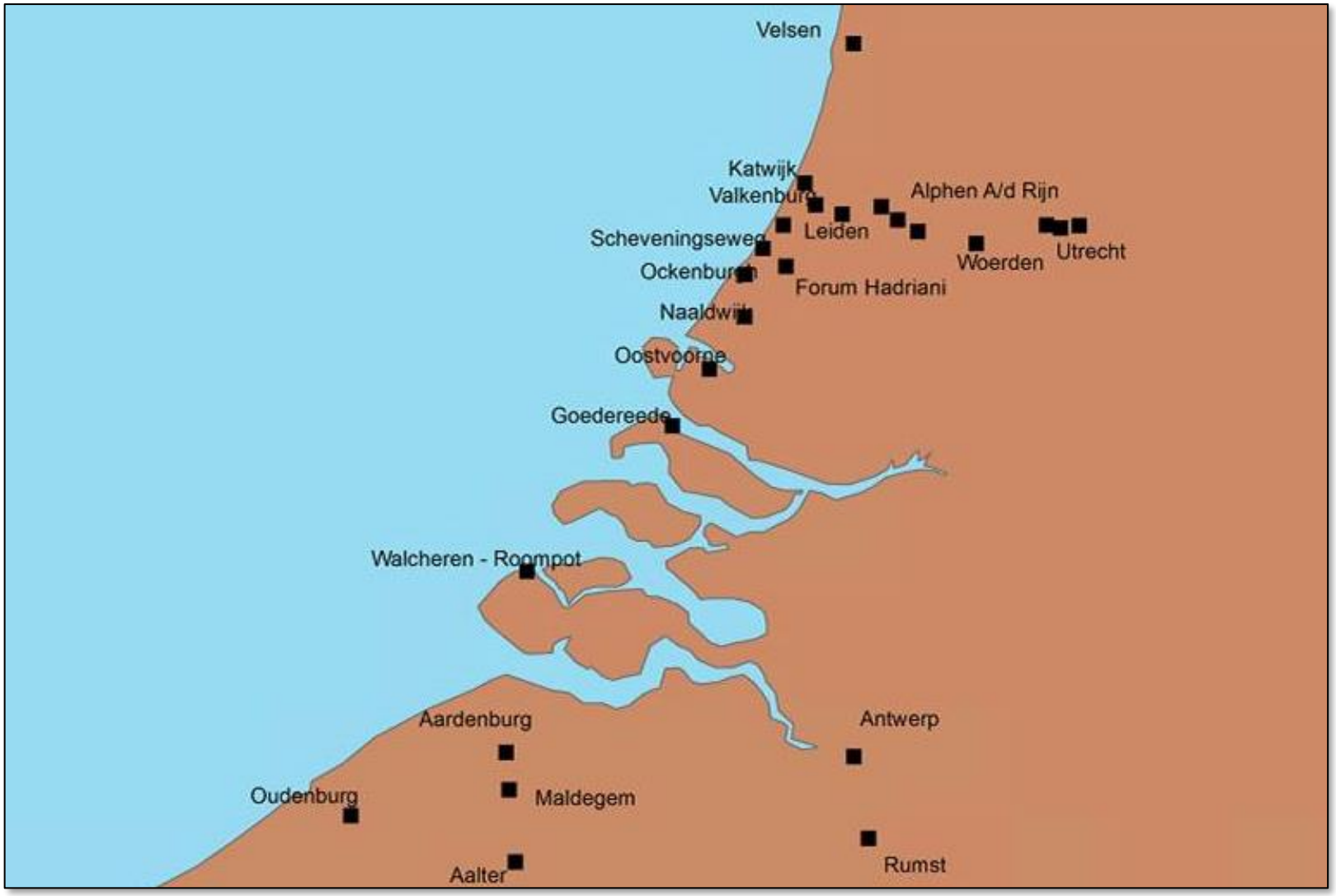


Figure 9 - *Confirmed and possible Roman military installations along the coast of the Netherlands, Belgium and France (modern coastline)*

2.2.5 Extra-mural settlement

UK (Kent and North-East)

Although the strategic importance of the ports and forts of the project area may lie in their role within the communications networks of the wider Roman Empire, all of them depended on the exploitation of resources in their immediate neighbourhood and sustained communities involved in these processes as well as the life of the forts. Foodstuffs, ceramics, salt, raw materials and labour often needed to be sourced locally and the major sites depended on their hinterlands to operate successfully.

In Kent, all the towns, whether coastal or otherwise, would have had extra-mural settlement, albeit often ephemeral and small-scale. At Richborough, the town was laid out on a grid pattern when the site was converted into a military and supply base. In a reversal of the normal pattern, the later masonry fortifications were then constructed within the area covered by the town. The town must have continued to fulfil many of the roles of a more typical *vicus* nonetheless. At Rochester, where the town was established next to a bridge constructed across the river Medway, such extra-mural settlement as existed seems to have been on the western side of the river, opposite the town. Similar evidence exists in Dover: several buildings identified during the town centre excavations appear to have been contemporary with the fort but were situated outside its walls (Kent County Council 2020). Little is known about this extra-mural settlement but the fact that the buildings uncovered all appear to be high status (including buildings with painted plaster, a possible *mansio* and a bath-house) perhaps suggests a function other than just acting as a site where those dependent on the military would have lived. Many of these buildings were demolished or altered during the construction of the later Saxon Shore fort for which there is so far little evidence of extra-mural settlement.

As was generally the case for Roman forts, on Hadrian's Wall the forts were supported by extensive extra-mural settlements, the full extent of which is only now becoming clear as the result of a sustained campaign of geophysical survey. Most of these sites appear to have been abandoned in the late 3rd century, even when the forts with which they were associated continued.

Belgium (Flanders)

As there is only one known coastal fort in Flanders, that of the Oudenburg fort, only one extra-mural settlement or military *vicus* can be defined for this region. Prior to the arrival of the army, a settlement developed from the Flavian period onwards on the sand ridge bordering and protruding into the coastal plain, near to a tidal

channel. Starting at the tip of this promontory this settlement, most likely related to a small harbour (not yet found), expanded to the east later on. With the decision of the army to erect an auxiliary fort on this strategic location c. AD 180 or somewhat later, the settlement evolved into a flourishing extra-mural settlement surrounding the fort, until its occupation stopped in the 260s or around 270. Cremation graveyards related to the pre-fort and the later extra-mural settlement – one of which contained over 600 graves – were also brought to light

Figure 10 - *Aerial photo of Oudenburg with overlays indicating the situation in the first half of the 3rd century, with the position of the sand ridge and the nearby tidal channel.*

France (Nord and Pas-de-Calais)

There was certainly extra-mural settlement at Boulogne although the lack of large-scale modern archaeological excavation makes characterising it difficult. The port at Boulogne was on the right side of the Liane estuary which was more conducive to shipping than the coast to the north of the town. A text by Florus suggests that a bridge may have been built here as early as the late Republican period. The main period of growth of Roman Boulogne was associated with the invasion of Britain. The *Classis Britannica* port occupied the area between the rue de l'Ancien Rivage and the rue Boucher de Perthes. It would almost certainly have been accompanied by warehouses and other stores. Further east, along what is now the rue Gayole,

houses with hypocausts, plaster and frescoes have been found. West of the port, occupation is known to reach at least the Grand Rue although later changes in the area make the nature and extent of this uncertain. Further afield the port was marked by a lighthouse, the Tour d'Ordre (which collapsed in 1644). Relatively little is known of the extent of the town in the later Roman period although it certainly seems to have reduced considerably in size.

The rising waters, which began around AD 250., gradually flooded the coastal salt pans. The salt trade gradually disappeared, and Cassel lost its importance. In AD 293, during the reign of Maximian, Emperor of the West, the administrative map was redrawn and Tournai became the capital of the Menapiens, replacing Cassel, which seems to have reduced considerably in size.

2.2.6 Waterfront/harbours

UK (Kent and North-East)

In addition to the large, constructed ports that were to be found in coastal areas, there is also significant evidence of smaller-scale maritime installations, often on riverbanks and some distance inland. These must have provided for much of the coastal trade in and out of Kent. The best evidence of this in Kent is at Northfleet Villa where a substantial oak quay and timber revetments were constructed to allow the *villa* access to the river Ebbsfleet. A little way further up the same river, properties at the religious centre at Springhead backed onto the river and may have again been furnished with quays to enable access to the river.

Belgium (Flanders)

Roman harbours are supposed to have existed along the major tidal inlets reaching towards the Pleistocene sand ridge, but they have not yet been found except for at one place. In the late 19th century, the remains of what has been recently exposed as representing two sea-going vessels from the mid-Roman period were uncovered on the limits of the large tidal inlet *Blankenbergegeul*, at the northern fringes of Bruges. The ships show striking parallels with other sea-going freighters such as the London Blackfriars ship. It remains unclear whether the timber from the ships points to the presence of wrecks, or to a quay in which it was reused. It is, in any case, evidence of the use of tidal inlets for shipping and for maritime connectivity across the North Sea.

It can be supposed that the Oudenburg settlement prior to the military presence, and later the fort itself, were related to a harbour, as one of the navigable tidal channels passed by the sand ridge. However, archaeological evidence is so far lacking. For

the 4th century there are indications that water reached the north side of the fort, and it may be that the connection from the tidal channel to the fort was canalized.

France (Nord and Pas-de-Calais)

It seems that Étaples (in the Baie de Canche) may have been a trading post, even if there is no concrete archaeological evidence to suggest that the river was navigable in ancient times. However, the presence of the port of *Quentovic* in the commune of La Calotterie, used between the 7th and 9th centuries, is an argument in favour of a very open estuary, suitable for navigation.

Other harbours may have existed on the coast, such as Tardinghen, Wissant or Wimereux/Ambleteuse (baie de la Slack), although their precise roles cannot be determined.

Netherlands (South-Holland and Zeeland)

Along the Rhine, Roman fortifications would have boasted installations and amenities such as quays, boatyards, and warehouses to support nautical operations. Maritime traffic was likely for a mix of military and civilian (commercial) purposes. It seems plausible that the Rhine, serving as a vital artery, was more critical than the imperial *Limes* road constructed along the river's southern shore. The bulk of construction materials for the forts and outposts were shipped from the Rhineland, where major settlements and the administrative centre of Cologne were situated. The significant river traffic on the Rhine is evidenced by ship finds at Zwammerdam, Woerden and Vleuten-De Meern. One can assume such harbour facilities existed everywhere in the Dutch coastal area in South-Holland as in Zeeland.

2.2.7 Villas

UK (Kent and North-East)

There are almost a hundred Roman *villae* in Kent but almost none of them lie on the coast (Folkestone Villa being an exception). Most are, however, located either close to coastal areas or have good river or road connections to the coast. This is presumably to take advantage of the much lower transport costs associated with sea and river travel compared with land transport, and because it allowed the *villae* to control the valuable resources to be found on low-lying coastal areas. A striking example of this is in north Kent where between London and Canterbury a string of *villae* has been discovered controlling coastal estates with good access to Watling Street and the sea. As mentioned above, Northfleet Villa provides a very good and well evidenced example of how a *villa* would integrate its operations with

river/estuarine transport by developing marine and maritime infrastructure). *Villae* have not been observed in the Military zone of Hadrian's Wall.

Belgium (Flanders)

Villae are unknown for the coastal plain of Flanders and for the bordering sandy region, but definitely exist further away in the hinterland.

France (Nord and Pas-de-Calais)

The *villa* at Conchil-le-Temple (which replaced an indigenous farm in the 1st century) was abandoned at the end of the 3rd century. In the Authie valley, the *villae* of Tigny-Noyelle and Dompierre-sur-Authie are among the most northerly ancient sites identified by aerial detection in the *Ambiani* area.

The development of Étaples during the Gallo-Roman period is demonstrated by the numerous finds made throughout the area, and there is no doubt that this could not have been achieved without the establishment of an efficient supply network. These *villae* could also have been the headquarters of landed estates focused on agricultural and/or fisheries production, a possibility supported by their border positions, enabling trade with the two *civitates*.

In Roman times, Nord-Pas-de-Calais was an agricultural and livestock-raising region. Aerial surveys have revealed several large *villae* inland, particularly around Arras. A large number of agricultural estates have been excavated in Nord-Pas-de-Calais in recent years, revealing a complex and contrasting world in which owners and tenants, large and small, coexisted, with very different farming methods, sometimes within the same property. Small farms, which may have been dependent on one another, are evidence of the dense occupation of the land. Numerous discoveries are adding to the data and opening up new perspectives. In Cassel, only one *villa* has been identified, located to the south of the town at a place called 'Chemin du Prince'. Other *villae* have been discovered, such as the two in the town of Bailleul.

Netherlands (South-Holland and Zeeland)

To encounter a proper *villa* landscape one has to travel to eastern and southern parts of the Netherlands. There are, however, some similarities in the Straits region at some distance from the coast. The excavation of Rijswijk De Bult revealed the so-called *villa* of Rijswijk, with large storage buildings. The same large buildings have been found at Den Haag-Uithofslaan. The size of these structures suggests surplus production for army supply.

2.2.8 Religious/ritual sites

UK (Kent and North-East)

Many forts, towns and *villae* contain ritual features or objects (shrines, altars, statues and other offerings). For example, at Dover an altar was discovered dedicated to the Mother Goddess of Italy. There are also several examples of ritual pits and shafts from coastal areas including at Birchington, Dover and Ramsgate. At Swanscombe a ritual pit 12m deep was discovered filled with sand, animal bones, ox-horn, pottery and nails. Three human skeletons lay side by side at the bottom. The Birchington shaft was 11m deep with footholes for the first 7m. Unopened oyster shells covered the bottom (similar to the Gallo-Roman ritual shaft at Troussepoil, France) The shaft contained a horse's skull, a few pieces of bones and some pieces of oak; a circular piece of sandstone 10cm thick, blocked the shaft at 9m depth and the remainder of the infilling contained the remains of ox and horse and a few pieces of Roman pottery. Two interconnecting hollows cut into the chalk close to the shaft also contained Roman pottery.

There are several examples of Roman temples close to the Kent coast, including at Worth, Oare/Luddenham and Gillingham. These generally follow classical models. The temple at Worth has a *cella* c. 8.5m square and the surrounding ambulatory is about 16m long by 15.5m wide. The temple is thought to have been built in two phases; after the first building was destroyed another temple was built re-using building material, including stone sculpture and tiles, in the flooring. The temple is on the site of an Iron Age ritual site showing the considerable continuity from the Iron Age to Roman periods in much of Kent.

The most important ritual site in Kent is at Springhead (*Vagniacis*) in the north-west of the county. It seems possible that the spring at the head of the river Ebbsfleet, which connected to the coast 2 km away, had a ritual/religious significance as early as the Bronze Age and veneration appears to have increased significantly from the last quarter of the 1st century BC. A similar level of ritual activity may have continued into the early Roman period. Brooches appear to have replaced coins as the main votive offering at the spring in the second half of the 1st century AD as they appear in very large numbers, too many to be explained by accidental loss. There also appears to be continued use of the area on the slopes overlooking the spring where two further viewing or feasting platforms were constructed. It was not until the late 1st and early 2nd century AD that the construction of buildings relating to the sanctuary appears to have really begun. Excavations have revealed at least seven temples or shrines alongside an array of associated features including altars, plinths, pits with structured deposits, lean-to structures and ovens spanning the late 1st to late 4th centuries. These were all within a walled enclosure located on the south side

of Watling Street, approximately 100 m to the south of the spring. There was a major phase of redevelopment and construction at the complex in the later 2nd and early 3rd century AD the first temple was raised on a platform and another temple was added similar to the first – also on a raised platform and connected to the southern side of the first via a wall. Alongside this, a small rectangular temple was built on the north side of the first and an imposing gate house/small temple was built along the eastern enclosing wall. Overall, by the 3rd century the temple complex would have had an imposing and impressive architectural arrangement that must have had a significant visual impact upon those people travelling along Watling Street from the east.

Religion played a major role in the Roman army and a variety of temples and altars have been found along the line of Hadrian's Wall. These include the temple to a local god Antenociticus at Benwell, and several *Mithraea*. Altars dedicated to Neptunus and Oceanus recovered from the river Tyne in Newcastle hint at a bridge head temple there – then and now the lowest bridging point on the Tyne. Alongside local divinities, *Mithraea* with their quasi-eastern origins, and established Roman gods and goddesses, there is evidence for a range of deities from north-west *Gaul*, brought to the region across the North Sea and the Channel. Thus, for example we see Hercules Magusanus, whose main temple and cult lay in the Netherlands, venerated on the Northern Frontier in Britain. From time to time, divine assistance was invoked to call for harmony, or Concord, between the different groups drawn to Hadrian's Wall. An inscription from *Vindolanda* in Northumberland shows that Britons and Gauls came together at the site to make just such a dedication.

A related theme is the transition from paganism to Christianity. Coastal evidence of this is sparse in Kent although a late Roman period church was constructed at Richborough. A rich and growing body of material indicates the presence of Christian communities along the northern frontier, often settled around fort sites and retaining their own link to the Roman world, for some decades after the collapse of imperial administration. A church, with a surviving table altar, may have been built in the headquarters building of the fort at South Shields at some point in the 4th century.

Belgium (Flanders)

Religious or ritual sites are unknown for the coastal plain of Flanders and for the bordering sandy region, but definitely exist further away in the hinterland. At the fort at Oudenburg, excavations revealed a *valetudinarium* or military hospital in the south-west corner area and dated to the second half of the 3rd century. On the courtyard of this large timber-framed building of *c.* 32 by 23 m which was decorated with wall paintings, the remains of a *sacellum* or shrine were found, also with wall paintings. It can be assumed that it served as a shrine for the healing gods, such as Aesclepius. Several isolated artefacts at the fort site and in the extra-mural.

Figure 11 - *Plan of Springhead Roman religious centre (Williams et al 2007)*

settlement refer to religious or ritual activities, such as *dea nutrix* figurines, Mercury statuettes, a cymbal related to a mother cult (possibly Cybele), and in the fort produced open snake-like bracelets with stylized snakeshead ends associated with the dedication of mother goddesses. Both the cymbal and these specific bracelets date to the fort of the late 3rd century. From the bath house erected in the south-west corner area of the Oudenburg fort in the 4th century a *Venus pudica* statuette was found that most likely adorned a niche.

France (Nord and Pas-de-Calais)

There is little evidence of places of worship on the Nord-Pas-de-Calais coast, but numerous *fana* (Romano-Celtic temples) have been found during aerial surveys in rural areas.

Apart from a sanctuary dedicated to Attis/Cybele in Arras, the only known sanctuary was discovered in Marquise. This sanctuary was active from the 4th to the early 5th century, and yielded a batch of 563 coins and, above all, a very fine sculpted block bearing a snake.

Cults are known mainly from finds of artefacts. It would be difficult here to make an exhaustive inventory. Two inscriptions - preserved in the Musée de Boulogne - refer to Juno (Marquise) and Jupiter (Halinghen), as well as bas-reliefs depicting Mercury (Rinxent), Sol-Appollo (Frencq) and a stone with four gods representing Hercules, Mars, Victory and probably Mercury (Marquise). Most are isolated finds or were reused later (such as the Frencq stele, used in the paving of the church).

In Boulogne, there are representations of Hercules and Venus and a nymph - probably the personification of the Liane river – and bronze or terracotta statuettes of mother goddesses (*dea mater*), Venus, Mercury and a probable representation of Nehalennia.

At Cassel, 3 necropoli and a temple have been discovered. The first Roman necropolis was located to the east of the mount, between the Route de Lille (D 933) and the present-day cemetery. These were cremation tombs, discovered in 1825 during the excavation of a sand pit. The inventory reports the discovery of vases, tiles and glassware, as well as charcoal both alone and with vases, some of which were stamped. Other Gallo-Roman and Merovingian artefacts were collected up until 1876. There is mention of a ‘13 cm bronze funerary cippus representing a naked bearded god holding an indeterminate object and a sceptre’; this is thought to be the statue of Jupiter, mentioned before 1841 along with other objects that can also be attributed to the sandpits (toiletries, a gilded bronze statuette of Venus); ‘terracotta

vases of the Drag. 18/31 and Drag. 45 (types), an earthenware lamp, glassware, particularly Ising, 61, 63 and 103 17'; 'small bronze objects: keys, rings, sconces decorated with a lion's head, spatulas, twisted pins, sole or box nails; two shields, two spearheads'; coins... of Augustus, Domitian, Hadrian, Faustina, Posthumus, Tetricus, Diocletian, Constantine and vases with coins of Augustus, Tiberius, Germanicus, Trajan, Antoninus, Faustina and Posthumus.

A second Roman necropolis was discovered in 1848 in the sand pits of M. Moisson to the south-west, near the road leading from Cassel to Bavinchove station, 2500 m from the centre of Cassel. At a depth of 5 to 6 m, a wealth of material from cremation tombs was discovered: 500 to 600 red vases, more than 20 white vases, lamps and statuettes (Delmaire 1996)

A third necropolis was excavated in 2004. The area investigated lies halfway up the slope of the Mont, around 500 m south-east of the Porte de Dunkerque, and is steeply sloping, with an altitude varying between 104 m and 90 m NGF.

Fifty-five structures located on the periphery of the cremation area were excavated. The types of structure identified were: cremation graves (14), pyres (8), pyres or ashen pits (12), ashen pits without bones (11), offering or disturbed cremation pits (9) and 1 other type.

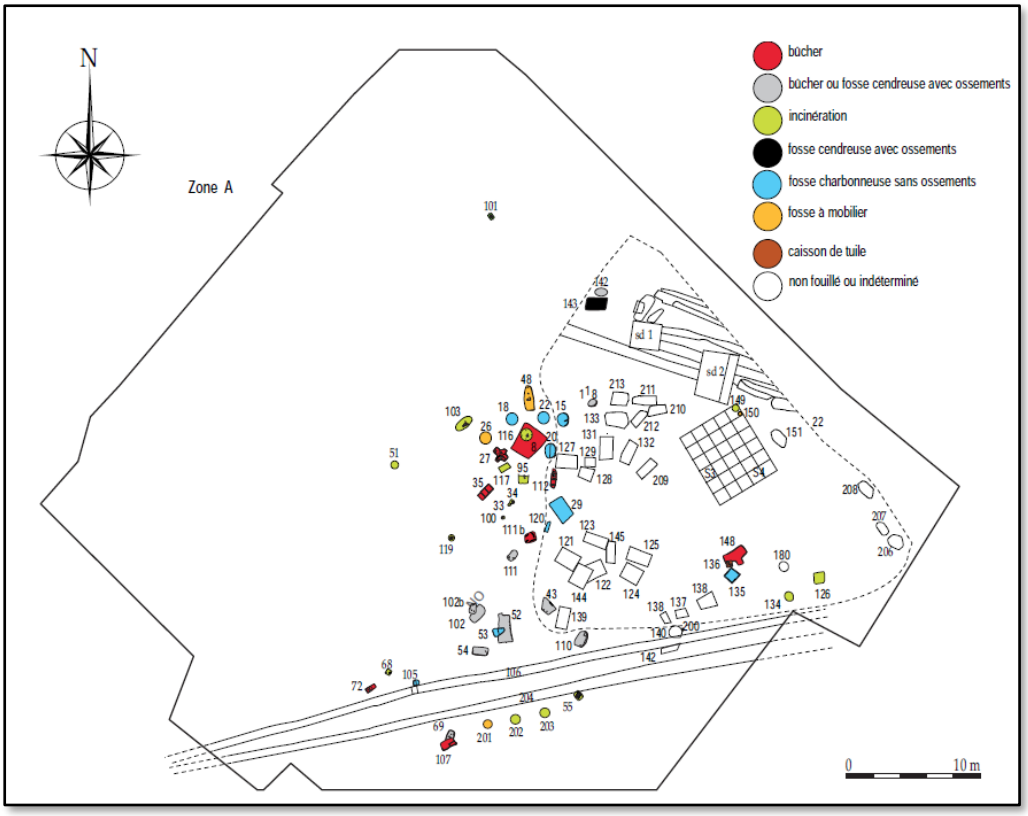


Figure 12 *- Distribution of the different types of Gallo-Roman funerary structures. DAO N. Soupart and E. Delmont.*

Figure 13 *- View of the remains of the deceased in the pyre 35, the figurine and the cinerary repository in burial chest 55 (Photograph: N. Soupart).*

The material collected from the entire site, according to the fairly classic ceramic production, dates from the first to the third quarter of the 2nd century AD. As the earlier layers of the cremation area have not been reached, it is not unlikely that it was first used in the course of the 1st century (Soupart et al 2014)

Next to the third necropolis, a Roman temple was excavated in 2005. The excavation revealed two rectangles of interlocking foundations on a centred

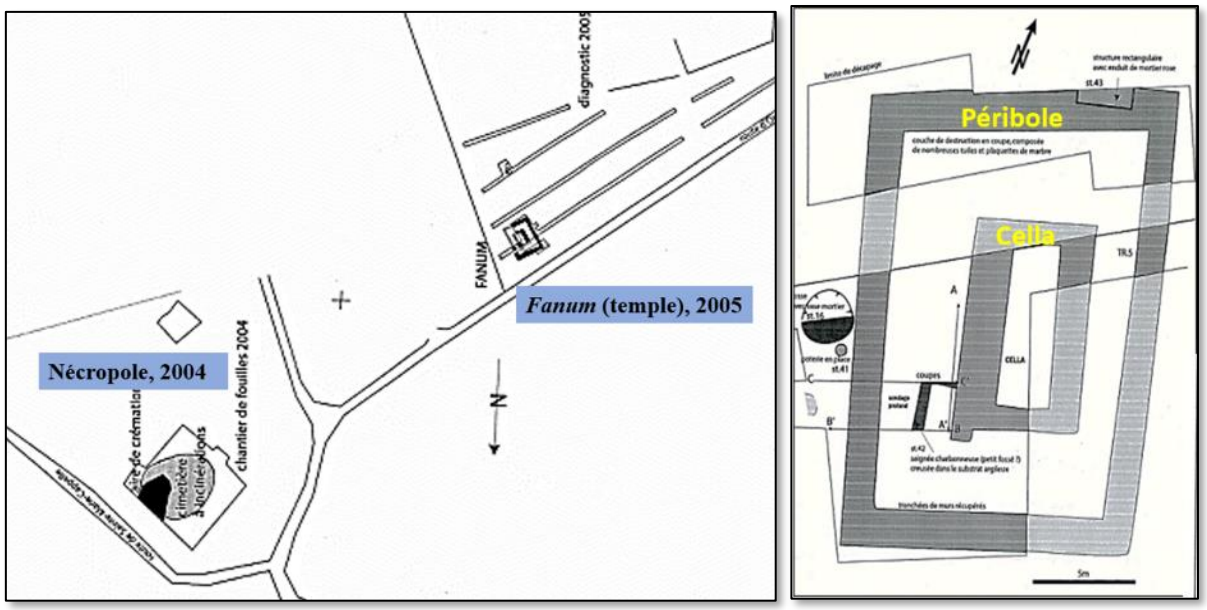


Figure 14 - Location and plan of the Fanum at Cassel

plan; the smaller (cella) measures 9m by 6m, while the larger (peribolus) is 20m by 15m, making this an imposing type of building. As the excavation report states: 'This fanum must have enjoyed a certain prestige because of its probable architectural appearance in opus sectile with complex decoration of triangles and squares or rectangles in polychrome marble slabs, a common motif in paving ornamentation in Roman *Gaul*. In its immediate surroundings, the function of the building can be compared to the cremation site excavated in 2004. The dedication to the god has not been found, although we know that in Flanders the god Mars is one of the most represented.

Netherlands (South-Holland and Zeeland)

The inventory of ritual sites along the Dutch coast is not long. It begins just north of the Rhine at Velzerboek (near the early Roman fort of Velsen). In a peat valley on the edge of the dune area lay a ritual sacrificial site that was in use before the occupation period of the harbour fort of Velsen but which also remained in use after its abandonment by Corbulo. Along the western *Limes*, no ritual sites are known, nor temple buildings in or near forts. No doubt, however, the Rhine and its tributaries were considered suitable for contact with the gods as shown by the presumed sacrifice of an equestrian helmet in the harbour of Fort *Matilo* (Leiden). An altar fragment at The Hague-Uithofslaan site also suggests the presence of a temple.

The most important religious sites were discovered at Colijnsplaat and Domburg where c. 300 and 30 altars respectively were discovered, mostly dedicated to the local goddess Nehalennia, who was believed to protect travelers and traders. Both temples have been washed away by the waves. Another clearly religious site is the temple within the *castellum* walls of Aardenburg.

In addition, in the coastal regions numerous finds indicate religious worship by individual civilians, soldiers and travelers as evidenced by the curse tablet from *Matilo* (Leiden) and Bodegraven, figurines of pottery and bronze and the dozens of gems with images of gods. Remains of imperial statues have been discovered in a few places (*Matilo*, *Forum Hadriani* and Naaldwijk) which, together with, for example, the altar from *Forum Hadriani* dedicated to the divine emperor, point to the practice of the imperial cult.

2.2.9 Local industries (general)

UK (Kent and North-East)

In contrast to the larger settlements, ports and forts, the most numerous coastal communities in the Roman period are likely to have been small rural settlements practicing agriculture, animal husbandry, fishing and both small- and large-scale industries. There is considerable evidence for these activities in Kent, fleshing out the social and economic landscape. Towns and roadside settlements presumably acted as market centres: Rochester, for example, probably prospered on the back of a trade in salt, pottery, Kentish rag and the produce of the Medway *villae*.

Belgium (Flanders)

The evidence of reclamation structures such as dykes demonstrate that economic activities other than pastoralism and salt-making were indeed possible in the Roman coastal plain. At Stene (near Ostend) the botanical research at the platform points to the local cultivation of *Brassica rapa* / white turnip and broad bean. The palynological analysis of a dung fragment suggests that these plants were used as fodder for sheep, of which the bones were found. The site seems to have been focused on animal husbandry and agriculture mainly for the needs of the livestock. It is unclear whether the sheep were held for their meat or for their wool.

In the bordering sandy region, the many oak forests – of which the existence is well-established by scientific evidence – were ideal homes for pigs. The Menapian ham was famous, as is known from Martialis and the Price Edict of Diocletian.

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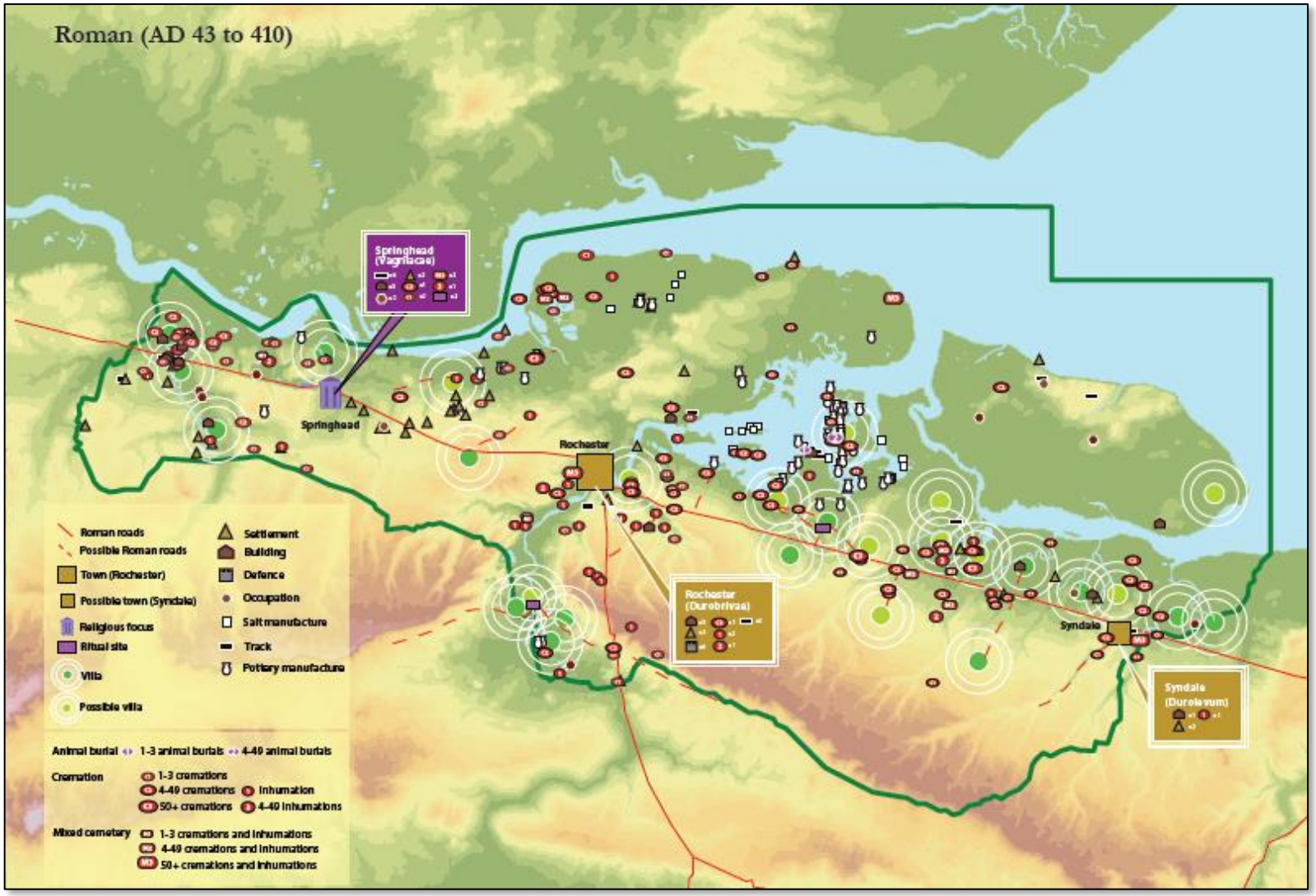

Figure 45 - The Roman coastal landscape of north and north-west Kent (Kent County Council 2022)

At the fort at Oudenburg the excavations at the south-west corner revealed a workshop area in the late 3rd century, with the evidence of bronze and iron working, not only for reparations but also for the attested production of (at least) simple brooches and bracelets. Several artefacts point to the existence of textile working and leather working at the fort site

France (Nord and Pas-de-Calais)

There is still little information about the industries and produce of the north of France. According to Pliny the Elder [HN, X, 52] the *Morini* raised geese, which were famous in Rome for their robustness and feathers. He insists that it is a refined delicacy and describes the force-feeding of the geese. However, if these animals reached Rome, it was because they had been reared on a scale that went beyond local needs and made it possible to meet external demand. *Atrebates* wools were also very well-known and there is evidence of the production of tableware here and there.

Quarries are well known in the hinterland and seem to have been an important part of economic activity. Sandstone was quarried at Baincthun, and oolitic limestone at Marquise. These sites were quarried to provide stone for construction, dedications and other lapidary needs in Boulogne-sur-Mer and even as far as the Authie Bay in the case of the Marquise limestone.

Netherlands (South-Holland and Zeeland)

There is little evidence for industry and crafts in the *vici* and the rural settlements of the Dutch coastal area. The clearest examples are the industrial zones in Aardenburg and the salt-related site (see Fishing). In rural settlements loom-weights suggest local production of fabrics and clothing. Many excavations have revealed evidence of metallurgy, but this is mostly interpretated as representing the repair of pottery or metalware.

2.2.10 Fishing

UK (Kent and North-East)

Although there is plenty of good evidence in Kent for the consumption of fish in the form of fish bones and shells (for example halibut, shad, mullet, mackerel, plaice, sole, shellfish have all been found), there is, so far, no evidence of fishing (although several undated fish traps have been found). There is some limited evidence of fish processing. It has been suggested that the production of *garum* (or possibly *allec*) often accompanied the production of salt or pottery and at a pottery works on the Isle

of Grain, Kent, *amphorae* were made and garum was reportedly made and transported.

There is evidence for fishing in the shape of fish-hooks in 4th century contexts at South Shields, and for the consumption of fish (cod) at South Shields and Wallsend. The fish bone evidence is biased towards the larger species as they were recovered by hand, not sieving. There is plentiful evidence for the consumption/use of shell-fish at South Shields and to a lesser degree at Wallsend.

Belgium (Flanders)

The fish spectrum at the Oudenburg fort reveals mainly the collecting of shellfish and fishing in nearby waters or not far away from the coastline, although these are a rather small portion of the food supply. Several netting needles and lead net weights found at the fort also point to these fishing activities. Based upon the species identified during archaeozoological study of marine fish-bones found on inland sites, it has been demonstrated that fishing took place close to the coast. The catch was traded inland in various ways. The production of fish sauce is one of these; it was made from small fishes caught in the estuaries and in the North Sea close to the coast. Large quantities of mussels and oysters found on sites far inland seem to point to a highly organised and voluminous trade, but the coastal starting point of these activities has not been discovered yet.

France (Nord and Pas-de-Calais)

We already know the importance of Étaples in this area. In Boulogne, the remains of ichthyofauna and finds of artefacts seem to indicate fishing activity (hooks, equipment for repairing nets, seals, etc.). The most important find is undoubtedly the fishermen's settlement dating from the 3rd century at Nempont-Saint-Firmin, where fishing activity exceeded local needs and required special equipment (as evidenced by the size of the fish caught).

Netherlands (South-Holland and Zeeland)

Despite its location along the coast and the presence of plenty of fresh water, the archaeological finds show little evidence of either fish or shellfish production or consumption in the Roman period. This is largely blamed on the survey techniques used to date. Apart from a small amount of fish bones from both military and civilian contexts, there are two needles for repair of fishing nets. Lead weights for fishing nets and two fish traps were found in Katwijk-Marktveld.

2.2.11 Pottery manufacture

UK (Kent and North-East)

Across Kent there are more than 50 known pottery manufacturing sites recorded in the Historic Environment Record. Some of these are from inland sites but the majority are from sites in the north Kent marshes, where the workers could take advantage of sea- and river-borne communications. Indeed, pottery production sites continue to erode out of the Thames foreshore, and many more existed than are currently recorded. These sites were primarily dedicated to the manufacture of Black Burnished Ware, a pottery type manufactured along both sides of the Thames Estuary from the mid-2nd century to the mid-3rd century. In Kent, many of these included small kilns with permanent domes such as at Bromhey Farm, Cooling. One example, from East Chalk near Gravesend, may represent an entire settlement dedicated to pottery manufacture. More than ten kilns may have existed in conjunction with domestic structures and a small cemetery and may have produced pottery for more than 200 years before becoming a largely agricultural settlement in the 3rd century. Some of the pottery produced suggests that continental potters may have migrated to serve developing markets. Claudian-period potteries at Eccles and Canterbury included the production of flagons and mortaria.

In north-east England there was local production of pottery for the military in the 2nd century in the Lower Tyne Valley, although the location of the kiln(s) is unknown. After that period the sites imported almost all their pottery from elsewhere in the country.

The northern half of the *civitas Menapiorum,* which includes the northern part of the Belgian coastal plain, the neighbouring Flemish hinterland and Zeeland in the Netherlands, shows a distinctive regional pottery tradition. From the mid-2nd century onwards, a clear coherent group can be discerned, first only involving handmade pottery, but by later in the 2nd century also wheel-turned pottery, characterized both in fabric as in forms and decorative styles. Based on the distribution pattern of this ware, the name ‘North Menapian’ was introduced, indicating only a geographical significance and by no means implying an ethnic connotation. No kilns or wasters have been brought to light yet. This regional pottery manufacture seems to have come to an end by the end of the 3rd century, although there is no certainty whether such industries still survived into the late Roman period.

The handmade pottery of the southern half of the coastal plain and its neighbouring Flemish hinterland appears to form one tradition with that of the adjacent region in the north of France.

France (Nord and Pas-de-Calais)

The potters' workshop discovered in Desvres in 1976 (a famous pottery town both in the Middle Ages and the modern period) is not known from any structures, but only by a voluminous and homogeneous pottery assemblage comprising Belgian pottery and light-coloured common pottery. Apart from this workshop, nothing is known about the occupation of Desvres. The site lies, however, on the edge of the road linking Thérouanne, the capital of the *Morini*, with the major military centre of Boulogne. In the surrounding area, the density of ancient sites seems low, but this may be due to the bias of archaeological discoveries. The repertoire of products from the Desvres workshop is small - perhaps due to the limited extent of the excavations. It consists mainly of *terra rubra* pots and common ceramics. Activity at the site has been roughly dated to between AD 20 and 120. It is therefore possible that this workshop opened, and perhaps developed, with the increase in military and port activity in Boulogne, from the time of Claudius onwards. Privileged by its mineral resources, Desvres could have been a major ceramic production centre from the Roman period onwards, and its development may have been due to the integration of Britain into the Empire.

At La Calotterie workshops have been discovered which suggested production both for local consumption and possibly export to Britain.

Netherlands (South-Holland and Zeeland)

There is no evidence for industrial pottery production in the region. In the *Cananefates* area (northern part of South-Holland), up to the middle of the 2nd century, rural settlements used hand-made pottery that was probably produced on a fairly large scale in the region. The residents then switch to wheel thrown Low Lands Ware, which was produced near Bergen op Zoom.

2.2.12 Salt manufacture

UK (Kent and North-East)

Kent has more than 60 known Roman salt-manufacturing sites. Although some are on Romney Marsh in south Kent, or along the east Kent coast, the majority are in the same areas as the pottery manufacturing sites – in north and north-west Kent, exploiting access to the sea as both necessary to the process and advantageous for commercial exploitation via sea-borne transport. Numerous examples have been excavated, and many more still exist as mounds clearly visible in marshland. Most represent the site of salt-manufacture only, but it is likely that some sites will have involved salt manufacture in conjunction with pottery manufacturing as at Bromhey

Farm, Cooling. The sites generally consist of hearths and brine tanks, with surrounding mounds of the resulting briquetage. The importance of southern salt-manufacturing to the supply of the frontiers may be reflected in the distribution of Black Burnished Wares, which are believed to have been produced primary as salt containers. From the AD 140s to the 3rd century, large quantities of Black Burnished Type 2 (the wheel-thrown variant), produced on both the Kent and Essex sides of the Thames Estuary, found their way to Hadrian's Wall and, for a brief time, the Antonine Wall beyond.

There is no evidence for salt manufacture at South Shields during the Roman period. It was, however, a major salt producer in the medieval and early post-medieval period, and if the Romans produced salt in the same location as the later salt pans, any evidence may have been lost.

Belgium (Flanders)

During the Roman period the coastal plain was extensively used for salt-making. The remains of briquetage pottery and some heating structures (at Leffinge) were found at several locations spread throughout the coastal plain, but always near active inlets. Close examination of the debris allowed the reconstruction of the *chaîne opératoire* pointing to a shift in technological and organisational structure. Deconinck (2023) demonstrated an upscaling in the production of salt from a domestic, household-based production using single hearths and briquettage pottery towards a more industrial activity in which salt was evaporated on batteries consisting of up till 15 simultaneously operating furnaces, heated by peat (e.g. at Leffinge).

France (Nord and Pas-de-Calais)

The exploitation of salt on the northern coast of France is well documented from the protohistoric period (Final *La Tène*). This activity continued and was undoubtedly given fresh impetus in the Flavian period by the regular needs of the army, now permanently established on the Rhine border. Archaeological research has revealed the many points of exploitation, and epigraphy provides us with information about the trade that took place.

As a result, the production and marketing of cured meats was also a common feature shared with the Menapians.

To the north, next to Leffinge (in Belgium), Looberghe and Steene are important northern salt production sites, in addition to the well-known site at Ardres, near the Boulogne-Cassel road. At this site, the Gallic settlement was transformed around AD 30-50 into a *vicus* of over 50 ha, with clear signs of Roman influence. It reached its peak at the end of the 2nd century and in the first half of the 3rd century, before

being abandoned around AD 268, probably as a result of the rising sea-level and increased insecurity (particularly from piracy). Other mining sites have also been discovered in the southern part of the *Morini* and *Ambiani* territory, showing remarkable continuity between Latin and Gallo-Roman settlements, such as at Gouy-Saint-André, Conchil-le-Temple and Sorrus.

The Menapians were also renowned for the flavour of their cured meats, as the Latin poet Martial pointed out. But a lot of salt was needed to make these cured meats. Salt was made by heating seawater brine in earthenware pots. As salt water and buckets were needed, the salt works had to be located close to the coast for the brine, but close to where the clay was extracted to make the buckets. Two of the main production sites were in Steene and Pitgam, which had these two basic elements. Two Roman roads led from Cassel to these two sites. There were also others sites in Looberghe and Bray-Dunes near La Panne.

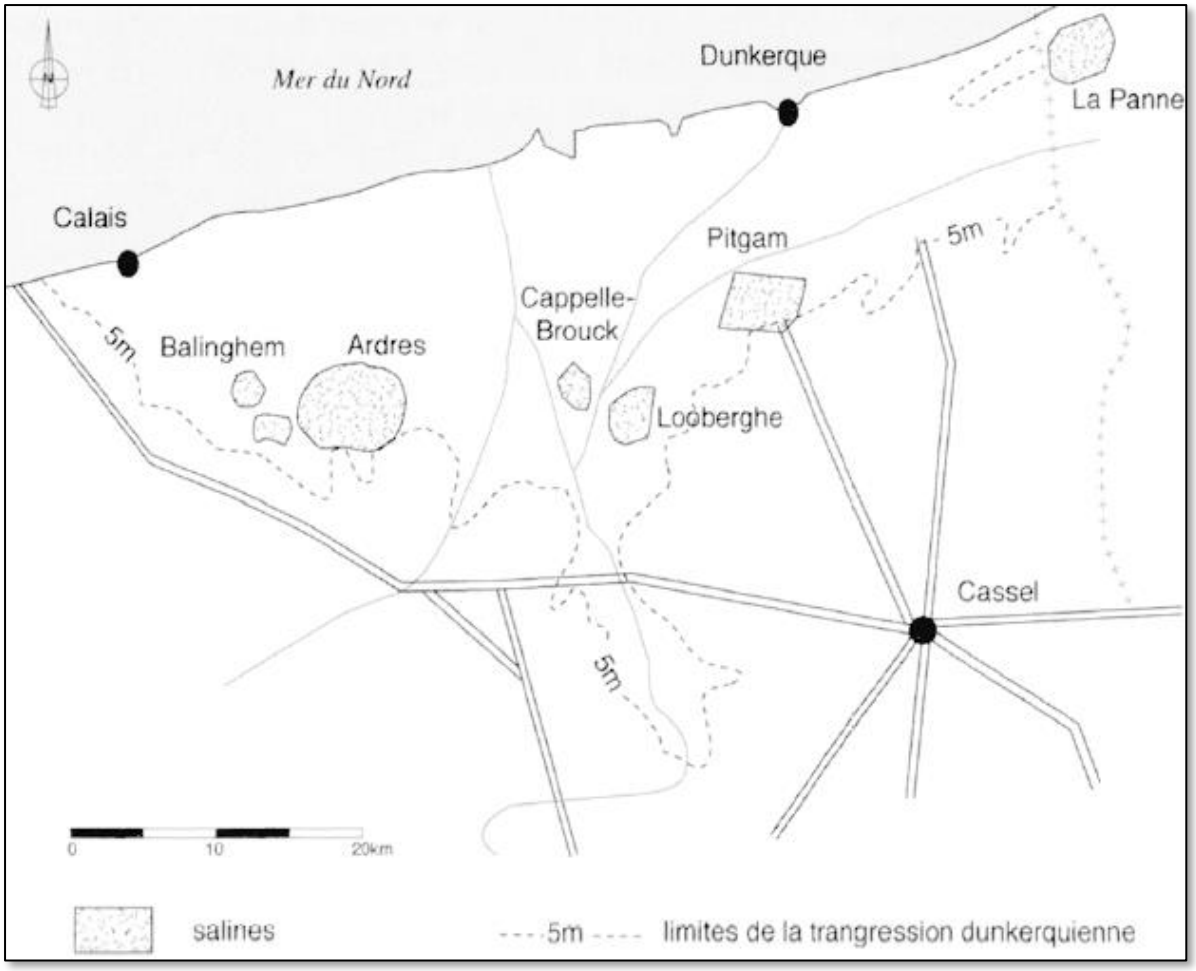

Figure 16 - *The location of Cassel and the saltworks on the maritime plain (Roland Delmaire 2004).*

Figure 17 - Salt kilns from 's Heer Abtskerke

Netherlands (South-Holland and Zeeland)

The core of salt production in the Dutch region must have been located south of the mouth of the Scheldt. Some excavations have revealed the traces of kilns with ashes (for example at the site of 's Heer Abtskerke but also at the *vicus* of Aardenburg, the site of Middelburg–Mortiere and at Middelkerke Zwarteweg) suggesting professional salt production or production of *allec*. We also see quite a few *negotiares salarii* and *allecarii* dedicated to Nehalennia. There are also two salt-related sites north of the Meuse (*villa* of Poeldijk and De Lier-Leehove) with quite a number of briquetage ceramics.

2.2.13 Trade

Trade must have formed part of the lives of many coastal communities. Seaborn traffic likely played a crucial role in the movement of both salt and ceramics. The pottery and salt manufacturing industries (described above) were certainly integrated into regional trade networks, and local communities must have traded with the towns, ports and forts of the region. The Material Culture section of the Resource Assessment will also demonstrate the extent to which goods and manufactured items were traded across the project area.

2.2.14 Drainage

UK (Kent and North-East)

Large parts of coastal Kent were marshland in the Roman period. Evidence of reclamation is rare but has perhaps been found in the Lydden Valley survey where there appears to be the earliest wall and drainage related to the Romans though this is not absolutely proven. It would have been associated with the nearby *villa* at Hull Place. The Lydden valley seems to have seen a process of gradual reclamation with walls successively built northwards.

Belgium (Flanders)

Several earthworks point to reclamation and organisation of the landscape that was subject to marine influence. Roman period embankments are attested in the central part of the Flemish coastal plain at Raversijde and Stene, both near Ostend. Dykes were not systematically used and they seem to have been restricted to linears (Raversijde) or to have comprised certain inlets of ringed areas (Stene). The dyke at Raversijde was over 11 m wide and can be traced over some hundreds of metres. It was erected with clay sods, with the west side (likely the water side) strengthened with layers of peat. A linear ditch complex between Stalhille and Houtave in the eastern coastal plain has been interpreted as a drainage system over a very wide area, however hard evidence for this hypothesis is lacking.

Figure 18 - *Section through the Roman embankment at Raversijde (© Flanders Heritage Agency).*

France (Nord and Pas-de-Calais)

The first written accounts of the characteristics of maritime Flanders date back to Roman times. Strabo, the famous writer, historian and geographer born in 58 BC, described in his 'Geography' a region covered in forests and subject to the effects of the tides.

''The ocean washes over the plain twice a day, raising doubts as to whether these parts are really part of the mainland. The people live on small islands and place their huts on eminences formed in some places by nature or by the hand of man, and high enough so that the tides cannot reach them". (Delaine (1969)

Netherlands (South-Holland and Zeeland)

In the 1st century AD, fields were separated by ditches, which also drained water. From the 2nd century, an extensive and regular grid of ditches indicate a centrally controlled land development of the area behind the dunes in the northern part of South-Holland. The golden ratio or *actus* (35.5 m) may have been used as a measurement. This drainage system also involved the construction of culverts by dams. Several such culverts have been discovered in South-Holland (The Hague - Wateringse Veld, Bernisse (exhibited in Museumpark Archeon) and Oostvoorne). These and other measures of water management caused a significant increase in arable land (e.g Rijswijk-De Bult, Delft-Harnaschpolder), Oostvoorne.

Recently, various examples of Roman hydraulic engineering have been discovered in Valkenburg (three Roman bridge structures and two dam structures found in 2024) and Vlaardingen (where in 2021 an earthwork was found, probably from a small dike from around 250/200 BC). These finds fit into a longer series of hydraulic engineering structures that have been discovered, particularly in the South Holland delta at the old river mouths of the Maas and the Rhine. The last article that provided an overview of hydraulic engineering works dates from 1999 (De Ridder 1999). Since then, many new ones have been excavated that require a new overview. On the one hand, finds indicate that knowledge about hydraulic engineering began well before the Christian era and the arrival of the Romans, on the other hand, there are striking similarities in the construction of dams with culverts in Roman times (including the use of 'reused' canoes in both Valkenburg and Katwijk). In addition, a dam with a culvert is also known from Northern Germany. It is striking that the spread of the phenomenon of culverts is mainly limited to the current province of South Holland. This is probably not entirely coincidental, since this is where the two most important river mouths were traditionally located.

2.2.15 Local communications – major/minor roads, rivers

UK (Kent and North-East)

In addition to the well-developed network of Roman roads in Kent, numerous examples have been found of lesser roads, linking settlements, allowing access to natural resources, and connecting with larger roads. Although evidence of tracks and roads has been found at numerous sites across Kent it has not yet been possible to define more local networks in detail. It is suggested that subsidiary roads would have led from Watling Street to connecting points with the north Kent coast and the creeks descending from it; and from the road into Thanet connecting with coastal settlements. Connections would also have led from the major east Kent roads allowing exploitation of the east Kent marshes. In the north-east, South Shields and Wallsend were served by roads as well as rivers. The Military Way linked all the forts along the frontier, and all were linked to major north-south routes. As in Kent, any more local network that may have existed is not well understood.

Belgium (Flanders)

In the sand region bordering the coastal plain three Roman roads can be traced: the Steenstraat, the Zandstraat and the Zeeweg, of which the substructions have been documented at several locations. The Steenstraat is a *diverticulum* of the Boulogne-Cologne road. It runs from Steenvoorde in the north of France in a north-eastern direction over Poperinge, Woumen, Werken and Aartrijke. West of Bruges the Steenstraat connects with the Zandstraat, the road linking Oudenburg with Brugge and further with Aardenburg in the Netherlands and along which Roman occupation was dense. The Zeeweg is the direct connection between Oudenburg and Bavay, via Doornik, Kortrijk and Aartrijke.

So far, the road network in the coastal plain itself is barely known. There has been the attestation of a log road in 1948 but its date is uncertain, and the remains of a wooden palisade in Wenduine, discovered in 1957, is suggested to have belonged to the substruction of a *diverticulum*. From a geographic point of view, it could be possible that Wenduine was even directly related to the Roman road network from Bavay, via Blicquy. Paths will definitely have existed - e.g. on silted up tidal channels - but there were most likely no permanent structures within the tidal landscape. Traffic was presumably mainly by boats navigating the tidal channels, forming the connection between the open sea and the hinterland.

France (Nord and Pas-de-Calais)

The establishment of land routes leading to the port of Boulogne, even before the conquest of the island of Britain, bears witness to the importance of trade and the strategic nature of the site.

Three routes played a key role in these commercial and military exchanges along the coast of northern France. They were in place by the turn of the millennium. The first two headed towards the Mediterranean via Autun, Sens and Amiens or via Langres, Reims, Saint-Quentin, Arras and Thérouanne, while the third headed towards the Rhine area via Bavay and Tongres. Recent excavations in Amiens give a very reliable *terminus ante quem* of 10 BC for the construction of the section between Amiens and Boulogne of this 'Ocean route'. As for the Via Agrippinensis towards the Rhine, the sites along its route between Bavay and Cologne contain material from the Haltern horizon (9 BC to AD 9).

The discovery of a milestone bearing the names of Septimius Severus and his sons testifies to the rebuilding of the road between Thérouanne and Boulogne in the 3th century - probably in preparation for his expedition to Britain - and shows the central role of Boulogne.

Although the port of Boulogne played a key role during the Roman period, the Liane estuary was clearly not the only point of embarkation for trade with the British Isles. Maritime routes are still largely unknown to us, but warships once plied the coasts, as did trading and fishing vessels. Discovered almost twenty years ago in the bay of Wissant (Pas-de-Calais), at Tardinghen-Le Châtelet, the wreck of a Gallo-Roman ship from the 2nd century has provided a new clue, but the nature of this craft, between trade, war and fishing, remains difficult to determine.

Around the port of Boulogne and the Liane estuary, the Canche and the Slack, for example, are coastal rivers whose strategic and economic importance has been highlighted by recent discoveries at Attin/Beutin for the Canche and Marquise for the Slack. On the border between the *Morini* and *Ambiani*, the role of the Authie, with the Late Antique coastal site of Nempont-Saint-Firmin and the *villae* that were built along the valley, has been highlighted by excavations.

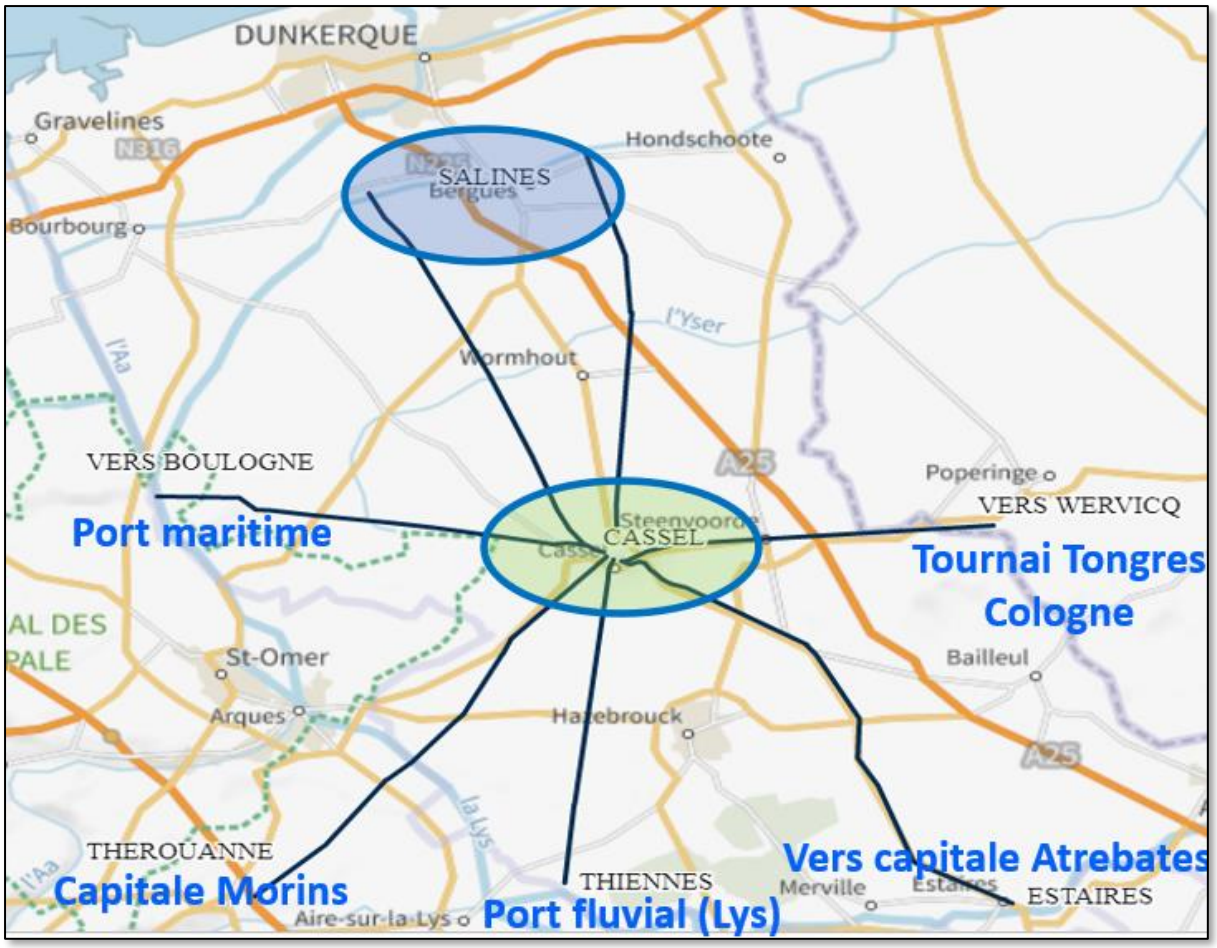

Figure 19 - Roman roads around Cassel and their destinations

Cassel is linked to 7 main Roman roads. Two ancient roads known as Steenstraet (stony roads) lead in a straight line from Cassel to the coastal salt works (Steene and Pitgam); a third heads to Boulogne (link with the sea); a fourth goes to Thérouanne (capital of the Morins); the fifth goes to Thiennes / Aire sur la Lys (river route); the sixth leads to the capital of the Atrébates (Arras) and the last leads to Cologne via Tongres.

Netherlands (South-Holland and Zeeland)

Two main routes (by water and by land) were planned and maintained by the Roman army in the Dutch coastal region. One is known as the *Limes* Road, together with the Rhine forming the main route from the Germanic hinterland to the North Sea at Katwijk. The other is the route from the Rhine (at Leiden of Valkenburg) along Cobulo's Canal and its southern extension to the transhipment seaport Colijnsplaat. A third main route along the Meuse to the *Helinium* (mouth of the Meuse) has been suggested but not yet proven.

In addition to these main thoroughfares, a network of minor routes existed, both over water and through the peat. Roads have also traditionally run parallel to the coastline over the beach ridges. These roads undoubtedly played a role in connecting the vanished coastal forts to the main roads. The peatlands have been best accessed by the drainage channels to the Rhine, Meuse and Scheldt.

2.2.16 Impact of imperial activities on local life

UK (Kent and North-East)

The construction, expansion and re-positioning of Roman forts and related defensive infrastructure, and the construction of roads and port facilities, and arrangements for supply and raw materials, must all have been ways that imperial policy impacted on local life throughout the Roman period. At times, the increase in military personnel for campaigning in Britain, or the removal of legions for imperial purposes or to support candidates for the imperial throne, must also have impacted significantly on the economy of coastal areas. In Kent, imperial decisions can be evidenced in the initial invasion site at Richborough, the temporary fortlet at Reculver and then the establishment of the *Classis Britannica* fort at Dover. Later, imperial policy is most clearly evidenced by the construction of the Saxon Shore forts at Reculver, Richborough, Dover and *Portus Lemanis*. The construction of these later forts must have caused disruption to the lives in people living in those settlements – for example at Dover, buildings that had been extra-mural during the *Classis Britannica* phase, were destroyed or altered to permit construction of the Saxon Short fort. Other impacts from imperial policy are evidenced by the discovery of 'CLBR' (*Classis Britannica*) tiles in the Kent Weald which demonstrates the known imperial control of the iron industry in the region. Involvement of the Fleet further reflects the state's massive demand for iron, most especially for military purposes. Vast quantities of iron products from nails to armour, were required on the frontier where the construction of Hadrian's Wall brought about immense change, with the late Iron Age/early Roman coastal communities of the Northumberland plain being abandoned at or shortly after its construction (Hodgson et al 2012).

Belgium (Flanders)

Although the impact on the landscape of the Imperium via its agent the Roman army is well established and the Menapian *civitas* had a tax-paying status, the real extent of Rome's direct impact on society and the daily life of the local communities remains difficult to grasp. The *cohors* of Menapian soldiers which helped in the construction of Hadrian's Wall will have been constituted of young men recruited (as a form of tax payment?) in local communities along the coast and in the hinterland, which constituted a new path to the integration of parts of society in the Roman army and

culture. During the late 1st century, a direct, salt-based relationship seems to have existed between the Roman army at the Rhine and the coastal *civitates* of the *Morini* and *Menapii.* Two inscriptions (Rimini, Tongeren) point to the presence of *salinatores*, involved in the trade and transaction of salt to the Roman state. It is very conceivable that in these early phases of Roman presence, salt made by local coastal communities was accepted as a tribute payment in kind. Tax-levying in kind could also be seen as one of the stimulating triggers for the incremental development of rural settlement and forest clearance witnessed in archaeological research in the area. During the last quarter of the 2nd century, many farms seem to have been abandoned or re-structured, pointing to widespread problems. The reasons for these are uncertain (social unrest, plague, soil depletion, Germanic incursions, ...), but they do coincide with the appearance of the Roman army along the coast, suggesting a considerable military aspect in this 25-year period of instability in local society. Some brief historical evidence indicates that the Roman state repelled marauding attacks of Germanic pirates with troops 'raised in a hurry in the province'.

During the 3rd century the forts at Oudenburg and Aardenburg clearly attracted civil occupation leading to the development of nucleated settlements near the military strongholds, pointing to an economic impact of the forts on society. The upscaling and technological shift in salt-making in the 3rd century may also have been influenced directly (e.g by requiring salt as a tribute or by the application of newly introduced technology) or indirectly (by an increasing demand or in response to a safer trading environment) by the Roman state. By the late 3rd century (around AD 270) instability increased and most civil settlements gradually declined and disappeared. Social unrest and local rebellions were repelled by the Roman state. In 286 the Menapian commander Carausius on behalf of emperor Maximianus defeated the so-called *bagaudae* in northern Gaul, and with the help of three legions and the *Classis Britannica* he subsequently proclaimed himself as emperor of *Britannia* and northern *Gaul*. In this case, therefore, the local coastal societies had an impact on the Roman state.

France (Nord and Pas-de-Calais)

In the north of France, the Augustan period is the starting point for the slow penetration of Roman ways of life. At the same time, the establishment of four cities imprinted Rome's mark on the organisation of the region. The cities were more or less based on the organisation of pre-existing peoples: in the north, the city of the *Menapii* at *Castellum Menapiorum* (Cassel), that of the *Morini* between the Aa and Canche rivers at *Tarvenna* (Therouanne), *Samarobriva*, the capital of the *Ambiani* in the south (Amiens) and inland, around *Nemetacum* (Arras), the city of the *Atrebates*.

In the late Roman period, at a date still unknown, the city of the *Morini*, with its capital Thérouanne, was granted the status of Roman colony. This promotion is interpreted as a form of compensation for the promotion of *Gesoriacum* to the status of autonomous city under the name of *Bononia*.

The role of the port of Boulogne should not be overlooked : the presence of the Roman army undoubtedly had a major impact on the organisation of the area, not least in term of supply for the army. In addition, the need for communication with the Mediterranean sea and the *Limes* meant that the development of road infrastructure had a lasting impact on the movement of people and goods. Boulogne is not only the point of embarkation to Britain, but also a customs post and the headquarters of the *cursus publicus* towards which the communication routes converge.

Netherlands (South-Holland and Zeeland)

The impact of the Roman presence in the Dutch coastal area was enormous but seems to vary somewhat by region. The survey exhibition ‘Roman Coast’ (Rijksmuseum van Oudheden 2016) summarizes this difference as follows - Roman influence north of the Rhine was limited to exchange and trade. When the armies had left after several centuries, the culture and house types were largely the same as before their arrival. This was completely different for the *Limes* region and the South-Holland coastal area. Partly because thousands of soldiers and their supporters settled permanently in this region, the character changed completely. The rivers and their banks were tamed by the large-scale Roman intervention, the population doubled in a short time due to the military presence and so did the population composition. The *Cananefates* may have constituted only a minority and new materials, needs and customs greatly changed life.

The local groups failed to integrate with the overlords as they did in other occupied regions. The *Cananefates* did not sufficiently succeed in capitalizing on the economic opportunities of the military presence. Despite some examples of economic success (the *villa* at Rijswijk, the veterans' houses in Wateringse Veld), hardly any economically independent *vici* or cities arose. With some difficulty, a *colonia* grew out of a village on the banks of the Corbulo Canal, but Emperor Hadrian himself had to ensure that it developed into the city of *Forum Hadriani* by giving it market rights. While the army maintained its full presence and used the region as a logistical zone between the North Sea and the continent, from c. AD 50 - 230, the region's economy grew through trade and some agricultural surplus production. However, once Roman troops moved south and reinforced the Rhine route only incidentally, the whole system collapsed again, and the modern economy did not continue.

In the southern regions, the *Frisiavones* and the *Menapii* seem to have seen more independent economic opportunities in the needs of the Roman army. In

Oostvoorne, dewatering of the land seems to have been intended to feed the men of the probable fort there. At Goedereede, a relatively large harbour emerged without direct interference from the army, and scattered throughout the Zeeland coastal area are several industrial production sites, probably related to the production of salt and fish sauce. The harbours of Colijnplaat, and possibly Domburg, will also have been a stimulus for this spirit of trade as evidenced by the busy activities of numerous merchants from the north-western Roman Empire. Characteristically, all these economic activities were developed while the Roman presence was significantly lower compared to the *Cananefates*. Nevertheless, after the beginning of the 3rd century, the economic activities nonetheless decreased significantly.

2.2.17 Ethnicities

UK (Kent and North-East)

Hadrian's Wall was a diverse place in the Roman period. This can be seen primarily in the names of the units based there. Many auxiliary units are named after the place where they were first raised, and a striking number had origins on the other side of the North Sea. Thus, we might note units of Batavians and Frisians (from what is now the Netherlands), Menapians (from what is now the south-west of the Netherlands, the west of Belgium and a small north-western part of France), Tungrians and Nervi (from what is now Belgium), and Aquitani, Gauls and *Lingones* from what is now France.

It was thought that units would have simply then recruited locally, but there is increasing evidence to suggest that additional personnel continued to be supplied from their homelands. In addition, there are a number of tombstones from Hadrian's Wall which recall the ethnicities of the deceased. South Shields fort has two of the finest in this regard -

- The Regina stone – commemorating Regina, a freedwoman and wife of Barates of the Palmyrene nation (a Syrian). She herself was from south-east England;
- The Victor stone – commemorating Victor, a freeman and servant to a member of a Spanish cavalry unit. The stone does not tell us whether the cavalryman was Spanish or not, but does reveal that Victor was a Moor from north-west Africa. His is one of two confirmed tombstones recording Africans on Hadrian's Wall;

Recent excavations at cemetery sites in the frontier zone are now using isotopic analysis to illuminate the far-flung origins of many members of its cosmopolitan garrison.

Belgium (Flanders)

The coastal plain administratively formed part of the *civitas Menapiorum,* which itself was a part of the province of *Gallia Belgica*. Not much is known of the tribe which was already mentioned by Caesar but like its southern coastal neighbours the *Morini*, it seems to have had a low degree of social hierarchy in the late Iron Age, or at least had a social structure that is not fully expressed in material culture like the minting of coins. For the Roman period there is little epigraphic evidence. Two military diplomas (122 AD and 124 AD) are known mentioning the *Cohors I Menapiorum*, soldiers recruited in the Menapian *civitas* and sent to the north of Britain to be stationed there. The *Notitia Dignitatum* of the early 5th century lists the *milites Menapiorum* who were stationed at the Rhine *Limes*, at Rheinzabern in a so far unknown late Roman fort, from the period of Valentinianus I onwards. Tile stamps of this unit, made at Rheinzabern, are known from several late Roman military sites in *Germania Prima.*

At the Oudenburg fort, the soldiers' barracks found in the late 2nd century and the military hospital of the first half of the 3rd century conform to a 'classical' layout, with the hospital courtyard and mural paintings reflecting contemporary metropolitan Roman cultural expressions. From the middle of the 3rd century onwards, changes in construction style and in consumption patterns mirror changing cultural traditions indicative of regional recruitment. The *limitanei* who renovated and reoccupied the fort in the third decade of the 4th century, testify to the importance of this unit and the significant presence of military officers, imbued with an imperial lifestyle. Nevertheless, the pottery points to a wider regional economy reflecting amongst other things a changing preference in foodstuffs and liquids. The imperial identity the army wanted to uphold in that period stands in strong contrast with the picture from 380 AD onwards. The fort community became Germanized, or culturally Germanic, regardless of whether they were all ethnically Germanic or not. This non-regular unit, whether it concerns *foederati* or not, was multi-cultural and of cosmopolitan character. This military community must be seen as inhabitants of a merged frontier society, a 'North Sea cultural zone', formed by a history of incomers.

France (Nord and Pas-de-Calais)

The northern coastline of France was occupied in pre-Roman and Roman times by the *Menapii* in the north, the *Morini* between the Aa and Canche rivers and the *Ambiani* in the south. Inland, around Arras, the city of *Atrébates* developed.

In Bavinchove, near Cassel, at a place called 'Castel Veld', on either side of the D 933 road, known as the old Cassel-Thérouanne Roman road, numerous Gallic remains were found during archaeological surveys for the construction of the TGV high-speed train (Tène moyenne: 300 BC to 100 BC).

At Oxelaëre, near Cassel, at a place called ‘Breel Veld’, remains of pottery dating from the Final Tène (100 BC to 30 BC) have been found.

Netherlands (South-Holland and Zeeland)

North of the Rhine lived the Frisii. Between the Rhine and the Meuse was the territory of the *Cananefates*, the *civitas Cananefatium*, with *Forum Hadriani* as the administrative capital. South of the Meuse and north of the Scheldt lived the *Frisiavones*. Both groups play a role in the discussion of migration of tribes in the early Roman military operations in Germany. Tacitus claims the *Cananefates* were related to the Batavians and the *Frisiavones* could be a separate tribe somehow related to the *Frisii.*

Crossing the Scheldt, the modern islands of Noord / Zuid-Beveland and Walcheren were probably the territory of the *Marsaci*, a quite unknown tribe. More important are the *Menapii* who were associated with the Flemish coastal area but maybe also dominant in the territory of the *Marsaci*.

Figure 20 - *Suspected areas of tribes in the coastal regions in the Netherlands, Flanders and the north of France. (M.C. Kosian – Rijksdienst voor het Cultureel Erfgoed, edited by Hazenberg Archeologie)*

2.3 Themes and Research Questions of relevance to Coastal Communities

2.3.1 The Iron Age / Roman transition

- In all areas of the BtNS project, but at different times and by different processes, there was a transition from Iron Age cultures to new cultures that included traits of both pre-existing cultures and Roman culture. How similar to one another were the experiences of different parts of the BtNS area? To what factors can common or different experiences be ascribed?

- What was the extent of cross-Channel/North Sea contacts, both social and trading, prior to the arrival of Rome?

- How did the arrival of the Roman empire affect settlement patterns in coastal communities?

- What impact did the Caesarian, and then Claudian invasions of Britain have on continental coastal communities?

- What impact did the transition from Iron Age to Roman have on pre-existing relationships? For example, did the cross-Channel relationships between Gaulish and British tribes survive the Roman conquest of first *Gaul* and then Britain?

2.3.2 The impact of the Roman military

- Is there evidence in the region of a military response to Roman invasion, whether on land or at sea? How were local communities affected by immediate proximity to the Roman military?

- How did native cultures deal with conquest? What was the scale and nature of human loss? How did native cultures respond to this? What was the impact of the later removal of people for military service?

- By what route was Britain invaded (both Caesarian and Claudian invasions)? From where did the troops depart and where did they land? Is there evidence from continental sites of preparations for invasion or reinforcement?

- Following the period of conquest, what evidence is there for continued military presence, besides the *Classis Britannica*? What relationships did military sites have with inland sites?

- To what extent was the Roman army and navy involved in directing road and port development in the region?

- What form did the late Roman military activity take in the region? Can our understanding of the Shore Forts be enhanced via evidence from external sites?

- How were coastal communities, both in Britain and on the continent, affected by the Roman advances into northern Britain? Were new trade routes developed and what was the impact on older routes? Was there a secondary invasion by sea and if so, from where did the ships depart and where did they land?

- What was the social and settlement impact of the militarization of the Hadrian's Wall and *Limes* regions?

- What was the relationship between the military and the native and civilian populations? Was there a difference between army camps and military ports?

- To what extent did the military control trade routes across the Channel and North Sea at different times?

- What was the role of the British and German fleets in protecting trade along the rivers and coasts of the region? What role did the fleets have in trade more widely?

2.3.3 Roads and transport

- What can be learned from a re-examination of coastal road networks? Archaeological fieldwork over the last decades has revealed that an extensive network of roads existed in addition to the major known roads, often sited to access salt or pottery production sites. Can this be reconstructed to explore how coastal areas were connected to neighbouring settlements and ports?

- All elements of ports need further investigation, from wharf and mole construction (dating and techniques) to waterside structures. Any trace of vessels (whether wrecks or reused timbers found elsewhere) is of great interest.

- To what extent did the roads and maritime trade routes exist before the arrival of Rome? How were existing the patterns of routeways reorganised following the Roman conquest?

- How did the Roman roads network affect the settlement patterns of the region? How did the development of Roman ports affect coastal patterns of harbours and anchorages?

- What was the nature of monumental display along Roman roads and rivers? How did they affect the monumental and religious landscape?

2.3.4 Settlement

- How much evidence of coastal settlement have we lost, either to more recent settlement or landscape change?

- What was the nature of *oppida*-type settlements in the Iron Age and what happened to such settlements following the Roman conquest? Why did some large Iron Age settlements have a Roman town established nearby and others did not?

- How is Roman settlement in the region affected by proximity to the coast?

- How much do settlement patterns vary within the BtNS region? Why do we see more centralised/nucleated patterns in some areas e.g south-east Britain, and more dispersed settlement patterns elsewhere (e.g north-west France, the Netherlands)?

- Are there settlement types that are only found in north-west Europe? Can we trace the transmission of settlement types across the region from one area to another?

- What is the relationship between extra-mural settlements and the proximate military site? We know that sometimes the 'extra-mural' settlement pre-dated the fort. Were they always dependent on the fort and what was their relationship to the civilian population?

- How did coastal settlements differ from inland settlements?

- How did roadside and port settlements develop? What factors created them and from where did their populations come?

2.3.5 Beliefs, burials and the population

- Religious activity is not well understood in general. There has been too great a focus on temple sites and elite modes of expression. Greater attention is necessary on smaller less-monumental sites; these were likely to have been the more common foci of experience for the majority of the population on a daily basis.

- In the north there are relatively few temple/religious sites away from the forts. Is this correct and what does it mean? Is this common to the *Limes* areas?

- Existing and newly discovered burials would benefit from isotope and DNA analysis. The movement of peoples within and from without the Roman empire is an emerging area of potential. Given the south-east's position in relation to the provincial capital and role as a route of transit to and from the continent, it is possible that rural and urban populations were more diverse than has been realised. Such analysis also potentially enables identification of under-represented social groups. Isotope analysis has the potential to shed important light on diet, differentiating between urban, rural, coastal, rich and poor. Further research is necessary on the demographics of the Roman population in general.

- Dating remains a major shortcoming in relation to burial evidence. Radiocarbon / luminescence samples need to be collected as a matter of routine.

- What was the impact on the maritime world on religious/ritual life in the BtNS area? How common were dedications to Tritons, Oceanus, Neptunus, Nehalennia and others? What can be learned from ritual commemorations for safe passage? Can we develop a sacred topography of coastal areas to complement our understanding of sacred rivers?

- Can we study the symbolism of the sea in the BtNS area? For example the story of Caligula and the sea-shells, the mystical role of Britain in the Roman imagination at the time of Claudius etc ?

2.3.6 Industry & agriculture

- What was the economic role of the salt industry in the BtNS area? How interconnected were salt-producing sites and how did they relate to other economic hubs e.g Roman *villae*?

- How was the Roman coastal landscape controlled e.g by sea-walls and drainage? To what extent did this draw on Iron Age techniques?

- What was the economic role of fishing in the BtNS area? Often it is a neglected subject in archaeology and yet it must have been very important. What was the role of the shellfish industry? How far were fishing and shellfish products traded across the empire and how was the trade enabled?

- What was the nature of exchange between coastal and inland communities?

- To what extent did both coastal and inland communities specialise in agricultural or fishing production? What were the consequences of such specialization and how was exchange managed?

2.3.7 People and identity

- Who was moving into and out of the BtNS area? What are the processes that cause individuals or groups to move?

- How freely could people move in this way? Could people have extensive networks of long-distance contacts and how were these maintained? How common was the use of writing to maintain relationships e.g as at Vindolanda?

- How far was movement dependent on the state and to what extent were people free agents in movement?

- To what extent does artefactual movement reflect human movement? Do the arrival of artefact types in an area reflect population movement? If sometimes but not always then how can we tell the difference?

- How did identity work in the late Iron Age and Roman period? Did people clearly identify as members of tribes/groups as Roman authors suggest e.g Frisians, *Menapii*, Batavians etc? How long did such identities survive post-conquest and did new identities emerge? Can we chart the emergence of sub-regionalities?

- How can scientific methods e.g isotope analysis be deployed more effectively and consistently to investigate human movement? Can they identify links between groups?

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3 Material Culture

3.1 Introduction

The main objective of the 'Bridging the North Sea' project is to study the connectivity between different regions of north-west Europe during the Roman period and to understand how these regions formed part of the wider western empire. We seek to explore how people, ideas and objects – the material culture of the Roman world – moved through the area, how these connections changed the lives of the people who lived here and how this period has continued to shape life in the region today. In this chapter, we will review the objects that people imported into, exported from, or transmitted through the North Sea region, identify those that contribute to our understanding of this connectivity and consider what they tell us about how north-west Europe was affected by both local and wider events and processes in the Roman empire. As such, this chapter will only focus on material culture that provides insights into these issues. Alongside these were many other aspects of material culture that we will not consider in detail. These include those that were made and consumed locally, or that were not regularly transferred across the North Sea area.

To develop a full material culture resource assessment for north-west Europe is beyond the resources of this project. We can only briefly review the main relevant material culture types and draw some initial conclusions. There have, however, been many studies of how objects moved through the Roman world. This review draws significantly on a 2010 thesis by Francis Morris ('North Sea and Channel Connectivity during the Late Iron Age and Roman Periods (175/150 BC-AD 409)' and research by other scholars to whom the authors are indebted, as well as the notes from the 'Bridging the North Sea' material culture workshops carried out in 2023.

3.2 Material culture – the resource

In opening the consideration of the material culture of the north-west empire, it should be noted that we are not totally reliant on archaeological artefacts for our understanding. Literary evidence also has a role to play. Strabo, for example, writing shortly before the Roman Conquest of Britain, described not only some of the main trading routes to Britain, but also the produce exported from Britain to the continent – grain, cattle, gold, silver, iron, hides, slaves, and dogs, and objects imported into Britain such as ivory, chains and necklaces, amber, glass and pottery. Some of these are considered below, but we should reflect that these categories are those that survive archaeologically. Others will be by their nature almost absent from the archaeological record – animal and slave exports for example – although new scientific analytical techniques offer the potential to change this.

We should also note that the three sub-periods identified – AD 43-165, 165-260, 260-409 – are broad and imprecise. They describe three general phases of Rome's post-conquest interaction with Britain, and it must be remembered that the continental context was very different with northern France being conquered several decades earlier and part of the Netherlands significantly later. We should also bear in mind that Britain was not always the final destination for imports. Many objects imported from the continent, or manufactured in *Britannia*, subsequently found their way north into Scotland where they sometimes played different roles to elsewhere. For example, silver was often hoarded at ritual sites whereas coloured glass was used for feasting events or recycled into bangles, a frontier zone fashion.

3.2.1 c. AD 43-165

Pottery

Pottery is a crucial artefact type for studying and understanding material culture. By the Roman period it had become an almost universal material, present in every society, on almost every site, and in considerable quantities. The pottery assemblages of north-west Europe show considerable stylistic variation, often the result of social, technological and artistic differences Consequently, pottery is the ideal material for studying patterns of production and exchange, and in turn an understanding of how these changed over time can reveal much about the evolving societies and their connectivity.

Pottery was a much-traded commodity in the Roman period. Types traded across the empire were used alongside more local traditions. The ability of people to access pottery from far away was often a sign of greater wealth or economic power, but also a sign of state power, with major producers supplying to state actors such as the military or bureaucracy who in turn carried it to all parts of the empire, including across the Channel and North Sea.

Roman pottery was known in Britain well before the Conquest of AD 43. After this time, though, it rapidly began to be imported in great quantity. The largest imported type was the *terra sigillata* tableware (usually known in Britain as samian ware), produced on an industrial scale in southern *Gaul* and found across *Britannia* up to c. AD 120, when it was generally replaced by central Gaulish types until c. AD 200. It was found across the Roman province but especially frequently in south-east England, including more than 10,000 stamped sherds from London alone (Marsh 1981) which suggests that it entered Britain from south-eastern ports. Illustrative of this was the Pudding Pan wreck site, found 3 km north of Herne Bay in Kent, from which hundreds of vessels have been recovered. Recent assessment (Walsh 2006) has suggested the site may include two or more wrecks, covering a span of about

200 years and the site shows that bulk pottery transfers were taking place across the Channel throughout much of the Roman period. The preponderance of the types in Belgium suggests that it probably crossed the Channel via what Morris calls the Southern North Sea and Eastern Channel route, focusing on the Dover Straits.

Figure 21 - *Group of Roman samian ware pottery from Pudding Pan Rock. Ref: AN1896-1908 R. 332-3; AN1909.1157-60 (Ashmolean Museum (https://britisharchaeology.ashmus.ox.ac.uk/highlights/pudding-pan.html)*

Other types of pottery were also imported into Britain during the first two hundred years of Roman occupation but in much smaller quantities. It has been suggested that the difference between the quantities of *terra sigillata* imported and those of other types may be due to the availability of native types which provided alternatives to non-samian wares.

Mortaria, kitchen vessels rather than table ware, were also imported into Britain from the 1st century, originating from as far afield as Germany and northern Italy. Although found across Britain, they have been found mainly in south-east England, but particularly close to London, Richborough and Colchester which again suggests entry via the Straits of Dover.

As might be expected, although common in France and Belgium, Roman pottery is very rare in the North Sea coastal regions of the Netherlands at this time.

Other material culture

Coins and metals

Coins were probably the most numerous artefacts that were imported into Britain across the Dover Straits in this period. The vast cost of maintaining four legions as well as the growing bureaucracy and gifts and loans to elites would have seen huge

amounts of currency flow into the country. Mattingley calculated that the military in Britain would have cost the empire about 90m sesterces per year by the end of this period, much of which would have been paid in coinage (Mattingly 2006). The UK Portable Antiquities Scheme database records over 19,000 coins dating to the period recorded since 1997 alone. By contrast there are very few coins found along the North Sea continental coast in this period. A hoard of *denarii* up to AD 117 was found at Dronrijp in the Netherlands and two other roughly contemporary hoards at Barger-Oosterveen in Drenthe and Middels-Osterloog (Berger 1992).

Coins and metals were also exported from Britain to the continent during this period. Pre-Roman and older Roman coin types were gathered for re-issue as older types had greater silver content. Rome also expanded on earlier minerals industries and gold, copper, lead and iron were exported and perhaps tin. A key area for the iron industry was the Weald of Kent and particularly Sussex. Iron production here reached an industrial scale by the 2nd century. At several sites stamped tiles demonstrate that the *Classis Britannica* had a key role in the industry, and it is likely that any iron exported was via southern ports. The role of the *Classis Britannica* in the production of Wealden iron suggests that the iron would be used by the fleet for its own purposes but also that the fleet may have exerted some control over the export of iron to the continent.

Figure 22 - *Stamp of the Classis Britannica found on a probable iron-working site in Cranbrook, Kent (Sussex Archaeological Collections 118 (1980), 183-196)*

Ornaments & copper alloy goods

Following the invasion of AD 43 large numbers of brooches were imported into Britain, mostly in the forms of Aucissa and Hod Hill brooches, probably from *Gaul*. By c. AD 70 imports are rare, suggesting they had been replaced by local products (Bayley and Butcher 2004). Copper alloy buckets and

Figure 23 - *An incomplete cast copper alloy Aucissa brooch of Roman date (AD 43-100) from Yorkshire. (The Portable Antiquities Scheme / Trustees of the British Museum, cc 2.0)*

kitchenware have also been found, primarily associated with military sites.
Brooches were also exported to the continent in this period. Morris (2010) has identified 179 brooches of probable British types found in continental Europe, primarily in north-western areas and notably at military sites along the Rhine. Other products include a 1st century AD mirror from Nijmegen as well as a relatively small number of copper alloy vessels which have been found in northern *Gaul* and along the Rhine. The numbers are sufficiently small, however, that it is unlikely that they were traded and were perhaps transported by individuals moving across the empire.

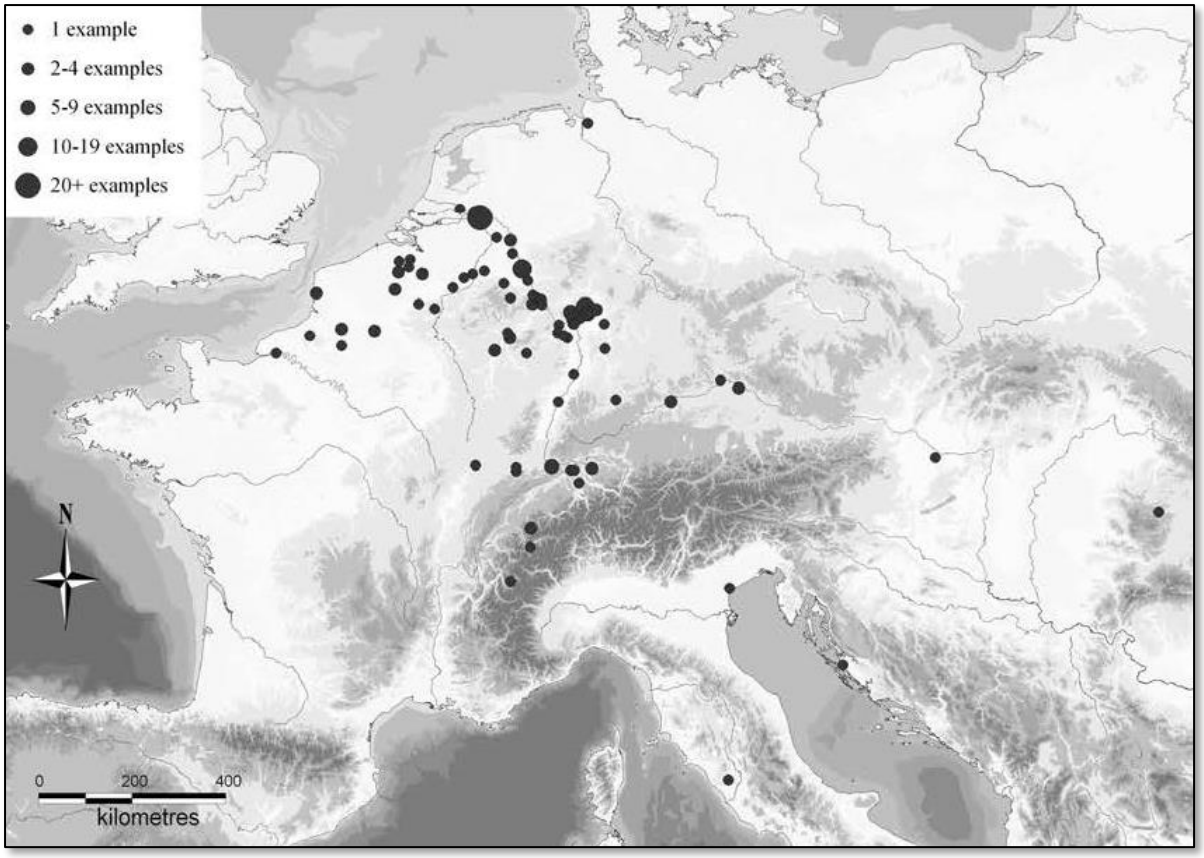

Figure 24 -5 Continental distribution of Romano-British brooches AD 43 – 165 (from Morris 2010, Fig. 4.35)

Amphorae

Olive oil *amphorae*, most commonly type Dr.20, are common across Britain and are known from pre-conquest contexts (for example at Welwyn Garden City where a Dr. 1b *amphora* was found accompanied by other wine drinking vessels (Carver 2001)). They mostly carried olive oil from Spain and are especially common in urban and military sites, such as along Hadrian's Wall. Initially they were probably imported mainly into Richborough and London but in the latter half of the period the role of the southern ports seems to have declined suggesting that the *amphorae* were now directly imported into northern ports. Wine *amphorae* are also common in Britain,

carrying wine particularly from Languedoc and the Provence via the Rhone and Rhine and then crossing the Channel. It was probably the case that a minority of the wine was shipped in *amphorae*, however, with most being carried in archaeologically less visible barrels, particularly where the imports were on a larger scale such as for military sites. *Amphorae* for seafood are also known, mostly from Spain and southern France. As with Roman pottery, although common in France and Belgium very few *amphorae* are known from the continental North Sea coastal regions at this time.

Lava querns

Numerous lava querns have been found in Britain, mainly from Mayen. They are mostly found in the south-east of England although there is also a concentration on military sites in the north on both Hadrian's Wall and the Antonine Wall.

Glass

Glass vessels became relatively common in Britain after the Roman invasion. Excavations at Caerleon, Colchester and York have produced thousands of fragments of glass at each. It is possible that glass was imported into Britain as manufactured goods but equally that it was imported as a raw material and then worked into vessels locally.

3.2.2 c. AD 165-260

Pottery

The importation of Roman pottery seems to have declined significantly in the later 2nd century. *Terra sigillata*, primarily from Lezoux workshops in central *Gaul*, continued to be imported but the volume certainly declined in the second half of the 2nd century. Similar types continued to be imported from eastern Gaulish workshops down to c. AD 270, along with lower quantities of *mortaria* and black-slipped ware, but the volume of total imports was far below that seen up to the mid-2nd century.

Figure 25 - *Central Gaulish Lezoux samian ware vase of form Dragendorff 30, with the name-stamp of the potter Divixtus in the decoration. AD 150-190. Ht.15 cm. British Museum, London. PE 1853.1-10.5 (Creative Commons Attribution-Share Alike 3.0 Unported license. Author AgTigress)*

Although this period saw a decline in cross-Channel imports, there was at the same time an expansion in exchange between the North Sea coast of the Netherlands and the German frontier regions. The Rhine and routes across Lake Flevo would have been the main axes of this exchange. Significant amounts of *terra sigillata* made their way to the northern Netherlands, perhaps as a result of large quantities of Roman coin finding their way to Germany and areas to the north of the empire (including the north Netherlands) in the form of state payments. Considerable quantities of imported pottery have been found in settlement contexts. Slightly smaller quantities of *sigillata* are known from Noord-Holland and Groningen. This is confirmed by the increased number of other Roman products that reached the Netherlands and German interior, including coins and copper alloy vessels as well as lava querns and statuettes.

Other exports across the Southern North Sea and Eastern Channel included small amounts of pottery which probably represent low-level private trade.

Other material culture

Coins and metals

The transfer of coins to Britain continued at a high level from AD 165-260 as new units were transferred to the province. The coin necessary for salaries presumably contributed a major share of the coinage found from this period. However, the silver content of coins of this period declined rapidly from a high point of 65-70% under Marcus Aurelius to 5-8% by c. AD 260 (Wilson 2007). As with the early Roman period, though, there was also a considerable export of coinage as older types with higher silver content were gathered and exported for re-casting. A similar pattern was seen in north Netherlands contexts where there was a considerable influx of Roman coinage into the area and at least 13 hoards have been discovered. The coins probably represent a subsidy paid by Rome that reached the inhabitants of the north Netherlands. That such links existed is further evidenced by the presence of Frisian units in the Roman army on Hadrian's Wall by the mid-3rd century. It has been hypothesized that the Frisian units were on the Wall as a direct result of subsidy payments ie part of a deal, but this is only a hypothesis and rather different to normal practice. We should also note though the presence of 'Housesteads' or 'Frisian' Ware on Hadrian's Wall. The form is clearly an imported style, though interestingly fabric analysis points to it being produced locally.

There may also have been a decline in metal ore mining though evidence is fairly limited. Iron production continued strongly throughout the period, however, although it began to decline in the middle of the 3rd century. Presumably some of the iron was exported.

Amphorae

There was a significant fall in the amount of olive oil imported into Britain by the late 2nd century. Type Dr.20 remained the most common type and finds are common in the south-east, along Hadrian's Wall and the Welsh borders. Much of this trade will have been into south coast ports direct from Spain but it is likely that the Dover Straits played a role too. There may have been a decline in wine imports at the same time. Many wine producing areas seem to have gone into decline at this time and some vineyards in *Gaul* were abandoned (though production in areas such as Aquitaine do not show the same decline). Much of the wine continued to be supplied via the Rhone and Rhine, indeed two altars set up by wine traders have been found at Colijnsplaat, a port on the Scheldt that had known links to Britain (Stuart and Bogaers 2001).

Seafood imports to Britain also seem to have fallen during this period although in Brittany there was an expansion of salted fish processing on a large scale. Evidence of fish sauce production has been found across the Straits area including in Britain, Belgium and the Netherlands (Hamilton-Dyer 2008).

Lava querns

There may also have been a steep decline in the import of basalt lava querns in this period although fragments are known from later sites.

It is suggested that the cause of both the decline in cross-Channel exchange and the increase in exchange between areas of north-west Europe outside the empire were the same. The Antonine Plague (AD 165-180) may have led to the deaths of 10% of the Roman population and was particularly deadly in the cities and army units where the density of the population was at its highest. At the same time, the empire fought the Marcomannic Wars against Germanic and Sarmatian tribes. These wars were particularly destructive and, for the empire, exhausting. The combination of these two factors may have produced a significant economic decline that impacted on Britain, while stimulating new engagement between the empire and extra-imperial areas to the east and north following the subsidies paid to the Germanic tribes to bring about peace. It should be noted, however, that other reasons for the decline of imports to Britain have been suggested, such as British products replacing continental imports due to changes in taste and fashion and the army becoming more local in origin and a decline in imperial interest in Britain following the end of the Severan campaigns.

3.2.3 c. AD 260-409

Pottery

In the later Roman period (AD 260-409) there was a further decline in the importing of Roman pottery into Britain. Some types did continue to be imported in fairly small quantities, in particular Mayen and Argonne (from east of Reims) ware as well as fine slipped wares from western *Gaul*. Both Mayen and Argonne ware have been found mostly in the south-east of England, concentrating in east Kent, which suggests that the import route was cross-Channel in origin. This distribution may suggest small-scale civilian trade, with penetration further inland being limited by existing British manufactures.

In the north Netherlands, late Roman imports include Mayen ware, which has been found in small quantities at Den Burg and Schagen-Muggenburg on the Noord-Holland coast and at Wijster in Drenthe (Diederik 2002,). There were, however, a small but significant number of pottery imports from Britain and at least 21 sites on the north European coast have been discovered that contained Romano-British pottery, including several in the Netherlands.

Other material culture

Coins and metals

Figure 26 - *The Frome Hoard is a hoard of 52,503 Roman coins found in April 2010 near Frome in Somerset. The hoard dates to AD 253 to 305. (By Portable Antiquities Scheme from CC BY-SA 2.0)*

Britain continued to receive very large amounts of coinage during this period but there seem to have been significant fluctuations in the amount of coinage received and where it went. Some types had higher silver content than others and the most valuable are less likely to be lost so the number of coins found can be misleading. The early 4th century seems to be the period when the supply of coinage was at its maximum although the silver content was low and losses correspondingly high. During the later 4th and early 5th centuries hoarding seems to have become common and a very large number of coin hoards have been discovered in Britain, it is thought due to the increasingly uncertain political and military situation (Fulford 1996).

It is likely that the means by which coinage arrived in Britain changed during this period. Prior to the mid-3rd century, the most significant factor in the coin supply was the need to pay the army. During the 3rd and 4th centuries, however, soldiers were increasingly paid in kind (Jones 1964). The main driver for the increased coinage therefore seems to have been the role that Britain now played in providing agricultural products. By the late 3rd century Britain was exporting agricultural products to the rest of the empire and by the mid-4th century emperors were intervening to ensure that the supply to the Rhine legions was secured. This is evidenced by a change in the distribution pattern of Roman coinage in this period, away from its prior focus on military sites towards civilian settlements and producers.

It is likely that coins continued to be gathered, probably by taxation, and returned to the continent for re-casting.

In addition to coinage there is some limited evidence for the import of so-called crossbow brooches and some copper alloy vessels at this time. There is also evidence for the export of British brooches. So-called cogwheel bracelets dating to the 4th century have been found at Oudenburg and Tongeren in Belgium. At Oudenburg indeed, seven bracelets of probable British origin were found in four graves.

There is no evidence of gold mining in Britain in the late Roman period. Lead mining, by contrast, may well have continued as there have been numerous discoveries of lead coffins across Britain. Lead was also still being exported as examples of British lead have been found in Germany.

Iron production continued in the Weald in the later 3rd century although output fell drastically. By the 4th century output was very limited and it is likely that exports ceased.

During the same period there was also a marked decline in exchange between the empire and the north of the Straits region. As in Britain, the amount of coin imported into the north Netherlands rose significantly, even as the silver content of the coins themselves declined. A particular concentration of radiates has been observed in north Netherlands dating to AD 260-274 but are rare thereafter. Very few Roman copper alloy vessels or ornaments dating to AD 260-409 have been found in the Netherlands.

Amphorae

Spanish olive oil seems to have ceased to reach Britain by the mid-3rd century, about the time that Dr.20 *amphorae* went out of use. The main supply of olive oil after this time was north Africa but never in the same quantities as Spanish olive oil in early periods. The import of wine probably declined in this period too. Both *amphorae* and barrels become very rare in the late-3rd century. Importing seafood in *amphorae* also seems to have ceased about this time and many of the continental processing sites went into decline.

Amber

During this period a small number of discoveries of amber in Britain may suggest a coastal trade route existed down the North Sea coast.

3.3 What does the material culture of the North Sea region tell us about connectivity in the North Sea region?

Morris (2010) suggested that the material culture of north-west Europe allows some conclusions to be drawn about those processes that influenced the ability of people living in north-west Europe to interact across sub-regional boundaries.

3.3.1 The role of the state and private trade

The state played a leading role in promoting exchange in the region. A large proportion of the coinage used in the region must have been supplied by the state in the form of salaries for the military and bureaucracy and in the form of gifts and loans to local elites. These in turn used the coins to buy goods and services. When the state payments were larger the economy flourished rather better and people were able to buy both local and imported products such as pottery, olive oil, wine, querns and ornaments. When the supply of coin was restricted, such as during the later Roman period when payments for military service shifted to payment in kind rather than cash, the economy constricted, and the range and volume of goods transferred across the Channel fell. This is a complex equation though and at times when the exchange of most goods fell, others might see an expansion. In the middle Roman period, when movement of seafood products generally fell, there was nonetheless an expansion in the supply of processed fish from Brittany. In the late Roman period, although the range of goods exchanged across the Channel fell, there was a nonetheless significant expansion in agricultural exports from Britain to the near continent. State processes were also important in determining the amount of coin in circulation by the recovery of older types for re-casting and by variations in the silver content which either encouraged or discouraged retention and hoarding. Another

way that the state influenced connectivity was in the sponsorship or control of key industries. The role of the *Classis Britannica* in the production of Wealden iron, for example, suggests that the iron would be used by the fleet for its own purposes but also that the fleet may have exerted some control over the export of iron to the continent.

The role of private trade in cross-Channel exchange is more difficult to assess. Apart from the exchange of bulk products such as pottery, coin and raw materials, artefacts traded across the Channel tend to be found in fairly small numbers and it is difficult to know whether they represent small-scale trade or the movement of individuals carrying those artefacts. Nevertheless, it is well known that the many private traders existed in the Roman world and it has been convincingly suggested that the supply of wine in *amphorae*, for example, represents private small-scale trade rather than bulk supply for the military. Additionally, many of the goods traded across the Straits area must have been sold on by private traders locally, even if the initial supply across the Channel was arranged by the state.

3.3.2 The effect of political upheaval

The economies of north-west Europe, and particularly exchange across the Channel, seem to have been very sensitive to upheaval in the western empire. This upheaval could take the form of either war or peace settlements. For example, the Marcomannic Wars of the 2nd century seem to have produced, combined with the Antonine Plague, a serious downturn in the economy of the western empire which affected the transmission of goods across the Channel. By contrast, the peace treaties after the end of the Wars led to a significant increase in coinage and other goods entering the northern Netherlands, probably due to financial subsidies paid by the Roman state.

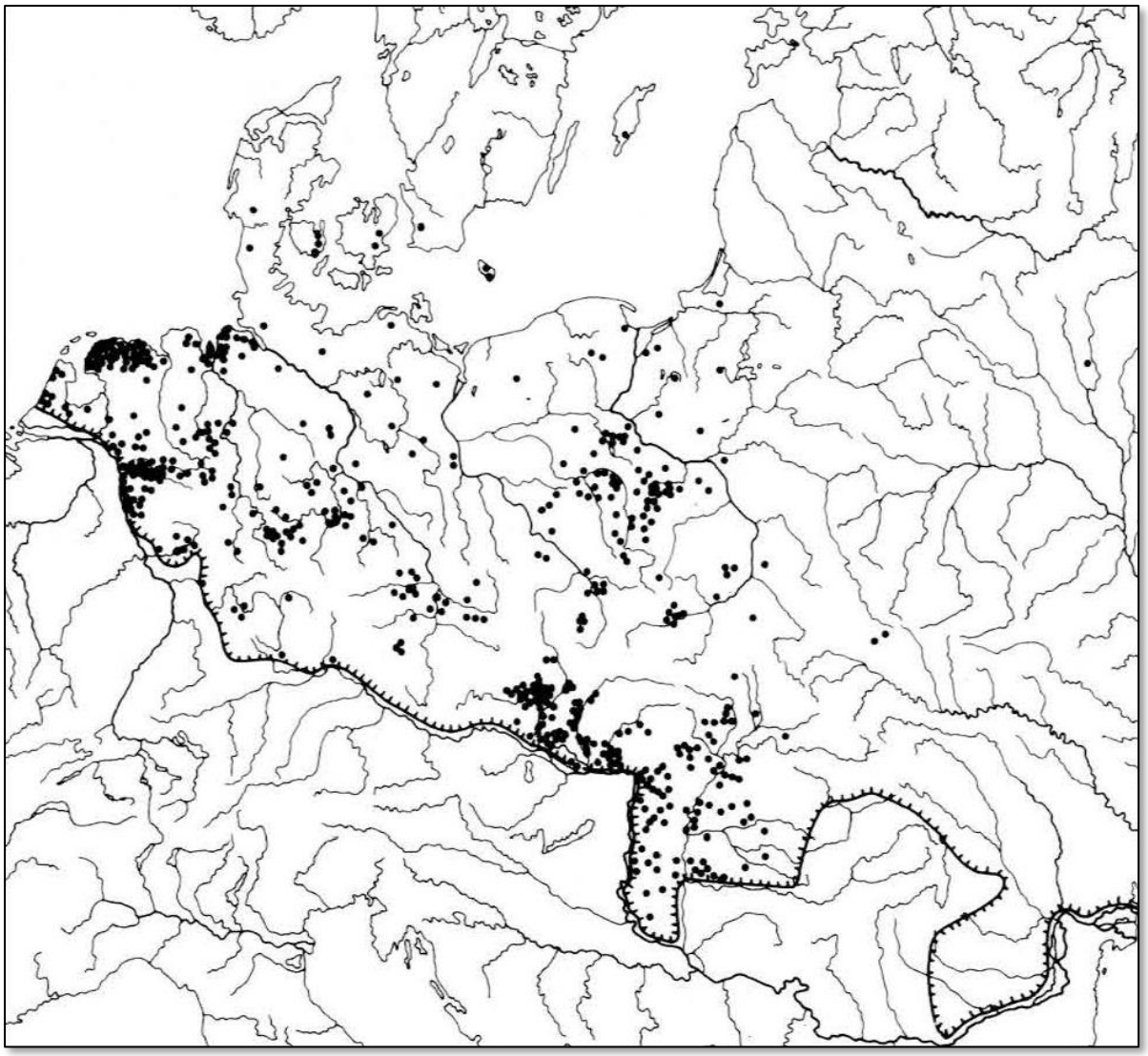

Figure 27 - Distribution of terra sigillata north of the Roman Limes AD 165-260 (from Morris 2010, Fig. 5.12 after Lund Hansen 1987, Fig. 127, after Godlowski 1985, Abb.2).

3.3.3 Economic growth and decline

The period of strong economic growth in the western empire seems to have been short lived. In Britain it began in AD 43 but economic activity was already declining by the later-2nd century, at least as reflected in the material culture of the Straits area. Imports of pottery, olive oil, wine and almost all other goods declined from the later 2nd century onwards and although some exports from Britain strengthened or only really developed in the later Roman period such as cogwheel bracelets and agricultural produce, the overall level of exchange across the Channel fell considerably. The tail-off was over a long period, however, and cross-Channel exchange continued right up to the end of the Roman period in Britain.

3.3.4 Changing taste

In no part of the empire was Iron Age culture replaced wholesale with Roman culture, but change did take place. The nature, pace and consequences of that change differed in different areas, and the processes that encouraged or discouraged it were also different, depending on the particular pre-Roman culture and level and nature of pre-conquest interaction, the process of conquest and its aftermath and the degree of cultural autonomy that continued after the conquest. Other factors will have included proximity to established exchange networks and to extra-imperial territories and their culture. Change was also unbalanced, being more visible in urban and military areas than in some rural areas. The process of change was an important driver of cross-Channel trade as initially elites, and subsequently a wider range of people, sought access to goods from the continent and began to produce goods that could be exported to the rest of the empire. The consequence of the interaction of these variables was the emergence of regional cultures, each bearing both similarities and differences to its neighbours. It also led to mixed cultural traits with objects and styles from around the empire being found together.

Figure 28 - *A selection of pottery found in Roman Britain. The assemblage includes Black Burnished Ware jars, a Rusticated Ware jar, a Central Gaulish Colour-Coated Ware beaker, Trier Black-slipped Ware with white trailed decoration, Nene Valley Colour Coated Ware, a coarse ware cheese press and other fine wares (By AgTigress (Own work), CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=11263012)*

3.3.5 Long-distance networks

Although the Bridging the North Sea project is focusing on connectivity within the Straits area, it should not be forgotten that the area was also integrated into much longer trade networks stretching right across the western empire, into extra-imperial areas and even further afield. Key elements in these networks were the Rhine and

the Rhone which were crucial for the transfer of wine and pottery between the empire and northern *Gaul*, Britain, and Lake Flevo which enabled the transmission of goods and people from *Germania* to the north Netherlands. An Atlantic sea-route enabled the olive oil trade from *Baetica* in Spain. These routes not only enabled trade but to some extent conditioned the kind of material culture that could be exchanged as areas close to them would have had preferential access. When these routes were either improved by being connected to road systems or the construction of new ports or harbours, or disturbed by warfare, climate change or economic decline there could be a significant positive or negative impact on the exchange of goods within the Straits area too.

3.3.6 Ports

Not all Roman sea trade depended on ports. Shallow draught vessels could pull up on beaches or anchor offshore to offload and load cargo. Nevertheless, the availability of constructed ports did play a crucial role in the exchange of goods, especially where bulk transfers were required or where the state played the central role and goods needed to be accounted for, taxed or controlled. Distribution maps of artefacts often show clear clustering around ports, often waxing or waning over time, which allows the exchange networks to be reconstructed.

3.3.7 Movement of people

It should not be assumed that material culture only moved through the empire by trade and exchange. There was significant movement by people, whether as part of large groups such as army units or in later periods by raiding bands, and as individuals. These people carried objects with them, often over considerable distances. Determining archaeologically whether a single object, or a small group of objects, found a long way from its point of creation is a result of trade or movement is of course extremely difficult. DNA testing and other scientific methods can help but caution should always be applied.

3.3.8 Climate change

Climate change could also be a driver of the movement of material culture. During the late Roman period, sea-levels generally rose in the North Sea basin. This will have impacted on coastal societies, introduced instability into existing networks and, perhaps, have provoked the movement of people including by raiding. This would have impacted on existing exchange networks but also perhaps introduced new object types and styles into societies that had not known them before.

3.4 The study of material culture in the 'Bridging the North Sea' area

Material culture is crucial to the study of past societies. The pottery, glass, organic artefacts, worked stone, building materials, metalwork and other finds that humans leave behind them evidence how societies worked and evolved over time. Each past community has its own material culture. Between some there will only be small differences. Between others the differences will be significant. All tell their own story. In researching the Roman coastal communities around the North Sea basin, the study of material culture is an invaluable tool in understanding issues such as identity, internal relationships and relationships with other communities, and direct and indirect links with other coastal communities around the Channel.

While 'material culture' addresses all kinds of finds, the text below will focus on pottery because it is a material that is common to all partners in the project. Not every region has stone, nor the conditions to preserve more fragile materials such as metals and organic materials. Pottery, however, is ubiquitous and generally present in abundance. Moreover, because it is less fragile than other materials it is a good resource public engagement. This focus in no way means that other classes of finds are less valid or useful.

3.4.1 Issues in current approaches to using material culture to study regional processes

Although the areas represented by the partners in the Bridging the North Sea project were once part of a single unit – the Roman empire – we are not today. We are divided across four different states, each of which has its own archaeological traditions and each of which faces its own particular challenges. We literally speak different languages. This has led to certain problems emerging in how we consider the material culture of the wider region.

There are inevitably limits to what can be achieved within existing methodologies and using existing research frameworks. Some of these limits are entirely practical, such as the language issues. Dutch pottery texts tend to rely on German literature and are much less aware of French or English approaches. English approaches may, perhaps, be more insular and often unaware of continental developments. This inevitably leads to gaps in existing frameworks. For example, within the existing Dutch pottery framework there is little place for English or Menapian pottery as the framework is drawn largely from the experience of archaeologists working on the German *Limes*. With frameworks being weighted towards national, rather than international, experience comparisons across borders become all the more difficult.

Similarities between traditions are missed which can also hinder the identification of what is unique.

Archaeological structures can also hinder understanding of wider regional relevance. In countries where commercial archaeology is prevalent it has been observed that the time and cost constraints often restrict the ability of archaeologists to think beyond the site in question. Equally, the relationship between commercial archaeology and university-based archaeologists is often not close and so the understanding being reached by academics takes a long time to flow down to the commercial sector and the planning archaeologists who co-ordinate it. The increased financial pressures on the university sector only exacerbate the problem.

A problem that is becoming particularly apparent is the declining availability of material culture specialists across the region, both in universities and commercial archaeology. There are several reasons for this. The funding formulae used by universities is often inimical to training and retaining specialists capable of studying materials from across the Straits area. For their part, commercial units, who have to study sites of all periods and types, need finds specialists who can work on a wide range of finds but this is inevitably at the expense of familiarity with the detail of international types. These factors impact on the career prospects of finds specialists and thus limits entrants into the profession. Paradoxically these problems are being encountered at the same time as technological and scientific developments are opening up possibilities for new research methods.

3.4.2 Some possible solutions

The study of material culture can provide essential opportunities for furthering research into Roman North Sea coastal communities. Co-operation and communication projects such as ‘Bridging the North Sea’ can themselves help individual researchers overcome the constraints of national research frameworks and methodologies and provide new insights into the similarities and dissimilarities with our neighbours. This should help us identify the finds that best describe North Sea trade in the region. How can continental archaeologist recognise Romano-British pottery or other artefacts? Similarly, perhaps the continental specialists can help their British counterparts identify Gallic pottery? Research in the coastal regions may also show what is unique about these communities. How does their identity differ? How is that identify influenced by their geographic position? How do these communities relate to each other and how is this connectivity revealed in terms of material culture?

As indicated above, the very act of engaging with this research transnationally, may have a positive impact on the popularity of this kind of research. Including current

students and researchers in the process could be invaluable. There could even be opportunities to include volunteers and amateurs, or even the general public, to help increase their knowledge and develop their interest. There is undoubtedly a certain magic in physically touching the past and engaging with it, that we should take advantage of.

Once there is a better understanding about what material culture can tell us about the identity of coastal communities and which finds can signify the interconnectivity between Britain, Belgica and *Germania*, it also becomes easier for museums and other public institutions to use this understanding and the objects themselves to tell the story.

The most important benefit of transnational cooperation is, of course, that it provides new questions for archaeologists to try to answer. The goal for the future actions of the Bridging the North Sea network should perhaps be to create a network of specialists to identify these new questions and develop methodologies for investigating interconnectivity across the North Sea region.

3.4.3 An example of the way forward: pottery hacks

An option suggested during the Bridging the North Sea workshops, by which we can engage with the challenges and opportunities identified above, is the concept of pottery hacks. These are transnational events in which specialists and other interested parties can engage with the material from other regions. This method can apply equally to specialist and more general audiences.

There are several benefits for specialists. They provide a durable network to support interaction between the specialists of each region. They provide hands-on opportunities for studying material from other parts of the Straits region and gaining insights about the nature of interconnectivity between these parts. They act as a start point for developing international research frameworks and methodologies and they help popularise material culture research. Including the public in this hack may equally create a better dialogue between specialist researchers, community archaeology groups and the general public, thereby helping all the participants understand and tell the story of the Roman north-west.

3.4.4 Another example of the way forward: online pottery databases

Fabric analysis is the key in identifying the origin of pottery. Together with typology and decoration the fabric leads the researcher to the specific dating of the pottery. Online pottery databases including high resolution fabric pictures are an important tool to determine fabrics accurately, and are easily accessible while determining

ceramics. At Ghent University the development of such an online pottery database is in progress: the FLEPOSTORE (https://flepostore.ugent.be/). The Flemish Pottery and Stone Reference collection offers an online open access platform related to a physical hands-on collection of locally produced as well as imported pottery and ceramic building material from archaeological contexts and local and imported worked stone from prehistoric to pre-industrial times (c. 5000 BC – 1700 AD), including an important Roman collection. The principal aim is to collect, to document and to make available diagnostic reference geo-materials, such as ceramics from pottery production sites. Flepostore wants to facilitate the open access availability of these geo-materials, a scientific reference platform and a feeding-ground for future research initiatives, and aims to function as pivotal network centre for geo-archaeologically underpinned support for scientific research, education and heritage management projects in archaeology, geology, arts and architecture, but it also offers high quality information and images for anyone with interest in these topics. The collection strategy is based on the secured provenance principle. Only samples that have a documented find location and provenance are taken into account. Samples from consumption sites are only taken into account when the geological and geographical provenance is determined in an accurate way (*e.g.* by means of a potter's stamp, specialist determination, geochemical and petrographical analysis, etc.).

Past online initiatives have proved themselves to be extremely valuable, to offer insights in the range of pottery categories, fabrics, types, decorations, and for their related bibliography. Potsherd, the Atlas of Roman Pottery (https://potsherd.net/home/), gives an overview of the existing pottery categories in Britain, and relates to the National Roman Fabric Reference Collection of the Museum of London Archaeology Service in London. 'Roman amphoras in Britain' (https://intarch.ac.uk/journal/issue1/tyers/toc.html) (1996) goes deeper into the range of amphorae in Britain, but the more recent project 'Roman Amphorae: a digital resource' produced some years ago by the University of Southampton (https://archaeologydataservice.ac.uk/archives/view/amphora_ahrb_2005/index.cfm) has a wider range and also) has a wider range and also includes fabric pictures.

The further development of such online databases, the mapping of these initiatives, and the knowledge and the use of such tools in the Bridging the North Sea region can improve the identification of pottery, and will lead to better understanding of trade networks and connectivity in the Bridging the North Sea region.

3.5 Research questions

3.5.1 General

- What was the nature of economy in the BtNS area? Were there in fact multiple economies operating alongside each other? If so how did these relate to one another?
- Does the material culture support the accounts of literary sources?
- Did the same object types play the same roles in different parts of the BtNS area? Do they mean the same thing to different people? If not what does that tell us?
- Did the presence of nearby sea connections aid the spread of different pottery (and other material culture) types compared to landlocked areas? What was the impact of this?
- What differences exist in material culture assemblages of coastal areas compared with inland areas?
- What was the role of long-distance trade routes in local trade and exchange? To what extent did trade develop away from such routes?
- How did riverine connections shape development in the region?
- What can we say about the relationship between state and private actors in the pottery and other trades (especially metals)? Can we recognise this archaeologically?
- How effective is archaeology at distinguishing non-local types from local copies? Are our methods of doing so being applied correctly?
- Can we tell the difference between small-scale trade and personal possessions of travellers?
- How do changes in material culture reflect the suggested movement of groups within the BtNS area? How can studies of material culture be integrated into other research methods such as DNA or isotope analysis to learn more about group identities and movement?

- Britain exported significant quantities of agricultural products by the late 3rd century. What does this say about the economies of continental NW Europe and does it affect our ideas about the financial 'viability' of Roman Britain?

- During the 3rd/4th centuries the military was increasingly paid in kind, rather than coin. Was this the case across the BtNS area and if so what does it say about the economy of the area? How does this relate to the falling silver content of coins?

- What factors affected changing tastes across the BtNS area? Why were Roman types/processes adopted in some areas and not others? What was the role of proximity to effective trade networks and routes in this? What was the role of the proximity to extra-imperial areas?

- What was the impact of climate change on trade and exchange?

3.5.2 Research Questions about single artefact types

Pottery

- What can we say about the trade routes used for pottery transfers? How did different types of e.g *terra sigillata* make its way to Britain from the continent?

- As non-local types intruded, what happened to native types? Were these traded more or less than previously? Were new connections established?

Coins and metals

- Is the imbalance between coins (and other material culture) recorded in Britain and along the continental coast real or the result of differential recording caused by e.g the Portable Antiquities Scheme?

- How much Iron Age coin was exported to the continent in the early Roman period? Was this process matched on the continent? Has this impacted on our ideas about the prevalence of Iron Age coin in then BtNS area?

- Why did hoarding become common in the later 4th century? Was this common across the BtNS area?

- What was the role of the Classis Britannica in the metal trade within Britain and further afield? Whas this role seen in other forms of material culture? Was this involvement matched by other military units in other places

3.5.3 Research Questions about the archaeological study of material culture

- How do we overcome the 'localism' of archaeological knowledge? Can existing reference collections be widened to provide an international context?

- How do we overcome the limitations of both commercial and academic archaeology?

- How do we overcome the lack of material culture specialists in the BtNS area?

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4 Connectivity

4.1 Introduction

Long before the Roman period, archaeological evidence indicates that both the English Channel and the North Sea served to connect peoples, not simply to divide them. Connectivity manifests itself through the movement of individuals, goods, and ideas. The information revolution that transformed Europe and the wider Mediterranean world under the Roman Empire led to connectivity on an unprecedented scale, and north-west Europe was no exception. At the most elevated levels, the grand narratives of Roman writers attest how ideas of power, rulership and divinity crossed the waters. In the 1st century BC, even before large parts of our region were incorporated into the Empire, no less a figure that Julius Caesar wrote of Commius, a ruler of the *Atrebates*, who held power on both sides of the Channel.

In the centuries that followed, many thousands lived lives that spanned the waters. Soldiers, one of the most richly attested groups in Roman inscriptions, played a crucial and often brutal part in binding the region together. Without recruits from modern France, Belgium and the Netherlands, Britain might never have been won for the Empire, and the island's subsequent garrison certainly depended on manpower drawn from all these regions. In time, Britain in turn was to send soldiers and even imperial usurpers back in the other direction. But crucially, the flow of people was not simply one of soldiers, administrators, and rulers. A lively variety of women, men, children, the free and the enslaved, rich and not so rich, craftworkers, merchants and sailors are attested too, together they created a mosaic of thoughts, commodities and relationships that fostered a new regionalism. We encounter these individuals in the altars they dedicated, the tombstones on which they were commemorated, and just sometimes – as with the famous *Vindolanda* tablets – in the letters they wrote. In this chapter we will, from time to time, identify these individuals and a non-exclusive list of such travellers is presented in Appendix I.

When in the 3rd century AD control from Rome faltered, the power of the North Sea and the Channel to bind people and territory together was manifested in the boundaries of the so-called 'Gallic Empire', led by one Postumus, Roman commander of the Rhine army and believed to be of Batavian origin. A few years later, a new imperial usurper, Carausius, a Menapian briefly ruled his own empire from Britain. In the 5th century AD, as the empire in the West, temporarily restored, crumbled, glimpses of the rich connectivity that had bounded peoples together can still be found. Theological debates traversed the Channel, as clerics from *Gaul* made their way to southern England to confront the teachings of Pelagius, a British-born heretic.

Our written sources thus attest to a wide variety of people and ideas, but they represent only a fraction of the surviving evidence for connectivity. A broad array of goods made their way across and along the Channel and North Sea coasts. With these goods circulated shared ideas, about fashion, dress, food, writing, hygiene, and many of the essential habits of daily life. Transport infrastructure, from roads to harbours, were established to facilitate and sustain this movement. Granaries, stores, forts, and *mansiones*, hostels for official travellers, were built alongside them. This mass of archaeological evidence, from artefact to site to landscape, evokes a complexity and sophistication that transformed north-western Europe – by bringing people and ideas together. Today, specialists across the region continue to illuminate the often surprising, and always fascinating, ways in which these material remains from the past speak to a dynamic past, and an enduring legacy. Connecting their expertise, and this evidence, must be at the heart of any appreciation of 'Bridging the North Sea'.

4.2 A short history of crossing the Channel in the Roman period

4.2.1 55 BC – AD 43

Contacts between mainland Europe and the British Isles were already intense prior to Roman interference in the Straits region. In the 1st century BC, the *Veneti* seem to have controlled the crossing between Brittany (Bretagne) and the south-west coast of England. The *Morini* and the *Menapii* controlled the Channel zone. We have few sources from this era regarding the inhabitants of the South-Holland coastal area. Nevertheless, before Julius Caesar could carry out his expeditions to Britain, he had to deal with these strong seafaring peoples. By 55 BC he had done so and made two short expeditions to Albion, using the Boulogne to Richborough route. Despite the Roman army's failure to gain a permanent foothold, the operation combined with the earlier Roman pacification of *Gaul* does seem to have resulted in increased trade between Rome and British traders.

It has been suggested that there may have been Roman installations in the coastal zone prior to the invasion of AD 43 although, as yet, this cannot be proven.

4.2.2 AD 43 – 80

In AD 43, the Emperor Claudius managed to reach Britain and, unlike Caesar, hold out. The four legions involved were brought by land routes and by the Rhine along the North Sea coast. Although it is not certain, it is generally assumed that this huge army made the crossing to Richborough from Boulogne-sur-Mer. The recent discovery of the *castra* at Valkenburg (Netherlands) also opens up the possibility of some of the units crossing the North Sea from the Rhine estuary. Several decades

earlier Germanicus had constructed 1,000 ships in this area to transport troops which shows the area had the capability to provide large-scale shipping.

Although the Rhine had begun to be fortified even in the time of Augustus with a series of defences that were later connected, it was during the Flavian and Nerva-Antonine dynasties that the frontier developed into a complex and coherent defensive system known as the *Limes* defence system. This consisted of roads, walls, watchtowers and forts. An important element in the system, and one of the earliest, was the Corbulo Canal (*Fossa Corbulonis*) that connected the mouths of the Rhine and Meuse over a distance of 23 Roman miles. Tacitus wrote that it was constructed in part to keep the soldiers busy, but it also allowed safe transfer of shipping along the Dutch coast.

Although the *Limes* complex was built for military purposes it took on an important economic and social role. It became a place for exchange between the empire and external regions and large communities grew up at the forts and towns along its length. This growth, combined with the protection it offered, also allowed the Rhine and canal to become an important trade corridor linking the central part of the empire with the Channel and North Sea.

4.2.3 AD 80 – 193/230

In the second half of the 1st century AD, Roman forces conquered further parts of Britain with fleet units, including the *Classis Britannica,* playing an important role. After the year AD 100, the major threats to the Roman occupation were largely in the north. In most of Wales and England a long period of relative peace began, establishing a prosperous economy. On the continental mainland, after the Batavian revolt a stable situation emerged with growing prosperity and strong integration with Roman structures. This integration was partly motivated by the Roman army's constant need for supplies and building materials. For the coastal zones of *Lower Germania, Gallia Belgica* and south-western *Britannia*, this meant a great increase in bulk transport. This increase resulted in a great strengthening and modernization of the imperial infrastructure. A network of water and land routes emerged on the continent to organize transport from the hinterland to the coast. There were also inland ports (Voorburg, Goedereede) and seaports, where cargo was transferred to seagoing vessels.

As transportation intensified, Boulogne's role as a crossing point grew. Under Trajan, Boulogne grew into a monumental fortress with a harbour, two lighthouses and a sprawling trading settlement. A number of military ports were active on the south-east coast of England. Reculver may have joined Richborough as a seaport. Dover was designated by Hadrian as the primary port opposite Boulogne. In addition, the

commercial ports of London, as well as Rochester (Kent) and Colchester (Essex), grew up in the east and Chichester in the west. The ports were suitable for receiving seaworthy ships. It is likely that sea routes between the mainland and the eastern British trading ports did not only run via Boulogne but also directly across the North Sea. The same applies to the transfer of troop units between the Rhine *Limes* and the port of South Shields at the Stanegate and Hadrian's Wall.

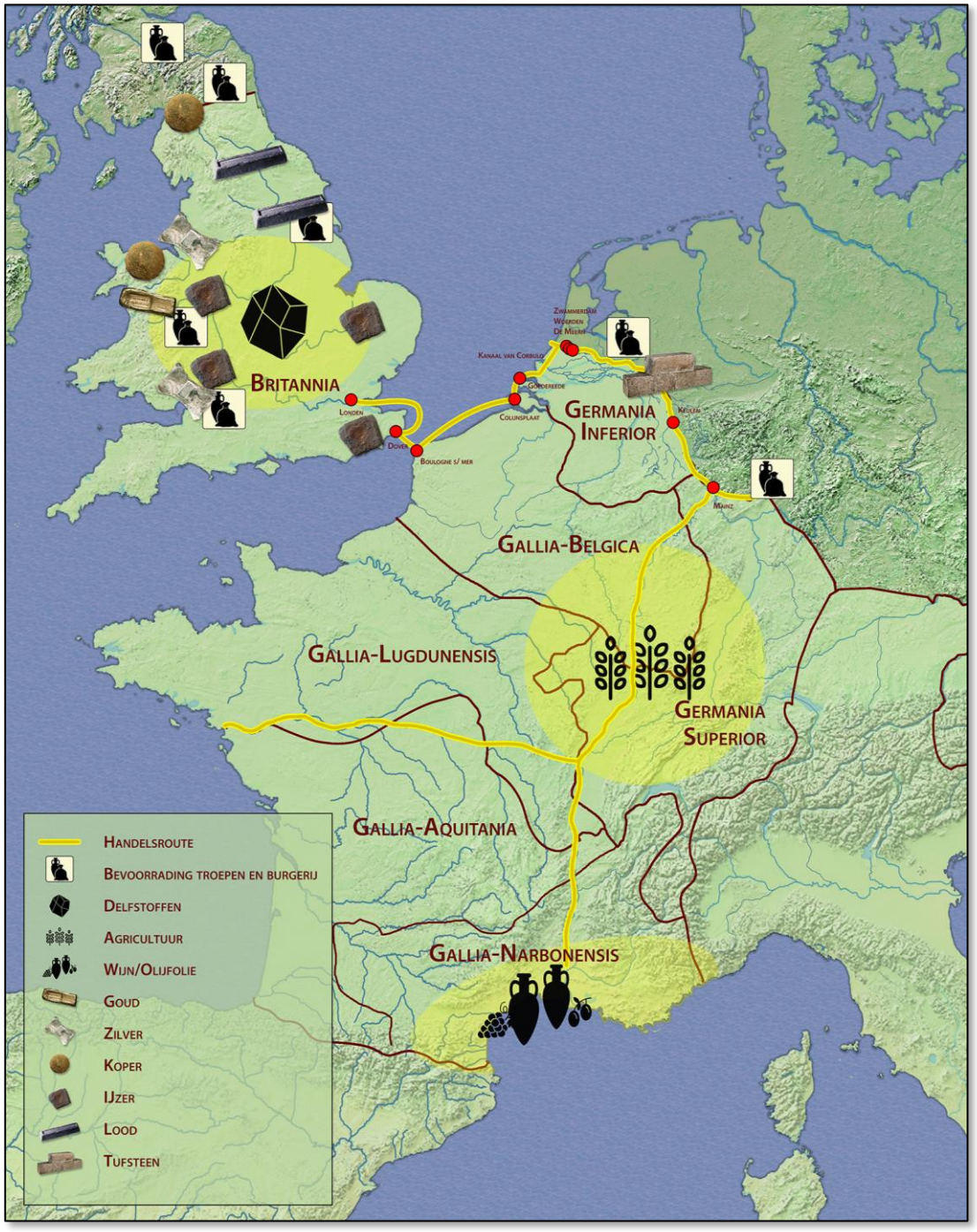

Figure 29 - *Model of trade routes between Britain and the Roman Empire (concept by Tom Hazenberg 2023)*

There were also ports on the mainland with a connection to the coast (Aardenburg, Bruges, Oudenburg and Maldegem). However, the connection appears to have consisted of shallow tidal channels. The two sea-going freighters discovered near Bruge (Blankenbergegeul) are evidence of the use of these tidal inlets for shipping and for maritime connectivity across the North Sea.

4.2.4 AD 193/230 – 400

For *Britannia*, the assassination of Emperor Commodus in AD 192 ushered in a period of unrest resulting in a battle between usurper Albinus and the eventual victor Septimius Severus at Lyon in AD 197. Septimius Severus organized a major restoration program including the modernization of the port of Dover. In the late 2nd and early 3rd centuries in particular, there is evidence of many troop movements to northern England to quell the Caledonian raids. The sunken ship in the Tyne, with coins of Germanic units of around AD 200, is a witness to this. Septimius Severus and his sons also reinforced the Rhine *Limes* as a supply route, possibly as a bridgehead for the direct route to South Shields and Wallsend.

Until the end of the Severan emperors, the Rhine defences continued to function at full strength. The northern North Sea coast was set up as a well-guarded region to secure transportation. A number of coastal forts and harbours provided a safe route from the Rhine and Meuse to Colijnsplaat. A large part of these forts and harbours disappeared beneath the waves due to land erosion. Only Katwijk-Brittenburg/Valkenburg and Naaldwijk have been more or less recovered. The inland ports of *Forum Hadriani* and Goedereede experienced their heyday at this time. After AD 230, however, the Roman army retreated south in a depth defence. The delta of the Rhine, Meuse and Scheldt were no longer permanently maintained and fell into disrepair. The unrest of the mid-3rd century was also to be felt along the coasts of *Gallia*. For much of *Britannia*, however, after the Severian reorganization, peace returned, and the economy flourished.

From 260 onward though, *Britannia* became involved in political developments again. Its connection to the mainland was threatened by the Gaulish Empire. The British provinces sided with the rebellious Gauls and the unrest continued when Carausius first restored Roman power in the North Sea and later rebelled with the support of the *Menapii* themselves. Around AD 300, under the leadership of Constantius, this revolt too was put down. All these developments led to a different organization of the fleet. The *Classis Britannica* is no longer mentioned from the mid-3rd century. It may be that the British fleet began to focus on protection against the pirates and was divided into small flotilla units at coastal forts. A possible consequence of this is that the military port of Dover was dismantled after AD 200. Dover did continue to function as a civilian port as did Boulogne on the Gallic shore.

Along the coasts of the region, the threat of piracy continued to grow and so the army concentrated on fortifying the Channel shores. This system of forts eventually grew into the Saxon Shore network (which among its developments saw a new fort constructed at Dover).

All these developments in the 3rd century affected the transportation links between *Britannia* and the mainland. Economics and transportation benefit from political calm. During the 3rd century the weak governance of the emperors thus caused more unrest and danger. Nevertheless, the volume of transport between *Britannia* and the continent must have remained quite extensive (as witnessed by exports from Britain and its demands for Mediterranean goods). We can be sure that Boulogne and Dover continued to function as main ports throughout the 3rd and 4th centuries. Boulogne is known to have been surrounded by a wall until the late Empire. The port of Dover meanwhile suffered from silting due to the low force of the Dour failing to flush the port clean.

Aardenburg continued to exist until about AD 280 but it is unlikely that the harbour at *Ganuenta*/Colijnsplaat was still functioning. More northern harbours (Naaldwijk and *Forum Hadriani*) were already out of use by then. Along the *Limes*, late activity can sometimes be recognized, but it no longer formed the safe route of yesteryear. So, the question is whether from the middle of the 3rd century seaports were active in the Flemish and Dutch coastal area? Initiated by the Dutch Limes Association a group of specialists (in coins and ceramics) are researching material from the *Limes* dating from the mid-3rd century and are discovering more activity along the Rhine than was previously assumed.

In this period, it is possible that from the estuary of the Rhine (Katwijk) and the Meuse (Naaldwijk) there were direct connections to ports on the east coast of *Britannia*. South Shields was converted to store grain and other supplies. Floor plans at Katwijk/Brittenburg and Valkenburg near the Rhine can also be interpreted as representing grain warehouses in the early 4th century. This would indicate that with some regularity the Rhine route was brought back into use.

4.3 Major communication routes in the Bridging the North Sea project area

4.3.1 Routes across the Channel and North Sea

- Boulogne sur Mer – Porchester (?) / *Portus Lemanis* / Dover / Richborough / Reculver / London ;

- Valkenburg/Katwijk – *Segedunum (*Wallsend/*Arbeia* (South Shields*)* (putative) ;
- Colijnsplaat – Britain (putative) ;

4.3.2 Routes connecting hinterlands to sea ports

Routes to Boulogne-sur-Mer

- Lower German *Limes* / Corbulo's Canal / Goedereede / Colijnsplaat / Flemish Coastline / Boulogne sur Mer;
- Meuse / Goedereede / Colijnsplaat / Flemish Coastline / Boulogne sur Mer;
- Schelde / Colijnsplaat / Flemish Coastline / Boulogne sur Mer;
- (Major road) Cologne / Tongeren / Bavay / Cassel / Boulogne sur Mer ;
- (Major road) France / Boulogne sur Mer ;

Routes from the Mediterranean Coast to the North Sea (Schmidt, p.29 Abb. 20)

- (Water) Rhone, Saône, over land transfer, Moussel, Rhine etc;
- (Water) Rhone, *Atrica (?),* over land transfer, Loire, French Atlantic Coastline;
- (Major road) *Via Agrippa* (Lyon, Chalon/*Cavillonum*, Auxerre, Amiens, Boulogne) (cf map Wikiwand.com);

Routes to Portus Lemanis / Dover / Richborough

- (Major road) London – Rochester – Lympne;
- (Major road) London – Rochester – Canterbury – Richborough;
- (Major road) London – Rochester – Canterbury – Dover;
- (Major road) London – Rochester – Canterbury – Reculver;

Routes to Pevensey & other places (East Sussex)

- (Major road) London – Rochester – Pevensey and smaller ports;

Routes to Segedunum & Arbeia

- (Major road) Hadrian's Wall forts via the Military Way/Stanegate – *Segedunum / Arbeia;*
- (Major road) North of Hadrian's Wall – *Segedunum/Arbeia;*
- (Major road) London – York – *Segedunum/Arbeia;*

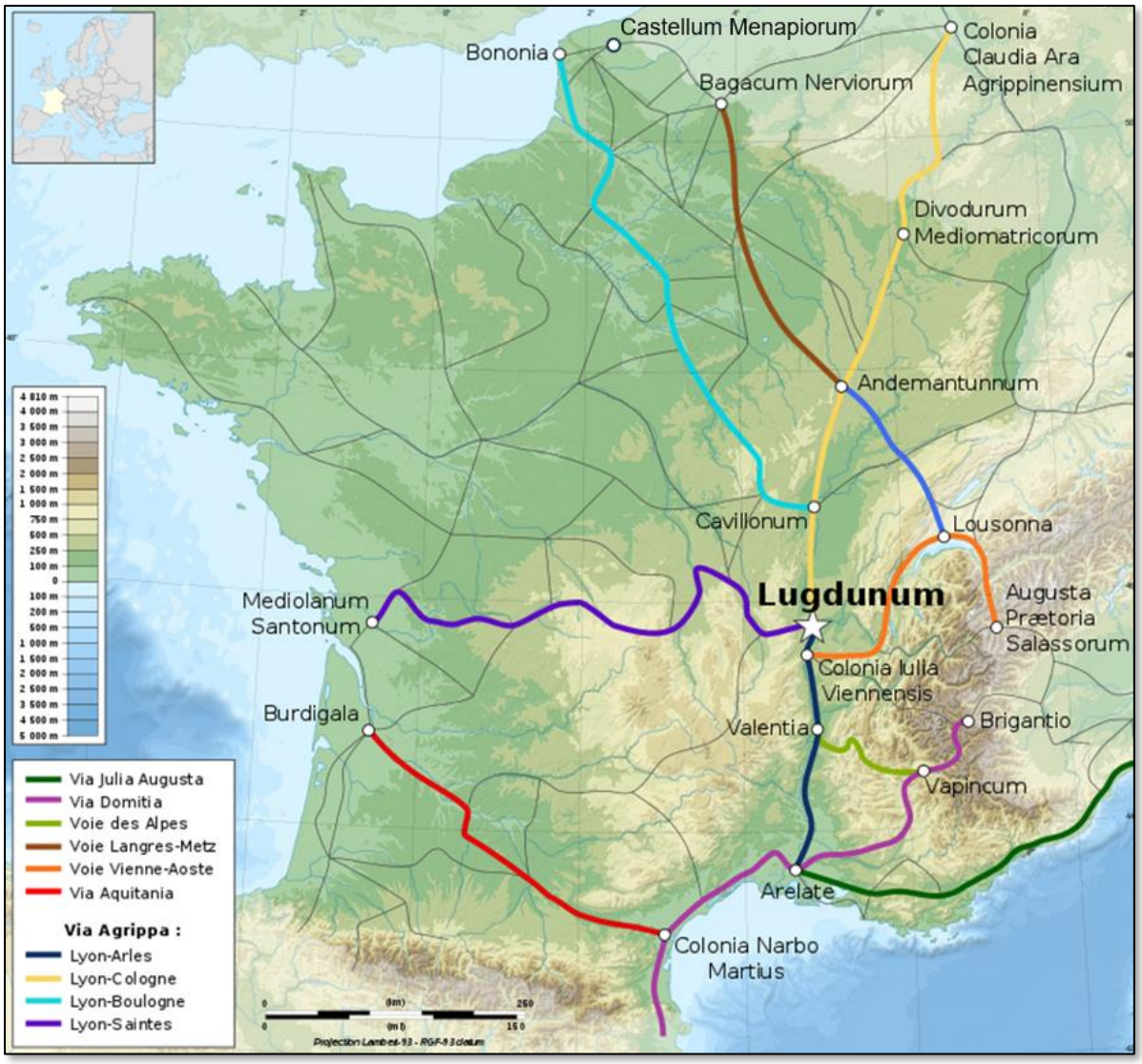

Figure 30 - Map of major routes approaching Britain from Gaul (By Eric Gaba, Flappiefh) Own work from a topographic map from Eric Gaba, and from data provided by www.omnesviae.org CC BY-SA 4.0, https://commons.wikimedia.org/w/index.php?curid=2022628

4.4. The archaeological evidence

The core of the imperial infrastructure of the North Sea consists of the main seaports and harbours along the North Sea coasts, the sea routes that connect these harbours and the navigable rivers and roads connecting the harbours with their hinterland. This overview will briefly review this infrastructure and place it in its imperial and chronological context.

4.4.1 Harbours/ports of the Channel and North Sea

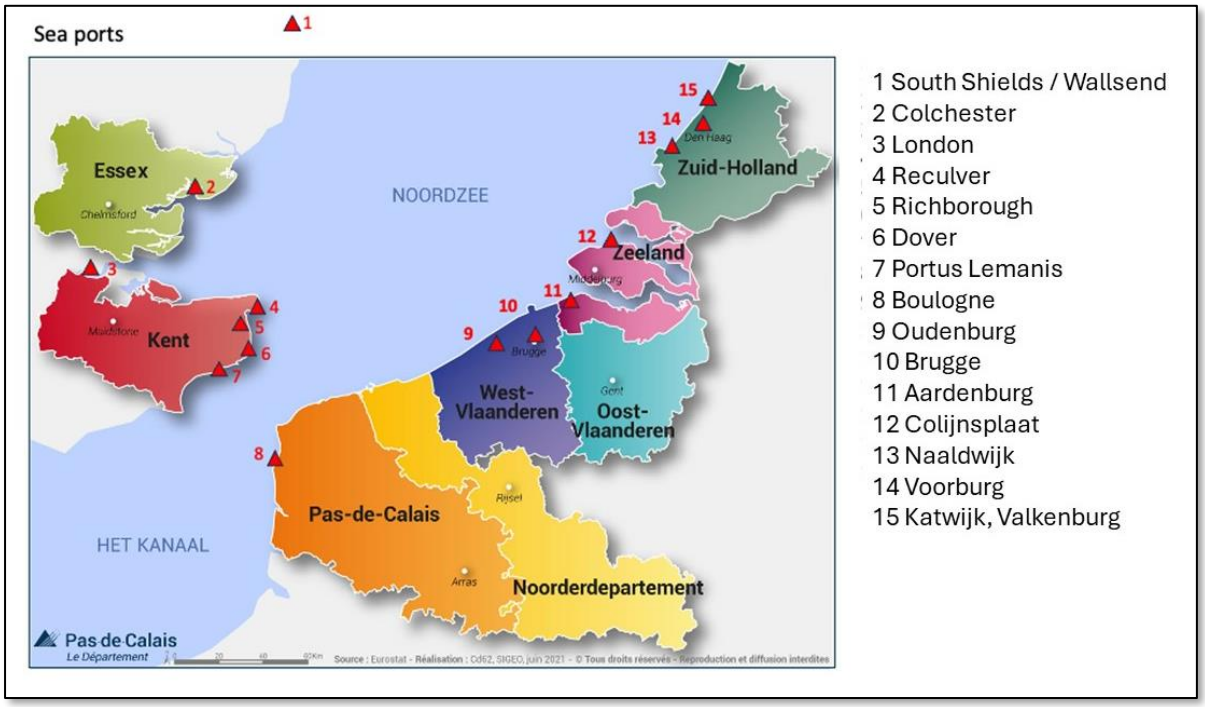

Figure 31 - Harbours/ports of the Channel and North Sea (based on Straits map and from Dhaeze catalogue, 2019, 190 – 301)

UK

Richborough/Rutupiae

Richborough was the probable initial site of invasion and became an important supply base thereafter. It became an important link in the Roman trade network, with Canterbury developing as a node from which branches of Watling Street eventually linked to London (*Londinium*), Reculver (*Regulbium*), Richborough (*Portus Ritupis/Rutupiae*), Dover (*Portus Dubris*), Lympne (*Portus Lemanis*) and Rochester (*Durobrivae*). It is clear that Richborough became an important supply base for the Roman army from the early 40s down to *c.* AD 85 and was a primary port of entry into Britain through much of the Roman period. This is shown by the evidence of the Antonine Itinerary, the British section of which begins at *Rutupiae* (Richborough) and includes the port as the terminus of its longest route, which extends to Birrens beyond Hadrian's Wall (Rivet and Smith 1979, 154). Key to its success was the sheltered mooring it provided for ships in a channel, now silted up, separating Thanet from the rest of Kent. Port facilities must have been constructed subsequently but these have not yet been discovered.

Dover/Dubris

Dover was a harbour long before the Romans arrived in Britain. After the conquest, however, it rapidly developed into a key naval base with two lighthouses, mirroring the two at Boulogne. From AD 130 a *Classis Britannica* fort was constructed (although an earlier phase of construction had begun by c. AD 116). The fort continued in use (though with periods of abandonment) until c. AD 208. There is limited evidence of harbour installations except for a possible breakwater, though locating these is made more difficult by the rapid infilling of the natural harbour throughout the Roman period. There was a significant extra-mural settlement that included a *mansio* and bath house and roads led into the hinterland of Kent and in particular towards Canterbury. In the mid-3rd century a new fort was constructed as part of the Saxon Shore defences. This was itself abandoned by c. AD 330 and Dover's role thereafter is unclear.

Lympne/Portus Lemanis

Portus Lemanis is relatively unknown archaeologically. An inscribed altar dedicated to Neptune was found at the fort. It was put up by L. Aufidius Pantera, Prefect of the fleet, in *c*. AD 135/45 (*RIB*, 66). Although this is earlier than the surviving fort at Lympne, it has often been taken to imply the location of an earlier fort and a base for the fleet here. *Classis Britannica* personnel certainly seem to have been involved in the fort's construction as evidenced by stamped tiles. A Saxon Shore fort was also constructed in the late 3rd century. The *Notitia Dignitatum,* a late Roman administrative document, records soldiers at Lympne from a less regular type of unit, the *numerus Turnacensium*, that had been raised just across the Channel at *Turnacum* (now Tournai), perhaps as late as the 360s.

Reculver/Regulbium

Regulbium means 'great headland' and the fort is located high on cliffs at the northern end of the Wantsum Channel that separated the former Isle of Thanet from mainland Britain. A fort was probably first established in the early 3rd century on the probable site of an earlier 1st century fortlet. The site was located to watch over shipping in the Thames Estuary and using the Wantsum to travel from Richborough to London. Buildings, including the commandant's house, the headquarters building and a bath house, have been identified and a civilian settlement grew up outside the camp. Evidence from the excavations suggests that the Saxon Shore fort had fallen into disuse by the beginning of the 5th century AD.

London

Although located outside the Bridging the North Sea project area, London should be mentioned due to its key administrative and economic role, which certainly impacted on Kent and the communications routes to the continent. There was no significant pre-Roman site at London and the settlement seems to have been entirely new, located at the point where the river Thames could be bridged but where shipping needing deeper mooring could still operate. The growth of the town seems to have been fairly organic at first before being laid out in a systematic manner after the Boudiccan destruction in the 60s. A large fort and port facilities were constructed. The town prospered, becoming the largest port in Roman Britain and although population estimates vary widely, it may have reached a population of c. 30,000 to 60,000 people by the mid-2nd century. Although thereafter the population gradually fell, it remained a significant settlement for the rest of the Roman period. The main significance of the town for connectivity in the Roman period is the place it held at the centre of Britain's maritime, riverine, coastal and road transportation network.

South Shields/Arbeia

Arbeia stands at the entrance to the river Tyne and guarded the approaches to Hadrian's Wall. It was initially constructed in AD 129 as a small fort for a single cohort although the first datable fort on the site is Antonine (Bidwell and Speak 1994) but was redesigned in c. AD 198 in preparation for Septimius Severus' invasion of *Caledonia*. At that time, it took on a role as a storehouse for goods delivered by sea in addition to its garrison functions. It ultimately became the main supply base for all the Wall's forts. It was finally abandoned c. AD 400. Although the fort has been extensively excavated, the location of the port remains unknown but is presumed to be nearby.

Wallsend/Segedunum

Segedunum was constructed in c. AD 124 as the eastern terminus of Hadrian's Wall (which until a few years earlier had ended a few miles to the west). It was located on a plateau above the river Tyne from where it commanded views east towards *Arbeia* and west upriver. Port facilities included a wharf or jetty projecting into the river. The fort's main role was to serve as a secondary logistical and supply base (after *Arbeia*) for the surrounding area. It was abandoned around AD 400 (Hodgson 2003, Rushworth and Croom 2016).

France

Boulogne-sur-Mer (Dhaeze 2019, 243)

Originally a settlement of the *Morini*, Boulogne became an important settlement, *Gesoriacum* in the 1st century BC. It developed into an important trading and military site, particularly important as the main contact point with Britain and, in due course, as the main base of the *Classis Britannica*. The harbour consisted of two areas of jetties and quays next to the bank of the river Liane and a warehouse in the walled part of the town which stood on terraces, measuring 6 ha. The harbour area was constructed in the early 2nd century. Two lighthouses are thought to have existed. The Tour d'Ordre was situated on a cliff of the right bank of the Liane and a second lighthouse possibly stood on the cliffs of Châtillon on the other side.

Traveller: Trierarchus Domitianus, who raised a memorial to his children c. AD 250-275 (Musée de Boulogne-sur-Mer, inv. 4020.R5) See Appendix I.

Belgium

Oudenburg

It can also be supposed that the Oudenburg settlement prior to the military presence and later the fort itself were related to a harbour, as one of the navigable tidal channels passed by the sand ridge on which the settlement and later the fort developed. The Roman settlement probably had mooring facilities for flat-bottomed boats. No quays or other mooring remains have been discovered yet.

In the 4th century, when the marine influence in the coastal plain had increased significantly, there are indications that the water reached the north side of the Oudenburg fort. It is suggested that the connection from the tidal inlet to the fort was canalized and that a harbour is to be assumed just outside the north wall of the fort.

Bruges

The presence of a Roman harbour (Fort Lapin) in the north of Bruges (Brugge) shows that this was an important trading post. The site is situated on a sandy levee of the gully connecting Bruges with the North Sea. In the late 19th century, the remains of what has been recently exposed as representing two sea-going vessels from the mid-Roman period were uncovered on the limits of the large tidal inlet *Blankenbergegeul*, at the northern fringes of Bruges. The ships show striking parallels with other sea-going freighters such as the London Blackfriars ship. It remains unclear whether the timber from the ships points to the presence of wrecks

or to a quay in which it was reused. But either way, it is evidence of the use of tidal inlets for shipping and for maritime connectivity across the North Sea.

Netherlands

Aardenburg harbour and fort at the Rudanna creek

With its location on the Rudannâ, relatively high on the edge of the Flemish sand area, Aardenburg formed a logistical link between the North Sea and the road network running towards *Gallia Belgica*. The port facilities themselves have not yet been discovered but the fort, with extensive industrial activity zones around it, bears witness to Aardenburg's role in trade, transport and supplying the army from the mid- to late 3rd century.

Bruges – Oudenburg – Aardenburg: sea ports?

There is a question of whether the putative harbour/port settlements of Bruges, Oudenburg and Aardenburg served as halts on the coastal route from Colijnsplaat to Boulogne. Were the harbours accessible to ships with relatively large drafts or were there mooring facilities at the actual mouth of the channel?

Colijnsplaat – Ganuenta

The major transshipment port for the southern route to *Britannia* was near the modern village Colijnsplaat. Of the port and the possible associated fort only loose material such as brick, tuff and wooden posts have so far been unearthed. The most important discoveries were the approximately 300 altars and fragments dedicated to the local goddess Nehalennia. These were discovered and literally fished up several hundred metres off the shore of the present island of Noord-Beveland in the now widely-eroded Oosterschelde, one of the successors to the `Roman' Scheldt on which the seaport of Colijnsplaat was located. The likely Roman name for this port was *Ganuenta*. *Ganuenta* formed an important link between inland navigation to and from the Scheldt, Meuse and *Limes* on the one hand and coastal navigation and crossing to *Britannia* on the other.

Traveller: Gimio, known from Nehalennia altarstone B50 of Colijnplaat; he lived for a short period in Ganuenta c. AD 150-250 (see Appendix I)

Naaldwijk

At the junction of the *Helinium* (Meuse estuary) and Corbulo's Canal was probably the western fleet station of the *Classis Germanica* at Naaldwijk. Numerous roof tiles with the stamp of the fleet have been discovered here. In addition, an inscription

from a pedestal of an imperial statue, which has not itself been discovered, mentions the *Classis*. The fleet station itself has not been discovered at Naaldwijk but its location near the crossing point to the tribal areas of the *Frisiavones* and the *Menapii* constitutes a strategic location for a sailing unit.

Voorburg - Forum Hadriani

Also in the province of South-Holland, the site known as *Forum Hadriani* is known to have served as a principal port of the region. Excavations in 2007 uncovered a river port, likely integrated with the Canal of Corbulo. It provided linkage from Voorburg to the Rhine (North Sea and Germany) in the north, and to the south to the Meuse estuary (North Sea) and further on to the southern inland waterway along Goedereede to Colijnsplaat and Domburg. Stamps on roof tiles bearing the insignia of the Roman military and naval forces – mostly *Classis Germanica* - hint at the site's martial and potentially maritime undertakings. Finds with a provenance from all over the western empire witness to trade and transport over long distances.

Katwijk-Brittenburg/Valkenburg

Where the Rhine flowed into the North Sea, the combination of two forts probably formed the seaport area for the northern route to *Britannia*. Directly on the coast was *Lugdunum* `Brittenburg' near present-day Katwijk. . In this context, Willy Groenman-Van Waateringe suggested a new interpretation for the drawn map from the 16th century. According to her, this structure could also have served as a lighthouse (oral communication 2024). A few kilometres upstream was the fort at Valkenburg, `*Praetorium Agrippinae'*. Of the Brittenburg we know only of a late Roman map last seen and recorded in the 16th century. East of the *castellum* at Valkenburg was an industrial and commercial district `De Woerd'. The quay that lay adjacent to it probably formed the actual harbour facility for ships using the northern route across the North Sea. Apart from the quay, the harbour facilities have not yet been discovered. The location and spatial layout of the area do provide strong evidence for this role though.

Since the discovery of the *castrum* of Caligula/Claudius near Valkenburg, it has become clear that the Rhine estuary was also used by the Roman army as a base for the conquest of Britain. The discovery of this *castrum* provokes discussion about the real course of the Corbulo Canal: from Valkenburg to the Vliet instead of the traditional view in which the *Fossa Corbulonnis* flows into the Rhine at *Matilo* (Leiden).

Velsen

The most northern port in the Netherlands in Roman times is Velsen. Strictly, Velsen lies outside the Straits project area (in the province of Noord-Holland) but played a major role in the early phase of the Roman invasion of the region. The first fort at Velsen, almost certainly *Castellum Flevum*, was located on the south bank of the Oer-IJ, the northern arm of the Rhine, close behind the beach ridge of the North Sea coast. The *castellum* could accommodate about 1,000 men. This army camp had an extensive harbour installation with several jetties. Its location along the beach ridge caused the connection to the sea to silt up gradually. Nevertheless, the *castellum* continued to function for several decades. Velsen was certainly abandoned when emperor Claudius ordered Corbulo to establish the Rhine *Limes*.

4.4.2 Ships

The vessels used in the Bridging the North Sea project area can be distinguished in two ways. First, by the waters they could navigate (riverine or sea-going) and secondly by building tradition (Mediterranean or north European). The sea-going ships of the Mediterranean tradition (Roman warships and cargo ships) that sailed our seas we know only from literary sources and inscriptions. The trireme Radius is mentioned on an inscription in the Chateau Musée in Boulogne. Only a few sea-going ships have been excavated and these are all of a north European building tradition such as the Asterix from Guernsey and the Black Friars 1 from London: the latter type has also been found at Bruges. By contrast many river-going ships have been excavated on the continent. Some are of a Mediterranean building style, such as the ship from Vechten and some loose trusses at Valkenburg, Zwammerdam and Woerden (all Netherlands). The best examples for these ships are the ships of Oberstimm (Germany) which have been identified as being of the Roman *liburna* and *navis lusoria* types. The naming of Roman ship types generally leads to much debate however.

The most common ship type found in the Dutch and Belgian coastal area is the flat-bottomed type `Zwammerdam'. Ships of this type seem to have been most commonly used for inland navigation in the delta of the Rhine, Meuse and Scheldt rivers. It is remarkable that ships of this type have not yet been discovered in England and Wales as for rivers with shallow banks the Zwammerdam ships seem very suitable. However, this type of ship is unsuitable for sailing at sea. It is possible that some of the cargo ships, of both Mediterranean and northern construction tradition, were suitable for both inland and coastal navigation and possibly even for crossing the English Channel and the North Sea. One such ship was `The Swallow', whose captain was named Firon, the freedman of Publius, as the inscription on his helmet tells us. The ‘Swallow’ was discovered near the Dutch island of Texel. This

ship was possibly among the 1,000 ships that Tacitus says Germanicus had built in 16 AD. The County Hall Boat found at London could also have been suitable for riverine as well as coastal navigation.

An example of the late Roman ships is the Nydam ship (Denmark), which seems to represent a transition to the period when northern European peoples began to control the North Sea but also intensified contacts with the British Isles.

Examples of known Roman-era sea-going and riverine vessels

Type	Tradition	Country	Place of discovery
Flatbottomed, type `Zwammerdam	NW European	NL, B, and Zwammerdam-family in France	NL: Zwammerdam, Woerden, Utrecht, Kapel Avezaath, Druten, (D: Xanten, Keulen), B: Pommereuil F: Lyon, Arles
Dugout	NW European	NL	NL: Zwammerdam, Woerden, Dreumel
`Hybrid' dugout with board construction	NW European	NL	NL Zwammerdam, Dreumel
`Punter' (= Dutch)	NW European	NL	NL: Utrecht
Transports	NW European	UK	UK: London, County Hall ship, New Guys House boat
Galley type `Oberstimm'	Mediterranean	NL	NL: Vechten, Zwammerdam en Woerden

Table 3 - Examples of known river transport vessels from the project area

Seagoing vessels / coasters:

Type	Tradition	Country	Place of discovery
Freighter	NW European	B, F, UK	B: Brugge F: Guernsey, Tardnighe/Chatelle UK: Black Friars 1
Bireme/trireme	Mediterranean		

Table 4 - Examples of known sea-going vessels from the project area

4.5 Users of the infrastructure

4.5.1 The military

Classis Britannica

The creation of a permanent provincial fleet in the English Channel and North Sea, the *Classis Britannica*, is generally attributed to Emperor Claudius in 43 AD. The fleet was still occupied with conquest missions as the Roman presence in Britain moved steadily northwards during the 1st century, eventually encompassing much of the island under the command of Agricola. As a result, transporting troops and supplies were at the heart of its activities. The size of these troop movements was at times very significant. Caesar's expeditions (though before the creation of the *Classis Britannica*) comprised 30,000 troops, requiring 680 transports and 200 commandeered merchant ships (Mason 2003). Claudius' invasion force consisted of 40,000 troops (four legions), 1000 vessels, 50-100 warships, 3500 tons of grain, equipment and 10,000 mules needed for moving material. In AD 196 Clodius Albinus brought 40,000 troops with him from Britain in his bid for the imperial throne.

The fleet was firstly an important protection, deterrent and tactical force. In times of peace its essential mission was to maintain relations between the two shores of the English Channel, in particular through the passage of civilian and military officers. Nevertheless, it also played a role in securing the Channel, which was subject to pirate attacks from the 1st century onwards, and throughout the 3rd century.

In Boulogne, a camp was built on a promontory (now the fortified town) overlooking the Liane estuary and the Roman harbour, located in a meander. On the plateau of the upper town, excavations have enabled the study of the northern corner of the *Classis Britannica* camp and revealed the barracks. Built after AD 110 and restructured in the late 2nd or early 3rd century, they were still in use in the mid-3rd century, when a fire destroyed at least part of the fleet buildings. Their reuse in the 4th century could indicate the maintenance of a garrison inside the *castrum*, although it is not yet possible to characterize precisely the military or civilian nature of this occupation, or its chronology. Below the plateau, the ancient port has been well documented by excavations at the site called "Terrain Landrot", at least from the 2nd century AD.

The units involved in the conquest of the island are known: the legions II Augusta, IX Hispana, XIV Gemina and XX Valeria Victrix. To these must be added the auxiliary troops. Expeditionary corps occasionally reinforced them. Among them, a *vexillatio Britannica* is attested at Nijmegen. In AD 122, the force commanded by T. Pontius Sabinus probably brought together legions VII Gemina (Spain) and VIII and XXII

from Upper *Germania*. These expeditionary corps probably passed through the ports of Boulogne and Dover on their way to their assignments. Beyond the 1st century, when fleet troops played a definite role in Agricola's military campaigns in Scotland, and later in large-scale expeditions, the numerical importance of the *Classis Britannica* remains difficult to define over the long term.

The creation of a fleet in the middle of the 1st century and the considerable investment required to maintain and supply it, as well as to maintain military installations, for at least two centuries, underline the strategic importance of controlling the sea routes through the straits of the Pas-de-Calais. The abandonment of this link, although difficult to pinpoint, must undoubtedly be linked to the loss of control over the island of Britain at the turn of the 5th century.

Classis Germanica

We know of the *Classis Germanica* from 12 BC onwards from the accounts of Germanicus' operations in the Netherlands and Germany. After the invasion of Britain and the establishment of the Rhine *Limes*, the main task of the *Classis Germanica* was to guard and help build and maintain this border and transportation route. This fleet also guarded the Meuse and Scheldt rivers and their basins. Its headquarters were east of the city of *Colonia Claudia Ara Agrippinensium* in Cologne-Altenburg. Of particular interest to the Bridging the North Sea project is the presence of the Germanic fleet in the western Netherlands. Many roof tile stamps have been discovered at the *Limes* forts, along the Corbulo Canal and in Zeeland. It seems that the working area of the *Classis Germanica* reached to here and that the *Classis Britannica* had authority over the coastal defence from Flanders.

Numerus Barcariorum Tigrisiensum / Late Roman military transport

From the mid-3rd century, the *Classis Britannica* is no longer mentioned in sources. A possible reason for this is that the British fleet began to focus on protection against pirates and was divided into small flotilla units at coastal forts. One of these smaller naval units could be the *Numerus Barcariorum Tigrisiensum* as mentioned in the *Notitia Dignitatum* based in South Shields (Van Daele, 2006, p. 129)

4.5.2 Trade and transport

Even before the Roman armies arrived in northern Europe, a busy trade existed between the continent and the British Isles. Caesar reported that the *Veneti* played an important role in this. After Caesar's brief visits, Roman interference in British trade already seems to have been significant. It has been suggested by some researchers that Romans on the south coast of England maintained port facilities

even before Claudius' invasion. There is currently no evidence of this however. Bulk transport only really took off when Claudius' troops reached *Britannia* and were able to hold out.

In the first decades after the invasion, supplying the legions in *Britannia* will have been the top priority. Goods transported will have included food, weapons and Mediterranean products. A wide range of traders supplied the army such as M. Exingius Agricola, a *negotiator salarii* (trader in salt) from Cologne (Colinsplaat A 1) and Marcellus, the *negotiatior vinarius* (wine merchant) from Augst in Switzerland (Colinsplaat A 8). See Appendix I for more details of these travellers.

As Roman cultural and economic traits became more widely adopted in southern England, in particular the development of *villa* estates, so the demand for luxury goods from the continent grew. Similarly, it can be assumed that ores, minerals and other goods were exported from the new province to the rest of the empire (see 'Material Culture' in chapter 3). Pottery from the continent was also much sought after. It is plausible that M. Secundius Silvanus (*negotiator cretarius,* a dealer in ceramics) traded pottery from the continental production sites such as Lezoux and Trier to *Britannia* as well as bringing British Black Burnished Ware back to the mainland. This was a lucrative trade and evidenced by the Nehalennia altar he established at Colijnsplaat, but is also perhaps suggested by altar 23 at Domburg.

Except for periods of unrest and danger in the North Sea due to piracy, this situation continued well into the 3rd century. In the 4th century *Britannia* became not only the `grain barn' for the legions and auxiliary troops on the island itself but also seems to have transported agricultural produce to the continent to the Rhine (perhaps to forts with storage capacity at Katwijk/Brittenburg and Valkenburg.

4.6 Studying the routes crossing the North Sea

There have been many studies and much research on the land and sea routes of north-west Europe in the Roman period. Many of these have focused on one particular area or province, however. The Bridging the North Sea project offers the opportunity for this research to focus on the North Sea itself: which routes are known, which routes are possible with the vessels available in Roman times and which routes were logistically necessary or desirable? A short selection of relevant texts is presented in the Bibliography.

Central to the study area is the North Sea, which has connected the continent to England, Wales, and Scotland for thousands of years. The resource assessment of the Coastal Communities theme provides an overview of the main roads and trade hubs on the coast and in the nearby hinterland and also the navigable rivers with

ports and transshipment harbours. The study of sea routes depends on an understanding of how these sites interlinked, and particularly with how they connected to trade routes into the continent and interior of Britain. Also of importance is the knowledge of accessible coasts, sea currents and prevailing wind directions, the navigability of the Channel and the location and role of the few lighthouses.

Current research focuses on several outstanding questions. One of the major research goals is to map the different routes between the continent and England, both the short crossing between *Germania / Gaul* and southern England and the possible regular route between the Rhine estuary (Lower German *Limes*) and *Segedunum* (Hadrian's Wall).

Boulogne-sur-Mer is considered the central harbour on the continent for crossing to *Britannia* and several overland and river routes from *Gaul* and *Germania* are directed to this main port. It is generally believed that from the Lower Germanic *Limes* the route ran from the Rhine and Corbulo Canal to the transshipment port *Ganuenta* in Zeeland. From there, coastal shipping sailed to Boulogne to make the actual crossing to, for example, Dover. One research question is whether Boulogne was the only crossing point though? Is a direct crossing from *Ganuenta* or Flanders also a possibility?

Was the Boulogne connection also used to reach northern England? This connection must have been important. Many continental cohorts guarded Hadrian's Wall, so contacts with the wider empire must have been continuous in nature, as epigraphic evidence proves in which a Batavian soldier asked his mother for warm socks. Coins discovered in the Tyne near *Arbeia* may also prove that Germanic troops came to offer help against the Caledonians c. AD 200. Did the socks and troops sail via Boulogne or did they make a direct crossing from the Germanic North Sea coast at Valkenburg / Katwijk?

Another way to study and discuss the sea routes is to study the marine and maritime context in which these contacts existed. For example, what challenges were presented by the currents, tides, winds and shallows along the Belgian coast between Zeeland and Boulogne? To address questions such as these interdisciplinary approaches will be needed, perhaps involving maritime departments of the Universities of Delft (NL) and Newcastle (UK) which have relationships with the archaeological departments of Leiden and Newcastle. An additional partner could be the Nautical School in Vlissingen (Zeeland) and the Vlaams Instituut voor de Zee in Oostende (Belgium).

4.6.1 A possible flagship project for exploring connectivity.

The Bridging the North project is inspired by the maritime history of the region and is imbued with the sea – its waves, sea lanes, ports and of course ships. To gain a fuller understanding of what was possible in the Roman period, we need to know more about the ships and sailing techniques employed at the time. There are many ways to acheive this. The sea lanes in Roman times could, for example, be studied by computer modelling on one hand and a `flagship' project on the other. The modelling project could be an exercise in which non-archaeologists can also participate such as marine, climate and engineering specialists. The flagship-project would involve the construction of a Roman-era vessel, potentially by teams working in co-operation on different sides of the North Sea. This would be both an exercise in experimental archaeology, an opportunity to bring together researchers from different areas and disciplines, and would engage the public across the BtNS area in an innovative and stimulating manner.

An inspiring example is provided by Prof. Pascal Warnking of Trier who has been involved in a project that has very successfully achieved something very similar, but for the Mediterranean. In summary, he has been able to demonstrate that for the Mediterranean currents were less important than often suggested and that what we have often thought of as coastal craft could, and probably did, cross larger stretches of open water. He has also noted that the implications of different wave heights has been insufficiently modelled in past research.

To model the crossing of the North Sea/Channel we could use our expertise (and perhaps collaborate with researchers at Trier University) to create more sophisticated models of North Sea crossings. This could include building a series of scale replicas of a variety of ancient ships to test in laboratory swim tanks, studying sailing characteristics, loads etc.

We could even build a 1:1 replica of one or two Roman-era vessels. These could include, for example, the Gallo-Roman trading vessel from Guernsey discovered in 1982, or perhaps another that would allow us to explore not just trade but military issues such as a Roman galley. This would provide an excellent way to transmit knowledge, ideas and experience around the network. Crews for these trips could be students from the BtNS regions but also from other coastal communities in the region.

For the modelling, the BtNS network is already familiar with similar projects being carried out by colleagues in Europe who are willing to share their knowledge and experiences with us. For the flagship shipbuilding project the BtNS Network already

includes some members who are already working on similar projects (eg Museumpark Archeon and North East Museums.

Although the Bridging the North Sea network is a relatively recent creation, members could embrace this ambitious approach of conducting research by modelling, shipbuilding and sailing because of the excellent opportunities it offers for involving external maritime partners like sailors, carpenters and volunteers. Most of all, sailing ships under the BtNS flag will generate wide publicity to promote the common BtNS vision of the importance of North Sea connectivity, both today and in the past.

4.7 Research questions on the theme of Connectivity

The theme of Connectivity forms the core of the BtNS project and so many of the relevant research questions overlap with the Coastal Communities and Material Culture themes.

The research question for the theme of Connectivity will be addressed at three levels.

Level 1: Maritime connectivity;
Level 2: The impact of connectivity in the Roman period on maritime societies;
Level 3: The relevance of maritime connectivity to modern communities;

4.7.1 (Level 1) Maritime connectivity in the Roman period

The development of transport and trade

The arrival of the Roman troops in Britain in AD 43 seems to have led to an intensifying of traffic across the Channel/North Sea for the next few centuries. However, the traffic between the north of France and Britain went back much further than this. Within the Roman context, even the first expeditions of Julius Caesar in 55 and 54 BC probably resulted in a growth of trade across the Channel. The question arises of how trade and transport across the Channel/North Sea developed from 55 BC until c. 500 AD and which harbours were of importance at different times?

Sea lanes and the opportunities provided by the North Sea

Which routes between the continent and Britain were suitable for sailing ships of the period? Several main harbours are known: Boulogne-sur-Mer, Lympne-Dover-Richborough, *Arbeia-Segedunum*, Valkenburg-Katwijk and Colijnsplaat. Archaeologists and historians have tried to define the main routes (sea lanes), whether proven or supposed, between these harbours. In this constructed 'cross-

Channel/North Sea system' we have to take account of the opportunities the North Sea itself offered for navigating ships to the opposing coasts. The sailing capacities of the sea-going ships were probably restricted in comparison with 16th century ships that conquered the oceans towards unknown continents. To define the main sea lanes across the North Sea would demand thorough study of the characteristics of the sea and the estuaries of the contributing rivers: currents, wave heights, winds, underwater landscapes, shallow-depth, the change of seasons etc. Could we learn from similar research projects in the Mediterranean (Warnking / Keay)? In this we may also find support in relevant maritime institutions (e.g Newcastle University, Zeevaartschool Vlissingen) and historians studying North Sea crossings in later periods.

Navigation

In the BtNS region lighthouses are recorded near Boulogne-sur-Mer (2) and Dover (2). At Oostvoorne (the former island of Voorne-Putten, south of Rotterdam) a lighthouse is supposed. What navigation aids were set up along the coasts of the BtNS area, eg. lighthouse, signalling, maps etc? Could we learn from similar arrangements in the Mediterranean (research programs Warnking / Keay)? We can again search for support in maritime academies (Newcastle University, Zeevaartschool Vlissingen) and historians on North Sea crossing in later periods.

The ships of the Channel/North Sea and coastal areas

The BtNS region is quite rich in archaeological ship discoveries, although most of these are riverine barges and canoes. These ships helps us to map the logistical infrastructure in the continental coastal areas (Pommereuil (Belgium), Zwammerdam/Woerden,Utrecht (Netherlands)). The number of coasters/sea-going ships is limited with representatives including Guernsey/Asterix-F, London/Black Friars 1-UK and Bruges-B. Which ships have sailed the Channel and the North Sea? Were these of Gallic/continental, Mediterranean origin, trading ships, coasters, war ships? Is it possible to appoint locations for wharfs and docks? Did shipyards in the BtNS region produce Gallo-Roman as well as Mediterranean types of ships? Is it possible to define regional building traditions in the separate coastal regions in the BtNS project area?

The sea lanes crossing the North Sea

After researching the built Roman maritime infrastructure of the BtNS area, the characteristics of the Channel and the North Sea in relation with navigation and the ship types of the North Sea fleet and its coastal hinterlands, we can model and map the sea lanes of the Channel and North Sea through the Roman period.

The goods crossing the North Sea

The sources (textual, epigraphic and archaeological) prove that transport across the North Sea must have been quite intensive. But which goods were transported between the European continent and Britain and in what quantities? Which goods from Britain were attractive to the Romans? Were the British minerals meant for the supply of the Germanic or Gallic provinces or for the central regime in Rome? Which goods from the continent were sent to Britain and which British products to the continent? Is it possible to recognize developments during the Roman period? (cf. research questions for the Coastal Communities chapter)? Was this trade so lucrative that it justified the efforts of the Roman army to build and rebuild the military logistic infrastructure to the coasts of the North Sea? We know that the postal service of the Roman army was responsible for the transport of some pairs of socks from the Cananefatian parents of a soldier in Vindolanda. How was this service organized?

Community of travellers/users of the infrastructure

In addition to the technical aspects of connections between the coastal areas in the Channel/North Sea area we need to consider the connectivity of coastal communities and the human beings who were travelling these routes and formed the connections. Who were these travellers? Were they fishermen, sailors, emperors, governors, soldiers, merchants, slaves, refugees and adventurers? Large military units and their followers travelled to *Britannia* and back to the continent. They must have used hundreds of ships or more. A merchant took a large risk in sending his salt in just one ship from the continent to the British legions. Presumably individual travellers also moved across the region on these trading ships. Research should aim to underscore the human factor in cross-Channel/North Sea history by integrating the human needs and experiences in the technical aspects. Identifying and describing the travellers is a useful and attractive instrument for this. Who are the travellers? How can we bring them to life? How can we present the history of the BtNS region in the Roman period from a human perspective more than the more usual technical descriptions of the theme?

4.7.2 (Level 2) The impact of connectivity in the Roman period on maritime societies

- What was the impact on maritime societies of moving people, goods and ideas across the Channel/North Sea in the Roman period?

- What was the nature of connectivity and exchange between coastal communities in the BtNS region?

- Can we talk about the development of a Roman Channel/North Sea society or identity?

4.7.3 (Level 3) The relevance of connectivity to modern communities

- How do observed differences and similarities between ancient Channel/North Sea identifies relate to modern societies in the BtNS area?

- What lessons can we draw about the impact of climate change on Roman BtNS communities?

- How can we use these lessons to best share information about climate threats and best practice and develop a common climate change response?

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5 Changing Landscapes

5.1 Introduction

The Roman landscapes of the North Sea coastline and its hinterland have changed dramatically through the last two millennia through processes of natural and human agency. The Changing Landscapes theme seeks to examine, for each of the partner regions, the ways in which these landscapes have changed, what form they presently take and their states of preservation and legibility.

An important part of the study is to understand the catalysts for changes in the past and drivers for future change. The importance of understanding how our surviving Roman landscapes will change through future climate change and coastal pressures is paramount to underpinning future strategies for conservation and investigation in the regions. Learning from the past may help to influence future change and contribute to wider climate change studies.

The following resource assessment considers in turn the following:

- Roman landscapes and their present condition
- Catalysts for change since Roman times
- Drivers for future change
- Opportunities
- Past and present projects studying landscape change

5.2 Roman landscapes of the North Sea coastline and hinterland

5.2.1 Summary

The sections following examine in turn the Roman coastal landscapes of the partner regions. Together they demonstrate a representative collection of the ways in which the Romans have inhabited, exploited, defended and navigated the coastal areas of the North Sea. It is clear from the study that in many places the coastal areas have seen dynamic landscape change before, during and after Roman times, change that is likely to extend into the future or that requires significant effort to manage. The study has highlighted common processes that have changed that landscapes to what they are today. The overall timelines and processes of change are complex, in many cases not linear and further work is needed to understand these better. However, an overview could group them as follows:

- **Landscapes that lie, in places deeply, buried beneath former salt marsh and inundated landscapes that have developed behind dunes and shingle spits**. The peoples at the time of the Romans experienced marginal, inhospitable areas but worked to drain and utilise these areas, exploiting them for industries such as salt production and taking advantage of local high areas (sometimes artificially raised) to inhabit and farm, and channels to navigate.

  Dunes formed through deposition of sediments carried by tide and current from the west along much of the coastline in the study area from the Flemish Maritime in Northern France along the Flemish coast to Zealand. In Kent we also see similar processes of longshore drift that have deposited shingle and sands to enclose vast areas that formed salt marsh and lagoons that over time were drained and reclaimed. In Kent this is known as 'inning' while in Flanders and the Netherlands it is the creation of 'polders'. An interesting point to note is that the early efforts made to reclaim peat bogs in the Iron Age and Roman period in Zealand served to dry the peats which then dropped in level and subsequently reflooded forcing the inhabitants to abandon the area.

  The examples discussed in the following sections include: The 'Wateringues' a vast area of the Flemish Maritime in northern France that extends from Calais to Dunkirk and as far inland as St Omer; This extends along the entire Flemish coastline to the estuaries at the mouth of the Scheldt and Meuse in Zealand. In Kent we see examples with the former Wantsum Sea Channel, the Lydden Valley, Swale and the Romney Marsh. Much of the Roman landscape in these areas lies deeply buried beneath alluvial deposits although perhaps more accessible on higher parts that developed in the landscape. In most cases significant sites can be seen lying on higher land on the edge of the former marshlands, sites that were accessed through deeper, navigable channels.

- **Landscapes that are being lost to the sea as levels rise and erosion increases** – the example being the saltings in the Medway estuary in Kent. South Holland also has landscapes beneath the sea where coastal and river erosion, especially from the Old Rhine has had a significant effect. Coastal erosion in front of the Old Rhine estuary has stripped an area that is several hundred metres wide from the coast.

- **Landscapes and heritage assets that are at risk from coastal erosion**. As well as the aforementioned erosion of the low lying saltings in the Medway estuary, the effects of wave actions on the chalk cliffs of the Boulonnais and at Folkestone and in the past at Reculver have caused collapse and loss to the sea of significant heritage sites. In the Wimereux area, north of Boulogne increasing severity of storms has led to collapse of the dunes at La Pointe aux

Oies in 2022, collapse of cliffs and loss of the coastal path. Archaeological sites in that area are under threat.

- **Landscapes lost to urban and port expansion**. Both at Dover and at Boulogne we see examples of important Roman harbours that have subsequently silted due to the deposition of sediment at the valley mouth. As a result, later ports have moved further downstream in response to the challenges of the natural processes and, also, the need to facilitate the development of improved and larger harbours. Alongside the loss of the harbours the associated port towns and defences are now found beneath the expanding and changing townscapes. A similar situation can be seen at South Shields at the mouth of the Tyne. The Roman port associated with the important supply base *Arbeia* is lost somewhere beneath the reclaimed land on the riverbank as the river has narrowed through the deposition of ballast which has for centuries been left by ships collecting coal from the local coalfields. Other coastal developments, as can be seen on the dunes of the Flemish and Dutch coasts is encroaching on the buried Roman landscapes of these area.

5.2.2 United Kingdom

The following contributions for the United Kingdom focus on the coastal landscapes of the two partner regions of Kent and Hadrian's Wall. While there may be some variations not covered along the wider North Sea coast the regions provide sufficient examples to illustrate the wider picture.

Kent

Kent is a coastal county situated in the south-eastern corner of England and is the nearest part of the United Kingdom to mainland Europe. The short crossing of the Strait of Dover has provided access to Britain from ancient times. For the Romans, the east Kent coast was twice the point of landing by Caesar and later the beachhead for the Claudian invasion of Britain. Through the Roman period major ports of entry, the gateways to the province, were founded at Richborough, Dover and Lympne. Trade crossed the Channel, worked its way up the east Kent coast, through the waters of the Wantsum Sea Channel and along the North Kent coast into the Thames and eventually London.

The coastal areas of the county proved to be attractive to the Roman settlers both for its access to the sea via the many inlets and rivers and for the resources that the marginal areas provided for industries such as salt working and pottery manufacture.

The Kent coast itself varies between low lying areas that are gradually being submerged or have been reclaimed for agriculture to areas of high chalk cliffs that in many places have been substantially eroded since before Roman times.

To illustrate the Roman coastal landscapes in Kent the following key landscapes are discussed below:

- **Richborough** and the **Wantsum Sea Channel** – a former sea channel that once separated the Kent mainland and the Isle of Thanet and now reclaimed for agriculture. The main port of entry at Richborough lay at the southern end of the channel.
- **The Lydden Valley** - marginal / inundated land reclaimed from Roman times through natural and human processes.
- **Lympne and the Romney Marsh** – the former Roman port at Lympne lies far from the sea overlooking the Romney marshes on the south coast of Kent.
- **East Wear Bay, Folkestone** – an important *villa* and trading settlement that is being lost through erosion of the chalk cliffs.
- **Swale's creeks** – a rich Roman landscape that developed around creeks and the main Roman road through Kent.
- **Medway Estuary** – submerged and semi-submerged sites in the Medway estuary – a buried industrial landscape.
- **Dover** – a Roman harbour lost beneath the modern port town.

Richborough & the Wantsum Sea Channel

The Wantsum Sea Channel was formed during Mesolithic times through the flooding, mainly because of rising sea levels, of a valley that separated what became the Isle of Thanet from the Kent mainland. The channel became an important sheltered waterway between the eastern and northern coasts of Kent. The way in which the valley formed during the ice ages and the degree to which it was fully navigable throughout its history is an area of current research. At the southern end of the channel the Romans founded their main port of entry at Richborough complete with a monumental gateway to their new province. There is strong evidence to support Richborough also being the landing point of the Claudian invasion and present research suggesting the channel also saw the earlier arrival of Caesar.

Natural processes of longshore drift saw the development of a shingle spit at the eastern mouth of the channel. This spit, together with a shingle bank developing in front of Richborough, known as the Stonar Bank, caused sedimentation of the former channel as the river Stour wound its way around the obstructing banks. By the medieval period the channel had become un-navigable and was actively reclaimed by the monastic houses at Canterbury who built sea and river walls and drainage channels to convert the salt marsh to grazing and arable land.

The landscape of the former channel is still visible as a series of earthen sea walls and drainage channels that bound rich arable fields. The ruins of Richborough Castle, port and amphitheatre sit on high land at the southern / eastern end of the former channel overlooking the former Stonar Bank which has been extensively built upon.

Within the channel are alluvial deposits that provide a very good account of its sedimentary history. This is complex with the channel having been run into by several small tributaries including the River Stour which today runs through its southern half. The channel is likely to have been a landscape of channels running through salt marsh with small islets scattered throughout, some of which are known to have seen activity on during the Roman period. The potential for buried peats and waterlogged deposits that will provide an indication of previous activity in the channel and preserve organic archaeological remains and indicators is high. Deposits associated with the very early use of the valley before its inundation will also be present.

At the northern end of the channel is the Saxon Shore fort at Reculver, guarding the northern mouth of the Channel as it emerges into the Thames estuary. Reculver has some evidence of fortification during the Claudian period and a 1st and 2nd century settlement grew up around a probable harbour. The size of the settlement is unknown as a large area including the northern part of the fort, has been lost due to coastal erosion.

That the Wantsum Sea Channel was important to early peoples including the Romans is testified by the rich complexes of archaeological remains that can be seen on both sides with many cropmark sites being identified through aerial photography. The presence of the Shore Forts at either end increases its profile.

Today the outline of the former channel can be easily seen from aerial photographs with its characteristic drainage channels amongst high quality agricultural land. The land, being low lying, is at high risk of future inundation by sea level rise. The present course of the Stour is contained within post medieval embankments.

The eastern end of the channel has seen the emergence of large-scale development on the former Stonar Bank immediately within the outlook from Richborough Castle. This development started in the early 1900s with quarrying of the shingle banks to build the great harbour at Dover and then saw the establishment of a large military supply port in the First World War. Although the original port has now vanished the land is being developed for a range of industries including power generation. The Thanet side of the east mouth of the Chanel is also a favoured landing point for electricity cables from the continent and offshore wind turbines. Pylons extend along the channel to link with the national grid in Canterbury. Further development such as solar parks are being proposed within the former channel lands.

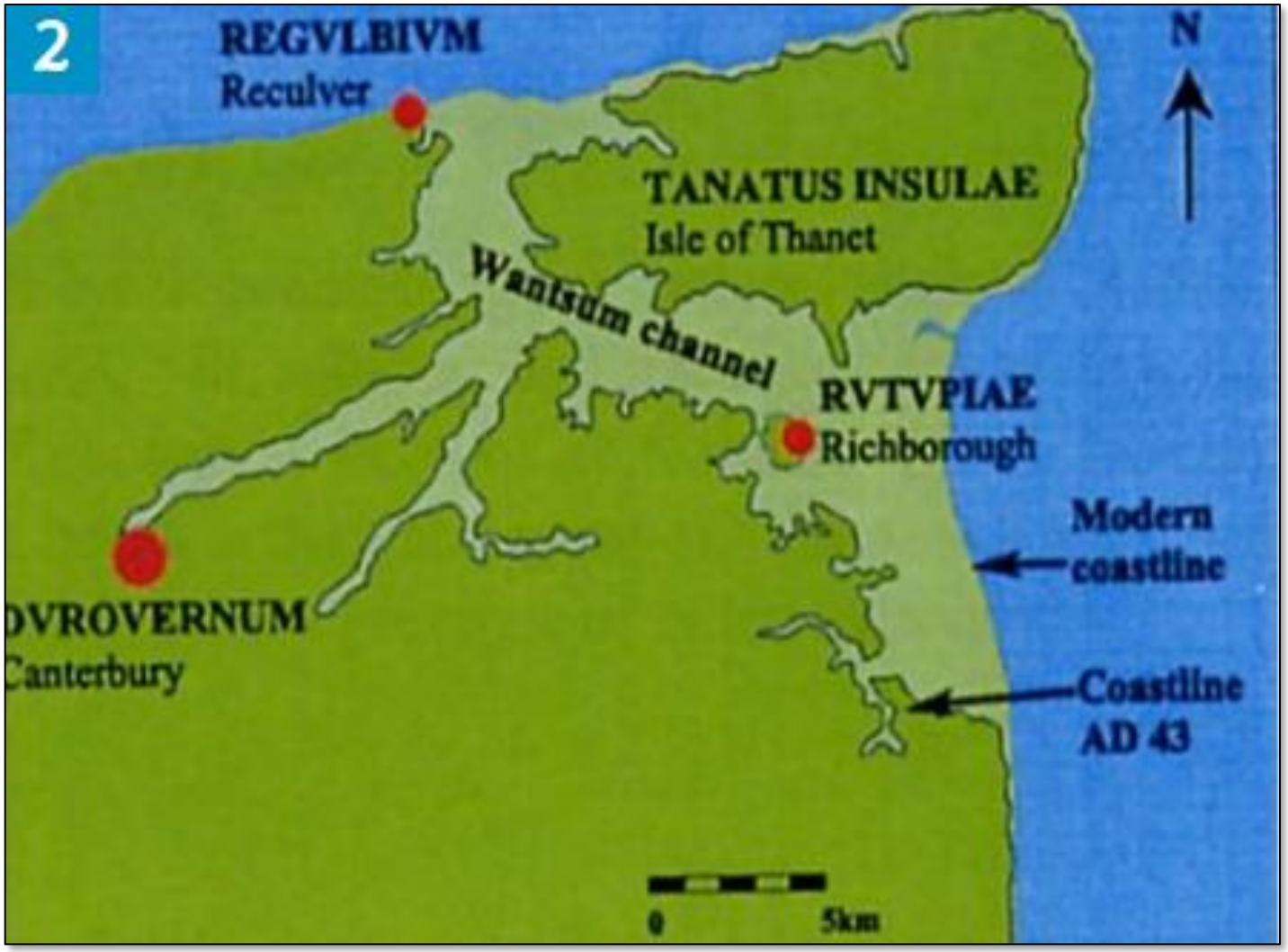

Figure 32 - The Wantsum Channel at time of the Romans

The former channel has been the subject of much research and writings over the last century. Recent development has often been required to include a programme of geoarchaeological assessment and borehole work adding to our understanding of the sedimentary history of the channel. A recent study for the Richborough Connection Project funded by the National Grid saw one of Britain's largest geoarchaeological borehole programmes that followed a transect through the southern half of the channel. This is shortly to be published. Additional studies are ongoing alongside current development programmes which will extend the modelling. The Thanet Archaeological mapping project also includes further characterisation of the Wantsum Channel and will bring together the known research more coherently.

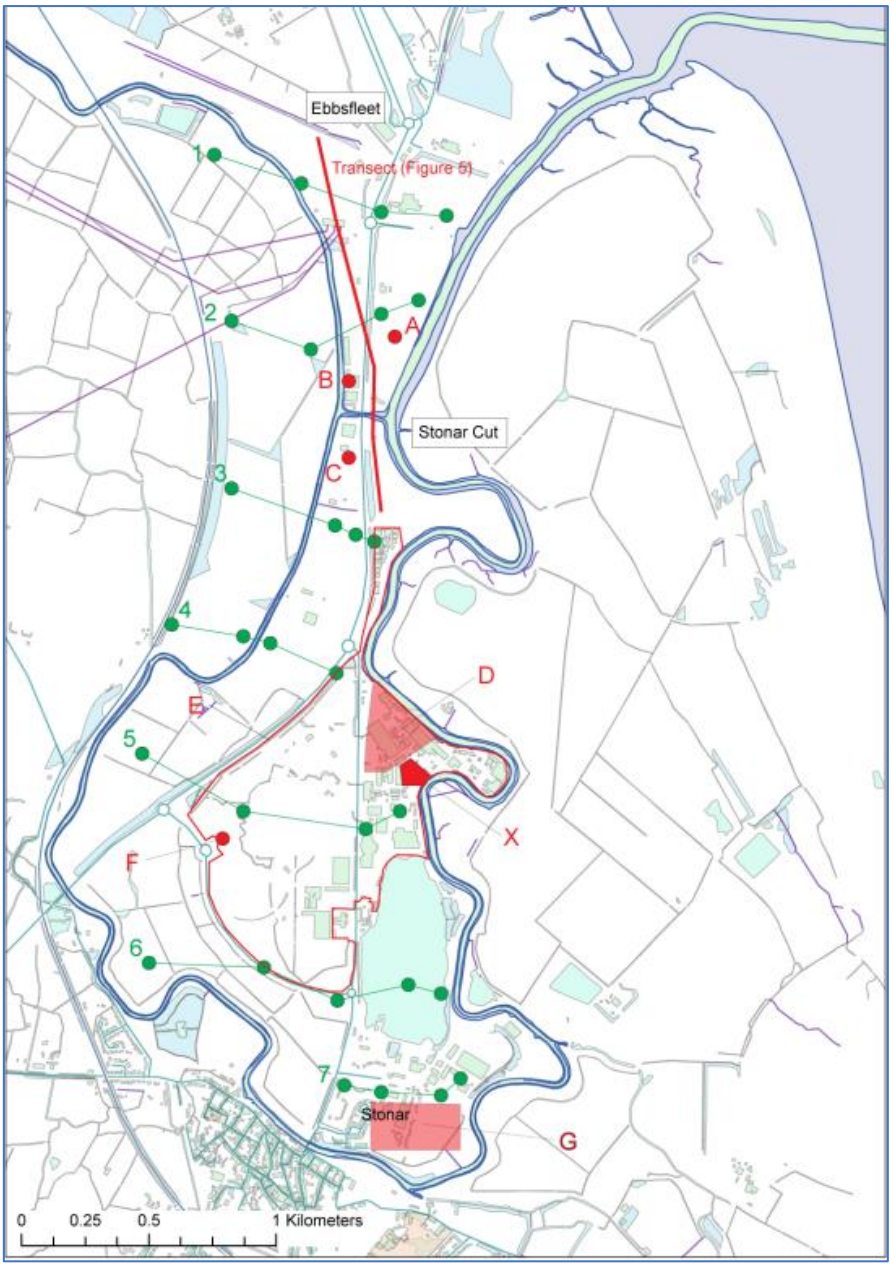

Figure 33 - *Borehole studies at the mouth of the former Wantsum Channel*

Lydden Valley

As mentioned above, a shingle spit extended northwards from Deal into the mouth of the Wantsum Channel. It is generally accepted that the spit started to extend northwards through the process of longshore drift from around Deal about 5,000 years ago. By Roman times the spit had at least reached as far north as Sandwich Bay and to the north-east of Sandwich by medieval times. Due to the growth of the spits the land behind became a muddy lagoon, gradually filling with sediments to form mudflats and salt marsh.

The natural marshland resources of the valley behind the Deal spit that became later known as the Lydden Valley provided an attractive resource for ancient peoples. A period of relatively dry conditions in the Neolithic and Bronze Age saw occupation sites established on these marginal lands before sea level rise in the Later Bronze Age saw the area inundated and the land surfaces submerged once more. Today, evidence of these former land surfaces, the contemporary environmental conditions and the prehistoric occupation of the area lies buried in well preserved peat deposits within the alluvium.

The extending spits and the increasing marshland saw the gradual reclamation of the salt marshlands for freshwater pasture. From Roman times sea walls were constructed and drainage ditches excavated to reclaim more and more land. Recent study by the Lydden Valley Research Group has examined the northward progression of the sea walls and drainage works from Deal to Sandwich. The earliest wall identified by the project, possibly Roman in its origins, is that which they have named The Lydden Wall running from Finglesham, east across the valley to meet the Deal Spit to the south of Dickson's Corner. As the reclamation progressed northwards, subsequent walls were built to reclaim more and more land culminating with the Green Wall in the 18th century.

Within the Lydden Valley many of the sea walls constructed to reclaim the salt marsh still survive as raised earthworks across the relatively flat landscape. Given the unobstructed access that many of them provide across the drainage network and farmland, unsurprisingly many of them are today followed by tracks, footpaths and in some cases the highway network. The network of drainage ditches associated with the 'inning' of the salt marsh extend throughout the Lydden Valley and provide a clear impression of the area that has been reclaimed.

Roman activity associated with this landscape include a consideration that the original landings by Caesar were focused on the Deal Spit. A Roman *villa* has been found on the northern edge of the valley that may have taken advantage of the navigable channels within it and may have been a catalyst for the original reclamation as suggested by the Lydden Wall. As with the Wantsum Channel the low-lying lands of the Lydden Valley will be vulnerable to future inundation.

Figure 34 - *Lydden Valley and the Mouth of the Wantsum showing Shingle Spits, Historic Sea Walls and Droveways*

Lympne & Romney Marsh

The Romney Marsh is the largest coastal wetland on the south coast of England covering around 100 square miles. The Marsh has a long and complex natural history that has given rise to variable geological deposits across its area. It is primarily a story of land reclamation and the ongoing battle to defend and adequately drain the fertile land that has been gained. The constant upkeep of drainage systems, massive earthen and man-made coastal defence walls and natural shingle barriers have allowed for the continued protection of the Marsh against the sea.

The evolution of the Romney Marsh began around 6000 years ago when a series of events triggered the beginning of the formation of the Marsh. Large amounts of shingle had been deposited on the Channel bed following the end of the last Ice Age which then began to build up as sand bars and shingle spits that were growing across the Rye Bay because of longshore drift. This shingle barrier continued to build and soon stretched from present day Dungeness to as far northwards as what is now Dymchurch. The barrier created a large lagoon behind it which was open to the sea at Hythe and had the River Limen (later Rother) and its tributaries feeding into it. This gradually became mudflats and sediment deposition from the river valleys flowing into the lagoon from the Weald created swamps, salt marshes and vegetated land.

Behind the barrier most of the Romney Marsh remained intertidal for some centuries, particularly as at times it appears that the sea levels were rising faster than new land could be created. Certainly, during the Iron Age, Roman and Early Anglo-Saxon periods (approximately 800BC to 600AD) large parts of the Romney Marsh were still underwater making settlement of the Marsh more limited.

Following the Roman invasion some of the earliest parts of the Romney Marsh were beginning to develop. The settlement at Lydd developed during the Romano-British period on a shingle island that was still separated from the rest of the mainland. There is evidence of specialised site functions here for salt production that was also the case at Dymchurch and St Mary's Bay. All Saints Church in Lydd is considered to have 5th century elements within its fabric.

The vast majority of the 'Romney Marsh Proper' as it is known today had been reclaimed by the 13th century. Extensive networks of drainage ditches were employed to drain and maintain the fertile land that had been created and major coastal defences, the Rhee Wall and Dymchurch Wall were constructed. Despite this several storms battered the area in the 13th century, changed the coastline and landlocked various ports. Rivers systems through the marsh changed their course, shingle accumulated on the marsh edges and further marshland was reclaimed up to the 16th century.

Bordering the northern edge of the marshland the former coastline can be seen as the Lympne escarpment. The steep escarpment originally defined the northern edge of the saltwater lagoon beside open water and the marshland creek, the *Limen* (later Rother), which gave access to the Weald and formed a natural harbour. During Roman times the *Limen* was a large navigable river which ran westwards from the area south of Hythe. A major port of entry, *Portus Lemanis,* was established on the northern side of the river at Lympne. Around 270 AD a Saxon Shore Fort was established on the overlooking escarpment.

Significantly, there is evidence for an earlier fort around the site of *Portus Lemanis* as well as an association to the *Classis Britannica*. Tiles stamped with *CLBR* (*Classis Britannica*) have been excavated at both Lympne and Folkestone which has led to some believing that these sites had an important connection to the fleet during the Roman period. In relation to the earlier fort associated with *Portus Lemanis*, excavations by Charles Roach Smith in 1850 uncovered a 2nd century AD altar that had been reused as a gate platform. The altar had been dedicated by Lucius Aufidius Pantera who was Commander of the British fleet around 135 AD and was covered in saltwater barnacles. Despite attempts to locate this earlier fort, archaeological remains are yet to be found.

By the 3rd and 4th centuries AD sea levels had risen and this site as well as other Romano-British coastal sites had become inundated and were subsequently abandoned. However, the tidal inlet near Hythe probably remained as a natural harbour throughout the Saxon period until later in the 11th century when the focus for maritime activity appears to have moved from Lympne to Hythe. The Shore fort was abandoned around 360 AD.

Today the fort at *Portus Lemanis* survives relatively well although it has been significantly distorted by landslips. The ancient port has now completely disappeared and is dry land that became part of the Romney Marsh during the early medieval period. Lympne is landlocked and finds itself 2.5 km from the sea.

East Wear Bay, Folkestone

Evidence excavated around the East Cliff area in Folkestone suggests that trade with the continent had begun to expand rapidly during the Iron Age and Roman period. Whilst there is no evidence for a Roman town at Folkestone, the presence of archaeological finds dating to these periods suggests that there was some type of occupation at the site. It has also been suggested that there may have been an early ‘harbour’ at the foot of the East Cliff connected with this occupation, though archaeological evidence for this has likely since been lost to coastal erosion. If this was the case, it is likely that this early ‘harbour’ would only have been a shingle beach market that would have been able to cater for the ships of the time. Other Roman remains at the site do however suggest that the East Cliff area was still an

important post along the south coast during the Roman period and may have also played a prominent role with the provincial fleet.

The East Wear Bay area on the East Cliff was known to produce Roman finds from at least the 18th century including mosaic pieces exhibited in the 1870s. Excavations took place in 1924 attracting national as well as international attention and discovering a 1st to 2nd century Roman *villa*. Tiles stamped with *CLBR* suggested an association with the *Classis Britannica.* The site was opened to the public but due to post war austerity measures causing its deterioration was backfilled in 1957 and greased over to create a public green space.

The site was not excavated again until 1989 when the Kent Archaeological Rescue Unit began work to determine the level of erosion since 1924. The location of the site on the cliffs edge had made it incredibly vulnerable to erosion through cliff falls with substantial parts of the site already being lost. It was also found that the earlier excavations had only explored the upper layers present and so the potential for more archaeological remains was significant. In 2010 and 2011 the *villa* was re-opened as part of the *A Town Unearthed: Folkestone Before AD 1500* community archaeology project, and the site was revealed to be far more complex than was first thought. Works continue to better understand the *villa* site and earlier activity at the site before it is lost to the continuing erosion of the clifftop.

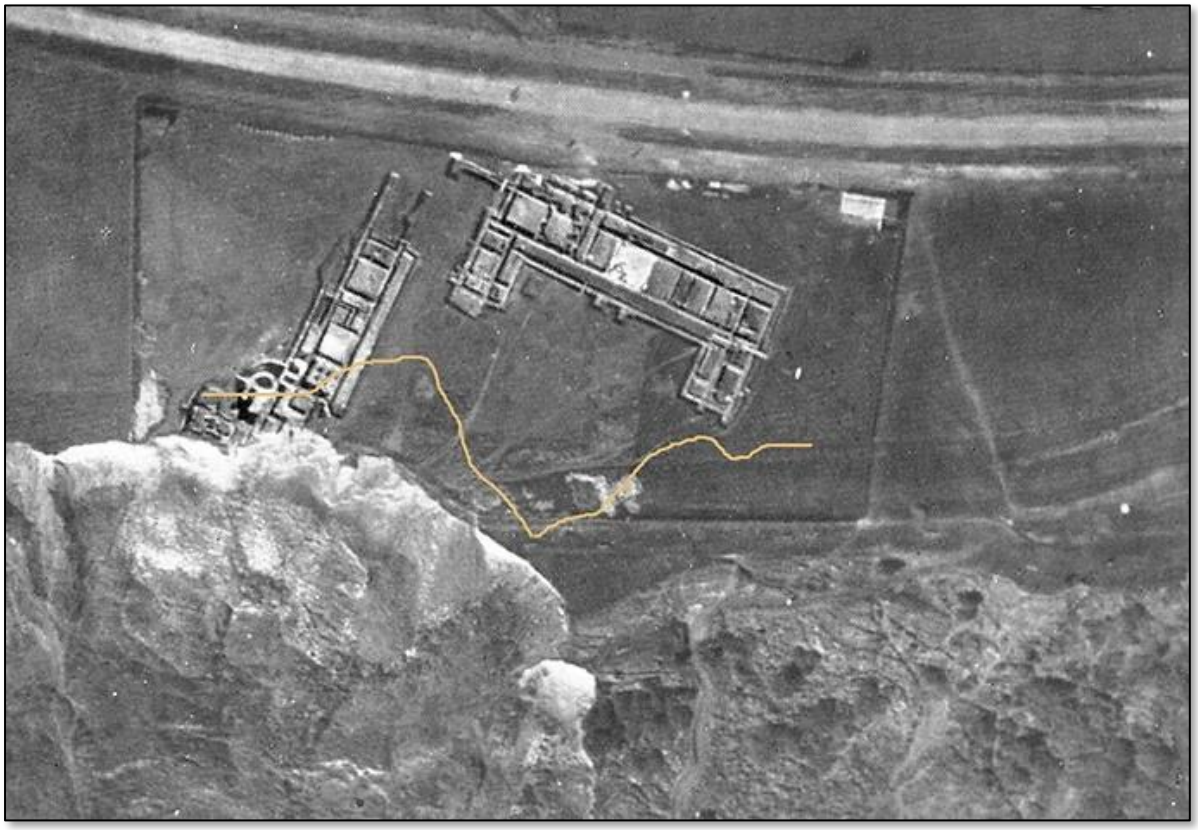

Figure 35 *- The Roman villa at East Wear Bay in the 1940s. Already the erosion at the cliff edge can be seen. The yellow line represents the current cliff edge which is progressing northwards.*

Further investigation would be needed to determine whether there was an early 'harbour' at the foot of the East Cliff perhaps connected to the Roman *villa* site here. However coastal erosion has likely removed any evidence for this and so conclusions about its presence cannot be definitively confirmed.

Swale's Creeks

The north Kent coast between Sittingbourne and Faversham is notable for the number of *villae* and other Roman sites that suggest a particular area of wealth and industry. The main Roman road between London, Canterbury and the coastal ports, later known as Watling Street, runs through this area.

The Roman coastline would have been characterised by several creeks and inlets from The Swale, a channel of the Thames that lies between the Isle of Sheppey and the North Kent coast and joins into the Medway Estuary. The location of the creeks and inlets close to the main Roman road is likely to have influenced the settlement pattern in this area during Roman times. The connectivity between road and coastal waters would have been advantageous for the movement of goods and taken advantage of at the time.

The creeks have been subject to silting and marshland generation since Roman times and the connectivity, and their past navigability is not immediately apparent now and is likely to be less so in the future as marshlands extend or areas become inundated subject to coastal change and management. The creeks and this broader landscape are also becoming more attractive to residential development that affects the buried remains and disconnects the Roman road from the coastal setting.

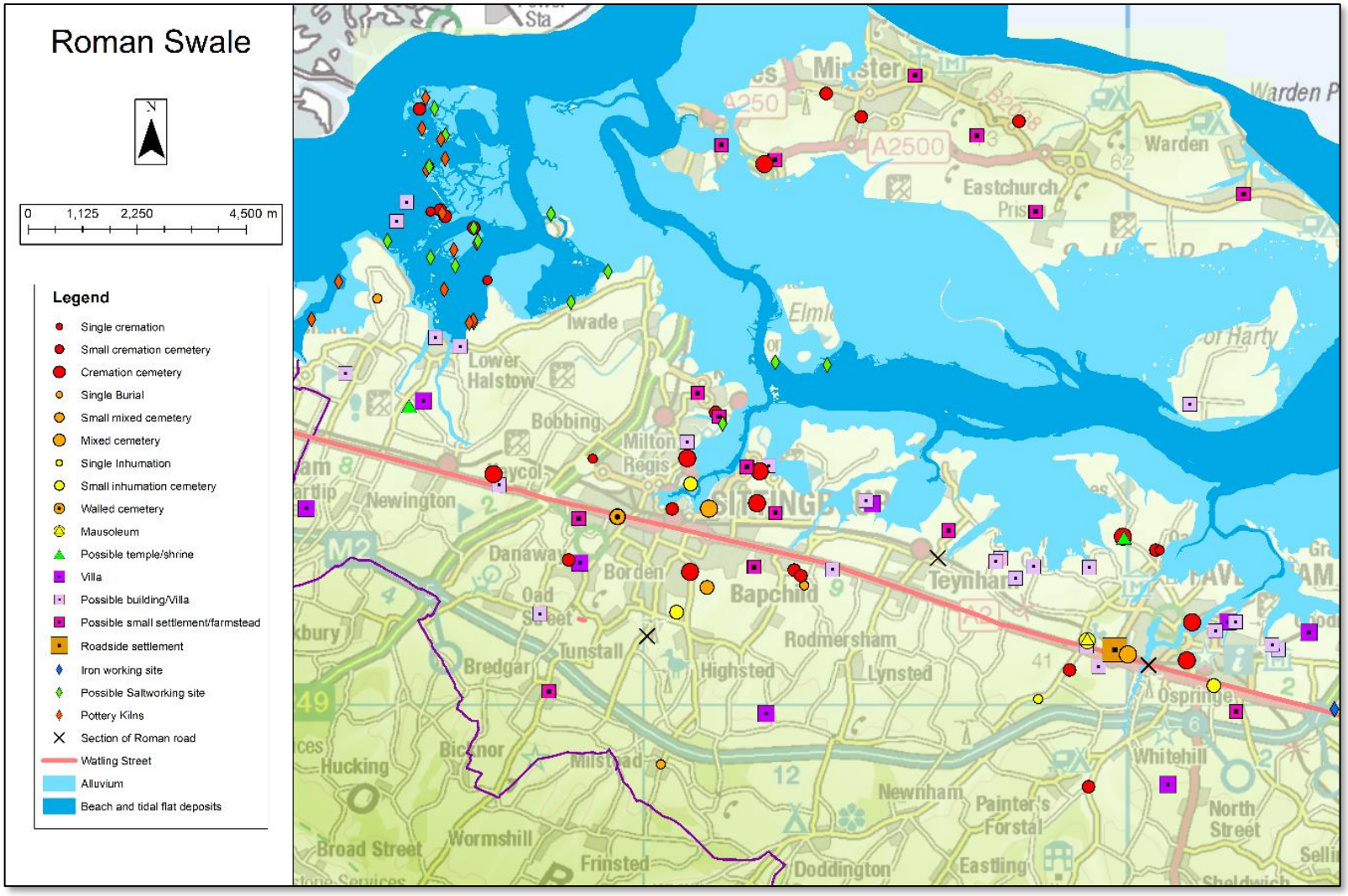

Figure 36 - The Swale and adjacent marshlands (or alleviated areas) shown blue, with key Roman sites. Note the areas of industry being found on the saltings and intertidal areas in the west, the villas and other buildings falling between the coast and Watling Street.

Medway Estuary

The River Medway flows through Kent to emerge into the Thames estuary between Sheppey and the Isle of Grain. The Medway estuary is characterised by a complex of large areas of brackish grazing marsh, inter-tidal marshes and mud flats. The complex of small, low-lying islands, or saltings, that lie within this landscape are the remnants of a landscape that is gradually being submerged as sea levels rise and eroded by river and tidal actions.

Archaeological survey work has identified that this landscape was active with industry in Roman times. Although access to the saltings is generally restricted, local archaeologists have recorded considerable evidence for pottery manufacture and saltworking, remains being found exposed on the eroded coastlines of the saltings and marshland edge. Other features exposed by the continuous erosion include a number of Roman cremation sites.

The Medway estuary provides a good example of Roman landscape that was once low lying and marginal but is now becoming lost through submersion, inundation and coastal erosion.

Dover

The development of a substantial harbour at Dover is not surprising, given its sheltered position at the tip of south-east England at the closest crossing point of the English Channel. To the west and east of Dover the white cliffs provide an impenetrable barrier preventing easy landing; at Dover however the River Dour has carved a natural break in the cliffs and it is likely that the mouth of the Dour has been used as a safe-haven for sea-going vessels since prehistoric times.

The strategic position that Dover offered for a harbour was not lost on the Romans who established a harbour in the area to the east and north-east of Market Square. The exact extent of this harbour is not fully understood, however archaeological and geoarchaeological evidence suggests that it was likely to have been extensive and equipped with wharfs and harbour moles/piers. The harbour is suggested to have developed from the Flavian period (second half of the 1st century AD). The harbour was also a home base for the fleet of the Classis Britannica and a fort occupied by the fleet is known in Dover. Two lighthouses, one on the eastern side of the harbour (now within Dover Castle) and the other on the Western Heights, marked the entrance to the port in Roman times.

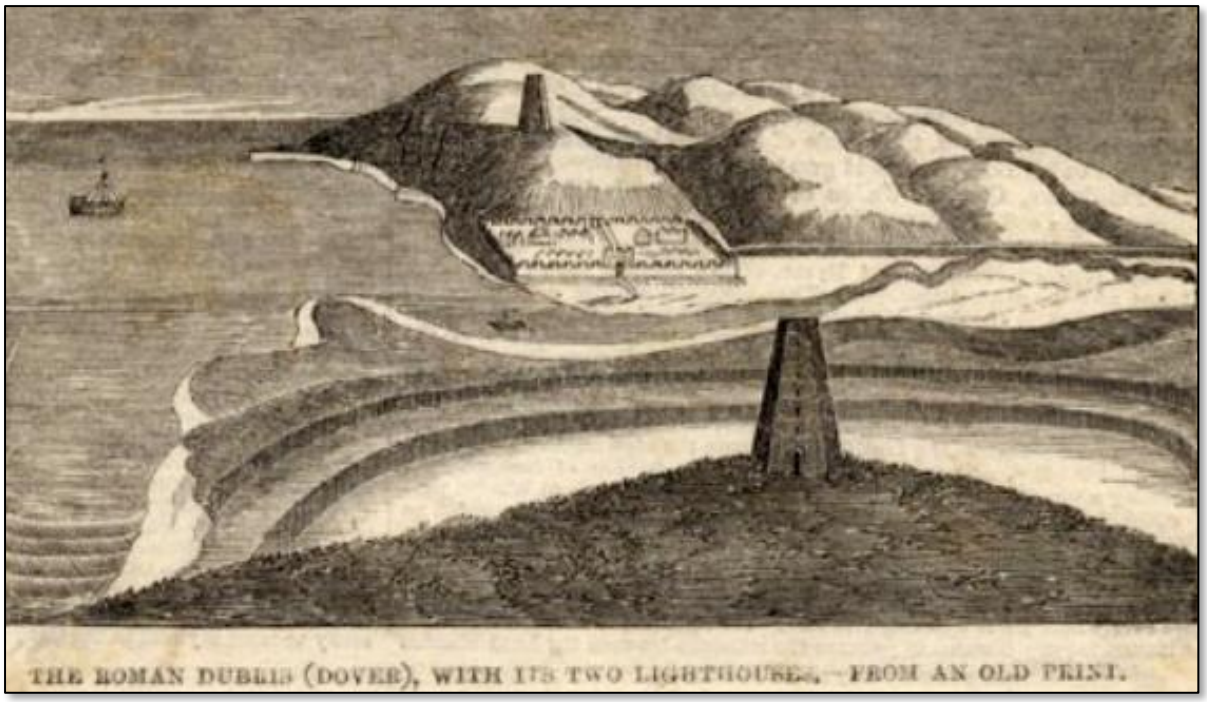

Figure 37 - *An impression of the Roman port of Dubris (Dover) with its two lighthouses. The print is adapted from one originally drawn by the noted 18th century antiquarian William Stukeley. © Dover Museum (d05960)*

In the late Roman period and through the early medieval period the Roman harbour was suffering from continual issues of silting. It is possible that some elements of the Roman harbour installations were usable in the earlier Anglo-Saxon period, although archaeological evidence is scant. By the end of the Anglo-Saxon period the former harbour had probably entirely silted up.

Evidence for Roman harbour works has been found at a number of locations within the town. During the excavation of the Dover Bronze Age Boat in Townwall Street, Roman timbers that formed one side of a box-framed harbour wall were also found. Further sections of a separate Roman harbour wall (or mole/pier) were found to the north-east in the area of Dolphin Lane in 1855. Further evidence for Roman wharf and quayside remains have been found including groins, piles and mooring rings and a section of a chalk block quay.

It is likely that further buried archaeological remains, including waterlogged timbers associated with the Roman harbour and harbour infrastructure will survive across central Dover. The exact extent of the potential harbour is unknown, although it has been suggested it could extend up to Pencester Gardens and potentially as far as Bridge Street. The silts and sediments infilling the Dover harbour may provide further information about the development and subsequent abandonment of the Roman harbour. Rich geoarchaeological deposits have been found across the site of the former Dour Estuary.

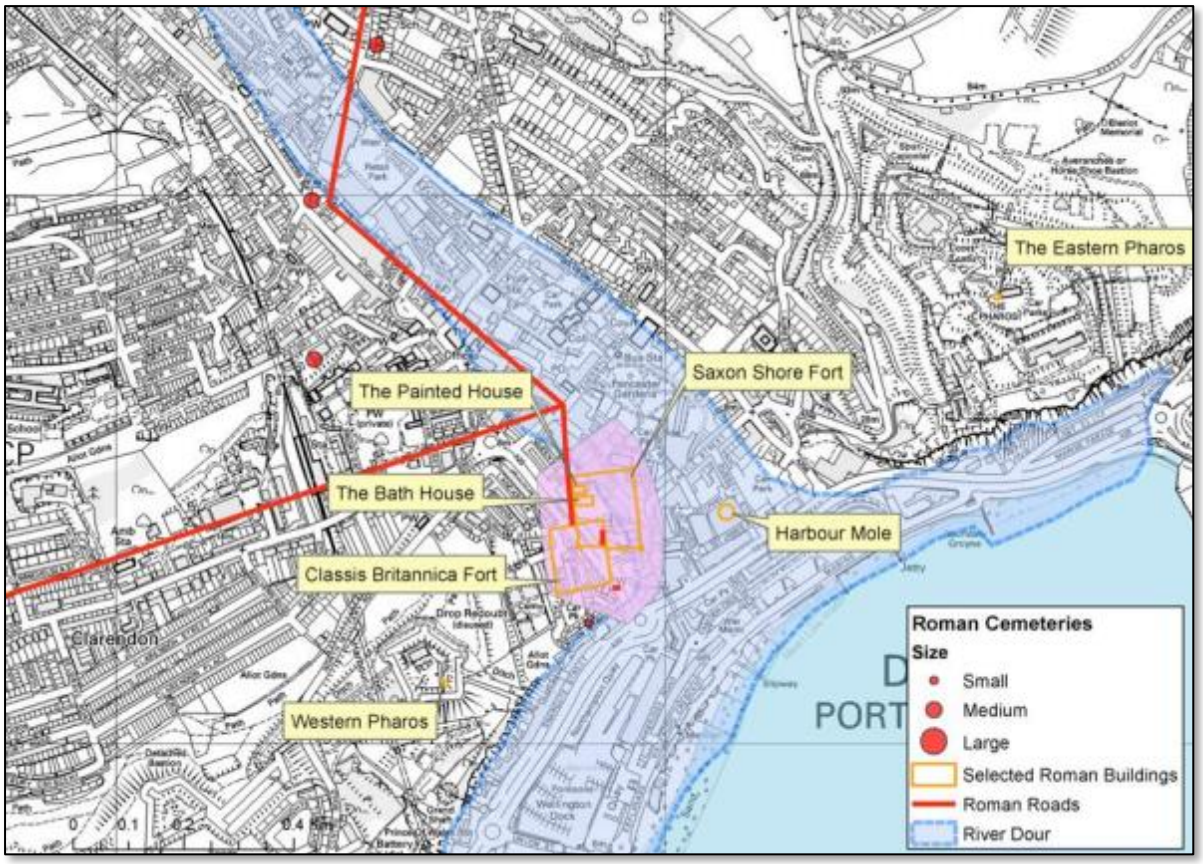

Figure 38 - *Features of the Roman harbour, forts and vicus at Dover (Dvbris)*

Figure 39 - *Roman pharos sited on the eastern heights in Dover survives as the tallest building from Roman Britain*

The entrance to the Roman harbour was marked by two Roman lighthouses (*pharoi*), one on the Western Heights and one on the Eastern Heights (Castle Hill). The eastern *pharos* is well preserved, standing to a height of some 13 m. and is the tallest surviving Roman building in Britain. The western *pharos* was largely removed when the 19th century fortifications were constructed (although a buried section remains).

On the western side of the Roman harbour was the Fort of the *Classis Britannica*. The Fort was constructed from c. AD 130 (although there is evidence for an underlying earlier and uncompleted fort dating to the start of the 2nd century) and was home to marines in the 2nd and early 3rd centuries. A Saxon Shore Fort eventually replaced the earlier fort in the 3rd century.

Dover is a prime example of the remains of a once great Roman port and *vicus* being subsumed under an ever-expanding townscape and evolving harbour system. The harbour itself evolved in response both to natural processes and the need for its development to respond to new uses, ships and trade. While much of the Roman landscape lies deeply buried beneath the streets, buildings and open spaces of the town, there are exposed elements that provide a glimpse into the former Roman port and fortifications.

The mouth of the Tyne

The mouth of the River Tyne was clearly an important entry point for traffic to Hadrian's Wall. However, the mouth of the river today is very different from the time of the Romans, primarily due to 19th century dredging by the Tyne Improvement Commission that has cleared many of the shoals and sandbanks recorded from the 16th century onwards. Those sandbanks and shoals were very likely representative of the situation in the Roman period.

Arbeia sits on the Lawe top, in present day South Shields, overlooking the mouth of the Tyne on its southern side. Various writers have theorised that the Lawe was a tidal island in the Roman period, and beyond, but no evidence for this exists beyond memories of major flooding events.

Given the conversion of the fort to a supply base in the Severan period and the likely 4th century garrison of bargemen, it seems clear that there would have been a port in the area. But the shoreline has been altered by centuries of ballast deposit, dumped by ships sailing from the south, especially London, to load with Tyneside coal. This has narrowed the river and buried the presumed line of the Roman riverbank beneath more recent urban developments. Excavations in 1990 showed that at least 60 m width of foreshore has been reclaimed since the late medieval period and a sherd of 4th century pottery was found beneath the reclamation deposits.

The Tyne & Wear Historic Towns Survey summarises the debate over the location of the port which despite several excavations has yet to be found. Speak (1994) suggests that based on topography and mapping of the 16th century sand banks the port is likely to lie to the immediate west of the fort, its closest point in the area that later was occupied by the Brigham and Cowan's shipyard. It has been noted in the Historic Towns Survey however that further work is needed to understand what is a complex coastal dynamic and that the entire river frontage from the headland as far south as Mill Dam should be regarded as important for the recovery of evidence of Roman and later riverside settlement and commerce.

The potential for Roman wrecks and their cargoes to lie within the estuary is illustrated by regular finds being made on the beaches and through dredging. Wrecks may also lie under the reclaimed land.

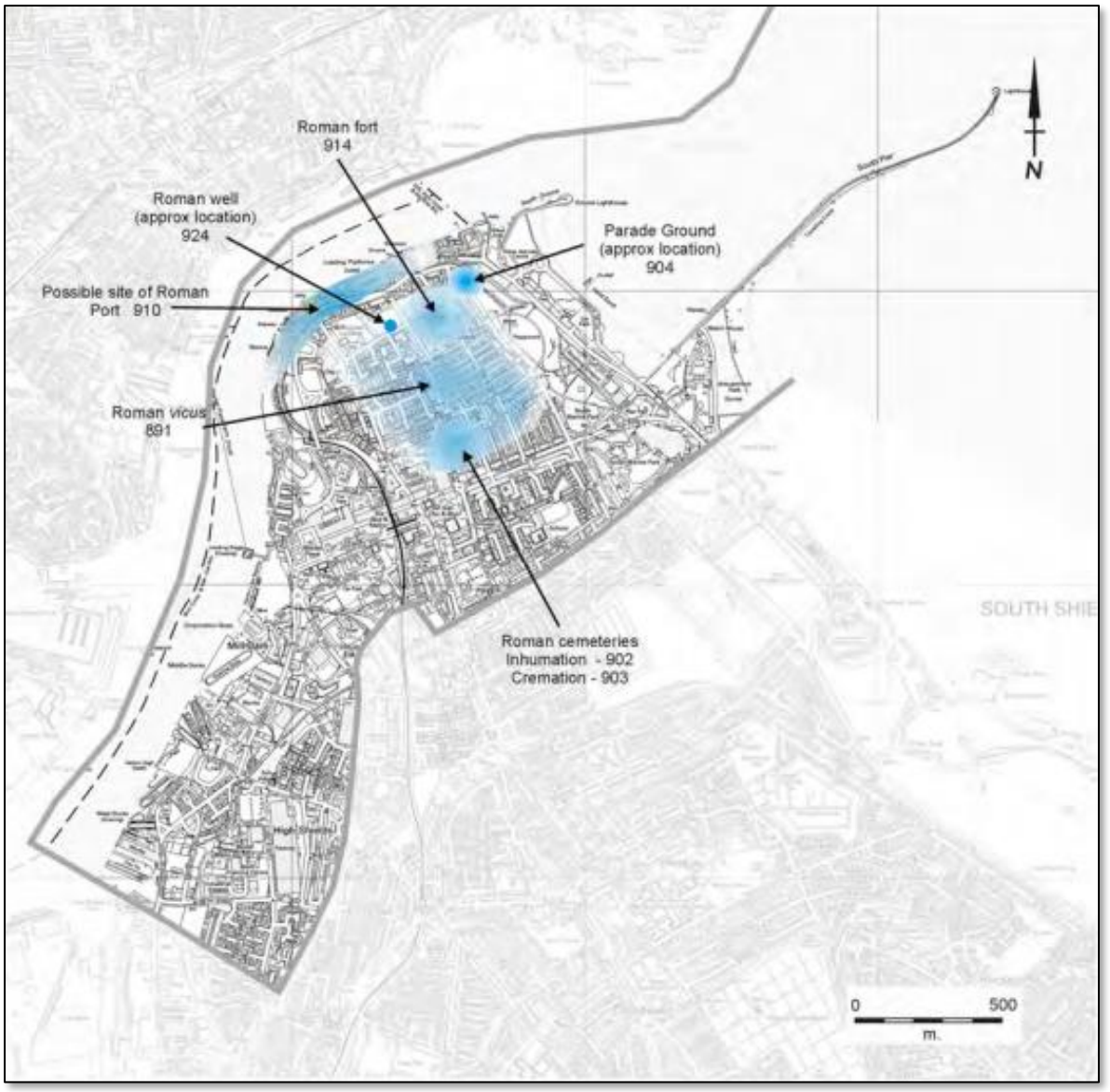

Figure 40 - Main Areas of Roman Activity at South Shields (Tyne & Wear Historic Towns Survey, 2004)

5.2.3 Flanders

In proto-historic times the coastal area witnessed an intense maritime influence and tidal dynamic, giving way to the transformation of the landscape from a peat marsh towards an environment dominated by tidal inlets, mudflats and salt marshes. Human occupation in the Iron Age seems to have been restricted to the more stable parts of the landscape such as dunes (*e.g.* De Panne in the west of the coastal plain) and the transition zone between the coastal plain and the Pleistocene sand ridge (*e.g.* Bruges). In the western part of the coastal plain and the area of Veurne more specifically, some evidence seems to point to a more active human presence on the more silted up parts of the landscape where occupation on an artificially raised

platform was attested. Also, the dune area attracted occupation. However, archaeological data are currently insufficient to shed a thorough light upon the social and economic structure of the societies living in or near the coastal area. Finds of briquetage pottery indicate that salt-making was of some economic importance. The elites inhabiting the Iron Age hillfort at the Kemmelberg, located further inland in the south of West-Flanders, could have played some controlling role in the production and trade of this valuable coastal resource. From the early Roman period onwards the occupation density increased considerably in the Pleistocene coastal hinterland. It is only from the Flavian period onwards that the human impact on the coastal plain becomes really visible; it became clearly more intense with traces of reclamation, exploitation and permanent habitation.

In the coastal plain the Roman level is generally situated at a depth of over 0.5 to 2 m, covered by clay sediments. As a result, Roman finds were for a long time only discovered as chance discoveries during large digging activities such as peat extraction. Development-led archaeological research is challenging and requires adapted methods. On the other hand, in undeveloped areas, the stratified position of the Roman level underneath the thick post-Roman marine clay cover has generally favoured a good preservation of the remains, which opens up many perspectives.

From the mid-1st century onwards the human occupation of the Flemish coastal plain started, to reach a maximum in the late 2nd and early 3rd century. This happened in line with a general increase and diversification of occupation in northern *Gaul*, but probably also following improving landscape conditions in the 1st century. Several indications point to an increasing tidal activity during the 3rd century and there are no secure late Roman finds in the coastal plain itself.

Several earthworks point to reclamation and organisation of the landscape that was subjected to marine influence. Roman period embankments are attested in the central part of the Flemish coastal plain at Raversijde and Stene, both near Ostend. Dikes were not systematically constructed in the whole coastal area, and they seem to have been restricted to lines (Raversijde) or to have comprised certain inlets of ringed areas (Stene). The dike at Raversijde was over 11 m wide and can be traced over some hundreds of metres. It was erected with clay sods, with the west side, likely the water side, strengthened with layers of peat. A linear ditch complex between Stalhille and Houtave in the eastern coastal plain has been interpreted as a drainage system over a very wide area, however hard evidence for this hypothesis is lacking.

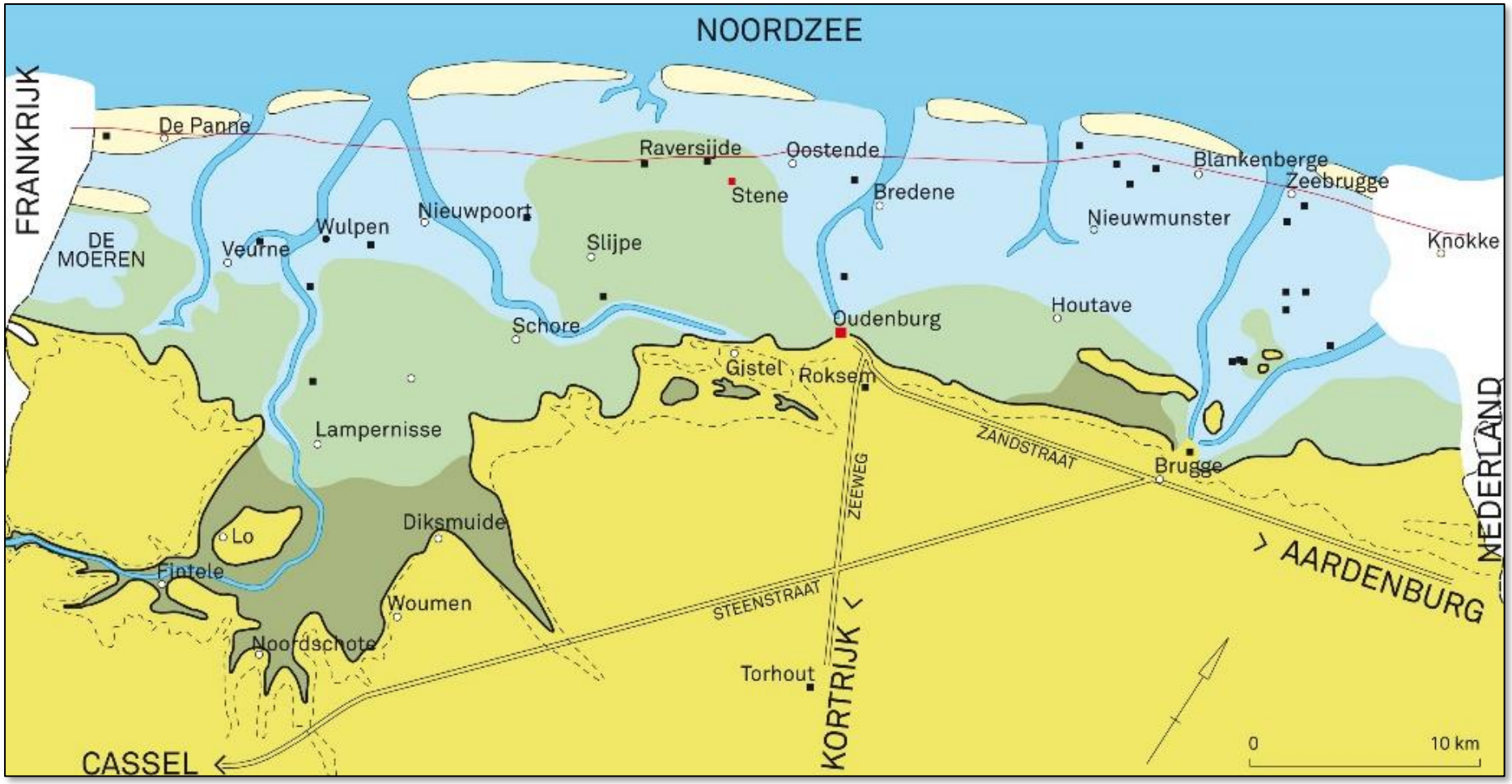

Figure 41 - *Schematic reconstruction of the coastal plain during the mid-Roman period (after Thoen 1987, with additions), with from the north-west to the south-east (top to the bottom of the picture): dune/beach ridge, tidal flats, marshes and salt meadows, crossed by tidal channels, peat areas (whether or not drowned), and the bordering sand region, with location of the settlement sites and the most important Roman roads. Red line: the current coastline; black line: border of the coastal plain in the Roman period; dotted black line: current border of the castal region. Situation 2013.*

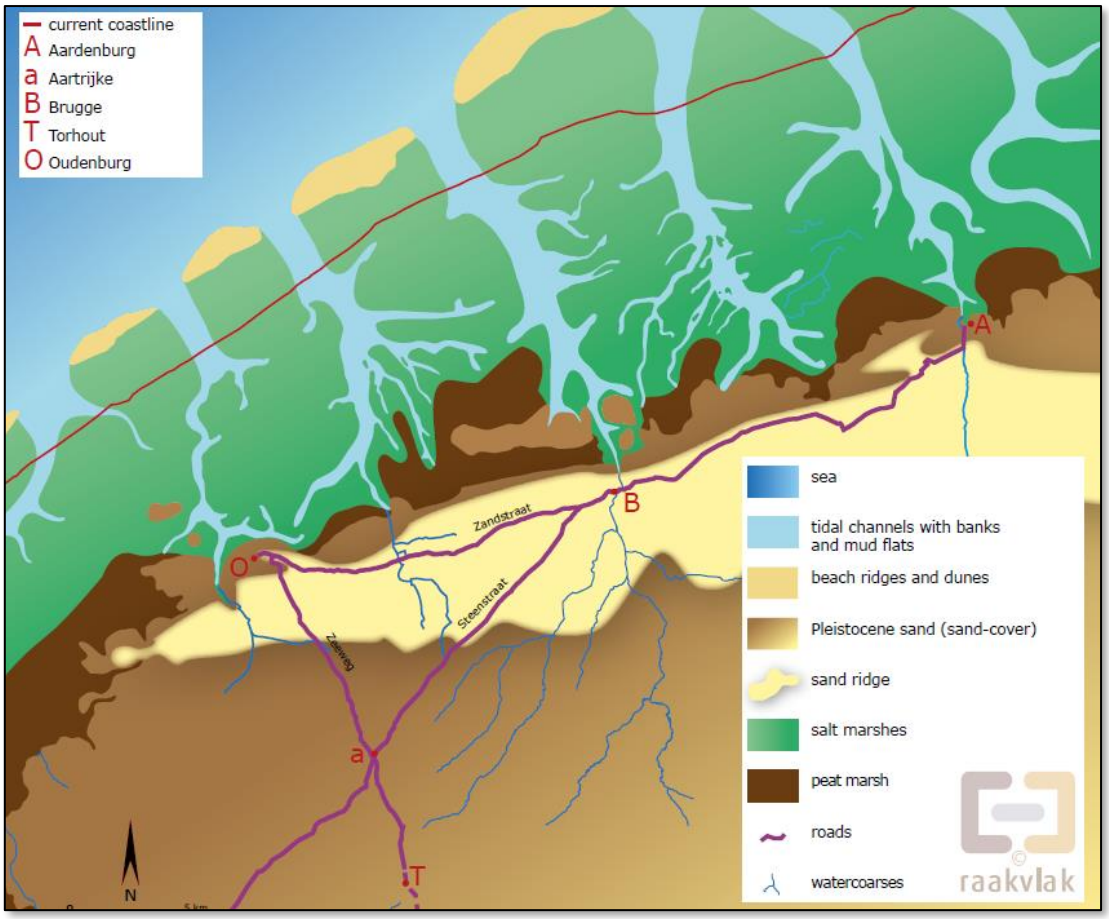

Figure 42 *- Reconstruction map of the eastern part of the Flemish coastal region during the mid-Roman period, based on soil maps, geomorphological maps, lithostratigraphic maps, sea soil maps and the Digital Elevation Model (© Raakvlak, with additions by Flanders Heritage Agency).*

63 *- Section through the Roman embankment at Raversijde (photo by Marnex Pieters © Flanders Heritage Agency;)*

Small settlements or farmsteads were located on various locations within the dynamic landscape setting. Dried-out peat soils and naturally sandy elevations outcropping the peat (*e.g.* Zeebrugge - Achterhaven; Dudzele - Heistlaan) were used for permanent settlement during the first two centuries. The habitation structures identified at Dudzele consisted of timber-framed buildings and some outbuildings similar to the ones of the Pleistocene soils. More to the north in the Dutch Scheldt estuary these local building traditions seem to have been influenced by house building styles known along the Dutch coast in Germanic territory. On the edge of Wenduine a stabilisation horizon was found, with Roman material, possibly the remains of a farm which developed upon a salt marsh.

During the 3rd century an increase in tidal dynamics occurred. The effects on the nature of the coastal settlement are unclear yet, but the artificially raised platform (terp) at Ramskapelle could be related to this increasingly inhospitable environment for stable occupation. The 3rd century site was characterised by a man-made elevation consisting of 600 m^3 of clay sods, reaching 90 cm above the spring tide level and on top of which sod-houses were built (Verwerft D *et al*, 2019 p.243-57).

***Figure 44** - The Roman (3rd century) terp at Ramskapelle (© Raakvlak; Verwerft et al. 2019).*

5.2.4 Nord

Geological Context

Three major geological entities, corresponding to distinct geodynamic zones, make up the northern France landscape as illustrated on the map below:

1) To the north is the Flemish maritime plain (q3 and e1) with its landscapes of polders and wet plains., connected to the Kent coalfield and the Brabant area. It also includes the Saint-Omer marshland, from which it is separated by a tectonic fault.

2) Boulonnais buttonhole (j3), a complex geological structure at the southern end of the Weald-Boulonnais synclinal basin, cut through by the Strait of Pas-de-Calais.

3) Picardy maritime plain (q3 and c2) - between Canche and Baie de Somme - linked to the Hampshire-Dieppe basin.

The landscapes here are highly diverse: to the south, the Picardy chalk plateau, covered in silts, offers large, little-formed expanses, gradually rising in altitude to 200 m towards the north and west. To the north, the maritime plain is a disparate collection of polder areas, wet plains and marshes.

Between the two, on the coast, the Boulonnais forms a buttonhole with southern England, cut in two by the Pas-de-Calais strait more than 450,000 years ago. Its landscapes contrast with the chalk plateaus and maritime plain. They form small, rugged, green ensembles that were once described as “geological marquetry” (Pierre Flatrès (Flatrès 1988, p. 13).

The coastal strips and dune massifs border the maritime plain from Calais to Dunkerque and Belgium seaside, the southern Boulonnais and the Picardy plain. The estuaries of the Slack, Liane, Canche, Authie and Somme rivers cut them.

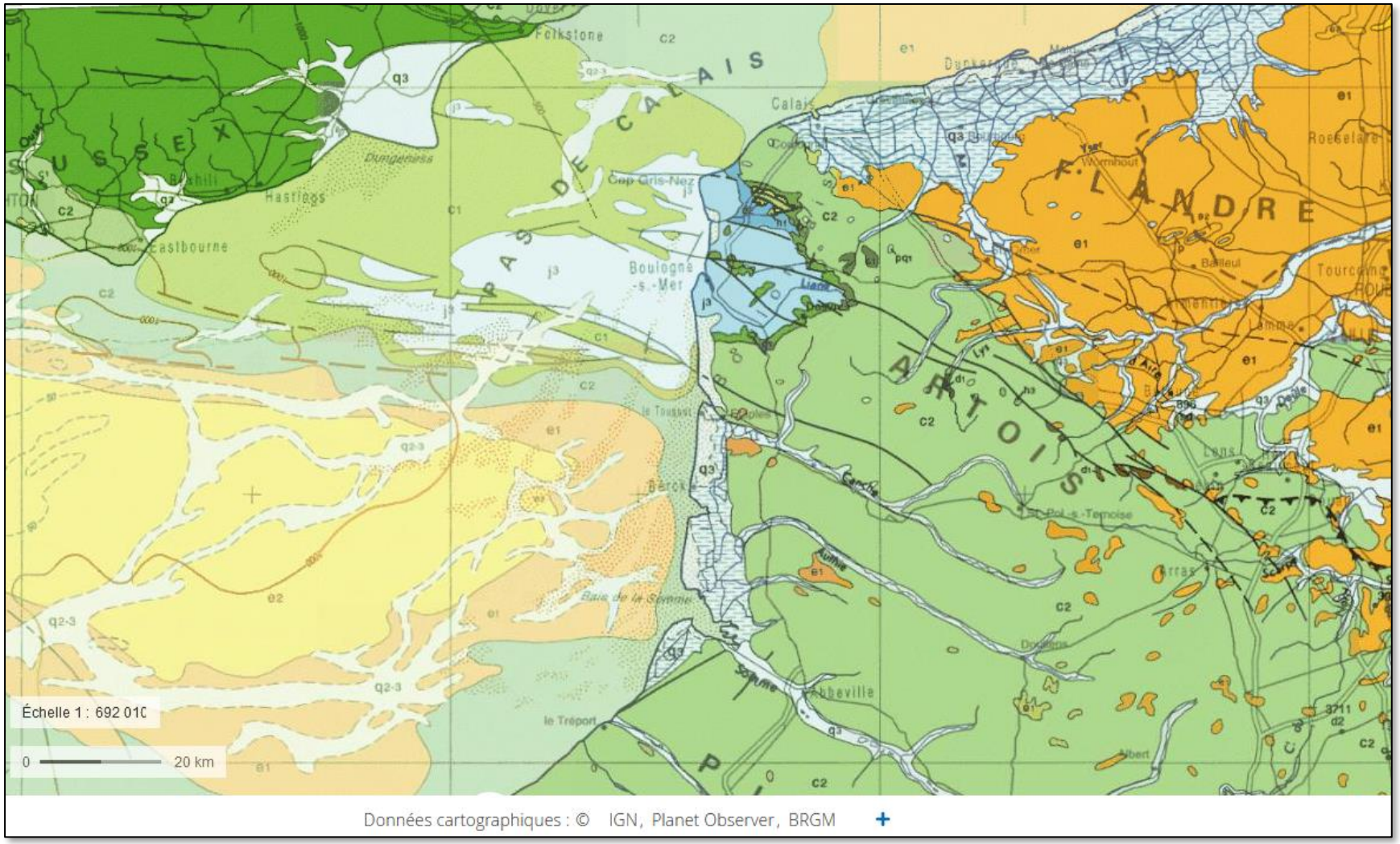

Figure 45 *- Three major geological entities, Pas de Calais (Geoportail: https://www.geoportail.gov.fr/carte)*

Boulogne and the Liane Estuary

Today the city of Boulogne sits astride the canalised course of the Liane as it emerges from the rugged Boulonnais to flow into the Strait. The ancient morphology of the Liane and its estuary have been a subject of survey and research in recent years drawing mainly on a series of deep surveys including core samples undertaken in the 1960s. This data has made it possible to identify the palaeochannel of the Liane and, in part, reconstruct the coastal and river landscape at the time of the Romans.

Geological observations and core samples have determined that the Liane channel is deeply incised into the Jurassic bedrock and probably narrow. It is filled with a mostly Holocene silt. Through a combination of cartographic and archive research, archaeological information and aerial survey a picture of the evolution of the Liane and its estuary over the last 2000 years is emerging principally through the work of geomorphologist Sylvie Coutard.

The estuary as seen today has little in common with its ancient form especially since its channelling in the 1960s. It once reached a width of 1 km between the cliffs of Chatillon in the south and Saint-Pierre (or Odre) in the north and 1.2 km between the heights of Montplaisir (Outreau) and the cove of Bréquerecque.

Figure 46 - Relief and topography of Boulogne-sur-Mer (IGN/ Géoportail)

The mouth of the estuary became increasing blocked by a spit of marine sands that accreted at the foot of the cliffs of Chatillon, pushing the course of the Liane northwards. That together with the retreating of the cliffs through coastal erosion suggests that the mouth would have been narrower and a bottleneck. Behind the spit a large area of channels meandering through flooded wetlands and between sandy islets developed as can be seen on 17th century mapping.

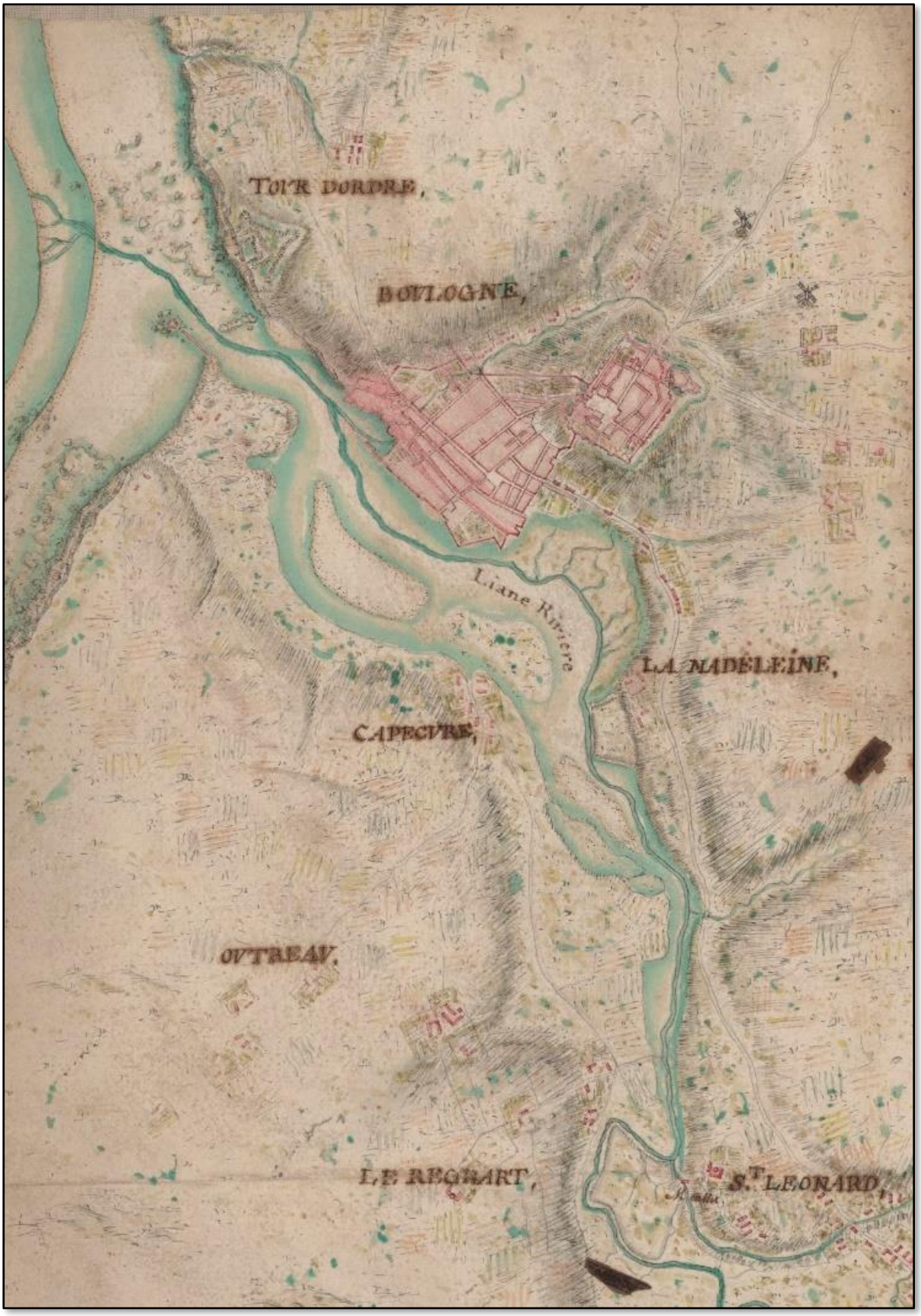

Figure 47 *- Detail of the "Plan of the port of Boulogne with the river which falls there up to Bournonville" dated 1699 Source: BNF, Maps and plans department, GE C-5024*

The first port of *Gesoriacum-Bononia* – or its beach of grounding – was probably located in the cove of Bréquerecque (a little to the south of the port of the 2nd century). The topography of the shallow slope to the river and recent archaeological evidence confirms the early occupation of the Bréquerecque district from the first half of the 1st century.

The location of the port area in the cove of Bréquerecque is attested, at least from the 2nd century, by the excavations of the "Terrain Landrot" of 1992-19933, with the discovery of buildings that the excavators identify as a *horreum* and possible *navalia*, a few meters back from the supposed line of the old shore. The limited scope of the excavation did not allow the verification of the hypothesis, put forward in the 19th century, of the presence of a masonry quay.

Beyond this site, the extension of the port facilities is very difficult to establish. Based on a map of the distribution of the discoveries of stamps of the *Classis Britannica*, suggestions have been proposed, which include in the perimeter of the naval base both the slope of the "Sautoir", between the upper town and the estuary, and the slopes of the rue Porte Gayole, between the ramparts and the Val Saint-Martin.

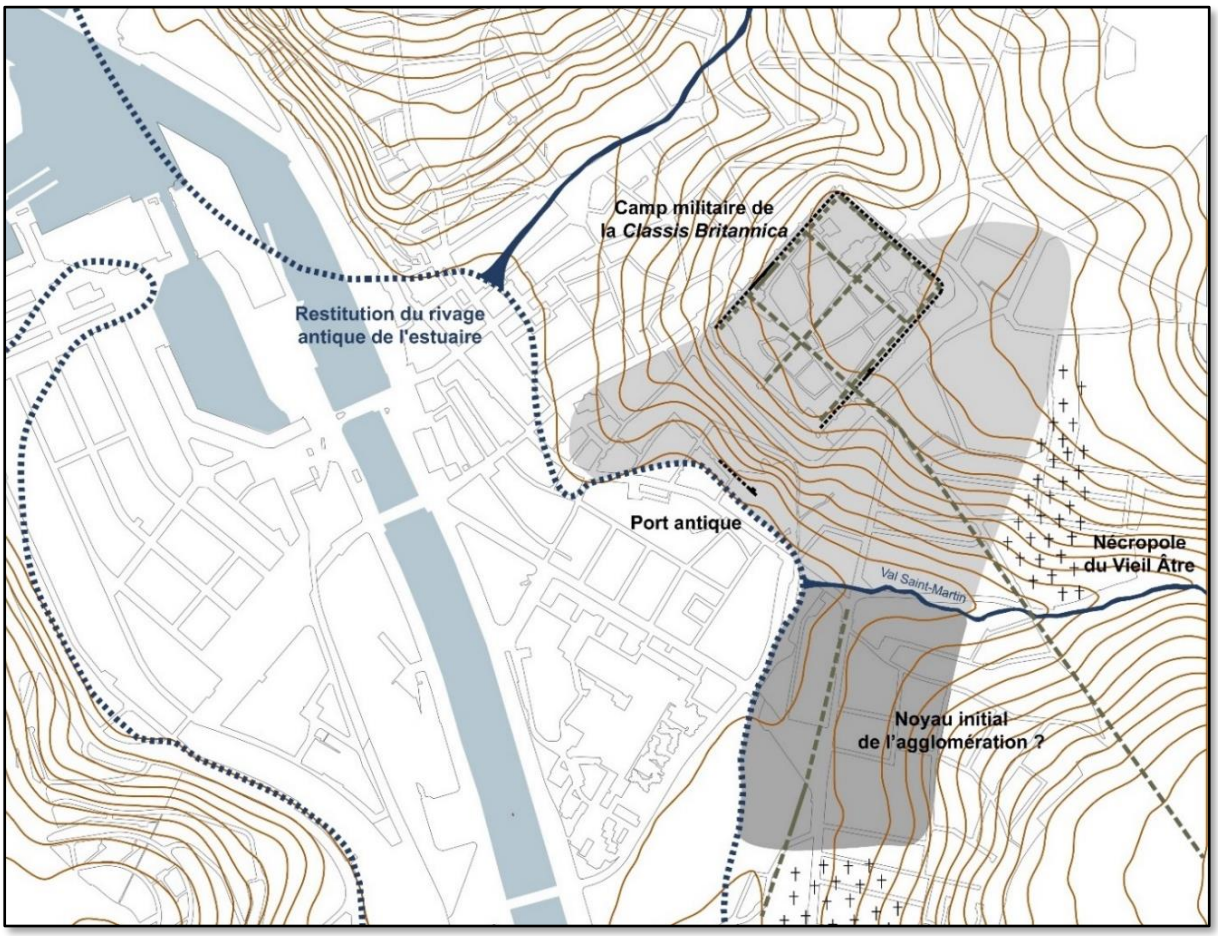

Figure 48 *- Principal elements of the 2nd century town and port focused on the cove of Bréquerecque (PCR Atlas de Boulogne antique (O Blamangin, Inrap))*

The discovery of High and Low Empire walls protecting the port facilities supports this hypothesis for the "Sautoir". It is more fragile for the sector of the rue Porte Gayole and the presence of stamped tiles does not constitute a determining argument, since they "are bought and resold, reused several times, including in private housing".

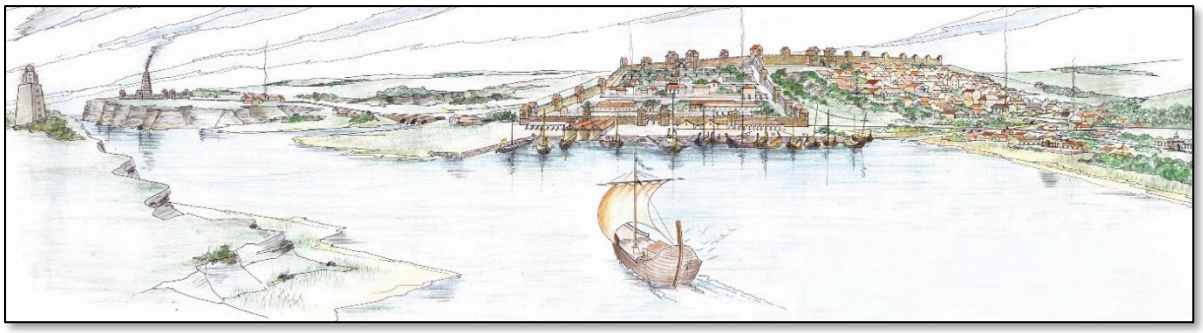

***Figure 49** - Artist's impression: the port and the estuary in the 2nd century Cl. Seillier and P. Knoblock (2004) – archives of the archaeology service*

***Figure 50** - Detail of the plan "Environs de Boulogne" dated from the end of the 16th or the beginning of the 17th century (BNF, GESH18PF35DIV5P6D*

Beyond the Roman period, the cove of Bréquerecque was gradually abandoned due to the silting up of the meander in which the port was installed. The port facilities therefore moved downstream of the estuary and set up at the mouth of a small tributary of the Liane: the Tintellerie stream (now channelled into the Vivier). The Bréquerecque cove was abandoned and became a marshland area.

Note that on the "Environs of Boulogne" plan, the dune massif of the coastal spit is clearly visible (and even mentioned). The northern cliff is already in sharp decline with the disappearance of a large part of the Tour d'Odre and the English fortifications that had surrounded it since the 16th century

From the 17th century the estuary behind the spit progressively silted naturally and was then claimed artificially through the building of dykes as can be seen on the early maps. In 1804 the excavation of the Napoleon basin fixed the location of the port which developed on the coastal spit. The erosion of the cliffs of Saint-Pierre and Chatillon was halted in the 19th century by the construction of dykes. The banks of the Liane started to be occupied particularly in Bréquerecque. Development continued to narrow the course of the river, and it was eventually canalised in the 1960s. Infra-red photography provides a good depiction of the former extent of the river and estuary beneath the present city.

***Figure 51** - Infrared aerial photograph. IGN 1998 (Géoportail)*

The Flemish Maritime

The Flemish maritime plain within northern France extends from Calais to the Belgium border. The vast coastal plain generally extends between 12 and 25 km inland from the present coast and is a landscape of polders and wet plains with some areas even beneath sea-level, protected from flooding by a dune belt. The area, forming a triangle from Calais – Dunkerque – Saint Omer has been reclaimed from the sea since the 12th century through the construction of ditches, canals, sluices and pumping stations.

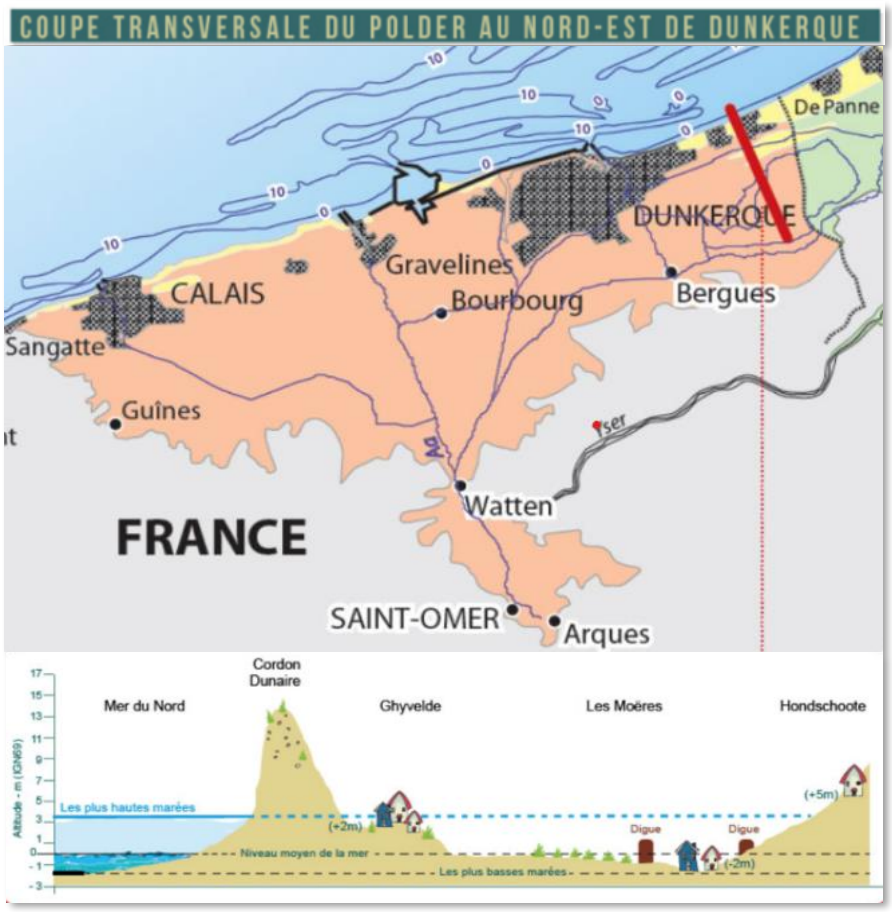

Figure 52 -7 Map of the coastal plain with a profile across the dunes and plain. (Source: website of the Intercommunal institution of the Calais-Dunkerque-Saint-Omer triangle of Wateringues (Societe Geologique du Nord, 2023).

With sea-level rising at the end of the last ice age the area of the maritime plain became flooded to the foot of the Artois hills. The plain was occupied by a shallow sea lagoon with numerous sandbanks and mud flats that emerged at low tide. This was separated from the North Sea by a dune cordon, a string of small islands along the current coastline. These dunes were formed through the deposition of materials brought from the west by tidal flow and currents. The resulting slowing down of the rivers and watercourses that flowed through the plain into the sea caused silts to settle, vegetation to grow and a large area of swampland and forest to develop.

In the Roman period, the territory was occupied by extensive marshes of the Aa delta and forests, described by Caesar as inhospitable. Recent archaeological works

have however also shown that there were settled areas with evidence for agriculture and salt production.

Figure 53 - The coastline before the Romans, from an 1860 illustration (Source: CMUA Dunkerque (Centre for Urban Memory of Agglomeration) - 1Fi13/1)

Roads to Pitgam and Steene led to saltings in the 1st and 2nd centuries. Salt was brought to Cassel and then dispatched to Boulogne, Thérouanne, Thiennes, Arras and Wervicq. These roads still exist today.

Following the Roman period the increasing development of the dune cordon held back the sea and the area became less inundated. By the 7th century the first attempts to drain the marshes to create arable land were undertaken by the monastery of Thérouanne.

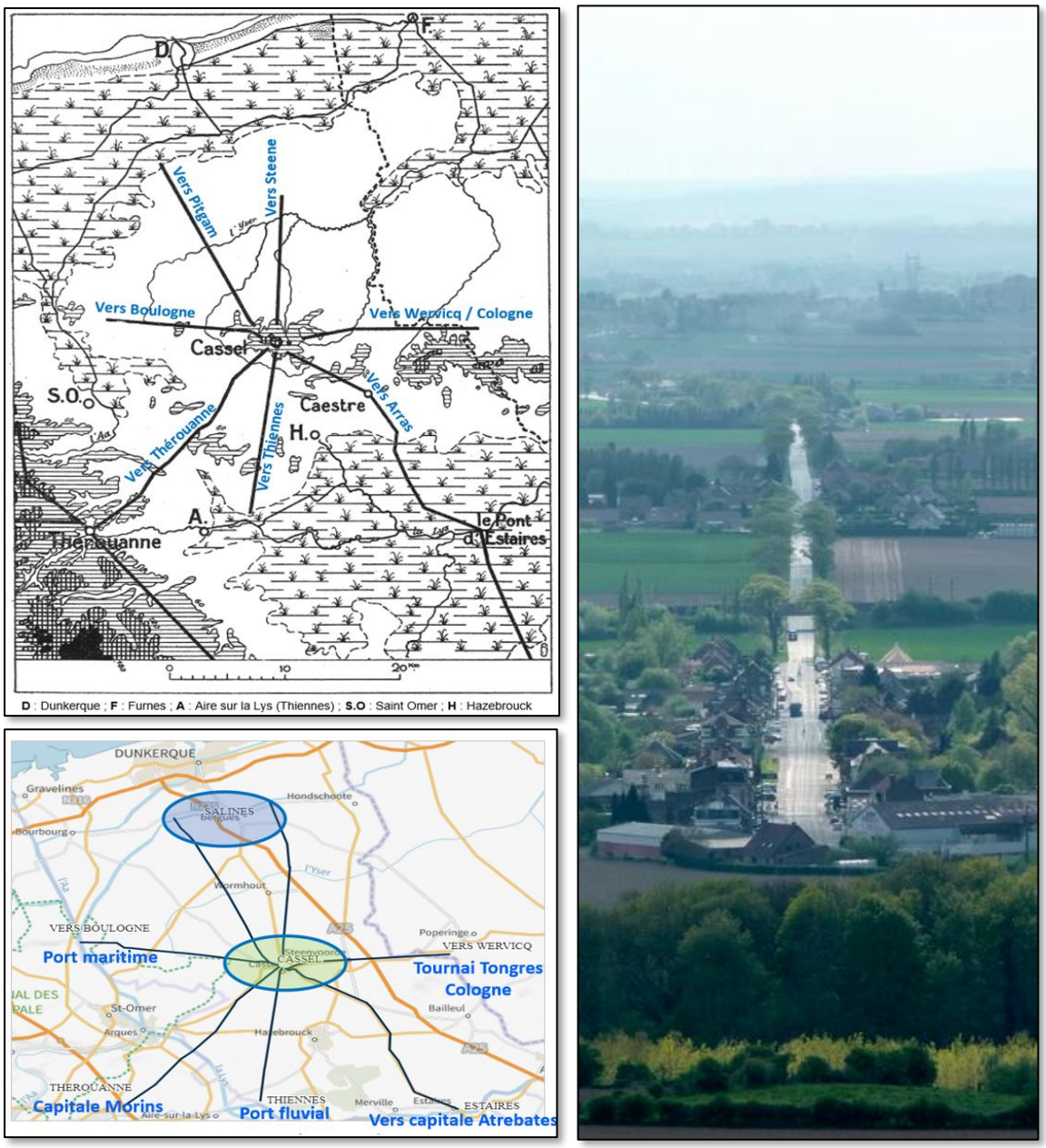

Figure 54 - Comparison of 1st century Roman roads with those of the 21st century. (Source: https://www.caue-nord.com/en/portail/41/observatoire/4118/voies-romaines-autour-du-mont-cassel-59.html)

5.2.5 The Netherlands

The coastal landscape of the Netherlands in Roman times is best summarized as a narrow strip of sandy coastal barriers and tidal inlets along the North Sea. The first section below presents a description of the coastal area from the Northern fort of Velsen along the mouth of the river Rhine to the Helinium (Meuse estuary) and the peatzone in the southern part of Zuid-Holland. This has been taken from the publication of Hessing et al. (2021) *Romans on the Waterfront* (Part II, Chapter 1

`Limes Landscapes in the Netherlands' by L.I. Kooistra, S. Lange and W.A.M. Hessing).

The second section below presents a description of the coastal landscape of the province of Zeeland. After discussion about the early formation of the landscape, we present a translation of the landscape section of an article by Wim de Clercq and Robert van Dierendonck (2013) called *Noordwest-Vlaanderen en Zeeland in het Imperium Romanum.* The section then concludes with some remarks of Bert van der Valk on the landscape of South Holland.

Coastal Barrier from Velsen area and Zuid-Holland

In Roman times, the landscape of the *Limes* zone in the Netherlands was completely different from the present. Large parts were almost inaccessible, other parts flooded regularly or offered only limited opportunities for agricultural use or other forms of exploitation. Just as we do now, people tried to take control of this environment - their actions, however, being very much determined by the physical landscape. This would also have applied to the construction of the military infrastructure along the *Limes* in the Low Countries. As the surviving elements of the Roman army's infrastructure seem to suggest, these were closely bound up with what landscape and vegetation had to offer. Landscape in this chapter means the Roman-period physical and cultivated landscape, including its natural and cultivated vegetation.

The Dutch North Sea coastal zone directly behind the beach consists of several coastal barriers, running parallel in a south-west-north-east orientation, the easternmost nowadays lying 5 to 10 km inland. These were formed mainly between 4,000 and 2,000 BC by a gradual accumulation of sand from the North Sea basin. Between the dune-covered coastal barriers were narrow marshy zones, draining the higher grounds towards the rivers Meuse and Rhine. Very soon after the formation of the barriers, people settled on the dry parts of the barriers and dunes. Initially these areas had nutrient-rich and calcareous sandy soils. By the beginning of the Roman period, however, the lime had leached out and many soils between the Meuse and the Rhine had become degraded. Natural processes together with centuries of farming had created a partly cultivated landscape with arable fields, dry, nutrient-poor grassland and heath, and relic woodland.

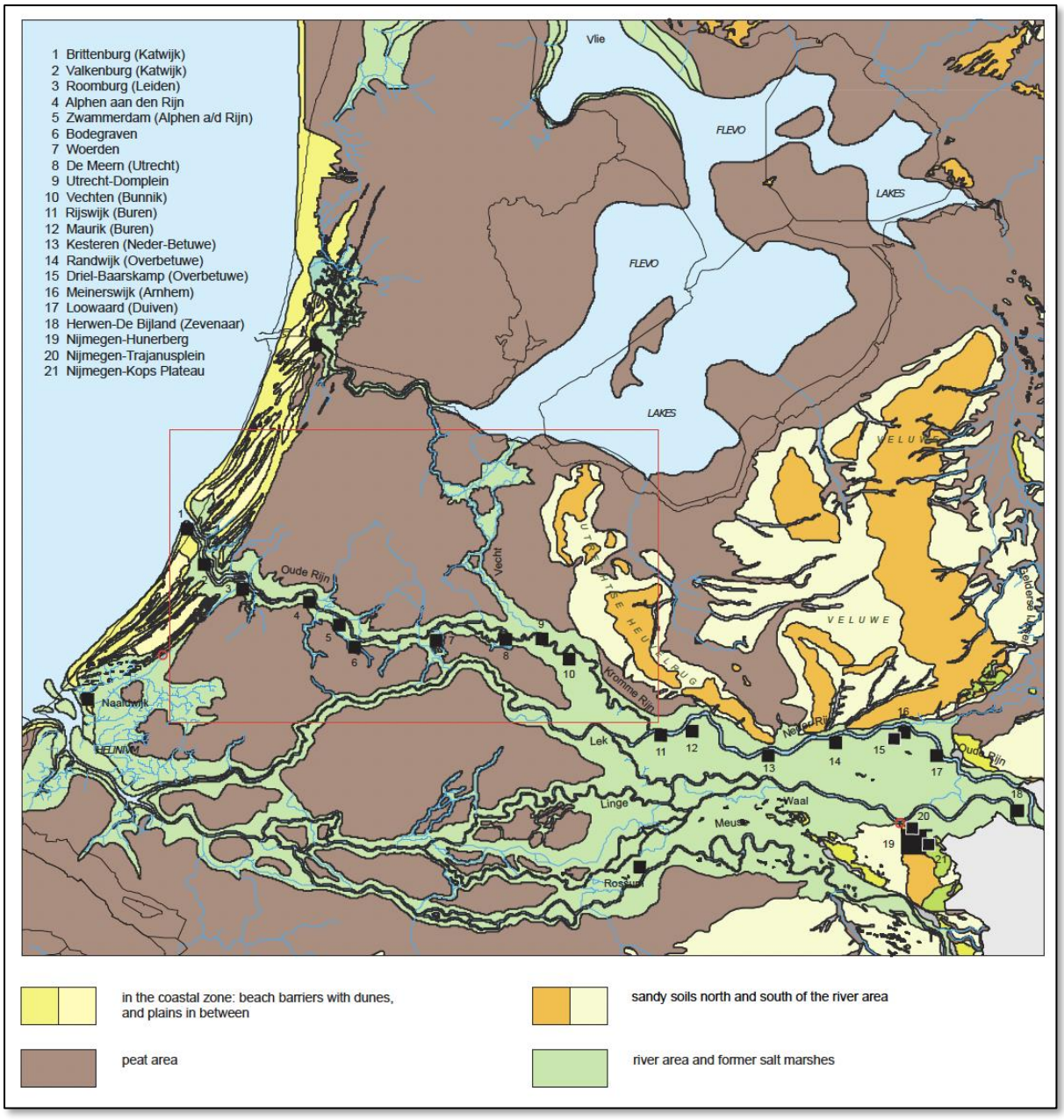

Figure 55 *- The central Netherlands c.AD 100, showing the main landscapes of the Limes zone with attested and presumed Roman fortifications*

Because of arable farming and trampling, sand drifts were a regular threat to the farmsteads, as is shown in the archaeological record. Sand drifts meant that underlying calcareous sands came to the surface, resulting in nutrient-richer grasslands with expanding sea-buckthorn. Sea-buckthorn made way for juniper when drifting ceased. This process was repeated in many different places and at various times. The woodland, or rather what was left of it, can best be characterised as mixed deciduous woods, dominated by oaks. Because of the prevailing westerly winds, trees did not grow tall, nor did they have very straight trunks. The hollows of

the beach barriers were bordered by low thicket vegetation, dominated by bog-myrtle and shrubby willow species typical of poor calcareous soils.

In the low-lying marshy plains between the coastal barriers with dunes, peat had accumulated over time. Reed marshes grew in the most waterlogged places, and alder carr in drier parts. Where the plains were wide enough, bogs developed in the central stretches. Around the estuaries of the Rhine and the Meuse, there were vast, treeless salt marshes. The most extensive of these were situated directly north of the wide Meuse estuary, east of the innermost coastal barriers. During the Iron Age, repeated floods had created a tidal marsh covering several dozen square kilometres, leaving clay deposits over a large area intersected by creeks and gullies. At the beginning of the Roman period, natural drainage offered new opportunities for human occupation, after which the area was settled, cultivated and partly reclaimed by active water management. Intricate field systems were parcelled out, bordered by systems of ditches and culverts to drain off excess water, and used as arable land or pasture. From the second half of the 1st up to the first decades of the 3rd century AD, the clay and drained peat areas were relatively densely populated.

The coastal strip north of the Rhine saw a slightly different development. Here, wide rivers with a constant supply of fresh water were no longer active. An estuarine lagoon, or wide tidal inlet, had formed between Castricum and Velsen. At its southern end, near modern-day Velsen, the northernmost branch of the Lower Rhine, starting off as the Vecht near Utrecht, emptied into this lagoon. This tidal system is now known as the Oer-IJ 'Primal-IJ' estuary. Around the end of the Iron Age or the beginning of the Roman period, the estuary near Castricum silted up, cutting this Rhine branch off from the North Sea. Wide expanses of now fresh water and reed marshes developed in and alongside the former inlet and the dead-end watercourse.

Vegetation on the drier parts of the parallel sand barriers was comparable to the coastal area between the Rhine and the Meuse. These beach ridges too had been occupied from their formation at the end of the Stone Age. An open landscape existed here of heath, grass and open woodlands, alternating with small settlements and their in- and outfields.

During the second decade of the 1st century AD, a Roman military fortification and harbour were built at the south of the Oer-IJ estuary. This was an obvious location for a sea harbour: with little tidal movement and sheltered from the sea by robust barriers and dunes. Although physical-geographical research has shown that the estuary near Castricum had by then already largely silted up, some passageway must have still been in existence between Lake Flevum and the sea by way of the Oer-IJ. It may even have been dredged out by the Roman army engineers, as has been established for the actual harbour basin at Velsen.

For the construction of the jetties and embankments mainly alder and, to a lesser extent, ash and oak were used. Initially the timber was taken from wetland woodlands in nearby flood basins.

Along the Lower Rhine itself, the building of forts started shortly before the middle of the 1st century AD. The Valkenburg and Katwijk forts were situated in the coastal landscape; the Roomburg-Matilo fort, just behind the innermost of the coastal barriers, on the edge of the vast inland peat area.

To date, extensive data on construction timber and wood supplies are available only for Roman Valkenburg and its surrounding infrastructure (vici, roads, etc.), in which a wide range of species had been used. However, except for some alder, trees appear not to have been felled in mass on the coastal barriers but came from the alluvial hardwood woodlands along the river Rhine. Alder may have originated from the natural alder carrs dominating the marshes between the coastal barriers.

The military posts along the North Sea coast itself, dating to the 2nd and 3rd centuries, were all located on the coastal barriers. The conditions for the preservation of wood are poor here, so we know little about the provenance of timber used in the military constructions. What we do know is that bulky transports by water must have been difficult here, so it seems more likely that timber supplies were sourced from local woodlands, either on the coastal barriers or from the plains in between.

Zeeland

Early development of the coastal landscape[1]

The southwest delta region of the Netherlands (i.e. Zeeland, and the southernmost part of South-Holland) consists of a number of islands, each nowadays composed of former smaller islands. Two major rivers flowed into the North Sea in this region, i.e. the River Meuse and the River Scheldt. The estuary of the River Meuse (which was joined by the River Waal) was in Roman times known as the Helinium. The Scheldt nowadays ends in two estuaries, the Western and Eastern Scheldt. In the Roman period the eastern (or rather northernmost) of these two branches formed the main Scheldt River, known as *Scaldis*. This river probably formed the border between *Germania Inferior* and *Gallia Belgica*.

[1] Please note that in this Resource Assessment, parts of the contributions for Zeeland are taken (with permission) from:

- B.H.F.M. Meijlink, B. Silkens, J.J.H. van den Berg & C. Turner (UCR) 2024, *Beach Archaeology. Bureauonderzoek voor een multi-disciplinair onderzoek naar archeologische sites op het strand en voor de kust van Vrouwenpolder*, Domburg (Walcherse Archeologische Rapporten 75 WAD);
- Zande, D. van de, 2023: 'Nodes and networks: military and civilian trade and transport in the Roman Dutch southwest delta', in P.B. Campbell & A. Tibbs (eds), *Rivers and Waterways in the Roman World. Empire of Water*. Londen: Routledge, 146-161. DOI:10.4324/9781003277613-13.

At the end of the last ice age (Weichselien) around 9700 BC, the sea levels increased very quickly due to the widespread melting of ice sheets. This caused a strong accumulation of the groundwater leading to peat growth on the Pleistocene substrate that made up the region at the time and is called Basic Peat. This peat formation process lasted until around 6000 BC, as the continual rise of sea levels and tidal action caused the northern parts of the delta region to flood, which created mudflats and salt marshes on top of the Basic Peat.

Tidal channels caused a large part of the Pleistocene landscape to erode. They also led to deposits that were mostly sandy. Afterwards the rising of the sea levels slowed such that the depositing of sedimentation and the rising of the sea levels took place at the same rate. This led to more clay-like sediments to be deposited, which were very soft and contained reed roots. The sand and clay deposits are part of the Wormer Deposit (Naaldwijk Formation; old nomenclature Calais Deposits).

A coastal barrier existing of a dune ridge was forming before 4.800 BP. This dune ridge was situated further seaward compared to the present-day coastline. What started as an open estuarine situation developed into a more closed coastline. Due to the reduced sea level rise, a silting process began to take place on top of existing tidal deposits, after which around 2500 BC peat started to form (Hollandveen Deposits). The peat environment changed from brackish to sweet, thus from eutrophic to oligotrophic. The Scheldt estuary between modern day Schouwen and Noord-Beveland was much smaller than the current Oosterschelde mouth. During both the Bronze and Iron Ages the Scheldt estuary widened. Perhaps the Veerse Gat was also formed during this time.

The peat layer can have grown well above sea level (Dutch NAP), and it is estimated that a large part of the region in the Iron Age consisted of inaccessible peat and bog landscapes. Creeks and streams connected to the sea (through openings that had started to emerge in the coastal barrier) however drained the landscape, making parts of it better accessible and suitable for occupation (Vos/Van Heeringen 1997). Among the Iron Age finds from the region is briquetage pottery (e.g. from Rockanje on Voorne, and Domburg on Walcheren), which indicates that, as was the case in coastal Belgium, salt winning was practiced in this region prior to the Roman period (Van den Berg 1968; Wind 1970; Van Heeringen 1988; Van den Broeke 2007). This practice continued in the Roman period.

Around 500 BC the peat bog reached its maximum spread and height. At this time the well-drained peat bog also became habitable. During the Iron Age and Roman period in order to cultivate the land people increased the drainage of the peat, by digging a large amount of drainage channels. From the Late Roman period, around 270 AD, due to the draining and the subsequent settling of the peat, the sea started to flow increasingly vehemently into the land, creating a tidal landscape again. The tidal channels eroded the peat eroded deposited sand, whereas the higher peat soils

were covered with a finer sediment of heavy clay. These deposits belong to the Walcheren Deposits.

Roman coastal landscape[2]

On the eve of the Roman period, the bulk of the region under marine influence was characterized by the presence of a wet and difficult to inhabit high peat bog. Possible settlement sites were limited to the beach embankments, well-drained edges of creeks in the peat bog, or the dry edges of the adjacent sandy inland area (Pleistocene). A few substantial break-in channels cut through the coastal dune belt in the Flemish area. Sites such as Oudenburg or Bruges were situated at the contact point of these channels with the Pleistocene hinterland. Through the moorland meandered Scheldt (now Oosterschelde), which in Roman times was probably the only stretch of this river which flowed into the sea shortly below the coast of present-day Schouwen, near Westerschouwen. Possibly, however, there was also a northern connection to the Meuse, the so-called Striene, although there is no geological clarity. Until recently the existence of the Western Scheldt (Westerschelde) in Roman times was thought to be limited to a small break-in channel near the coast. Although limited, there is now some evidence of marine influence in the late Iron Age at Arnemuiden at the occupation from that period of Arnemuiden-Brakenburg.

Recent archaeological and palaeoenvironmental research, especially at Ellewoutsdijk, however, has unequivocally demonstrated that as early as the 1st century AD, the peat bogs this far east of the North Sea were already draining and offered very good potential for habitation. In this rather open landscape people even managed to engage in agriculture and grow cereals (barley and oats) and other crops (flax, gold-of-pleasure and possibly horse bean), although the emphasis may have been primarily on raising sheep. This almost certainly indicates the presence of a good peat-draining gully system that flowed into a precursor to the Western Scheldt and its estuary. Perhaps this was a substantial break-in gully that extended at least to Ellewoutsdijk and Terneuzen and pushed up salt water during high tides.

Scots Pines dating to the 4th millennium BC., remnants of a fossilized forest extending from Terneuzen to the Verdronken Land van Saeftinge theoretically lay meters deep in Roman times and would only have been exposed with the final formation of the Western Scheldt. However, the native farmers of Ellewoutsdijk used the fossil pines to build their houses. This indicates that the logs were found on the surface or at least only very shallow during the 1st century AD or they were visible in the bank or bed of an incising gully in the area. This can only be associated with the presence of an active watercourse. Manure from the stabled animals in the farms of Ellewoutsdijk also showed that they fed on saltwater-loving plant species. Thus, the pasture area in the vicinity of the settlement at Ellewoutsdijk must have partly consisted of higher salt marsh vegetation (Kubiak-Martens & Hänninen 2003: 143-

[2] translation of De Clercq & Van Dierendonck, 2013

144). It can be inferred that marine influence was therefore not far away (Sier 2003b: 175), another argument pointing to proximity to an aquifer connected to the sea. Some older radiocarbon dating, and pollen analyses could also indicate that the Western Scheldt, as a substantial channel already played a much more important role during Roman times or earlier than was thought until recently. Finally, one may also wonder whether the role of the Roman fort of Aardenburg, may have been in the southern defence of the forerunner of the Westerschelde estuary (of which the Zwin was then a tributary), rather than only in the protection of the all-in-all rather unimportant cuesta stream, the Eede.

Paradoxically, the drainage of the peat did not only make the area more habitable. In time, the extraction of water from the peat also caused a subsidence, which made the area lower and immediately more susceptible again to floods. This in turn forced inhabitants to once again seek refuge on higher ground. Perhaps the abandonment of the settlement of Ellewoutsdijk during the 150s AD can be attributed to this; indeed, the site was fairly quickly covered by a clay blanket. At the end of the 3rd century, a panegyricus (eulogist) for Constantius Chlorus aptly describes the state of the estuary area of the Scheldt and Rhine:

> *"This can hardly be called land anymore, completely permeated as it is with water, so marshy that not only where it is clearly marshy it succumbs to the slightest pressure and swallows up the footstep, but also where the terrain seems a bit firmer it is touched by the pressure of the feet. In reality, this ground floats, and it might justly be said that such ground is very suitable for training a soldier for battle at sea" (*Panegyricus, March 1, 297).

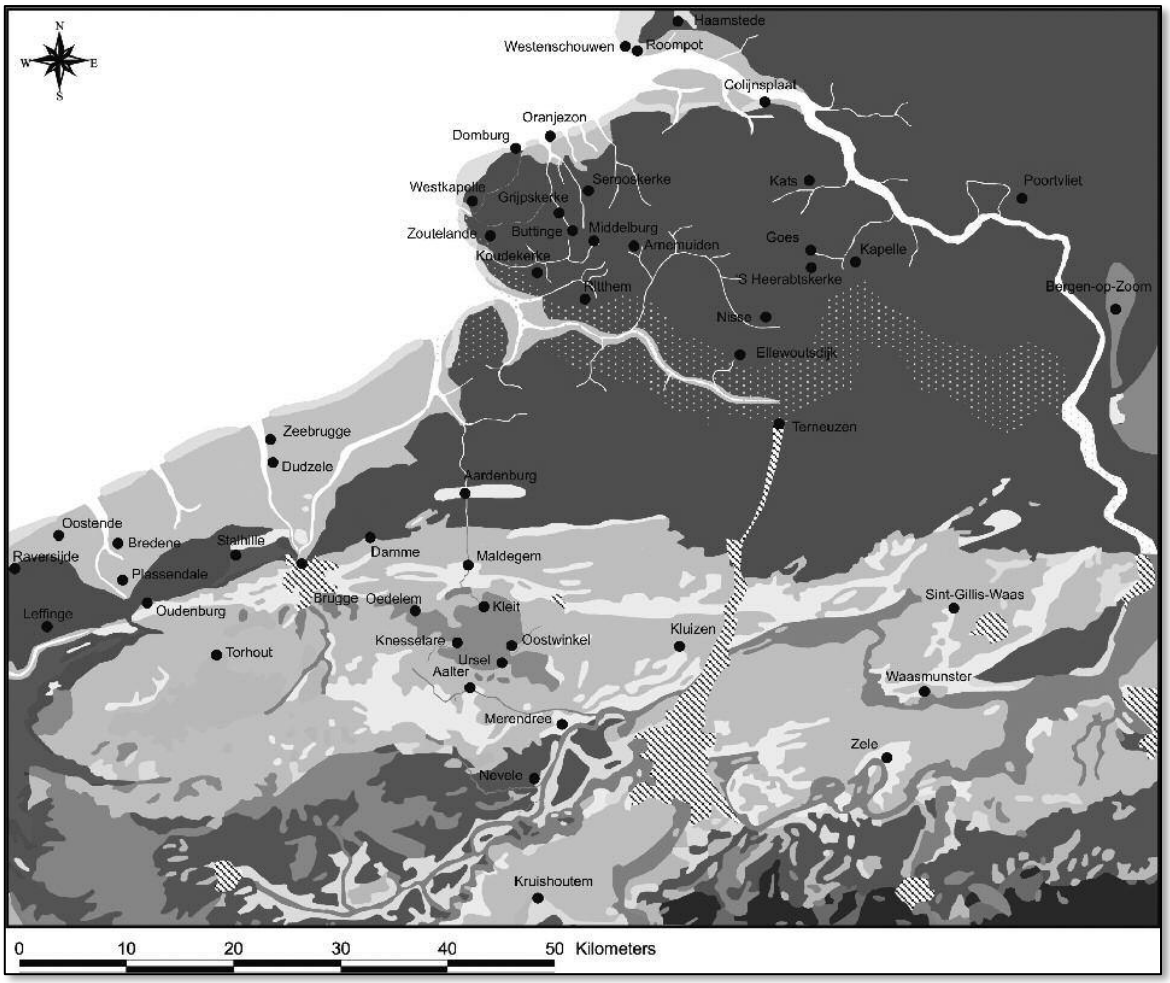

Figure 56 - *Paleogeographic map of the coastal area in Zeeland (NL and Flanders (B) (University of Ghent)*

Concluding remarks on palaeogeography of Zuid-Holland (Bert van der Valk)

The Roman landscape was partly preserved and at the same time has been affected in different ways:

1. by being covered with younger deposits, both fluviatile and marine and

2. having disappeared due to coastal and fluvial erosion, both in the order as written.

Along the Old Rhine river (as it is called nowadays), younger clay deposits covered the Roman infrastructure such as roads, forts, watch towers etc. Wind-blown coastal dunes and sandy/clayey marine deposits in the mouth area of the Rhine covered a granary, elevated roads, as well as *vici*.

Coastal erosion in front of the Old Rhine estuary has stripped a several hundreds of meters wide area from the coast. Severe and long-time coastal erosion in the south took away a vast coastal stretch starting just south of The Hague and running all the

way up to the former island of Goeree under the influence of large-scale estuarine flooding and severe tidal channel erosion during the Middle Ages.

5.3 Catalysts for change since Roman times

5.3.1 Summary

In the following section the partners have each summarised the main processes, both natural and artificial that have brought about change in their coastal landscapes. Examples of these include:

Natural processes

- Dune and spit development through deposition of sediments through tide, current and fluvial / river action.
- Formation of lagoons, salt marsh and peat bogs in areas behind the spits and dunes, material deposited by the rivers flowing into these areas and flooding as dunes breach.
- The effect of storm events, breaching defences, increasing the energy of rivers and consequent erosion and deposition of sediment.
- Retreat of the coastlines due to wave action on cliffs and dunes, especially during severe storm events.
- Sea level rise and submerging of marginal areas

.

Artificial processes

- Reclamation of salt marsh areas for agriculture; creation of polders and inning land through construction of dykes, drainage channels and water management features.
- Drying out of the former peat bogs which have lowered the land beneath sea levels increasing its vulnerability to flooding. Peat digging as added to this.
- Urban expansion and harbour development which has changed the landscapes (and seascapes) around our Roman harbours.
- Dredging and surcharging of sand onto the shorelines to improve coastal resilience.

UK

The Kent coastline is a long and varied one and as such the process of change on its Roman period landscapes are equally varied.

On Kent's eastern coast the Wantsum Sea Channel and the Lydden Valley, have principally been affected by the emergence of spits through longshore drift blocking

channels and creating tidal lagoons that have gradually silted up to create salt marsh. The natural processes were subsequently accelerated through the reclamation of salt marshes by 'inning', building sea and river walls and draining the contained marshlands to create at first grazing marsh and then rich agricultural land. The process of 'inning' mainly dates to the medieval period but there is perhaps some evidence for it back to Roman times in the Lydden Valley. This has left the ancient seaway now buried deeply beneath alluvial sediments and the major Roman port of entry at Richborough flanked by the River Stour rather than open to the sea.

On the southern coast, similar processes of longshore drift, creation of lagoons and coastlines affected by storm events and medieval 'inning' have served to create the Romney Marsh, burying the areas of early Roman settlement on its shingle banks and leaving the Roman port of entry at Lympne (*Portus Lemanis*) some 2.5 km from the sea and its Saxon Shore Fort overlooking a landscape of grazing marsh. While the extent of the change has been stabilized for the present through sea and river defences, increased pressure through sea level rise and storm events may affect these low-lying areas considerably in the future.

On the north coast of Kent, the alluviation along the Swale estuary makes the Roman coastline less distinguishable and has buried marginal sites in its sediments. Within the Medway estuary sea level rise and broad inundation has and is continuing to submerge and bury a once active Roman landscape of industry, settlement and burial.

The effects of coastal erosion on the cliff faces of the Kent coastline can be seen at East Wear Bay, Folkestone on the Channel coast and at Reculver on the north coast and mouth of the former Wantsum. At East Wear Bay the remains of an important Roman *villa* have been falling over a cliff as it has eroded over the last century and the possible remains of a harbour beneath the cliff have been lost through scouring and erosion. At Reculver evidence for the Roman harbour, town and a large part of the Saxon Shore Fort has been lost to the sea as the cliff has retreated a considerable distance in land. Sea defences have now arrested this loss

Erosion is not a process that is solely affecting the cliff faces on the Kent coast. The saltings in the Medway Estuary are a good example of a low-lying landscape that is being eroded through river and tidal action scouring away the shorelines. Archaeological remains are regularly being exposed on the shorelines of the saltings and marshland.

Around the Kent coast we also see examples of the human influence on past change since Roman times. As discussed above we can see evidence for the reclamation of marshland through the erection of sea walls and dykes and the draining of the enclosed land. As well as this we can see the development of industry at the mouth of the former Wantsum Chaneel that affects the setting of the remains of the Roman fort and port at Richborough as well as the appreciation of the former coastal setting

and the Wantsum. Similarly coastal development in Swale is affecting the legibility of the relationship of the main Roman road and the nearby coastal inlets.

Most significantly is the change at Dover. Though the silting of the harbour and its approaches may have been the initial catalyst for the demise of the Roman port, later expansion of the town into the Dour valley and changes to the port have left much of the evidence for the Roman harbour deeply buried within and beneath the modern port town. While some remains are exposed and provide glimpses of the Roman port and its forts, other remains lie vulnerable to excavations for new development which continue across the town.

Flanders

[3]From the Iron Age onwards the coastal plain was a vast tidal region of mudflats with a coastline moving inland, a totally different, dynamic landscape compared to the higher sand region.

The formation of the coastal plain during the Holocene was a complex succession of continuous sedimentary processes in which the tidal channels played an important role. In contrast to what has long been assumed, transgressions or sea level fluctuations did not form the basis of the late Holocene sedimentations and their lithological variation (Baeteman 2007a, 15). The sedimentary processes were influenced by palaeotopography, the decelerating relative sea-level rise, the supply of sediment and accommodation space, in turn affected by sediment and peat compaction (Baeteman 2013, 24). Over 7500 years ago, the exponential rise of the sea level resulted in a tidal landscape progressively proceeding inland combined with the deposition of a level of sand and clay, of almost 10 m thickness. Vegetation existed on the marshes, but since everything was covered by clay of the proceeding mudflats, these layers did not evolve into peat (Baeteman 2007a; 2007b; 2008, 9). The following decline in the sea level rise caused parts of the tidal landscape to silt up, as it was no longer flooded as regularly as before, resulting in freshwater marshes. However, the sea level rise still dominated the infill of the coastal plain and sedimentation continued in the numerous tidal channels, which shifted constantly through time, in search for accommodation for their water and sediments. This process caused the change of peat areas into mudflats and of areas deserted by the tidal channels into marshes, mudflats and freshwater swamps (Baeteman 2008, 10). Because of the continuous decline of the sea level rise, peat was able to take form and to eventually expand over vast areas. By c. 4800 years ago, almost the entire coastal plain was transformed into peat swamps (Baeteman 2008, 10-12). When and

[3] (Note that the text is largely taken from Vanhoutte S. 2023: *Change and continuity at the Roman coastal fort at Oudenburg from the late 2nd until the early 5th century AD. Volume I: The site and its significance within the wider context of the Roman North Sea and Channel frontier zone*, Relicta Monografieën 19, Brussels, 31-34)

how this peat growth ended, is still uncertain. Research during the last decades has shown that the traditional theory of transgression and regression phases or sea-level fluctuations between the Iron Age and the Carolingian period does not support the final formation of the coastal plain.

Recent research has concluded that several factors influenced the further development of the coastal plain, such as increasing erosion due to a run-out of sediment supplies, human intervention, an increased water supply from the sandy region due to increased rains 2800 years ago and deforestation during the Iron Age causing the erosion of tidal channels (Baeteman 2008, 12). In particular, human activities affected the coastal region in a negative way. Peat extraction and artificial drainage caused the peat surface to decline, resulting in an increased tidal influence. The subsequent erosion, drainage, compaction and sedimentation processes during the Roman period enabled the development of an expansive network of tidal channels eventually influencing the whole of the coastal peat and marsh area in combination with intertidal flats proceeding progressively further inland (Ervynck et al. 1999, 105).

At the start of the Roman period, the main part of the coastal plain was formed. It consisted of a tidal landscape characterized by intertidal flats, salt marshes, salt meadows, freshwater marshes with peat growth, tidal channels and natural gullies. Further away from the tidal channels, peat was still present, but these areas became largely covered during the Roman period (Hillewaert et al. 2019, 46). It must be emphasised that '*at any time the coastal landscape consisted of all the different sedimentary environments next to another, even over short distances*' (Baeteman 2013, 24). This was demonstrated at Raversijde (near Ostend) where research has shown that extrapolations cannot be made for larger areas (Baeteman and Pieters 2015).

Sedimentological research has illustrated the complexity of the late Holocene sedimentation history and of the landscape changes. During the Roman period, this area was subject to periods of rapid sedimentation alternated with long periods without any sedimentation. This resulted in a very diverse tidal landscape, with immense variations in time and space (Baeteman and Pieters 2015). Eventually the tide could re-enter the peaty swamps and by the late Roman period the tidal movements of the sea influenced the coastal plain as a whole. Around AD 300 the region was mainly a tidal landscape with a dynamic alternation of mudflats, marshes and active tidal channels, with continuing erosion of the wad and a coastline still proceeding inland turning sand ridges into islands. Mite and diatom assemblages found south-east of the Oudenburg fort illustrate that tidal influence reached the landward border of the coastal plain in the 3rd century AD (Schelvis and Ervynck 1993; Demiddele and Ervynck 1994; Ervynck et al. 1999, 117). A clay level locally found on top of the 4th-century cart tracks at this site (Hollevoet 1994) witness of the

late Roman inland progression of the coastline. In the region Oudenburg-Bruges only the large geest ridge Gistel-Stekene protected the sand zone from the sea.

The coastal plain between Cadzand in the Netherlands (near the border with Belgium) and Raversijde (near Ostend) was transversed by no less than seven tidal channels (Hillewaert et al. 2019, 46). The vicinity of one of these, the 'Bredenegeul', enabled direct access of the Oudenburg fort to the sea and enhanced its strategic position. This waterway ran from near Bredene and De Haan towards Bredene-village and bent widely via Zandvoorde towards near the base of the peninsula of Oudenburg at the north side running further eastwards (Thoen and Vanhoutte 2004, 183). This 'natural' channel, or at least an end-branch, reached the northern wall of the Oudenburg fort in the 4th century AD as is clear from archaeological observations and literary evidence. Since this fort maintained exactly the same position as its predecessors, this may suggest that human intervention was involved to influence the course of the side-arm of this waterway.

Since Roman times, the nature of the coastal plain has changed dramatically through large-scale land reclamation and embankment schemes, situating today for example the Roman coastal fort of Oudenburg over 8 km away from the current Belgian coastline. A determining element in the transformation of the coastal plain was the creation of The Polders, a reclamation of mudflats and saltmarshes gained from the sea by human interventions from the Middle Ages onwards, 10 to 15 km wide (in the Valley of the IJzer up to more than 30 km wide) and bordered from the sea by an almost continuous natural dune belt.

Nord

In the northern part of the Nord region, the maritime plain is particularly subject to sea-level variations. On the shoreline, evolutionary factors are essentially changes in climate, materialized by fluctuations in sea level and wind activity.

Since the Early Bronze Age, it seems that human activities and the colonization of coastal areas also had an impact, through land clearing and the development of agriculture, iron and steel and trade.

The rise in sea level at the beginning of the Holocene period is the main catalyst of change. The active sand spit on the coast then favours the development of backshore peat bogs and wet meadows, which seem to be used for grazing (cf traces of trampling).

Rising sea levels buried all these levels beneath the Holocene marine sediment cover. A new dune belt formed, isolating the coastal hinterland from marine influence while we see the formation of new peat bogs and lagoons in sand dunes depressions.

Human occupation of the coastline, with the development of urban centres in the historic period, has certainly contributed to the transformation of the landscape. Between periods of transgression, lower sea levels enabled people to colonize the coastline. However, the influence of storms and periods of climatic cooling led to flooding and the abandonment of dune belts. The installation of ports also has an impact on changing landscapes on the coastline. In the maritime plain, the creation of polders is one example (as in the Netherlands).

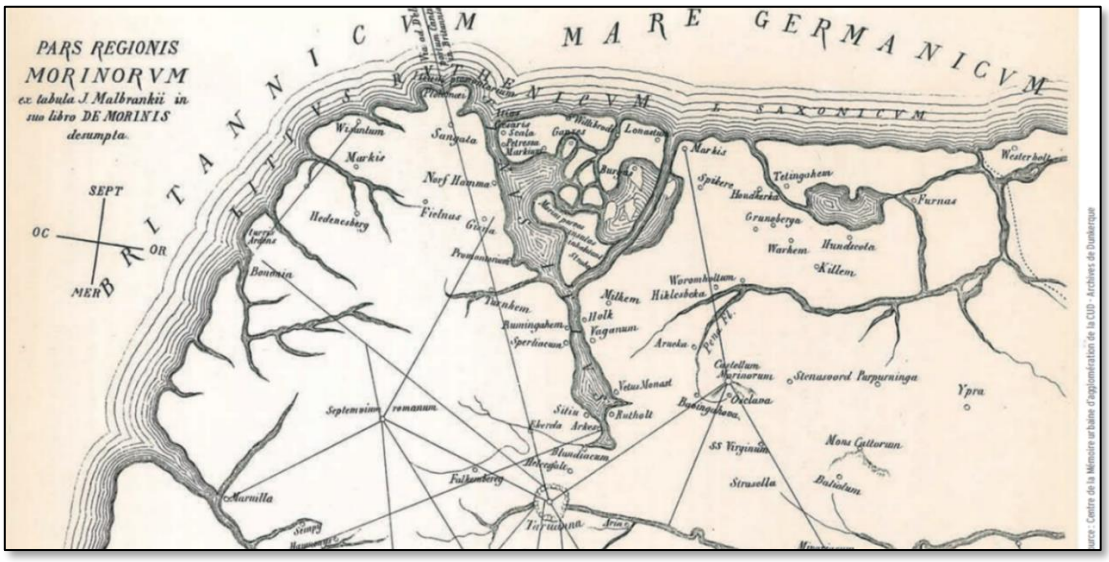

Figure 57 - The Aa delta in the 7th century in Les wateringues: hier, aujourd'hui et demain. (Xavier Chelkowski; AGUR Dunkerque 2014)

South Holland

It is generally accepted that sea-level rise has played a minor role in South-Holland landscape development since Roman times. However, two other factors have significantly contributed to the erosion of Roman remains.

First, during younger Holocene the rivers Rhine and Meuse provided less and less sandy sediment to maintain the location of Roman coastlines, effectively leading to coastal erosion and landward movement of the coastline. Secondly, periods of heavy storms in conjunction with the development of deeply incised tidal channels in the southern part of South-Holland and Zeeland have affected the location of adjacent coastlines, leading to structural erosion.

Any *in situ* trace of the Roman maritime coastal defence stations are now located on the sea floor. Their remains may be found at depths of over 5 to 10 m below present sea level and several kilometres off the present-day coastline. One example of this phenomenon is the fort near Goedereede named De Oude Wereld (The Old World). Another example could be Brittenburg, a Roman fort, probably a supply fort with granaries, that was exposed during the 16th and 17th century at the Katwijk beach

as a result of structural coastal erosion. One should however also consider an alternative scenario that the robust building had been covered by dune formation shortly after Roman times.

In the estuary backwaters, sandy clay deposits covered Roman period habitation (farms, *vici*) which preserved them rather well. Many of these were excavated after the second world war, in the wake of the construction of roads, urban extensions etc.

Zeeland

By the end of the 3rd century AD, the population in Zeeland seems to have largely disappeared. Evidence of human presence during the 4th and 5th centuries is scarcely known. Throughout the Early Middle Ages, the creeks slowly silted up which caused landscapes such as present-day Walcheren to form a single island surrounded by large tidal rivers and the North Sea. Towards the sea, dunes again formed a closed coastal barrier. The landscape behind the dunes initially probably consisted of a salty marsh landscape which slowly dried up in the subsequent centuries.

In the 6th century habitation started to return, albeit restricted to 'pockets of habitation'. Well known is the establishment of the trade emporium Walichrum to the north of Domburg. From this time on, population increased, and settlements were established. These settlements were now predominantly located on the silted-up creek ridges that, due to differential settling, had become raised areas in between lower clay grounds.

From the 11th and 12th centuries onwards, inhabitants of the delta region raised dykes to protect themselves from floodings. Salt marsh areas were surrounded by dykes in phases and became divided into polders. This process continued in the following centuries, with land reclamation and floodings alternately marking the regional habitation development. A widespread practice in the Middle Ages was the digging and extraction of peat for fuel and salt winning. This has severely influenced the landscape, as not only did this affect habitation levels and risks of flooding, but it also at times has affected (and destroyed) earlier occupation layers.

After the disastrous floodings in 1953 the Delta Works were initiated. Large-scale dams now permanently closed off the region from the North Sea. This process in itself has equally influenced processes of foe example beach formation.

A current practice that severely influences the coastline and possible (partly) submerged archaeological landscapes are so-called suppletion activities, in which sand is being pumped from the seabed by a dredger and sprayed onto the beach or just offshore. While this is being undertaken to reinforce the coast, it does mean that archaeological landscapes that have been submerged due to a shifting coastline are

being threatened, either directly through the pumping or indirectly due to a shift in currents which can result in the erosion of submerged sites.

5.4 Drivers for future change

5.4.1 Summary

Climate change, with rising sea levels and more frequent severe weather events, is likely to be the main driver for change in those areas that contain the North Sea's Roman coastal landscapes. In the sections below the situation in the partner regions illustrate the effects of the erosion of soft chalk cliff lines and the sediments of the dunes and alluvial plains due to wave action; the more frequent flooding of low-lying areas as rivers overbank; increased efforts to protect the coast line through increasing of the heights of dykes and beach replenishment; submerging of low lying areas open to the sea. Development pressures on the coastline, as ports change, towns expand and industry and infrastructure is built may also have direct and indirect effects impacts on archaeological assets and their relict landscapes. With many of the Roman coastal landscapes lying buried in former marshlands, changes in hydrology may have effects on the conditions for their preservation.

It is important to note that the contributions set out below are only broad level thoughts and not detailed analysis of what are complex issues regarding future change.

5.4.2 UK

The coastal landscapes of Kent are most vulnerable to the same natural processes that resulted in their formation and evolution, namely sea level rise and coastal erosion.

Cliffs formed through the erosion of the soft chalk North Downs by the sea are continuously being eroded. As sea levels rise and with more storm events caused by a changing climate the rate of coastal erosion is likely to increase. Sites such as the Roman *villa* at East Wear Bay will inevitably be lost to through cliff top collapse in due course. The remaining parts of Reculver have substantial sea defences which should arrest further loss, at least on its northern edge.

Low lying areas of the Roman landscapes such as the industries found in the saltings and marshlands of the Medway estuary are being lost through continued rising sea levels submerging the presently exposed areas and erosion through river

and tidal action and run off of flood waters. Rising sea levels will also affect, in future low-lying areas such as the Wantsum Channel, the Lydden Valley and the Romney Marshes which will become increasingly prone to flooding should sea and river defences not be maintained and fail and marshland and agricultural land becomes inundated. Reaction to this vulnerability through the creation of new flood defences may affect historic assets.

Ongoing management of the drainage ditches in the Wantsum, the Lydden Valley and the Romney Marsh involves the removal of sediments and may affect historic features and the original form of the drainage. Changes in hydrology may affect the preservation of important organic deposits present in the waterlogged alluvium. Relict sea walls may be eroded through farming practices as can be seen on the Rhee Wall on Romney Marsh.

Development proposals are likely to have more localised impacts on features and buried archaeology rather than the landscapes themselves, though settings are particularly vulnerable, particularly in the low-lying areas of the Wantsum and Lydden Valley. The Lydden Valley may be particularly vulnerable to the growth of Deal and improvement of access and services to the town. The eastern end of the Wantsum continues being developed for industry on the former Stonar bank. The eastern mouth of the Wantsum is also strategically placed for developing infrastructure connecting the National Grid with the continent and offshore wind farms. New undersea cables land through Pegwell Bay and connect to new substations and connectors. Pylons carrying the electricity extend through the Channel landscape towards Canterbury. In addition, the former channel landscape has also recently seen proposals for several solar parks responding to the need for clean and green energy generation.

Continued development and regeneration within Dover town centre will affect the rich geoarchaeological, palaeo-environmental and archaeological resources present beneath the town including remains of the former Roman port town and harbour. While the Roman forts are mostly protected as Scheduled monuments, much of the buried Roman archaeology is not and needs to be protected through development management processes.

It is likely that exceptionally rich and well-preserved remains underlie the town and that these would include waterlogged deposits. In addition to direct physical impacts such waterlogged deposits would be susceptible to harm through changes to the local hydrology.

5.4.3 Flanders

The Belgium coastline is 67 km long of which 33 km are dunes and the remainder is built up areas protected by dikes. Much of the coastline has been vulnerable to

erosion for decades prompting the construction of groynes to reduce the effects of currents and waves. Beach nourishment has been carried out regularly since 1960 to compensate for erosion. The coast is vulnerable to extreme storm flood events and consequential erosion potentially through breaching defences and dunes and flooding low lying areas behind. There are several projects on the Flemish coast that are intended to increase levels of protection to take account of 1:1000-year storm events. In 2011 the Flemish government introduced the Integrated Master Plan for Coastal Safety to address storm and se level rise risks. Measures include raising the heights of defences and increasing beach and foreshore nourishment that have helped to sharply increase protections. Source: Implementation of the integrated Master Plan for Coastal Safety in Flanders. As described for the Netherlands below the impact of potential coastal change on Roman landscapes is being managed through this process.

5.4.4 Nord

Coastal areas are particularly hard hit by climate change. An increase in the strength and frequency of storms is leading to a retreat of the coastline (as in the Wimereux area, north of Boulogne for example), collapse of the dunes (La Pointe aux Oies, 2022), collapse of the cliffs and disappearance of the coastal path. In addition, some archaeological sites are now under threat such as the protohistoric site of La Pointe aux Oies).

Recent floods, particularly in winter 2023-2024, in the Saint-Omer area and south of Boulogne, are also testimony to this.

In the area between Calais and Dunkirk, high population density and industrial development have profoundly altered the landscape, with a high level of land artificialisation.

Until recently, the idea of a coastal metropolis (based on the Lille Métropole model) stretching from Dunkirk to Boulogne was a wish, supported by political ambitions.

The “loi littorale” in 1986, has protected France's coastlines. Construction must be well thought-out and take into account the protection of natural areas. In recent years, projects such as the “Grand Site des Deux Caps” have been launched to protect the coastline. Structures such as the regional nature parks and the marine nature park of the Picardy estuaries and the Opal Sea are being established.

Around Dunkirk, low-lying or negative-lying land was drained by windmills in the last few centuries and is now being drained by electric pumps.

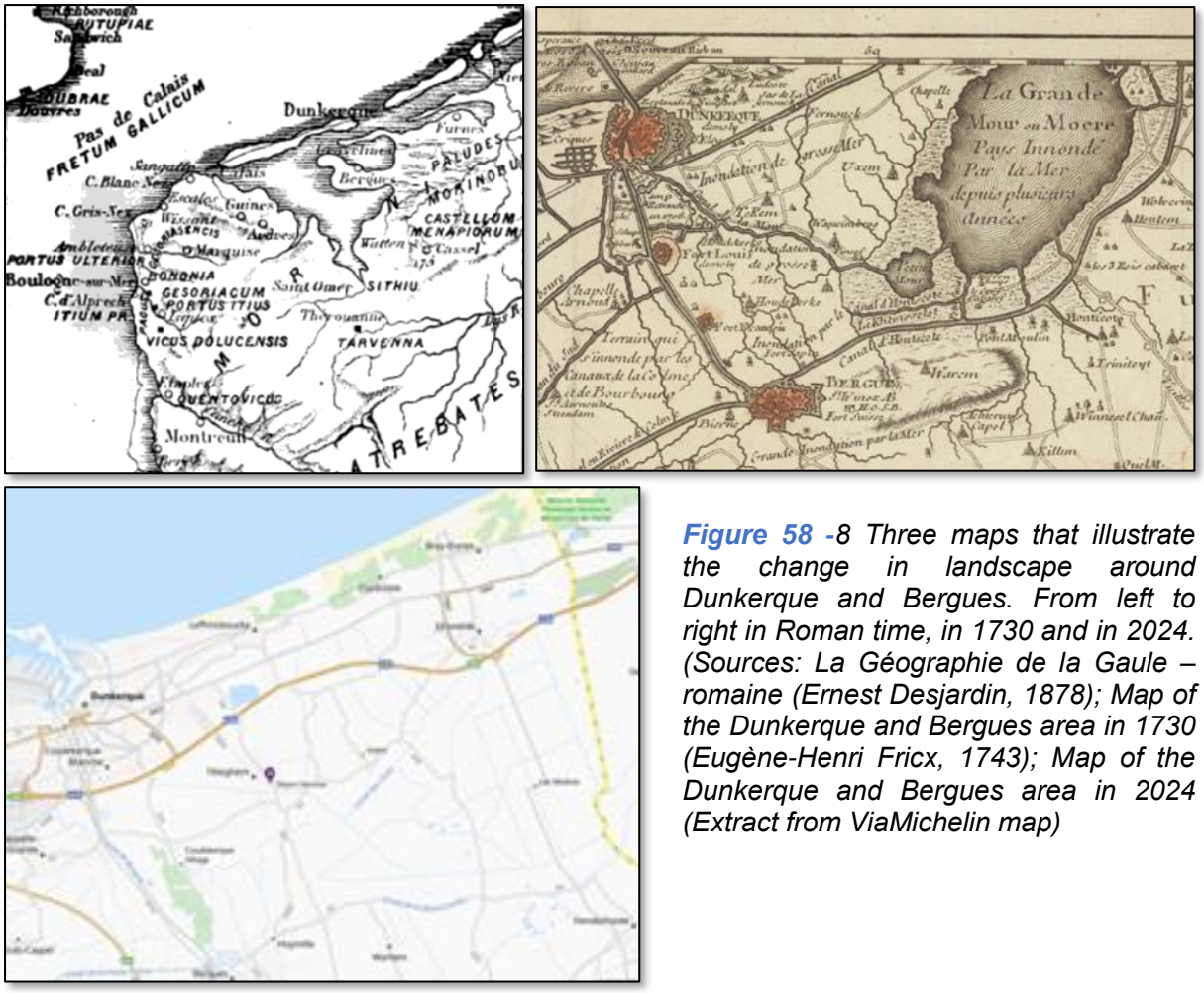

Figure 58 -8 Three maps that illustrate the change in landscape around Dunkerque and Bergues. From left to right in Roman time, in 1730 and in 2024. (Sources: La Géographie de la Gaule – romaine (Ernest Desjardin, 1878); Map of the Dunkerque and Bergues area in 1730 (Eugène-Henri Fricx, 1743); Map of the Dunkerque and Bergues area in 2024 (Extract from ViaMichelin map)

5.4.5 The Netherlands: South Holland & Zeeland

As explained above, natural landscape changes have been a threat in the past. They are no longer a reason for concern, since the Netherlands has engaged in a policy of maintaining its 1990 coastline by systematic artificial coastal nourishment with sand dredged from the North Sea (dredged below the – 20 m contour).

The major threat nowadays emerges from man-made, ever-intensifying land use of rural areas by deeper drainage for agriculture and/or development of farmland for urban expansions or for industrial use. The archaeology, including Roman archaeology, is a victim of market-led development as archaeology in these redeveloping areas is hard to assess in quality and quantity in advance of the development. Management of the resource by authorities can be piecemeal, as the system contains several loopholes. The main future threat to the resource is therefore man-made resulting from development and shortcomings of the systems to manage it. The situation of the Roman *Limes*, in South-Holland is a fortunate exception to this development impact being protected as a World Heritage Site.

There volunteers carry out studies (e.g. Brittenburg) to fill in some gaps in understanding which can assist in management of the resource.

New threats are anticipated from climate change in connection with changing groundwater levels. The Limes Association of the Netherlands, the State Service for Cultural Heritage and the province of Zuid-Holland are connected to an initiative of the Vindolanda Trust (Hadrian's Wall) focused on an intensification of the physical monitoring of archaeological sites of the Lower German *Limes* to get an understanding on the conservation of organic archaeological material *in situ*. These insights will help in finding solutions in countering the deterioration of the quality of sites. Knowledge and experience acquired by this international pilot project will be presented to, and shared with, partners in Zeeland.

5.5 Opportunities

5.5.1 Summary

The following contributions highlight some of the potential opportunities that the Roman coastal landscapes offer. Primarily, that an understanding of the ways in which the landscape has developed and been affected in the past, and the processes involved, can contribute to studies of future change. At a time when resilience to the effects of climate change is a critical consideration this can play an important role.

Investigation, survey and research of the North Sea's Roman coastal landscapes will provide us a with a much better understanding of how Roman period people inhabited, exploited, travelled through and defended these areas. It also provides an opportunity to understand how they managed their environment and the environmental conditions that they experienced.

Present studies are piecemeal and require more integrated and collaborative approaches and the development of techniques to investigate what in many places is difficult to reach archaeological evidence.

The contribution to interpretation, tourism and recreational use of the coastal areas, education and community projects is highlighted. An understanding of the past can help to engender a deeper sense of place in the areas.

5.5.2 UK

Kent's coastal landscapes provide a considerable resource to help understand how natural and human processes have changed since Roman times. Geographical and archaeological evidence can be used to illustrate the dynamic processes that have resulted in changes to the coastline through shingle and sediment deposition and through erosion of the chalk cliffs and vulnerable low-lying areas.

Borehole evidence is providing information on the sedimentary history of the Wantsum Sea Channel through targeted schemes associated with the ongoing development in the area. As well as sedimentary evidence the deposits are providing a better understanding of the climate and vegetational history of the area. Such evidence can contribute to a better understanding of the processes that are involved in landscape change and can contribute to future management practices and decision making.

In the Medway estuary there are opportunities to slow the erosion of the salt marsh and saltings through the creation of banks of dredged sediment in front of the present edges to create lagoons that will gradually silt and extend the salt marsh. An example of modern day 'inning' as seen historically in the coastal landscapes.

The archaeological assets of Kent's coastal landscapes have potential to substantially increase our understanding of the way in which the coast was utilised in Roman times and how Kent connected to other areas of Britain and the continent at the time. There are considerable gaps in our understanding and the resource offers opportunities to fill these. Information on the form, nature and use of the Roman harbours, port towns and landing places on our coast; the industries and exploitation of the marginal lands; trade, navigation and shipping; invasion and defence of the Kent coast and the role of the *Classis Brittanica* can all be addressed.

An increased understanding can help to explain the stories of the coastal landscapes to local peoples, attract tourism and be used in education across various areas of the curriculum. The coastal landscapes offer a great opportunity for connecting with the nearby communities, increasing a sense of place and raising their profile. The Wantsum Channel and its former use as a Roman waterway, and its connection with the main port and harbour at Richborough and the harbour at Reculver, could be better understood and appreciated. The Wantsum offers a significant opportunity for community led research and interpretation.

The recreational and visitor potential of the Wantsum Channel and the Lydden Valley is significant and could be improved through better connections and interpretation, improved access and branding. There are significant historic assets in the Lydden Valley and Wantsum Channel that should be identified and measures put in place to protect, enhance and interpret them.

Similarly, the unique landscape of the Romney Marsh offers valuable opportunities to reconnect with the natural environment and to instil a strong sense of place. Being outdoors and reconnecting with the landscape has important benefits for mental as well as physical wellbeing and can help to improve quality of life.

The survival of significant buried remains at both Lympne/*Portus Lemanis* and East Wear Bay have been identified and present valuable opportunities for further investigation and future archaeological discovery. This also offers the opportunity to build on understandings of the sites and their functions relating to the sea. Whilst Roman Kent is well documented generally, certain elements such as the *Classis Britannica* remain largely unknown and would benefit from further research. Both sites have produced stamped CLBR tiles which need more detailed research and documentation to better understand their significance.

There are also opportunities to build community projects around the Roman coastal assets. A good example of one such project is the *East Wear Bay Archaeological Project* which offers a number of opportunities for public participation in project work, such as excavation or supporting research, as well as open days. This is important in encouraging local ownership and feelings of pride in the local heritage and also attracting wider interest from visitors further afield. It is also an important opportunity to gather a substantial amount of information about the site before it is completely lost to clifftop erosion.

5.5.3 Flanders

No specific opportunities have been highlighted for Flanders, opportunities would in generic terms mirror those flagged by project partners.

5.5.4 Nord

No specific opportunities have been highlighted for Nord, opportunities would in generic terms mirror those flagged by project partners.

5.5.5 The Netherlands: South Holland & Zeeland

South Holland

Although the configuration of Roman-era settlements in South Holland is quite well known, still more sites are found, mostly in the context of emergency excavations before development into urban areas and/or industrial use. For a better

understanding of the history of the landscapes of the Dutch coast in Roman times, a permanent evaluation of the results of past and recent excavations should be organized. Governmental parties, municipalities, provinces and the state should guarantee this process in combination with the archaeological companies, universities and volunteer organisations. After 25 years of working under the European rules in Valetta/Malta Convention this has turned out to be hard to achieve. In recent decades this evaluation has been addressed by inviting archaeologists to participate in collaborative projects. One of these projects, Odyssee (2009-2013), has led to the Roman Coast project, the origin of the Bridging the North Sea network. Another important integration of 25 years of research along the *Limes* is the publication *Romans on the Waterfront* (Hessing et.al 2021), within which a large amount of the Dutch coastal area is covered.

Nonetheless, scientific progress has been less than it could be. This leads to a reduced level of understanding of past landscapes, which affects the public knowledge of these landscapes. A permanent process of evaluation is not in place. For the northern area of the Dutch Roman coastal area, a development has started with the Lower German Limes Research Framework in combination with the Limes-Network consisting of archaeologists of governmental parties, companies and volunteer groups.

It is hoped that the Bridging the North Sea initiative will strengthen the contacts within the Roman archaeological community and intensify cooperation, leading to a better understanding of the Roman landscapes of the North Sea coasts.

An excellent opportunity for the BTNS-region is to focus on climate change by working together at an international level between partners from Hadrian's Wall, Scotland and the Lower German *Limes*. This already has the attention of Dutch governmental parties (State, province of Zuid-Holland and the Limes Association of the Netherlands).

Zeeland

Knowledge of Roman-period occupation in the south-west of the Netherlands is based on various sources. These include development-led (commercial) projects, but also older collections from individuals and local/regional institutions. A challenge is to work beyond the 'patchwork-approach' and combine the available information. Through an integrated approach, a more multi-dimensional insight can be obtained (which is of course not limited to the Roman period).

Research into the ancient landscape is an important part of this integrated approach. For example, a combination of palaeo-geographical investigations and geophysical prospection will hopefully result in an informative landscape reconstruction for the region of northern Walcheren, which is the setting of what is presumed to be a

fortification of the *Classis Germanica*. This is part of Zeeland's 'Beach Archaeology' project, which is a citizen-science project that relies heavily on the involvement of volunteers. The design of this project is such that it is applicable to other parts of the Roman coast of the (south-west) Netherlands, which is an opportunity for future investigations. The results of this project will furthermore be of value for the development of methodologies for scientific archaeological research where volunteers and the public are an important and integral part of the project and will also aid in the updating of governmental heritage policies (which for beaches and water bodies are often absent in the Netherlands). Other opportunities include the investigation of the submerged temple of the local goddess Nehalennia near Colijnsplaat. Votive altars have been discovered by dredging/diving up in the 1970's and the location is protected under national law. However, divers (who have special permission to dive here) report seeing building material, and the impression is that at least part of the site remains *in situ*, waiting to be investigated. Erosion of the riverbed however threatens this site, which makes investigation desirable.

5.6 Past and present projects studying landscape change

5.6.1 Summary

The following section sets out a number of projects within the partner regions that are being undertaken looking broadly at coastal change or specifically on the Roman coastal heritage.

5.6.2 UK

Past research and resources relating to coastal change and the historic environment

The following section briefly describes research projects and resources relating to climate change heritage for the UK. Some of these resources have documented threats to heritage assets including those found in the North Sea coastal zone. Other research has mapped the types and levels of threats, which through comparison to the historic environment were used to understand how a site may have been impacted upon, such as through flooding. In addition, research which has documented and/or measured geomorphic change through time has been presented as these projects serve as exemplary for potential analysis of sites from the North Sea coast impacted upon by modern and historic coastal erosion. Information on accessing data portals which hold information pertaining to the coastal and marine environment have been included.

Rapid coastal zone assessments

Historic England commissioned several rapid coastal zone assessments (RCZA) dating back to the 1990s when they operated under the name of English Heritage. The purpose of the coastal zone assessments was to assess the condition of the UK coastal historic environment to inform shoreline management plans. A two-phase approach was originally employed. Phase 1 was a desk-based assessment characterizing the coastal historic environment. This included identifying threats to heritage assets to design strategies for fieldwork assessments for areas under greatest threat. Phase 2 involved carrying out the fieldwork. Some areas were subjected to a further third phase assessment. Regarding the North Sea coast of England, coastal zone assessments have been completed for the North East of England (Bacillieri et al, 2008, Burn, 2008, and Tolan-Smith, 2008), Suffolk (Everett et al, 2003 and Everett, 2007), Norfolk (Buglass and Brigham, 2007b, Jobling and Brigham, 2010, and Robertson et al, 2005) Yorkshire and Lincolnshire (Brigham et al, 2008, Brigham and Jobling, 2011, Brigham and Jobling, 2013, Brigham, 2014, Buglass and Brigham, 2007a, Buglass and Brigham, 2007b, Buglass and Brigham, 2008, Jobling and Brigham, 2010a, and Jobling and Brigham, 2010b), Essex (Heppell and Brown, 2008), South East of England (Dickenson et al, 2012, Hamel and Lambert, 2011, and Thorogood et al, 2013), the Yorkshire coast and Humber Estuary (Deegan, 2007), and the Inner Humber Estuary (Fleming and Royall 2019, Grant et al, 2021). This reports are available through the Historic England Research Reports online portal (https://historicengland.org.uk/research/results/reports/), some of can also be accessed via Archaeology Data Service (https://doi.org/10.5284/1106880). The culmination of the RCZAs over the years has been reviewed by Peter Murphy (2014). Murphy (2014) draws together results from each region, thereby providing a detailed national review.

Heritage at Risk

Historic England (2024) maintains a heritage at risk register (HAR) for the whole of England. The register is updated yearly with entries being added and removed as conditions decline or improve respectively. There are two Roman sites from the North Sea coast which are on the 2024 HAR Register. These are the Roman signal station (Scheduled Monument 1004187) at Carr Naze, and the Roman Villa (Scheduled Monument 1005158) at Folkestone, Kent. The signal station is experiencing extensive significant problems due to coastal erosion and is in a state of decline. Currently no action/strategy has been identified or agreed. The buried remains of the Roman Villa is considered to be at high risk-and is in a declining stat as loss is both significant and ongoing due to erosion of the cliff on which the *villa* sits.

Dynamic Coasts

The Dynamic Coast project began in 2017 aiming to provide evidence on the extent of coastal change for Scotland's coast (Rennie et al 2021a). This was in aid of the Scottish Government and Public Sector decision-making relating to the management of coasts in a changing climate system. The main activity of the Dynamic Coast project was mapping past and future coastal changes. The project used a spatiotemporal approach to map historic coastline positions stretching up to 130 years into the past and forecast future change under various climate change scenarios including accounting for sea level rise. In doing so, a comparison of coastline position through time was made possible, which enabled the quantification of erosion and a calculation of rates of change. Through comparison of the results to the Scottish historic environment, the project was able to assess impact of coastal change on cultural heritage sites. The mapping outputs from this project have now been made available to readers online through multiple web maps (https://www.dynamiccoast.com/webmaps). One of the key findings relating to the historic environment was that 210 cultural heritage sites covering an area of 140 ha are at risk of erosion by 2050, which will result in loss and decay of these culturally significant sites. In addition to this national scale assessment, Dynamic Coasts undertook local scale analysis at several 'super sites', including at the Bay of Skaill known for its world-famous Neolithic village, Skara Brae (which forms part of the Heart of Neolithic Orkney World Heritage Site). The site (a scheduled monument) has been protected by a sea wall, however the beach lowering from wave action is beginning to undermine the wall (Rennie et al 2021b). Wave action is anticipated to worsen under the various climate change scenarios. Historic Environment Scotland has conducted repeat terrestrial laser scanning surveys in 2010, 2014, and 2018 of Skara Brae as a means documenting and of monitoring the site. Dynamic Coasts has used this data along with lidar data in conjunction with the 1970's high water mark and the climate change scenarios to determine erosion of the beach by up to 7 m by 2050 and up to 29 m by 2100. The results of this 'super site' analysis were invaluable for informing the site adaptation plan.

The methodology employed by the Dynamic Coast project can be used as a blueprint for coastal change studies in other regions. Undertaking such a study for the North Sea coast would enable an understanding of the impact of coastal change on its historic environment at a quantitative and spatiotemporal level, both at a national scale and on a 'super site' scale of analysis. In addition, such a study has benefits beyond the cultural heritage sector benefiting from interdisciplinary research.

CHERISH

CHERISH (Climate, Heritage and Environments of Reefs, Islands and Headlands) was a collaborative interdisciplinary and transnational project between Ireland and Wales which ran from January 2017 to June 2023. The team was composed of experts in archaeology (excavation, desk-based assessment, rapid coastal zone assessment, interpretation), digital documentation (geomatic survey, aerial survey, geophysical survey) and 3D modelling (The Discovery Programme and The Royal Commission on the Ancient and Historical Monuments), geology (Geological Survey Ireland) and paleoenvironmental research (Aberystwyth University). The main purpose of the project was to document and monitor change associated with climate change to coastal heritage sites from around the Irish and Welsh coastlines. The CHERISH project team employed a diverse toolkit which included aerial photo survey, digital documentation (terrestrial laser scanning and terrestrial and UAV digital photogrammetry), 3D modelling, excavation, lidar and satellite imagery analysis, desk-based and coastal zone assessment, palaeoenvironmental sampling and analysis, and marine survey amongst others. While the work did not focus on the North Sea coastline, the project published a guide to the CHERISH toolkit (Barker and Corns, 2023) which can currently be accessed through the CHERISH website (https://cherishproject.eu/en/sharing-our-practice/). This publication can serve as a guide to employing an integrated approach in documenting and understanding past physical changes to coastal cultural heritage sites and landscapes of the North Sea coasts.

CITiZAN

CITiZAN (the Coastal and Intertidal Zone Archaeological Network) was a community-led project overseen by MOLA (Museum of London Archaeology) (CITiZAN, Museum of London Archaeology, 2024). The project used community archaeology and citizen science to raise awareness of coastal sites, from England and Wales, that were under threat from coastal erosion and climate change. The project team trained volunteers from the local community to identify and record heritage features located within the coastal and intertidal zones and to monitor changes to those features over time. A smartphone app was developed alongside an interactive website, which allowed users to geospatially record their observations such as adding information regarding new or accelerated erosion impacting a heritage feature or the discovery of a new heritage feature after storm activity. Through the work of the volunteers and community members using the app, a database of heritage features threatened by coastal erosion and climate change was built up. As their observations were geo-tagged with GNSS coordinates, an interactive web map was created which can be viewed and searched for Roman features at risk from the North Sea coast of

England. A version of the database (https://doi.org/10.5284/1116909) has been archived with the Archaeology Data Service.

SCAPE Trust

SCAPE Trust, funded by Historic Environment Scotland, began in 2009 to work with the public to research the archaeology, history and past environments of Scotland's coastal zones. SCAPE has worked on several notable projects including the SCAPE Coastal Archaeology app (SCAPE Trust, 2024a). This app allowed users to record their observations relating to coastal archaeological sites at risk. There are 13000 sites recorded in the geospatial database and can accessed online (https://scapetrust.org/sites-at-risk/). Another notable project includes the 4D Wemyss Caves (SCAPE Trust, 2024b), which were recorded using 3D scanning technology. Using the 3D captured data, SCAPE Trust was able to produce a 4D virtual world – a 3D model which can be explored through time (Pictish, medieval, 1900, and present day (day of data capture). The model is available online (https://www.4dwemysscaves.org/). The SCAPE Trust also works with volunteers to excavate sites that are in critical danger of loss due to climate change impacts and coastal erosion.

Climate Vulnerability Index

The Climate Vulnerability Index (CVI, https://cvi-heritage.org/about) was developed by researchers from Australia, the UK and the USA, as a rapid assessment tool to systematically assess climate change vulnerability of World Heritage (WH) sites. The CVI works by assessing the physical and ecological impacts from climate change to the WH sites Outstand Universal Value (OUV) while also assessing the economic, social and cultural consequences to communities local to the WH sites. The process is informed by a variety of stakeholders, including heritage professionals as well as members of the community. Regarding cultural WH sites within the UK, the CVI has been applied to WH sites in Scotland, including St Kilda (Bain et al, 2024), the Antonine Wall (Jones et al, 2023), the Old and New Towns of Edinburgh (Bruce et al, 2023), and the Heart of Neolithic Orkney (Day et al 2019). The CVI methodology has recently been expanded and modified for application beyond WH. It, therefore, can also be applied to cultural heritage sites without WH status, such as those from around the North Sea coast.

Natural hazard impact assessment for cultural heritage sites

As part of doctoral research, Davidson (2022) created a framework for assessing impact from natural hazards on cultural heritage sites. The methodology employed a spatiotemporal analysis that used 2D, 2.5D and 3D geomorphic change detection to

quantify past geomorphic change and argues for statistical analysis and numerical modelling to forecast future change. This workflow is suitable for sites where impact from natural hazards has presented itself as deformation of the Earth's surface, such as coastal erosion, for example, a retreating shoreline. It relies on multitemporal legacy and modern repeat survey data relating to topography, such as historic maps, aerial imagery, lidar, UAV structure-from-motion multi-view stereo and UAV lidar. While cultural heritage sites from the North Sea coast were not the focus area of this doctoral research, the methodology presented can serve as an exemplary for undertaking geospatial natural hazard impact assessment for sites exhibiting past and/or present evidence of geomorphic change such as coastal or riverine erosion.

National Trust Climate Change map

National Trust (2021), in partnership with Cadw, Department of Communities, Northern Ireland, Historic Environment Scotland, Historic England, and English Heritage, has produced guidance regarding climate change adaptation for properties in their care across the UK. As part of this guidance, a national scale climate hazard map was developed. This map now is available online at https://experience.arcgis.com/experience/0295557a52b5446595fc4ba6a97161bb/page/Page/. Plotted on the map, using a 5 km hex grid, are layers pertaining to climate-related events such as flooding and coastal erosion, for both current and projected future conditions. The map can be referenced to understand climate change related hazards which may impact the historic environment, including that of the English North Sea coast.

Coastal Risk and Priority Place

Historic England commissioned LUC to create a geospatial database of heritage assets recorded in the National Heritage List for England that are at risk due to coastal change. For this, LUC (2019) developed an equation to assess level of risks based on the heritage assets importance and its sensitivity to change, the magnitude of change and whether the heritage asset has already been negatively impacted upon (heritage at risk multiplier). Four test areas were used in the development of the methodology (Somerset Levels, Suffolk Coast, Humberside and Solway Coast), after which a national assessment was undertaken. The inland boundary for the analysis was defined by the extent of coastal erosion, flooding and sea level rise under the long term epoch (see below). In addition, analysis was narrowed to 1 km inland of the High Water mark due to large coastal flooding extents. Offshore protected wreck sites were included in the assessment. The results of the study were able to identify heritage assets most at risk from coastal processes in the short, medium and long term and were presented as a web map and report. The temporal scope for understanding risk chosen to be in line with definitions set out by the Shoreline Management Plans and National Coastal Erosion Risk Map, with short

term being 0 – 20 years (2005 – 2025), medium term being 20 – 50 years (2026 – 2055) and long term being 50 – 100 years (2056 – 2105). The web map does not appear to be publicly available, however the report is available for download at https://historicengland.org.uk/research/results/reports/68-2011).

This resource can be used to identify sites along the North Sea coast of England dating to the Roman period in need of further research due to risk of damage or loss from coastal processes. In addition, the methodology of assessing risk can be applied at a national level elsewhere along the North Sea Coast.

Other

Other noteworthy resources regarding coastal cultural and natural heritage include the Unpath'd Waters portal (https://unpathd.ads.ac.uk/) the MEDIN portal (https://portal.medin.org.uk/portal/start.php), DEFRAS Data Service Platform (https://environment.data.gov.uk/survey) and the National Network of Regional Coastal Monitoring Programmes (NNRCMP) https://coastalmonitoring.org/). The Unpath'd Waters portal is an online catalogue of marine heritage data from across mainly the UK. The catalogue currently links to just under 100,000 records, with 254 entries dating to the Roman period. MEDIN (marine environmental data & information network) maintains a portal that contains information pertaining to marine datasets from over 600 UK organizations. DEFRAS Data Service Platform is a geoportal where environmental data, such as lidar, bathymetry, multi-spectral imagery and vertical photography are made openly available. This data is useful for understanding changing landscapes over time as data has been captured on a regular basis. The NNRCMP is a good resource for information regarding coastal monitoring programmes from around the English coast which may intersect with Roman heritage sites.

Kent research and projects

The former Wantsum Sea Channel has been the subject of several past and present studies. Since the 19th century, scholars have examined the geography and archaeology of the sea channel and its harbours particularly Richborough. Archaeological works at Reculver by the Kent Archaeological Rescue Unit and by various parties at Richborough have revealed much about the core of those places but limited information on the harbours. A good recent summary of the evolution of the Wantsum from various accounts and analysis of the geography of the landscape has been provided by Gerald Moody ('Isle of Thanet from Prehistory to the Norman Conquest', 2008). Borehole surveys carried out in connection with development and, in particular, that for National Grid's Richborough Connection project, are increasing our understanding of the Wantsum. Further work is proposed as part of the ongoing

Thanet Archaeological Landscapes Mapping Project (Kent County Council), a major project to map and characterise the archaeology of Thanet and its landscapes. The Lydden valley has seen less archaeological work than the Wantsum but has benefitted from a comprehensive survey of its earthworks through the Lydden Valley Project.

Likewise, Romney Marsh has long been the subject of various studies in particular those carried out in the past by the Romney Marsh Research Trust whose papers are available online (https://www.kentarchaeology.org.uk/news/romney-marsh-research-trust-archive) and more recently through a resource assessment for the 5th Continent landscape project.

The area around the Roman port and fort at Lympne is the focus of ongoing survey and fieldwork by the Studying History and Archaeology in Lympne group. As mentioned earlier the Roman *villa* at East Wear Bay is also a focus of community archaeological investigations, rescuing the information from the site before it is lost to further coastal erosion (East Wear Bay Archaeological Project (https://www.canterburytrust.co.uk/east-wear-bay).

The long history of development in Dover has revealed partial information on the Roman harbour, port town and defences. Recent mapping for an Urban Archaeological Database has helped to bring together individual records and provided a useful management tool to help conserve the archaeological resource and guide investigations. (Dover Urban Archaeological Database Project: Introduction)

Heritage Strategies written by Kent County Council for Dover District and for Folkestone & Hythe have explained the coastal landscapes and coastal heritage assets of those districts, their vulnerabilities and opportunities that they provide.

The exploration of the Roman coastal heritage assets in the Swale has mainly been undertaken by the Kent Archaeological Field School who have investigated several of the *villa* sites adjacent to the creeks. The wider landscape is becoming increasingly understood through development-led archaeology. The area does lack a comprehensive synthesis of the investigations. Recent investigation of a temple / mausoleum site adjacent to the former Watling Street discovered a fine statue of a Triton suggesting a relationship between the temple / mausoleum and the sea. The temple / mausoleum was also partially constructed using Marquise oolitic limestone from Northern France which is often associated with the *Classis Brittanica* as seen at Boulogne and also used for a 3rd century altar dedicated to Neptune at *Portus Lemanis*. The find suggests a further trans-straits connection.

The archaeological remains being exposed in the Medway estuary have mostly been recorded through the work of the Upchurch Archaeological Group and a Rapid

Coastal Zone Survey by Wessex Archaeology. Again, the area lacks a synthesis of the results of this work.

5.6.3 Flanders

Coastal change and dynamics have been studied from the 19th century onwards, but significant progress has been made since, through the work of soil scientists and geologists like Amerijkcx, Baeteman and Mostaert. The 'Dunekirk transgression' lithostratigraphical model based on relative sea-level movements, proposed by Blanchard in 1906 and further developed in the 1950s by the historian Verhulst and the soil scientists Tavernier and Amerijkcx, was refuted during the late 20th century. New and ongoing interdisciplinary research projects such as the High Tide Low Project (north-east of Bruges, focusing on the maritime access to Bruges) and the Testerep-project (focusing on the transformation of the coastal landscape in the Ostend area) are applying a regional, diachronical research strategy, considering geological, archaeological, and historical data and providing detailed, diachronical views upon the coastal dynamics.

5.6.4 Nord

Several projects are underway that are focusing on paleoclimate and landscape change.

Murielle Meurisse and Brigitte Van Vliet studied dunes and barrier beaches in the 2010s. They took several drillings and core samples in the dunes to analyse changes over time.

In the Dunkirk region, numerous archaeological operations are being carried out in connection with port development work (see Mathieu Lançon and Samuel Dessoutter's research on the evolution and settlement of the maritime plain, for example). A hydraulic system and dykes have kept this reclaimed land from being flooded or inundated for centuries. The existence and economic viability of the wateringues plain depend on it.

In the south (from Canche to Picardie), the research project on the medieval port of Quentovic has completely renewed our knowledge of the ancient environment.

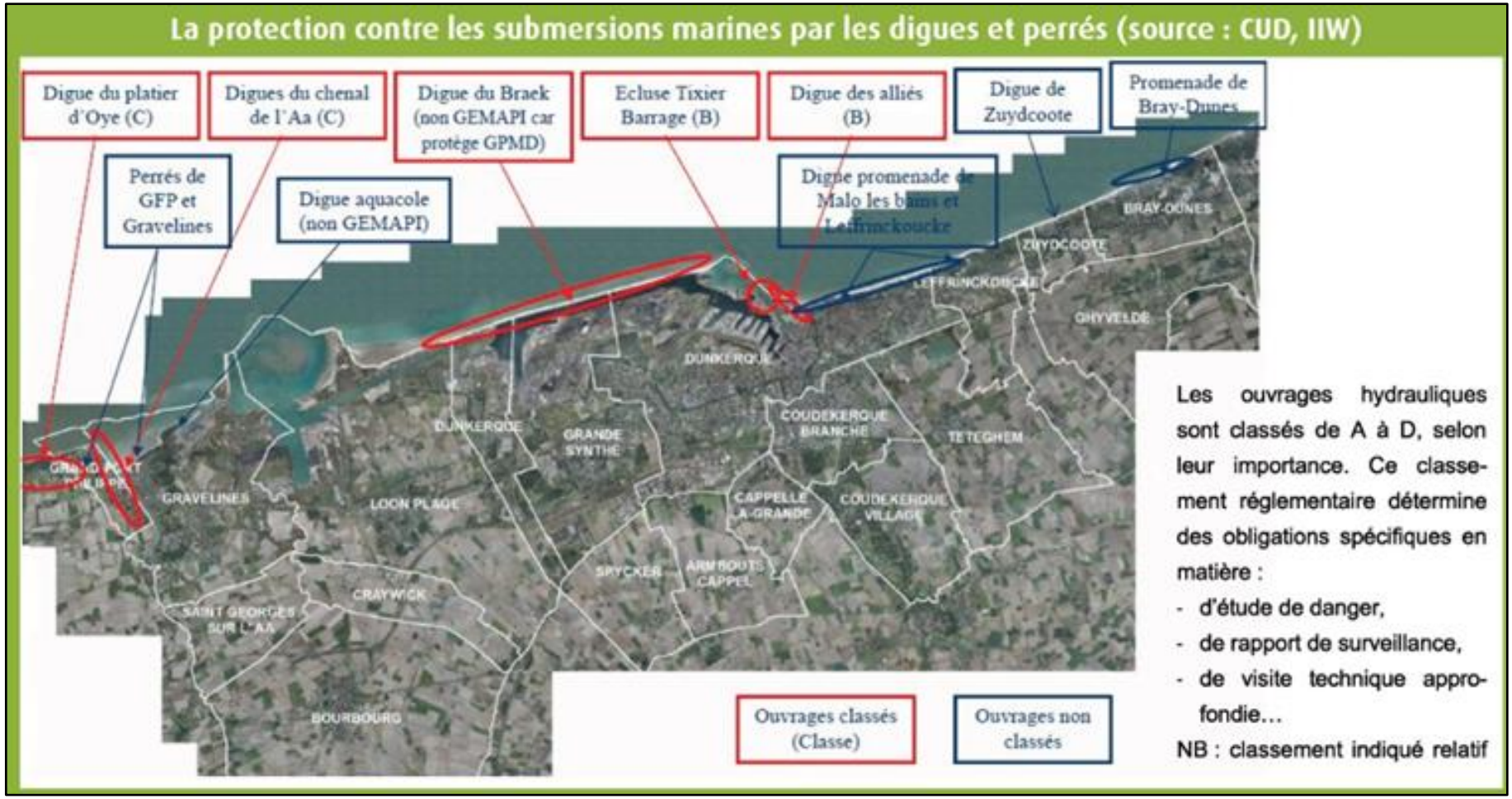

Figure 59 - *Position of dykes protecting against flooding in the Dunkirk area (Source: Cerema: Aquatic environment management and flood prevention with dykes (2018))*

5.6.5 The Netherlands: South Holland & Zeeland

Since the 1970's The Netherlands has been blessed with comprehensive studies of landscape development during the Late Glacial (the Weichselian) and entire Holocene (Zagwijn, 1975; Vos et al. 2011) periods. Underlying these studies is a wealth of shallow subsurface data (corings), archaeological information, as well as numerous radiocarbon datings. Hence landscape development is very well known. It is doubtful if additional research on Roman sites could add to this knowledge, but would be useful for filling in detail.

After 25 years of working under the European rules set in the Valetta/Malta Convention, synthetic or integrated studies of the substantial amount of data that has been produced by archaeological investigation has been difficult to achieve. Much of the data from the large number of archaeological sites excavated following "Malta" remains in the individual excavation reports and archives. During the last decades this issue has started to be addressed through bringing archaeologists together to collaborate within projects. As mentioned earlier, one of these projects, Odyssee in 2009-2013, has led to the Roman Coast project, the origin of this Bridging the North Sea network. Another important integration of 25 years of research along the *Limes* is the publication *Romans on the Waterfront* (Hessing et.al 2021), in which quite a lot of the Dutch coastal area is involved.

There are, however, examples of integrated studies. A first and foremost example is the Roman LIMES, of which some 50 km crosses the South Holland province. Concentrated study, a collaborative effort in which the central regional and local government is represented through Dutch Limes Cooperation (Nederlandse Limes Samenwerking, NLS) has resulted in the LIMES receiving World Heritage Site status from UNESCO. The fortunate offspring of this effort is that a large area situated between Leiden and Katwijk is now being surveyed and excavated in preparation for urban development, and is yielding spectacular results (e.g. a recently discovered castra).

One example is the study carried out by Van London on the Roman-age land partition scheme in Midden-Delfland (van Londen, 2006) that was based on extensive excavations. This partition largely survived more recent landscape change.

Another example, though not Roman, is the regional study of early-medieval South-Holland (Dijkstra, 2011). This study integrates and evaluates landscape and human/societal development between the 3rd and 9th centuries in an exemplary way.

The study of the Rhine-Meuse delta has, for decades, been a focus of the department of Physical Geography of the Faculty of Geosciences of Utrecht

University. This emphasis has resulted in a steady flow of PhD theses and other studies very relevant to this research theme – and is continuing to do so.

5.7 Research Questions

In discussions in the BtNS project Changing Landscapes workshop it was agreed that priorities for the BTNS project area should be:

- Developing better and more consistent mapping of the Roman coastal landscapes for the North Sea. This could be a GIS based output that can be adapted as understanding evolves.
- Promoting projects that synthesise the results of site-based investigations, data and studies.
- Developing projects that have an integrated approach with other disciplines and wider collaborations.
- Sharing understanding and developing approaches to investigate and study the often difficult to access Roman landscapes.
- Acknowledging that there is clearly an advantage to future collaboration across the North Sea in order to understand each region's Roman coastal landscapes.

5.7.1 UK

For Kent, the South East Research Framework (SERF) has identified several key areas for research that relate to the county's coastal landscapes.

Within the Geological and Environmental Background (Bates and Corcoran, 2019) for Holocene Environments the following are highlighted within the agenda:

The need for more off-site studies to understand the landscape influences of the sites that are being investigated. They note that:

> *"Topography influences Holocene landscape processes, which for the most part have been less dramatic than those of the Pleistocene. To some extent this is result of a temperate climate and the relative stabilisation of the landscape by the development of vegetation."*

For coastal areas the framework recognises the need to examine and date past sea level fluctuations within coastal sediments. Also understanding the rate of coastal erosion is critical to understanding the context of a number of important sites with the work by Bates on the Dour being highlighted.

The examination of the effect of shingle spits and processes of sedimentation is also raised with the Dour, Wantsum and Romney marshes mentioned as specific landscapes. The need for more collaborative work and synthesis of individual geoarchaeological survey results is highlighted. The focus on the Wantsum is seen as particularly important given its 'gateway' location.

A similar approach is also required for Kent's low-lying former coastal marshlands. The study notes (for Kent) that:

> "*Essentially, rising sea-level 'drowned' the lower reaches of river valleys; subsequent spit growth led to river silting and fen development landwards, with intertidal mud and salt marsh development seawards; renewed inundation by the sea, when the shingle spits and barriers were breached, alternated with episodes of land reclamation. At a very basic level this pattern is evident in … the Walland and Romney Marshes of the Dungeness Peninsula, as well as the Lower Medway, draining into the Thames Estuary. In all these areas, however, there is a need for geoarchaeological and palaeo-environmental work to map the evolving topography, reconstruct the changing environments and tie them in to episodes of coastal change and human activity.*"

Further work to understand the vegetational history of areas through pollen and plant remains is highlighted as being crucial to better understand the relationships between people and their environment. The coastal sediment provides well preserved deposits that would enhance such studies.

Climate change is considered in the framework. It outlines that the current understanding of the climate change in the south-east of England is

> "*for a general trend of rapid climatic amelioration in the early Mesolithic, at the start of the Holocene during a generally warm and dry climatic phase. Wetter (but still warm) conditions followed, during the later Mesolithic and earlier Neolithic, with increasing dryness in the Later Neolithic and Bronze Age, but from the Iron Age onwards, climate appears to have become cooler and wetter. Considerable fluctuations have taken place during the historic period, however. The warmer climate of the 10th to early 13th centuries (the Medieval Warm Period) prompted coastal settlements and their farmland to expand into marginal areas, which included extensive saltmarsh reclamation in the coastal areas of the South-East. Many of these efforts were destroyed during the subsequent period of increased storminess in the 13th and 14th centuries, when artificial sea walls and natural shingle banks were repeatedly breached by the sea (Galloway 2009, 2010). This was the beginning of the Little Ice Age: nearly six centuries of unpredictable weather, of dramatic climatic shifts and several periods of extreme*

> *cold, culminating in the frozen winters of the late 18th and early 19th century (Lamb 1982; Fagan 2000)*."

Future research is needed to refine this model, and it is noted that the historic era in particular has been largely neglected for study despite evidence that is available. It is considered that a greater understanding of the climatic fluctuation from the Roman period onwards would be useful and can be addressed through targeting natural deposits accumulated in natural and archaeological features that can be securely dated to the historic periods.

It is noted that long climate records in the region are limited by the nature of the sediment sequences that have so far been examined. One of the longest is at Holywell Coombe near Folkestone. It is possible that long sequences may exist in the lower reaches of the estuaries of the Medway and Wantsum Channel. The potential of the tufa deposits in the Dour to provide high resolution climate records is also highlighted.

Other research questions highlighted by Bates and Corcoran include gaining a better understanding of the onset of flooding in the lower reaches of our river valleys and the nature of the landscape transformation resulting from this transgression. The need to determine the nature and speed of inundation of submerged landscapes is also important.

They also note that:

> *"The availability and accessibility of information relating to past environments, archaeological science and environmental archaeology in the South-East is another area that would be useful to address. It can be difficult, time-consuming and unproductive to extract this information from HERs. Steps towards creating (and maintaining) a GIS-based digital platform for locating and accessing palaeo-environmental data, such as peat deposits, pollen sequences, interpreted natural deposit sequences and deposit models, would be of huge value to further research and facilitate its synthesis."*

The Roman Period chapter of the SERF (Allen, Bird and Croxford, 2019) provides an account of Kent's baseline resources. The research agenda again flags the need for synthesis of material that lies within the substantial backlog of unpublished reports. The research questions that could be addressed through further work in Kent's Roman coastal landscapes include:

For transition from the Iron Age to Roman Britain

- *Were there instances of early contact or Roman presence in Britain pre-conquest?*

- *Did the native elite remain in place post-conquest; did they adopt, adapt or resist?*
- *Can the impact of conquest be detected in settlement changes in this period?*
- *Is the dearth of evidence of military presence genuine, and if so, what does it signify?"*

The 'gateway' location of the coastal landscapes provides a prime resource for understanding early contact and transition.

The early military incursions by Caesar and the Claudian conquest are significant events in the onset of Roman Britain. Evidence for them in the archaeological record is scant. The East Kent coastal areas provide a prime resource to understand these further and address the following questions related to military activity in the county:

- *Are there any physical traces of Caesar's troops' in the region, either direct or indirect? For example, are there definable changes in late Iron Age sites (abandonment, fortification or intensification) that might evidence stress of or response to conflict/contact?*
- *Are there objects (weapons, equipment, personal items) that could relate to troops?*
- *Are there any fortifications, or even siege works, built by the Roman troops?*
- *Debate still continues concerning the landing place(s) for the Claudian troops. Is there any potential for identifying direct evidence of the Claudian conquest?*
- *Following the period of conquest, is there evidence for continued military presence, besides the Classis Britannica?*
- *Can our understanding of the Classis Britannica, and its relationship with inland sites, be enhanced?*
- *Is there evidence for military presence or involvement in other sites?*
- *What form did the late Roman military activity take in the region?*
- *Can our understanding of the Shore Forts be enhanced via evidence from external sites?*

Roads and transport is considered and in particular study is needed, beyond basic mapping of networks to better understand:

- *The use of fords and ferries to cross waterways which would be particularly important for the Wantsum Channel and around Richborough*
- *All elements of ports need further investigation, from wharf and mole construction (dating and techniques) to waterside structures.*
- *Any trace of vessels (whether wrecks or reused timbers found elsewhere) is of great interest.*

In relation to evidence for industry and consumption the following have been recognised:

- *The presence and significance of unusual faunal remains needs greater analyses: deer, fish and fowl principally. In relation to fishing, and shellfish cultivation, any evidence is of great interest. In general, there needs to be a dedicated research effort starting with on-site sampling to recover the important faunal evidence.*
- *Salt production in the region needs further examination, particularly in relation to associated activities on saltern sites and dating in general.*
- *The opportunity to investigate pottery production sites is an important one.*

The study recognises that the landscape is poorly understood in terms of vegetation and coastline.

- *More work is necessary on pollen and soil samples to determine basic characteristics of areas during the period.*

For the late Roman period and the transition into the Anglo-Saxon period there are several questions that can be addressed within the coastal landscapes:

- *How do the urban sites change in the late Roman period?*
- *Is activity concentrated in certain sites or parts of sites?*
- *Do activity types change within and immediately around urban sites in the later part of the period?*
- *What impacts on the landscape came about during the later period and into the sub-Roman phase?*
- *Are there discernible changes in agricultural practices and reforestation?*

Richborough provided the last focus of Roman administration before abandonment and would be a prime area for study in relation to these questions.

As well as these high-level questions there are numerous other site and landscape level questions that can be addressed through further research, survey and investigation.

5.7.2 Flanders

The scope of the present project does not allow a comprehensive review or account of research questions to be compiled however, general research questions concerning the Roman period in the coastal plain (the Holocene tidal area) could include:

- the driving factors explaining the appearance and disappearance of Roman-period settlement in the coastal plain (the first permanent settlements in history)
- the nature and extent of Roman reclamation activities (dikes, drainage systems).
- the variety in settlement types (nucleated and dispersed settlements) is not understood yet, nor socially nor economically.
- the evolution and reconstruction of the landscape (based upon the study of sediments, pollen, diatoms and other proxies)
- the economic structure of the Roman occupation, with a focus on salt-making, sheepherding, fishing, and early forms of agriculture
- the impact (or not) of the Roman military forts sitting on the Pleistocene edge of the coastal plain
- the study of harbour infrastructure (e.g. the Roman harbour of Bruges)

5.7.3 Nord

The main issues relate to preserving the coastline and trying to manage coastal retreat to protect local populations. It is also necessary to find ways of better managing catchment areas to combat flooding. In this sector, it is vital to limit the development of artificial land.

Issues relating to tourism and mass tourism also feature prominently in the public debate.

To meet these challenges, many decision-makers want to draw on the history of their regions.

5.7.4 The Netherlands: South Holland & Zeeland

South Holland

Since the military settlements in the southern part of the province disappeared into the North Sea, determining the location of these settlements must be undertaken using landscape reconstruction. A project integrating geology and archaeology could provide a fresh outlook on the location and situation of these settlements. Linking up with a running project of the province Zeeland (“Beach Archaeology”) may provide another important connection.

Integrating acquired knowledge province-wide on the nature and distribution of Roman settlements in general is recommended. As explained above, the data are spread over numerous scattered reports.

The Lower German Limes Research Framework (in prep, by the Limes Association of the Netherlands) will also involve the Dutch coastal area as a whole and will focus in 2 of its 6 themes on the research of landscapes: (theme 1) Landscape and environment & (theme 6) Managing the Frontier.

Theme 1 Landscape and environment

The military infrastructure of the Lower German *Limes* – including the installations along the North Sea coast and those across and behind the Rhine – was for the most part embedded in a dynamic Holocene riverine landscape. For its maintenance, however, the frontier depended on a much wider area also including Pleistocene areas.

These landscapes, with their different characteristics, shaped the frontier, but the presence and requirements of the frontier in turn shaped the landscapes. It is the interaction between nature (landscape) and humans (use and adaptation of the landscape) that is at the heart of this research theme.

Key aspects and research questions

Understanding the human-nature interaction in this domain requires a good knowledge of the wet and dry parts of the landscape, of the vegetation and of relevant climatic factors. In order to be able to assess the nature and degree of the human impact on the landscape it is necessary to establish the environmental conditions existing at the time of the arrival of the Roman army, the changes that occurred during the Roman period and those which followed after the fall of the Western Roman Empire.

Further, insight is needed into the human interventions in the landscape that were undertaken to allow and improve the military control of the area and to enable and optimize the exploitation of the natural resources required for its maintenance.

Finally, insight is required into the locations of the military installations and into the habitation of the frontier zone and its fore- and hinterland, in order to comprehend the interaction between the military infrastructure and its setting.

Because of the importance of distinguishing between human and natural triggers for landscape changes and of understanding human-nature interaction, appropriate methods and strategies must be applied during field work, in order to identify, record and date (long-term) developments and (short-term) events. Plans for field work should thus provide for adequate sampling for ^{14}C dating, micromorphological and diatom analysis, etc.

In order to be able to investigate the use of the landscape and its resources it is necessary that plans for field work include appropriate methods and strategies for the reconstruction of the natural vegetation and human exploitation of the landscape. These would include generous sampling of pollen and plant remains, an accurate

and detailed documentation of the use of wood, and adequate sampling for ^{14}C and dendrochronological analyses to establish a chronological framework allowing to identify changes.

Key questions to explore this theme are:

- Which changes in the landscape were triggered by natural factors, and which by human actions?
- How was the frontier embedded in the landscape?
- How was the landscape used?

Theme 6 Managing the Frontier

For UNESCO, managing World Heritage is not just about protection and preservation, but also about improving the understanding of key values, presentation to the public and community involvement. This wider view is reflected here.

Key aspects and research questions

To protect and preserve archaeological remains two steps must be taken: assess the condition of the remains and take measures to stabilize or improve it. Furthermore, monitoring is needed to periodically evaluate the condition of the remains and the effectiveness of the measures taken. Because of the international significance of waterlogged organic remains the relationship between such remains and the groundwater level is of particular importance.

Improving the understanding of the key values of the Lower German *Limes* has many aspects. Opportunities to carry out invasive research in core zones (component parts) of the World Heritage site are limited, because of their legal protection and the ultimate aim of preservation. Although excavations for scientific purposes are allowed, it is important to further develop methods for non-destructive prospection and to apply these to sites which are not yet sufficiently explored. In addition to sites and structures, finds are a crucial source of information which is at present insufficiently unlocked. There is a wealth of information hidden in documentation and finds from past excavations and in private collections. Usually, a lot of basic recording work has to be done before these sources can be exploited. As they often involve large quantities, it is important to develop effective strategies and methods. In this field, too, there is a need to develop new methods, especially in the field of natural science research on materials and organic remains.

Community involvement is not just relevant in the context of presentation and knowledge dissemination, but is a much wider concern, underlined by the Faro Convention on the Value of Cultural Heritage for Society (2005). This convention is based on the idea that the importance of cultural heritage lies not so much in the

objects and places, but in the meaning people attach to it and in the values it represents. Dealing with heritage therefore does not simply require a top-down government-led approach, but a bottom-up approach with a central role for society. Translating these principles into the management of the World Heritage property still requires a lot of thinking.

Key questions to explore this theme are:

- What is the condition of the remains of the Lower German *Limes* and how can this be monitored and maintained or improved?
- Which non-destructive prospection methods can be applied or (further) developed to improve the knowledge of the buried remains of the Lower German *Limes*?
- What is needed to unlock the information hidden in the documentation and finds of past excavations and in private collections, in terms of accessibility and research methods?
- Which strategies can be applied or (further) developed to improve the scientific basis of presentation and knowledge dissemination and to involve academic, professional and administrative levels as well as the wider community?
- How can society be more broadly and closely involved in the World Heritage of the Lower German *Limes*?

Given the nature of the aspects of this theme, they often do not lend themselves very well to formulating questions for research, but rather to formulating topics for action.

Zeeland

For Zeeland several broad research questions have been proposed:

- When did Roman occupation in the region start, and how can we characterize this?
- When did Roman military presence in the region start, and what was the nature of Roman military occupation in the Dutch delta region.
- What happened in the later Roman period and the ‘transition’ into the Merovingian period?
- How can we investigate ‘lost sites’/ (partially submerged) sites, and finds without a context such as beach finds?
- How can we actively and continuously involve the public in scientific investigations of the regional heritage.

5.8 Conclusion / Summary of main findings

The above sections examine the Roman coastal landscapes of the North Sea regions, highlighting how the Romans inhabited, exploited, defended, and navigated these areas. It notes significant landscape changes before, during, and after Roman times, driven by both natural and artificial processes. Key points include:

- **Buried Landscapes**: Coastal areas buried under former salt marshes and inundated landscapes, utilized by Romans for agriculture and navigation.
- **Erosion and Sea Level Rise**: Coastal erosion and rising sea levels threaten landscapes and heritage sites.
- **Urban and Port Expansion**: Roman harbours and associated towns are now buried under modern developments.
- **Natural Processes**: Dune and spit formation, lagoon and salt marsh development, storm impacts, and coastal retreat.
- **Artificial Processes**: Land reclamation, urban expansion, and harbour development.

The study emphasizes the impact of climate change and the need for integrated research to understand and preserve these landscapes. It also highlights opportunities for education, tourism, and community projects to foster a deeper sense of place.

Future priorities include better mapping and synthesis of data, collaborative and multi-disciplinary projects, and sharing research techniques. The partnership emerging from the Bridging the North Sea project is well placed to help take this forward.

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Appendix I Travellers

UK

Name	Place of discovery	Reference
Axios/Stolos, medicus in the Classis Britannica (creator of a celebrated eye-salve)	Text reference	Galen 12
M. Verec. Diogenes, Biturigan, moritex/shipper sevir Augustalis of York *m(arcvs) verec(vndivs) diogenes sevir col(oniae) ebor(acensis) ibidemqv(e) mort(vvs) cives bitvrix cvbvs · haec sibi vivvs fecit*	York	RIB 678; 687
L. Viducius Placidus, Velocassian, negotiator. Great case study: He is from Rouen area, dedicates at Domburg, and constructs an arch and temple at York *[..] et genio loci* *[et numinib(us) Au]g(ustorum) L(ucius) Viducius* *[? Viduci f(ilius) Pla]cidus domo* *[civitate] Veliocas[s]ium* *[.. n]egotiator* *[.. a]rcum et ianum* *[.. l(oco) d(ato)] d(ecreto) [d(ecurionum)]* *Grato et* *[Seleuco co(n)s(ulibus)]*	York & Domburg	York inscription is RIB 3195
M. Aurelius Lunaris, sevir Augustalis of York and Lincoln, dedicates altar at Bordeaux to *Tutela Boudig(a)* *(Deae Tutel(a)e Boudig(ae) / M(arcus) Aur(elius) Lunaris IIIIII/vir Aug(ustalis)*	Bordeaux	AE 1922. 116

col(oniarum) Ebor(aci) et / Lind(i) prov(inciae) Brit(anniae) inf(erioris) / aram quam vover(at) / ab Eboraci evect(us) / v(otum) s(olvit) l(ibens) m(erito) / Perpetuo et Corne(liano).		
Priscus, son of Tout(i)us, a Carnutenian, and stonemason, from Chartres area, makes dedication at Bath *Priscus* *Touti f(ilius)* *lapidariu[s]* *cives Car[nu-]* *tenus Su[li]* *deae v(otum) [s(olvit) l(ibens) m(erito)]*	Bath	RIB 149
Cerialis, praefectus cohors VIIII Batavorum and his wife Lepidina* Note Lepidina and (her?) slipper	Vindolanda	Attestations on multiple Vindolanda tablets
Lurio, Germanus, set up a tombstone to his sister Ursa, wife Julia, and son Canio at Chesters He may also be one of the four Germans (the lists includes a Lurio) who set up an altar to local god Maponus in N. Cumbria *D(is) M(anibus)* *Urse sorori* *Iulie coniugi* *Canioni filio* *[L]urio Germ(anus)*	Chesters & Unknown location in Cumbria	Chesters RIB 1483, other RIB 2063
Diplomas issued to Veterans include Treveran from Wroxeter. There are many other examples of Tungrian and Batavian troops etc.	Wroxeter	Treveran RIB 2401.8

Condrusi Contingent of the Condustrian district within c II Tungrorum to the goddess Viradecthis *Deae Viradec-* *thi pa[g]us Con-* *drustis milit(ans)* *in coh(orte) II Tungror(um) sub Silvi-* *o Auspice praef(ecto)*	Birrens, Scotland	RIB 2108
Mellonus, first bishop of Rouen, converted in Rome in 250s.		Vita S. Melloni archiepiscopi Rothomagensis
British Bishops at Council of Arles 314		
Pelagius, the monk, who gave birth to a 'heresy' spent time in Rome and the Holy Land, and had friends in *Gaul* (Paulinus of Nola, a Gallic aristocrat)/Note the visit of Bishops from *Gaul* (Germanus and Lupus in 429) to confront the heresy.		For Germanus, see Constantius v Germni 1. 19, 23; 2. 1-4; Bede HE 1. 17-21
Victor – Freedman and Moorish tribesman – possible evidence for a same sex relationship?	South Shields	RIB 1064
Barates – Palymrene nation – married to Regina – an English woman	South Shields	RIB 1065

We also know the names of over 250 potters who worked in Britain, at least some of these will have been migrants from across the Channel. An interesting case study might be Summacus son of Arontius (Birley suggests Celtic name, though possibly Greek). He had links with *Atisii*, potters of Aoste in *Gaul*. But perhaps better still would be Q. Valerius Veranius, who may have worked in Kent. It is said that 'he seems to have migrated across the Channel after first working at Bavai or somewhere in *Gallia Belgica*. In Britain, where his activity dates to the years c. 65-100 he is associated, by style and fabric, with over 15 other potters'.

France

Name	Place of discovery	Reference
Quintus Arrenius Verecundus *D(is) M(anibus) / Q(vinto) Arrenio / Verecundo / TR(ierarcho) CL(assis) B[R(itannicae)] / herede[s F(aciendum) C(uraverunt)]*	Boulogne-sur-Mer, quartier de Bréquerecque (nécropole tardive)	Musée de Boulogne-sur-Mer, inv. 1235.R5
Didio, sailor of the Classis Britannica *Didi[o] […]/ traex m[iles ex] Clas(se) / [Britannica] stipen(diorum) XXXV / [vixit a]nn(is) LXV [hic situs]est*	Boulogne-sur-Mer, cimetière de l'Est (Lelaurain, 1888)	Musée de Boulogne-sur-Mer, inv. 4070.R5
Syrian born soldier *[…]us de/[…na]tione su//[rus…]enus mi/[les ex Classe Brit]annica/[stipendorum… annorum]XVI […]*	Boulogne-sur-Mer, cimetière du Vieil-Âtre (Haigneré, 1870)	Musée de Boulogne-sur-Mer, inv. 1234.R5
Claudia Prima *Ti(berius) Claudius / Aug(usti) Libertus Seleucus / TR(ierarchus) monument(um) / fecit Claudiae / Primae L(ibertae) suae*	Boulogne-sur-Mer, sentier de la Porte Gayole	Musée de Boulogne-sur-Mer, inv. 1237.R5
Graecia Tertia *[D(is) M(anibus)] / Graec[tia Ter] / tiae P(ublii) fil(iae) vix[it] / an(nis) III, m(ense)I, d(iebus) XVI / P(ublius) Graecius Terti-/-nus pater TR(ierarchus) CL(assis) BR(itannicae) / p(onendum) c(uravit)*	Boulogne-sur-Mer, Place de Picardie (vers 1835)	Musée de Boulogne-sur-Mer, inv. 1238.R5
Children of Domitianus *D(is) M(anibus) / fili(i)s par/bulis / Domiti/anus / tr(ierarchus)*	Boulogne-sur-Mer, cimetière du Vieil-Âtre (Lelaurain, 1888)	Musée de Boulogne-sur-Mer, inv. 4020.R5

Netherlands

Name	Place of discovery	Reference
M. Exingius Agricola, negotiator salarii Deae | Nehaleniae. | M(arcus) Exgingius | Agricola, | ciues Treuer, | negotiator | salarius | c(oloniae) C(laudiae) A(rae) A(grippinensium), u(otum) s(oluit) l(ibens) m(erito).	Colijnsplaat	A 1
M. Secundus Silvanus, negotiotor cretarius	Colijnsplaat	A3
C. Iulius Aprilis, trader	Colijnsplaat	A5
Placidius	Colijnsplaat	A6
Agilius Secundus, Beneficarius consularis	Colijnsplaat	A7
Commodus	Colijnsplaat, negotiator vinarius	A 8
Valerius Marcellus	Colijnsplaat	A 9
C. Aurelius Verus, negotiator Brittancius moritex	Colijnsplaat	A 11
C. Iulius Flerentinus, negotiator salarii	Colijnsplaat	A 26
M. Cupitus Victor, agens rem adiutor	Colijnsplaat	A 29
A[..] Gratus, negotiator allecarii	Colijnsplaat	A 34
L. Secundus Similis, Negotiator allecarii	Colijnsplaat	A 39
Marcellus, negotiator vinarius	Colijnsplaat	A 41
L. Sattonius Victorinus	Colijnsplaat	A 45
C. Iulius Ianuarius	Colijnsplaat	A 49
M. Ottinius Frequens, Sevir augustalis	Colijnsplaat	A 54

Vegisonius Martinus, nauta	Colijnsplaat	A 57
Q. Cornelius Superstis, negotiator salarii	Colijnsplaat	B 1
NN, nauta	Colijnsplaat	B 4
L. Arisenius Marius	Colijnsplaat	B 10
NN, nauta	Colijnsplaat	B 21
Aminius Saturnius	Colijnsplaat	B 21
Sumaronius Vitalis	Colijnsplaat	B 30
NN, sesquiplicarius	Colijnsplaat	B 34
Q Phoebius Hilarus, Decurio municipii Batavorum	Colijnsplaat	B 37
Bosiconius Quartus, Actor navis	Colijnsplaat	B 38
C. Catullinius Secco, Negotiator allecarii	Colijnsplaat	B 44
Immuni Primus et Ibliomarus	Colijnsplaat	B 45
Exomnius Isaurici filii	Colijnsplaat	B 47
Gimio	Colijnsplaat	B 50
Sumaronios Primitivus	Colijnsplaat	B 75
Iucundinius Verus	Colijnsplaat	B 94
M. Exingius Agricola	Colijnsplaat	A 1
M. Secundus Silvanus	Colijnsplaat	A3
C. Iulius Aprilis	Colijnsplaat	A5
Placidius	Colijnsplaat	A6
Agilius Secundus	Colijnsplaat	A7

Commodus	Colijnsplaat	A 8
Valerius Marcellus	Colijnsplaat	A 9
C. Aurelius Verus	Colijnsplaat	A 11
C. Iulius Flerentinus	Colijnsplaat	A 26
M. Cupitus Victor	Colijnsplaat	A 29