Katalog der Kanalbauten bis zum 13. Jahrhundert im Arbeitsgebiet | Catalogue of Canals until the 13th Century AD in the Working Area

The following second part of the catalogue is an organised compilation of all the 205 canal structures recorded within the study area and dating up to the 13th century (**pls 149–150; tab. 16**). The site and the canal names appear in alphabetical order and are listed in groups according to country. The spelling of the place names is not consistent throughout. As a rule, it heeds the customary spelling in the respective country whenever the common English designations fail to apply. The sequential numbering of the entries serves the identification of the canals in the overview maps (**pls 153–154**) and in the text section.

The catalogue entries are structured according to a uniform basic arrangement, each beginning with the rough geographic coordinates of the canal in the field (latitude, longitude). All coordinates are given in decimal degrees (WGS 84). This is then followed by an assessment of the reliability and precision of the canal's location since not all structures are located with the same consistency (reliability/precision of geographic location). The next data set concerns the canal's association with hydrological networks (connected to) and neighbouring waterways. This is followed by basic information on known archaeological, written, or other evidence about the canal (written, archaeological, and other sources). The entry then furnishes what is known about the dates of the canal's planning and construction (Construction/planning, by century) and also general information about its functional period(s) and maintenance over the centuries (pre-1st cent. AD to 13th cent. AD). Certain dates are marked with »yes« to indicate that the canal was in use during a given century. A data set lacking reliable chronological information is tagged with »assumed« concerning the canal's most plausible construction and operating period for any given century. If a date is given in more general terms, as in »Roman« or »early medieval«, then all the centuries that fall within this period are »assumed« dates[1]. The date overview is supplemented with comments on the structure's chronology (Chronology), together with relevant bibliographic references. A general assessment of the reliability of the furnished information about the dating and chronology is also given (Reliability of dating and chronology). Another chief component of each entry is the general description of the canal (Description), again complemented with further references. In instances for which also written evidence is available, the source base and its key information about the canal is given (Description of the written record). This is followed by what is known about the Canal type, its Dimensions, the Bank revetments and other infrastructure, as well as the Initiators and responsible agents. Each catalogue entry ends with a short list of the key research References. The full references of the short titles are found in the general bibliography (p. 214–256).

The catalogue ends with a condensed overview (**tab. 16**) of all entries listing the key chronological data by country. This information forms the basis for the data displayed in the figured distribution maps (**pls 155–175**) that take into account the construction and functional phases of all canals over time.

Contrary to the other parts of this study, the superregional catalogue is presented in English. The reason for this is twofold: Firstly, the catalogue is based on the raw version of a database covering artificial waterways which was to be published as part of the European »Harbour Data Repository«[2]. The data repository was compiled entirely in English. On the

1 It must be stressed that in statistical analyses, this may result in artefacts of presumed uses which have no historical significance.

2 Vgl. www.db-thueringen.de/receive/dbt_mods_00035239 (10.3.2019).

other hand, various components of the superregional catalogue were developed in cooperation with international partners. Particularly significant in this respect is the work carried out by Eljas Oksanen for England and Marion Foucher for France. To render the results serviceable for everyone and to sustain the development of further joint research projects, there was no alternative to choosing English as work language. Not least, it needs to be emphasised that, compared to the rest of the work, the superregional catalogue is potentially of the highest interest to international researchers from different subject matters and linguistic backgrounds. It seemed therefore judicious to place the linguistic hurdles as low as possible to make the catalogue accessible for a broad readership.

The density of the information in the individual catalogue entries is extremely variable, mainly because of the enormous discrepancies in the available information and the specific research focuses in the different countries. By and large, the density of the data on canal construction from England and Italy is particularly high, which on the one hand owes to the traditions within research, but also to the particular wealth of the written and excavated evidence in these countries. A particularly low concentration of information is observable for some canals recorded in archaeological investigations in France. Unpublished data was collected from the inland water transport catalogue by Foucher 2020 but could not be upgraded by our archival research. The doctoral thesis by Paulin Peter »Archéologie et Histoire des canaux de navigation en France métropolitaine (II^{e} s. av. J.-C. – XVI^{e} s. ap. J.-C.)« which was handed in at the University of Nantes is expected to considerably increase our knowledge on this subject as it systematically processes original files and excavation reports from the abundant evidence in France. Unfortunately, however, the present study was unable to draw on this work.

The readers and in particular the local specialists on the various regions within the study area are bound to notice gaps and errors in the catalogue. Considering the sheer vastness of the study in terms of both time and space, terminological and linguistic diversity, and often fragmentary and vaguely published data, such shortfalls are hardly avoidable no matter the intensity of the exchange with innumerable specialists. However, suggestions and rectifications may find their way into future versions of the »Harbour Data Repository« and are therefore more than welcome. Future editors must furthermore be allowed to map and publish individual courses as accurately as possible in GIS and to gather images from secondary publications in a systematic and superregional section dedicated to visual representation. Unfortunately, neither could be achieved within the context of the present study[3]. It is hoped that, despite some weaknesses, the catalogue may help to contribute to a helpful departure for future research on the early history of canal construction and to fill the current deficit of current research.

Belgium

1 Bruges Damme canal/Damse vaart

Latitude 51,2520, **Longitude** 3,2800. **Reliability/precision of geographic location** high.
Connected to river; sea, **Adjacent waterways** Reie; Zwin.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to Murray 2005, 27–28, the Damme canal (Damse vaart) was built »in the twelfth century«. According to Witte 1999, 140, a »circle of inner canals« was built in 1127/1128, which also served as the city's defences. In 1134 a »storm-flood created a deep channel [...] this newly-formed gully was the Zwin. It formed a remarkably good shipping route, navigable to within 5 kilometres of the town. All that was needed was to dig a canal to link Bruges

3 However, the rich fund of images and mappings collected over many years is always available to interested colleagues on request.

up with this. This was done before 1180«. According to Bond 2007, 173–174, »Bruges was fighting a losing battle against the silting of its canals, and increasingly goods were carried overland to and from the outport of Sluis«. According to Clercq u. a. 2017, 2 »the silting of the inlet, as well as economic and political factors, led to the collapse of the system at the end of the fifteenth century«. **Reliability of dating and chronology** high.

Description According to Murray 2005, 27–28, »the Reie followed a slightly meandering course [...] to end up flowing into the tidal inlet at the point that became the Damme canal (Damse vaart) in the twelfth century«. According to Clercq u. a. 2017, 1, the Zwin tidal inlet »was connected to Bruges via a smaller canal only navigable by smaller barges«. The course mapped by Trachet u. a. 2016, fig. 1 runs from Sluis in the North through the Zwin tidal inlet southwards, passing Hoeke and Monnikerede, through Damme and then following the River Reie to Bruges. According to J. Trachet (pers. comm. 2018), an »emperor with great territorial/European ambitions ordered this canal so he could ›escape‹ the British on the North Sea. He wanted to connect France with the Netherlands with this canal, to move his troops without going to on the sea«. According to Bond 2007, 173–174, lock gates were added to »the canal from Bruges to the sea« as from 1180.

Description of the written record not specified.

Canal type parallel(?). **Dimensions** Length c. 15 km. **Bank revetments and other infrastructure** Lock gates. **Initiators and responsible agents** royal initiative(?).

References Witte 1999, 139–140. – Bond 2007, 171–174. – Murray 2005, 27–28. – Clercq u. a. 2017. – Trachet u. a. 2016.

2 Bruges Old Zwin

Latitude 51,2229, **Longitude** 3,2237. **Reliability/precision of geographic location** very low.

Connected to river; sea, **Adjacent waterways** Reie; Zwin. **Written sources** yes, **Archaeological sources** assumed, **Other sources** yes.

Construction/planning early medieval. **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to Verhulst 1999, 91, the canal was built »in the late eleventh to early twelfth centuries« and was called »Sincfal« and later »Zwin«. According to Witte 1999, 140, »in the second half of the 11. century [...] a canal was dug«. Trachet u. a. 2016, 313–316 and Trachet u. a. 2015, 5–8 discuss the research history concerning the dating of the Old Zwin and come to the conclusion that the first parts had been cut »between the 9. and 11. centuries«, whereas the part north of Oostkeerke was most likely cut later (»De eerste ingrepen zouden al tussen de 9de en 11de eeuw gesitueerd kunnen worden, terwijl de meer zeewaartse stroken ten noordoosten van Oostkerke waarschijnlijk pas in een latere fase werden aangelegd«). According to Clercq u. a. 2017, 2, »the silting of the inlet, as well as economic and political factors, led to the collapse of the system at the end of the fifteenth century«. **Reliability of dating and chronology** low.

Description According to Verhulst 1999, 90–91, the canal was cut into flood deposits north of the Pleistocene sands (see also Witte 1999, fig. 1). Following Trachet u. a. 2016, 305, »the silting up of creeks and canals turned out to be geomorphologically inevitable, and ultimately Bruges lost its vital connection to the sea.« Bond 2007, 171 claims that the construction was connected to the city of Bruges. According to Witte 1999, 140, »The Old Zwin was adequate as a drainage canal to drain off the water from the Reie to the sea but it was probably less suitable for navigation. This resulted in maritime trade becoming less important for Bruges.«

Description of the written record not specified.

Canal type dead-end. **Dimensions** Length c. 15 km. **Initiators and responsible agents** civic authorities.

References Witte 1999, 139–140. – Bond 2007, 171–174. – Murray 2005, 27–28. – Verhulst 1999, 90–91. – Clercq u. a. 2017. – Trachet u. a. 2015; 2016.

3 Canal du Bergues/Bergenvaart

Latitude 51,0695, **Longitude** 2,6578. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Yser; Aa; Canal de la Colme.

Written sources yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.

Chronology According to https://nl.wikipedia.org/wiki/Kolme, the canal was built in 1293. **Reliability of dating and chronology** low.

Description According to https://nl.wikipedia.org/wiki/Kolme the canal runs from the Belgian town Veurne to the French town of Sint-Winoksbergen.
Description of the written record not specified. **Critical remarks** no further references found, limited reliability.
Dimensions Length c. 24 km. **Initiators and responsible agents** indeterminate.
References https://fr.wikipedia.org/wiki/Canal_de_Bergues_(Belgique) (18.9.2018); https://nl.wikipedia.org/wiki/Kolme (18.9.2018).

4 Gent Ketelvest canal

Latitude 51,0495, **Longitude** 3,7251. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Schelde; Leie.
Written sources yes.
Construction/planning 12th cent. AD, **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Verhulst 1999, 79, the canal was built around 1100 (see also www.gent-geprent.com/stadspoorten/eerste-wal/ketelpoort). According to https://nl.wikipedia.org/wiki/Ketelvest, it was already built in the 11th century, but without furnishing further proof. **Reliability of dating and chronology** high.
Description According to Verhulst 1999, 79, the canal is located between the Schelde and the Leie south of the new town fortification of c. 1100. According to www.gent-geprent.com/stadspoorten/eerste-wal/ketelpoort, a quay wall was built along the bank towards the city using the spoil (»Met de uitgegraven aarde werd er aan de stadszijde een wal opgeworpen«). This »Ketelport«-harbour was built in the 12th century and was protected by towers and gates (www.gent-geprent.com/stadspoorten/eerste-wal/ketelpoort).
Description of the written record not specified.
Canal type connection(?). **Bank revetments and other infrastructure** quay wall. **Initiators and responsible agents** civic authorities.
References Verhulst 1999, 79. – Hadfield 1986, 28 map 1. – www.gent-geprent.com/stadspoorten/eerste-wal/ketelpoort (14.9.2018). – https://nl.wikipedia.org/wiki/Ketelvest (14.9.2018).

5 Gent Lieve

Latitude 51,0571, **Longitude** 3,7209. **Reliability/precision of geographic location** very low.
Connected to river; sea, **Adjacent waterways** North Sea; Lys.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Suttor 2015, 880, the canal was cut in 1251. According to https://fr.wikipedia.org/wiki/Lieve, it was built between 1251 and 1269. **Reliability of dating and chronology** high.
Description According to Soens 2012, 164, the canal connected the town of Gent with the Zwin estuary and the sea harbour at Damme. According to Suttor 2015, 880, the main purpose was a connection to the sea. According to https://nl.wikipedia.org/wiki/Lieve_(kanaal), the canal was only suitable for small boats less than 2.4 m wide and 0.9 m draft.
Canal type indeterminate. **Dimensions** Length c. 45 km, suitable for ships with drafts below 0.9 m. **Initiators and responsible agents** civic authorities(?).
References Soens 2012, 164. – Suttor 2015, 880. – https://nl.wikipedia.org/wiki/Lieve_(kanaal) (18.9.2018). – https://fr.wikipedia.org/wiki/Lieve (18.9.2018).

6 Lovaart/Canal de Lo

Latitude 51,0698, **Longitude** 2,6676. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Yser.
Written sources yes.
Construction/planning 12th cent. AD, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Gevaert 2006, 60 and https://fr.wikipedia.org/wiki/Canal_de_Lo, the canal was cut in the 12th century and widened in the 17th century, but no further reference is given, and the reliability of its dating is uncertain. **Reliability of dating and chronology** low.
Description According to https://fr.wikipedia.org/wiki/Canal_de_Lo, the canal connects the town of Furnes at the River Yser with the village of Lo/Loo. It was built for navigation but has also been used to regulate the water level of the River Yser.
Description of the written record not specified.
Canal type indeterminate. **Dimensions** Length c. 14 km, width c. 7,65 m. **Initiators and responsible agents** indeterminate.

References Gevaert 2006, 60. – https://nl.wikipedia.org/wiki/Lovaart (18.9.2018). – https://fr.wikipedia.org/wiki/Canal_de_Lo (18.9.2018).

7 Scheldt Canalisation

Latitude 50,6087, **Longitude** 3,3904. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Scheldt.
Written sources assumed.
Construction/planning 10th cent. AD. **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology According to Suttor 2008, 37, the canal construction/canalisation at the River Scheldt started in the 10th century. **Reliability of dating and chronology** low.
Description Sections of the River Scheldt have been canalised.
Canal type parallel(?). **Initiators and responsible agents** indeterminate.
References Suttor 2008, 37. 39.

Croatia

8 Danube-Save canal [*mutatio fossis*]

Latitude 44,9568, **Longitude** 19,7988. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Save; Danube.
Written sources yes.
Construction/planning 3rd cent. AD. **3rd cent. AD** yes, **4th cent. AD** assumed.
Chronology According to the *Historia Augusta*, excavation by Probus (emperor 276–282). **Reliability of dating and chronology** low.
Description According to the *Historia Augusta*, Emperor Probus gave order to build a canal to the River Save near Sirmium in the 280s AD, shortly before his death (Leveau 1999, 102; Felici 2016, 201–202). See http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Historia_Augusta/Probus*.html#ref8, 21: »When he had come to Sirmium, desiring to enrich and enlarge his native place, he set many thousand soldiers together to draining a certain marsh, planning a great canal with outlets flowing into the Save, and thus draining a region for the use of the people of Sirmium. At this the soldiers rebelled […]«. Nevertheless, it is uncertain if the canal was navigable. This canal is also mentioned indirectly in the *Itinerarium Burdigalense*, written in AD 333, via a *mutatio Fossis* near Sirmium (Fodorean 2017, 97–98. 103; Felici 2016, 201).
Description of the written record Historia Augusta; *Itinerarium Burdigalense*.
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type dead-end(?). **Initiators and responsible agents** royal initiative.
References Leveau 1999, 102. – Felici 2016, 201–202. – Fodorean 2017, 103. – Wilkes 1998, 643. – http://penelope.uchicago.edu/Thayer/E/Roman/Texts/Historia_Augusta/Probus*.html#ref8, 21 (28.2.2019).

9 Kopilice

Latitude 43,5190, **Longitude** 16,2580. **Reliability/precision of geographic location** high.
Connected to sea, **Adjacent waterways** Mediterranean Sea.
Archaeological sources yes.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed.
Chronology According to Radić Rossi 2008, 285, the canal is Roman. **Reliability of dating and chronology** low
Description The possible canal was connected to the Mediterranean Sea. As mapped in Radić Rossi 2008, fig. 4, it runs parallel to the coast and today is submerged close to the modern shoreline. Nevertheless, the connection to the sea is unclear and it is not sure if the structure really was a navigable canal. Its vestiges were recorded and partially excavated under water (Radić Rossi 2008). According to Radić Rossi 2008, fig. 5 and Zabeo 2010, 103, the canal had wooden revetments made of vertical posts and horizontal planks on both sides of the fairway.

Canal type parallel(?). **Dimensions** Length c. 0.1 km, width 2.5–3 m. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** indeterminate.
References Radić Rossi 2008. – Zabeo 2010, 103.

10 Osor Kavanela Canal

Latitude 44,6929, **Longitude** 14,3920. **Reliability/precision of geographic location** high.
Connected to sea, **Adjacent waterways** Mediterranean Sea.
Archaeological sources yes.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology According to Čaušević 2006, 34, the artificial canal is »protohistorique«. According to Protić 2015, 103, the canal was cleaned and repaired in the 16th century because by the 14th and 15th century, it had become almost unnavigable. According to Faber 1982, 62, it is impossible to date the canal exactly.
Reliability of dating and chronology low
Description The canal cuts an isthmus between the islands of Losinj and Cres. According to Protić 2015, 98, Osor is strategically positioned between Istria and Dalmatia at the transit to the Northern Adriatic (Čaušević 2006, 34).
Canal type parallel. **Dimensions** Length c. 50 m, width 10 m. **Initiators and responsible agents** indeterminate.
References Faber 1982. – Doneus u. a. 2017. – Protić 2015. – Čaušević-Bully/Bully 2015. – Čaušević 2006, 33–34.

Denmark

11 Kanhave Canal

Latitude 55,9073, **Longitude** 10,6053. **Reliability/precision of geographic location** high.
Connected to sea, **Adjacent waterways** Baltic Sea.
Archaeological sources yes.
Construction/planning 8th cent. AD. **8th cent. AD** yes, **9th cent. AD** no.
Chronology The construction's earliest part is dated by dendrochronology to AD 726. The canal was maintained at least around AD 750, as established by tree ring-dated repairs between AD 741 and 759. It was abandoned around AD 800, according to three ^{14}C dates from the canal fill (Nørgård Jørgensen 2002b, 137. 144–145; Daly 2002, 155–156; Werther u. a. 2018a, 361–362). In total, 24 oak samples and 16 beech samples have been dated, many of them with bark edges (Nørgård Jørgensen 2002b, 144–145). Except of two samples dating to spring/summer 729 and c. 750 (741–759), all the wood was cut in spring 726 (Daly 2002, 156). **Reliability of dating and chronology** high.
Description The canal is located on the Danish island of Samsø between Jutland, Funen, and Zealand in the southern part of the Kattegat. It cuts an isthmus between Saelvig bay in the west and Stavns fjord in the east. It was cut in a straight line. In the east and west, the canal and the wooden timbering do not reach the modern shoreline. The canal is cut through marine and lagoonal marine sediments of the Holocene. It offers a shortcut between Saelvig bay in the west and Stavns fjord in the east which is one of the safest natural harbours in the region. Perhaps the canal itself also served as a harbour (Nørgård Jørgensen 2002b, 137; 2009, 87). The written sources fail to specify its practical use and motivation. Nevertheless, there seems to be a consensus that the canal and the Stavns fjord served as an early naval military base to control the southern part of the Kattegat (see Christensen 1995; Nørgård Jørgensen 2000; 2002b, 126–145; Asingh 2006). The canal was excavated in 1960, 1977, 1979, and 1995 (Nørgård Jørgensen 2000, 221–222; 2002b, 135–136. 143–144). The canal connects two water-bodies on a homogenous level. Both banks had massive timber revetments of horizontal planks (e. g. oak and beech) in several rows that were fixed with c. 0,5 m long wooden pegs trough square mortises into the embankments. The planks were fixed additionally with 2–2.5 m long pointed oak piles that were hammered deep into the ground (Nørgård Jørgensen 2000, 221; 2002b, 144). Accord-

ing to Nørgård Jørgensen 2009, 87, »strong ropes« were found inside the canal, which would point to the mooring or towing of ships (see also Nørgård Jørgensen 2002b, fig. 14). The canal belongs to a group of large-scale infrastructure connected to the control of navigation – among them the sea defences at the harbour of Gudsø Vig and the Schlei Fjord close to Hedeby – built in the early 8th century around the southern Kattegat (Nørgård Jørgensen 2002a, 319–320; 2002b; 2009; Dobat 2008; Kramer 1999).

Description of the written record No contemporary written sources.

Canal type parallel/shortcut canal. **Dimensions** Length min. 0,5 km, fairway width 9–11 m, canal depth c. 2 m, water depth c. 0.7–1.1 m. **Bank revetments and other infrastructure** wooden revetments; towpath. **Initiators and responsible agents** royal initiative(?).

References Nørgård Jørgensen 1995; 2000; 2002b; 2009, 86–87. – Daly 2002, 155–156. – Sander 2014. – Werther u. a. 2018a, 361–363. – Müller-Wille 1997, 19–20. – Asingh 2006. – Christensen 1993; 1995. – Danmarks Kulturarvs Forening og KulturKonsulenten. – Englert 2015a, 64. – Grewe 2002. – Grøn/Nørgård Jørgensen 1997, 27. – Kasang o. J. – Skov 2011, 334–336.

12 Ribe

Latitude 55,3280, **Longitude** 8,7614. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Ribe Å.

Written sources yes.

Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** yes.

Chronology According to Hourihane 2012, 198, the canal was cut around 1200. **Reliability of dating and chronology** low.

Description According to Hourihane 2012, 198, »About 1200 Ribe was developed into a major market-town [...] The river was dammed and the town encircled by a canal, and this, although done for military purposes, so increased the flow of river traffic that in the 13th and 14th centuries Ribe was one of the most important trading centres in Denmark«.

Description of the written record not specified.

Canal type indeterminate. **Initiators and responsible agents** civic authorities(?).

References Hourihane 2012, 198.

England

13 Abingdon Swift Ditch

Latitude 51,6704, **Longitude** -1,2814. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Thames.

Written sources yes.

Construction/planning 11th cent. AD. **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to the *Historia Ecclesie Abbendonensis* and the *Chronicon monasterii de Abingdon*, the canal was built in 1052–66. Nevertheless, the source was written in the 12th century and refers to older rights, so there is a certain chance that a 12th century situation was projected back in time to justify these claims and rights. It seems most likely that the canal was somehow blocked in the later Middle Ages, as it had to be re-opened in 1624 (Steane 2008, 23). **Reliability of dating and chronology** high.

Description The canal is connected to the River Thames and forms a bypass around a difficult stretch close to the abbey of Abingdon. The citizens of Oxford (and perhaps also London) asked for the construction to bypass a difficult stretch of the River Thames. The canal was built on the church's meadow, and the abbey received the right to collect a water toll for all ships passing the canal. Nevertheless, the location of the canal as mentioned in the written sources is not entirely clear.

Description of the written record The 12th century *Historia Ecclesie Abbendonensis* describes the construction of an artificial waterway in the time of Abbot Orderic 1052–66 (Blair 2007b, 258; *Historia ecclesie Abbendonensis I*, ed. Hudson, 218–219). According to the translation of *Historia ecclesie Abbendonensis I*, ed. Hudson, 219, »the monastery of Abingdon has the River Thames flowing past on its southern side, through which shipping passes in both directions.

But in the time of Abbot Orderic, the channel of that river lay beyond the church's plot of land which is called Barton by those living there, next to the hamlet named Thrupp, thereby presenting considerable difficulty [*difficultatem non minimam*] for those rowing. For often, when the river-bed downstream stood considerably higher than upstream, it made the channel devoid of water. Therefore, the citizens of the town of Oxford, as their shipping very often had passage there, pleaded that the course of the river be channeled [*fluuii cursus…diriuetur*] through the church's meadow which extended below to the south of the river, on the following terms, that for the rest of the time one hundred herrings be customarily paid for from each of their ships [*naui*] to the monks cellerar. As their petition was fulfilled, the said undertaking is exacted, as agreed, to this day.« That the toll was really collected is documented in sources of 1110–1111, when Oxford boatmen wanted to use the canal without paying the toll, which was resisted by a Royal writ before the King's sheriff (Blair 2007b, 258–259; Davis 1973, 264). According to Davis 1973, 263, the toll was »a sort of season-ticket for the year«. According to Blair 2007b, fn. 13, the *Chronicon monasterii de Abingdon* too describes the canal construction, and he adds that it may have been written even some decades earlier than the *Historia Ecclesie Abbendonensis* (see *Historia ecclesie Abbendonensis II*, ed. Hudson, xxii). According to Blair 2007b, fn. 13, the *Chronicon monasterii de Abingdon* states that »the citizens ask the monks ›to allow them to make a channel (*meatus*) through their meadow, which is on the south side of the church, more easy for ships (naves) than by the other channel (alveus)‹«. The full Latin text goes: »*De Centum Allecis quas Coquinarius habuit de Navibus: Tempore Eduuardi regis et Ordrici abbatis navigium, quod est sub monasterio Abendoniae, valde nocivum erat nautis, ut vix naves transire possent usque ad Oxoniam. Qua moti Londonienses cives et Oxonienses convenerunt ab abbatem Ordricum, ut liceret eis per pratum ejus, quod est in australi parte ecclesiae, facere meatum navium faciliorem quam per alium alveum; hae imposita pactione, ut de unaquaque navi reddant c. allecia coquinario quotienscunque transierint, a Purificatione [2 Feb.] usque ad Pascha; quod conservatum est usque hodie*« (*Chronicon monasterii de Abingdon*, ed. Stevenson, 282).

Canal type parallel/bypass canal. **Dimensions** Length c. 2 km. **Bank revetments and other infrastructure** water toll/naval duties. **Initiators and responsible agents** monastery; civic authorities (Oxford, London).

References Biddle u. a. 1968. – Blair 1998, 49; 2007b, 258–268. – Hooke 2007, 42. – Bond 1979; 2007, 178. – *Historia ecclesie Abbendonensis I*, ed. Hudson, 218–219. – *Historia ecclesie Abbendonensis II*, ed. Hudson, xxii-xxii. – Astill 1984, 65. – Booth u. a. 2007, 81–102. 140–141. 251–255. 258–259. 326. – Charters of Abingdon Abbey 1, ed. Kelly. – Charters of Abingdon Abbey 2, ed. Kelly. – Rippon 2000, 240. – Baker/Brookes 2013, 285–286. – *Chronicon monasterii de Abingdon*, ed. Stevenson, 282. – Davis 1973, 263–264. – Steane 2008.

14 Aylmer Hall

Latitude 52,7012, **Longitude** 0,2888. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Great Ouse.

Archaeological sources yes.

Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed.

Chronology The chronology is indeterminate, but the canal is most likely Roman (Leah/Crowson 1993, 44; Bond 2007, 169; Malim 2005, 147). According to Bond 2007, 169, it did not survive into the early medieval period. **Reliability of dating and chronology** very low.

Description The canal is located in the Fen and connected to the River Great Ouse (Leah/Crowson 1993, 44; Bond 2007, 169 fig. 32). According to Malim 2005, 150–151, the canal offered a connection to the sea. A cross-section was excavated near Tilney in the 1990s (Leah/Crowson 1993; Malim 2005, 150).

Critical remarks it is uncertain, if it was navigable/navigated.

Canal type dead-end. **Dimensions** Length c. 5–6 km, fairway width/deepest part c. 5 m, trench c. 20 m, depth c. 1.7 m. **Initiators and responsible agents** indeterminate.

References Leah/Crowson 1993. – Bond 2007, 169 fig. 32. – Rippon 2000, 67. 71 fig. 24. – Malim 2005, 147. 150.

15 Bampton Canal

Latitude 51,7280, **Longitude** -1,5467. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Shill Brook; Highmoor Brook; Thames.
Written sources yes, **Archaeological sources** yes.
Construction/planning early medieval. **10th cent. AD** assumed, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The excavation produced no dating evidence, but the possible mention of the canal in 1005 suggests that it was built no later than the earliest 11th century. Several recuts in the archaeological excavations document a longer period of use, at least until the later Middle Ages when the canal was filled (Blair 2007b, 277). Blair 1998 suggests that it was out of use by the early 14th century. In the post-medieval period, the remaining depression was levelled through dumping. **Reliability of dating and chronology** low.
Description The canal is located in the Thames catchment, c. 35 km west of the watershed between the Thames and the Severn. It extends the network of navigable waterways close to the head of navigation (Oksanen 2019). Between Shill Brook and Highmoor Brook, two small northern tributaries of the Upper Thames, the artificial watercourse was built from Black Bourton via Bampton to the Thames at Shifford (Blair 2007b, 272). The canal was dug into Holocene alluvial deposits (British Geological Survey 2013). The agents behind the canal's construction are unknown. Nevertheless, it is most likely that royal initiative played a key role, as Bampton was an important royal estate in the 10th and 11th centuries. J. Blair carried out a geomagnetic survey and two machine-dug excavations at Bampton Deanery (Blair 1992; 2007b, 272–277). As mapped by Blair 2007b, fig. 64, the canal is a connection canal, bridging a small local watershed. Nevertheless, if the canal ended at Bampton, as mapped by Oksanen 2019, it looks more like a dead-end canal from Shifford to Bampton or/and a parallel canal to the natural watercourse. The bedrock in the excavated area consists of gravel, into which the canal was dug »at least 1.5 m«. The initial filling is an organically rich, peaty, fine-grained sediment mixed with collapsed gravel from the banks. The silted fairway was recut a number of times, which resulted in a ditch up to 12 m wide (Blair 2007b, 277). Although no wooden bank revetments have been observed, the banks revealed »revetments of rubble embedded in clay« (Blair 2007b, 277).
Description of the written record The most important document concerning the canal are the Shifford charter-bounds which date to 1005. They mention »two weirs, one above the *lād*, the other below« (Blair 2007b, 278), and Blair assumes that this *lād* was a canal, which was located between the two weirs at the River Thames.
Canal type indeterminate. **Dimensions** Length max. 8 km, fairway width c. 7.4 m; depth c. 2 m. **Initiators and responsible agents** royal initiative(?).
References Blair 1992; 1998; 2007b. – Caffyn 2010, 352–356. – Oksanen 2019. – Peacock 2015. – Booth u. a. 2007, 139. 248–251. – Booth u. a. 2007, 326. – Baker/Brookes 2013, 270.

16 Bardney Abbey

Latitude 53,2215, **Longitude** -0,3328. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Witham.
Other sources yes.
Construction/planning High Middle Ages. **11th cent. AD** assumed, **12th cent. AD** assumed.
Chronology The chronology is unclear, but it is most likely that the canal was built after the re-establishment of the abbey in 1087. **Reliability of dating and chronology** very low.
Description The canal connects the Benedictine abbey of Bardney with the River Witham (Bond 2007, 196). It is highly probable that the initiative for the construction came from the abbot and the monks. Bardney Abbey was destroyed by the Danes in the 9th century and re-established in 1087 as a dependent Benedictine priory of the abbey of Charroux in France (Page 1906; Sawyer 1998, 64–65. 145).
Canal type dead-end. **Dimensions** Length c. 0.7 km. **Initiators and responsible agents** monastery.
References Bond 2007, 196. – Everson u. a. 1991, 47. – Page 1906. – Everson/Stocker 2011. – https://sketchfab.com/models/4a8ee1d56480427dbd208485873160a8 (12.3.2018).

17 Barlings Abbey Canal

Latitude 53,2480, **Longitude** -0,3687. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Witham.
Other sources Topography.
Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology The abbey was founded in 1154, which most likely represents a *terminus post quem* for the canal construction (Everson u. a. 1991, 67). **Reliability of dating and chronology** very low.
Description The canal is connected to the River Witham, and an old course of the Barlings Eau had been »shortened by a straight cut about 1.1 km long« (Bond 2007, 196). In all probability, the canalisation was performed by the monastic community of Barlings Abbey.
Canal type parallel. **Dimensions** Length c. 1.1 km. **Initiators and responsible agents** monastery.
References Everson u. a. 1991, 66–70. – Colvin 1951, 70–77. – Everson/Stocker 2011.

18 Bishop Dyke York

Latitude 53,8334, **Longitude** -1,1287. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Ouse.
Other sources yes.
Construction/planning High Middle Ages. **11th cent. AD** assumed, **12th cent. AD** assumed.
Chronology The possible early medieval dating of the canal »for building works at the cathedral« (Bond 2007, 197) is very uncertain and highly speculative. According to Blood/Taylor 1992, 91, »the Dike is not actually recorded in documents until the early sixteenth century«. In their detailed survey of the landscape around Cawood, Blood/Taylor 1992 100–101 come to the conclusion that the canal was either cut anew or recut« between the late 11th and earlier 13th century. **Reliability of dating and chronology** very low.
Description The canal is connected to the River Ouse. According to Bond 2007, 197, the canal »runs for over 10 km from Sherburn-in-Elmet to Cawood on the River Ouse«. According to Bond 2007, 197, »it has been suggested that [the canal] was made in order to bring magnesian limestone from the quarries at Huddleston, 4 km west of Sherburn, for building works at the cathedral.« Nevertheless, Parsons 1991, 22 offers a critical view on this suggestion and comes to the conclusion that »the first leg of the journey [from the quarry to Cawood] was not made by water.« In 1986, a section of the canal in Cawood was excavated »but no dating evidence was found« (Blood/Taylor 1992, 91; Brinklow 1986, 29). According to Gee 1981, 250. 253 and Miller/Gee 1983, 167, wharfs and a *stagnum* (basin/pond) are mentioned at the end of the canal in the 15th and early 16th century.
Description of the written record According to Miller/Gee 1983, 167, the Dean and the Chapter of York »took a lease of Huddlestone Quarry« in 1385 (recorded in the Fabric Rolls of York Minster). For 1415/1416 the Fabric Rolls describe that the stone was transported by cart from the quarry to Cawood (Miller/Gee 1983, 167). Nevertheless, another text passage describes »*In sledding lapidum apud Cawood a diversijs stallagijs usque frontem ripae*«, which has been interpreted as a possible hint about the use of the canal in this period (Miller/Gee 1983, 167). In 1498/1499 and in 1504 there are several sources indicating that the stone coming from the quarry was unloaded from boats in Cawood which were moored »*a stagno de Cawood*«, i. e. ›in the pond of Cawood‹ and transported from there to the river quay on carts (Miller/Gee 1983, 167).
Canal type dead-end. **Dimensions** Length 9–10 km, width c. 5 m, water depth max. 0.9 m. **Initiators and responsible agents** indeterminate.
References www.pastscape.org.uk/hob.aspx?hob_id=974012 (5.4.2018). – www.pastscape.org.uk/hob.aspx?hob_id=974990 (5.4.2018). – www.pastscape.org.uk/hob.aspx?hob_id=54663 (5.4.2018). – www.cawoodheritage.org.uk/wordpress/?page_id=704 (5.4.2018). – Bond 2007, 197. Oksanen 2019. – Cawood Castle Garth Group c. 2010. – Blood/Taylor 1992. – Brinklow 1986. – Gee 1981, 250–254. – Parsons 1991, 22. – Moorhouse 2003, 194–195. 199; 2007, 308–309. – Miller/Gee 1983.

19 Bottisham Lode

Latitude 52,2404, **Longitude** 0,2397. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Cam.
Written sources yes, **Archaeological sources** yes.
Construction/planning medieval. **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to Hall 1996, 112, »there seems little reason to doubt that the lodes are of late Saxon or early medieval date«. According to Oksanen 2019 the canal was »in use in 1279, and probably in continued use in the Later Middle Ages« (see also Bond 2007, 185). According to Cole 2013, 60, the canal »must have been in existence by the second half of the twelfth century, when Lode is recorded«. **Reliability of dating and chronology** high.
Description The canal is located at the edge of the Fen and ends at Lode while connecting to the River Cam (Hall 1996, fig. 113; Bond 2007, 183. 185). The canal connected the villages nearby »directly to the Fenland waterway system and so with the sea port at King's Lynn« (Hall 1996, 112). According to Oosthuizen 2012, 215, there was a basin at the end of the canal in Lode »in which boats might turn as well as tie up«.
Description of the written record not specified.
Canal type dead-end. **Dimensions** Length c. 3.6 km. **Bank revetments and other infrastructure** basin/pond. **Initiators and responsible agents** indeterminate.
References Bond 2007, 183–185. – Oksanen 2019. – Hall 1996, 112–113. – Fowler 1933, 113–114. – Oosthuizen 2012, 213. – Cole 2013, 60.

20 Bourne Morton Car Dyke

Latitude 52,8030, **Longitude** -0,3723. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Car Dyke Canal.
Archaeological sources yes.
Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed.
Chronology According to Bond 2007, 169, the canal is of »probable Roman date«, Malim 2005, 147–152 does also argue for a Roman date. **Reliability of dating and chronology** very low.
Description The canal is connected to the Car Dyke canal and most likely offered access to the sea (Bond 2007, 169; Hayes/Lane 1992, 122. 125). According to Malim 2005, 150, the canal was excavated in the 1990s. After silting in the Roman period, it was recut (Malim 2005, 147. 150).
Critical remarks it is uncertain if it was navigable/navigated.
Canal type dead-end. **Dimensions** Length c. 6 km, total width c. 13 m, fairway 6 m, depth c. 2.6 m. **Initiators and responsible agents** indeterminate.
References Bond 2007, 169 fig. 32. – Hayes/Lane 1992, 122. 125–126. – Rippon 2000, 67. 70 fig. 24. – Malim 2005, 142–152.

21 Bristol St. Augustine's Marsh

Latitude 51,4501, **Longitude** -2,5980. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Froome.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Hutchinson 1997, 104 the project to canalise the River Froome started in 1239. According to Bond 2007, 199, »the citizens purchased the eastern part of St Augustine's Marsh from St Augustine's Abbey, and began the task of digging« in March 1240. **Reliability of dating and chronology** high.
Description The canal was cut to secure accessibility to the port (Hutchinson 1997, 104). From c. 1200 onwards, Bristol became a »major European port« (Baker u. a. 2018). According to Bond 2007, 199, it was dug as a »new channel for the River Froome to accommodate ships able to carry up to 200 tuns of wine«. To allow usability for ships with a cargo of 200 t (Bond 2007, 200), the fairway dimensions must have been significant. According to Baker u. a. 2018, figs 1.2; 2.8; 6.23, the canal seems to be identical with the harbour basin in the widened lower section of the River Froome. The construction was initiated by the citizens of Bristol, who »payed 5,000 to canalize the Froome and construct a new quay« (Hutchinson 1997, 104). In the 13th century, quays have been constructed »which could be used at different states of the tide« (Hutchinson 1997, 108; see also Jones 1991, 19). According to Bond 2007, 199 this »new stone-reverted quay for seagoing ships was made on the north bank of the new channel, opposite St Stephen's church«.
Description of the written record The construction of the canal is attributed to the year 1240 in a royal charter and in the Great Red Book of Bristol (Bristol Charters, ed. Harding, 18–19; Bristol Red Book, ed. Veale, 89–90). According to the Great Red Book »*totam communiam Bristollie*« was involved in the legal framework »*ad faciendum inde trencheam portum*« in a specified area, to which they were granted

free access by day and by night (Bristol Red Book, ed. Veale, 89–90). The royal charter of Henry III addresses the citizens of Redcliffe (*hominibus manentibus in la Redecliue in Suburbio Bristollie*) to support the construction of the canal (*quandam trenchiam*) to allow ships unrestricted navigation into the harbour of Bristol (*vt naues venientes ad portum nostrum Bristollie liberius et sine impedimento intrare possint et exire*), because not only the citizens of Bristol, but also they themselves would significantly profit from this work (*ex melioracione euisdem portus non solum ipsis Burgensibus Sed et vobis qui participes estis earundem libertatum quas predicti Burgenses nostri habent in villa predicta et in scotto et in lotto ipsis estis socii non modicum comodum debeat accrescere vobis eciam multum possit vtilis et fructuosa de operacionem*).

Canal type parallel. **Dimensions** Length c. 0.3–0.5 km. **Bank revetments and other infrastructure** quay wall. **Initiators and responsible agents** civic authorities.

References Hutchinson 1997, 104. – Bond 2007, 199–200. – Baker u. a. 2018. – Jones 1991. – Bristol Charters, ed. Harding, 18–19. – Bristol Red Book, ed. Veale, 89–90.

22 Bullington Priory Canal

Latitude 53,2767, **Longitude** -0,3507. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Witham; Barlings Eau.

Written sources yes.

Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.

Chronology The canal was constructed in the late 12th century, in/after 1195 (Bond 2007, 196; www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MLI51192&resourceID=1006 [15.3.2018]). **Reliability of dating and chronology** high.

Description The canal connects the priory of Bullington with the River Witham (Bond 2007, 196) or rather the Barlings Eau. The priory of Bullington was founded between 1148 and 1154 by Simon, son of William de Kyme (Houses of the Gilbertine Order 1906). The purpose of the canal is clearly mentioned in a late 12th century source: the aim was to have an easy access by ship from the river to the priory (Everson u. a. 1991, 47). According to Everson/Stocker 2011, 27, the 12th century source specifies the ditch to be »two perches broad ›for easy transit of ships‹ from the river«. This would approximately have corresponded to 10 m (2 perches are 11 yards or 33 feet according to www.nottingham.ac.uk/manuscriptsandspecialcollections/researchguidance/weightsandmeasures/measurements.aspx). However, Stenton 1920 and Charters Gilbertine houses, ed. Stenton mention perches measuring 16, 18, and 20 feet and that »there is no sign during the twelfth century of any attempt to make the local perch conform to any royal, official standard« (Stenton 1920, xlvii).

Description of the written record According to Bond 2007, 196 and Everson/Stocker 2011, 27, late 12th century written sources document the canal »for the easy transfer of ships« from the river. According to Everson 1980s/1990s, the original source is »Lincoln Central Library, Ross MSS vol. X sub Newball. [see also LRS 17, 309–310; BL, Harleian Charters 44A23; LAO, TYR 1/2/1]«, but it was impossible to consult the original text.

Canal type dead-end. **Dimensions** Length min. 3.4 km, width most likely c. 10 m. **Initiators and responsible agents** monastery.

References Bond 2007, 196. – Everson u. a. 1991, 47. 78–79. – Everson/Stocker 2011. – www.pastscape.org.uk/hob.aspx?hob_id=351484 (12.3.2018). – Houses of the Gilbertine order 1906. – Charters Gilbertine houses, ed. Stenton. – www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MLI51192&resourceID=1006 (15.3.2018). – www.heritagegateway.org.uk/Gateway/Results_Single.aspx?uid=MLI54188&resourceID=1006 (15.3.2018).

23 Butley Priory Canal

Latitude 52,0877, **Longitude** 1,4649. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Butley.

Archaeological sources yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.

Chronology Bond 2007, 192 reports that the »first construction was interpreted as dating back at least to the early part of the thirteenth century, possibly even to the foundation of the priory in 1171« (see also Myres u. a. 1933, 263). In the 13th and 14th century, the harbour infrastructure at the head of the canal was subsequently modified and »pottery from the silts in front of the jetty suggests that the deep-water channel remained in use at least up to the seven-

teenth century, but by the eighteenth century it had been abandoned and was used as a dump for rubbish«. According to Myres u. a. 1933, 260, the canal was filled »at some date after the sixteenth century«. **Reliability of dating and chronology** low.

Description The canal is located at the edge of the tidal marsh (Myres u. a. 1933, 260). According to Bond 2007, 192, it »was cut across Stonebridge Marshes from the tidal Butley River up to a wharf within 180 m of the Augustinian priory of Butley«. There are no specific sources, but it is most likely that the canal was cut on behalf of the priory. Bond 2007, 192 assumes that the main purpose was the transport of building material to the priory. Bond 2007, 192 mentions that a wharf is located at the head of the canal. At the northern bank of the canal a »timber revetment was traced for a length of some 27 m« which belongs to the earliest construction period. Later, this wooden revetment »was replaced with a buttressed stone wall some 18 m long, with a jetty 5.5 m to the south constructed of a line of stout oak baulks infilled behind with building debris« and connected to a massive levelling of the northern bank of the canal (Myres u. a. 1933, 263).

Canal type dead-end. **Dimensions** Length c. 2.5 km, width c. 3 m. **Bank revetments and other infrastructure** wooden revetments; jetty; quay wall. **Initiators and responsible agents** monastery.

References Bond 2007, 178. 192. – Myres u. a. 1933. – Oksanen 2019.

24 Bykers Dyke

Latitude 53,4413, **Longitude** -0,8206. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Trent; Idle.

Written sources yes, **Archaeological sources** assumed.

Construction/planning medieval. **11th cent. AD** yes, **12th cent. AD** assumed, **13th cent. AD**.

Chronology The canal was built before the end of the 11th century (Bond 2007, 180) or rather before the Domesday survey (Cole 2007, 65). Nevertheless, the arguments for this dating yet require clarification. **Reliability of dating and chronology** low.

Description The canal is located in the Trent catchment and connects the rivers Trent and Idle while crossing a local watershed. The canal is located in the floodplain (Natural Environment Research Council 2011 [2018]). According to Cole 2007, 65, together with other river diversions the Bykers Dyke »created a through waterway from the Trent to the Ouse, avoiding the dangerous eager, tides, and shifting sandbanks of the Humber«.

Description of the written record not specified.

Canal type connection. **Dimensions** Length c. 8 km. **Initiators and responsible agents** indeterminate.

References Bond 2007, 180. – Oksanen 2019. – Cole 2007, 65.

25 Cambridge

Latitude 52,2084, **Longitude** 0,1171. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Cam.

Archaeological sources yes.

Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** yes.

Chronology According to Newman 2011, 4 »three [canals] were inserted during the 12th to 13th centuries« and »at some time during the 13th century, the reclamation work evidently having been completed, a series of timber buildings were established to the north of the channel«. According to Cessford u. a. 2006, 27, the Cambridge Ditch was used in the 13th century. The second possible canal near St. Johns College has been dated to the 13th to 16th centuries (Cessford u. a. 2006, 27). **Reliability of dating and chronology** high.

Description In Cambridge several canals were cut through the marshland of the River Cam (Oksanen 2019; Cessford u. a. 2006, 27) and at least some of them were navigable. Newman 2011, 4 reports that »At the St John's College Chapel Court and Master's Garden site, three such drainage ditches were inserted during the 12th to 13th centuries [...] large enough to have accommodated shallow-draughted vessels and may well have acted a minor channel or barge pull«. Nevertheless, drainage seems to have been a main purpose besides navigation (Newman 2011, 4). According to Newman 2011, 4 »the most significant of these [canals] was around 4.5 m wide by 0.5 m deep«.

Canal type parallel. **Dimensions** Width max. 4.5 m, water depth max. 0.5 m. **Initiators and responsible agents** indeterminate.

References Cessford u. a. 2006, 27. – Walker 1911. – Newman 2011.

26 Car Dyke Lincolnshire

Latitude 52,7891, **Longitude** -0,3616. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Witham; Welland; Nene.
Written sources yes, **Archaeological sources** yes.
Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Simmons u. a. 2006, 11. 17, »the Car Dyke was constructed as a single monument and may, therefore, have been formed in one period« but »of all the excavations [...] none has yet produced reliable dating evidence, either in form of datable artefacts or from scientific dating method«. Nevertheless, it almost certainly was constructed in Roman times (Simmons u. a. 2004, 19; 2006, 25). Several Roman finds found in the canal as well as early Saxon sherds from the fill support its construction in the Roman period (Simmons u. a. 2004, 162–163). An construction in the early 2nd century seems possible, but there is no clear proof for this (Simmons u. a. 2004, 162). According to Bond 2007, 164, the canal is Roman. **Reliability of dating and chronology** very low.
Description The canal connects to the two main rivers Witham and Nene and crosses several other riverbeds like the Glenn and the Welland (Simmons u. a. 2004, 2; Bond 2007, 164; Rippon 2000, 69–70; Evans u. a. 2013, 11). According to Simmons u. a. 2006, 3, the canal »can be traced for 57 miles« (92 km) from Lincoln to Peterborough. North of Lincoln, the Fossdyke continues the line of the Car Dyke (Simmons u. a. 2004, 2). At the southern end, Cnut's dyke continues the line of the canal south of Peterborough (Simmons u. a. 2004, 2). Further south, the »Old Tillage« was long thought to be part of the Car Dyke, but there is no connection (Simmons u. a. 2004, 2. 162; Bond 2007, 165). Its original purpose is blurred, even though navigation, drainage, and boundary functions have been discussed (Simmons u. a. 2004, 19–30; 2006, 25–27; Rippon 2000, 128; Smith 1977, 78). There have been several excavation and drill campaigns along the canal course (Simmons u. a. 2006, 4. 10–17). In some sections the fairway was »lined with clay [...] to hold water in those areas where the local geology was of sand or gravel« (Simmons u. a. 2006, 11). According to Simmons u. a. 2004, 59, »a mean of 4,038,000 m^3 of soil was removed to form the channel of the Car Dyke«. The canal was completely filled with layers of silt and clay, peat, and eroded backfill from the banks (Simmons u. a. 2006, 13). According to Simmons u. a. 2006, 17, the canal bed at some locations »rose up as if an undug causeway had been left«, which may have functioned as »the simplest form of lock and would have allowed different water levels« (see also Simmons u. a. 2004, 59). According to Rippon 2000, 88, »some sort of sluice structure would have been required«.
Description of the written record Simmons u. a. 2004, 32 suggest that an early reference to the Car Dyke is the »pre-Domesday village name of Dyke, north of Bourne« mentioned in the Domesday survey as ›*Dic*‹«. Further evidence is furnished by a 12th century document dealing with a land grant »*extra Karesdic*« (Simmons u. a. 2004, 32).
Dimensions Length 65–90 km, width 12–17 m, depth 3.6–4.4 m. **Bank revetments and other infrastructure** towpath. **Initiators and responsible agents** indeterminate.
References Simmons u. a. 2004; 2006. – Salway 1981, 564. – Smith 1977, 77. – Bond 2007, 164–165. 176–177 fig. 32. – Rippon 2000, 69–70. – Frere 1999, 270. – Cole 2007, 68; 2013, 60. – Blair 2007a, 15. – Gardiner 2007, 87. – Wawrzinek 2014, 35. 413. – Malim 2005, 142–152 colour pl. 26. – Evans u. a. 2013, 11–13. – Campbell 2012, 223.

27 Cheddar Yeo Canal

Latitude 51,2673, **Longitude** -2,7932. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Axe.
Written sources yes, **Other sources** place name.
Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** yes.
Chronology According to Rippon 2007, 216, »the Yea must have been canalized by 1212, when Hythe is first recorded« (see also Cole 2007, 71). **Reliability of dating and chronology** low.
Description The Cheddar Yeo is a canalised stretch of the River Axe (Rippon 1997, 213; 2007, 216).
Description of the written record In 1242/1243 »a court case revealed that the Abbot of Glastonbury had a right of navigation on the Axe and that he had built banks on either side of the channel in order to increase its depth. [...] and it is specified that ›the abbot and his predecessors had a thoroughfare by their boats to go from their manor of Andredesye to

the abbey of Glastonbury, carrying their corn, their stone and their lime‹‹ (Rippon 1997, 213).
Canal type parallel. **Dimensions** Length c. 6.8 km. **Initiators and responsible agents** monastery(?).
References Rippon 1997, 212–213; 2007, 216. – Oksanen 2019. – Hollinrake/Hollinrake 2007, 232. – Cole 2007, 71. – Russett 1991. – Cole 2013, 60.

28 Cirencester

Latitude 51,7144, **Longitude** -1,9570. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Churn.
Archaeological sources yes.
Construction/planning 2nd cent. AD. **1st cent. AD** assumed, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** assumed.
Chronology Rogers 2013, 64 states that »the earlier course was infilled and the river diverted at the end of the first or beginning of the second century AD and the earthwork embankment constructed at a slightly later date‹, »probably in the early to mid-second century‹. According to Holbrook/Wilkinson 1998, 10, the construction took place »by the mid-second century at latest‹. In the 3rd century the channel still existed and even today parts of it are still filled with water (Rogers 2013, 64 fig. 2.11). There are clear signs of silting and lack of maintenance of the canal itself in the 4th century, as its massive stone revetments were at least partially destroyed and robbed (Wacher/Salvatore 1998, 39). In the medieval period, »this channel […] was used to power the Abbey Mill‹ of St. Mary's Abbey (Rogers 2013, 63), so it seems likely that it was maintained in the post-Roman period or re-cut in the Middle Ages. **Reliability of dating and chronology** high.
Description The canal is a redirected branch of the River Chur along the northern edge of the Roman town of Cirencester (Rogers 2013, 59–64). According to Rogers 2013, 64, the »new channel was cut into solid rock‹. The town authorities and perhaps also the military were likely to have been involved in a project of this scale. According to Holbrook/Wilkinson 1998, 10, the purpose was »to drain a larger part of the valley bottom‹. Nevertheless, navigation seems to have been possible, as well. Parts of the canal have been excavated at the Verulamium Gate of the Roman town (Rogers 2013, 63). According to Rogers 2013, 63, »a 1.8 m high clay, gravel and stone rubble levée was constructed on the downhill side to prevent overflow and flooding of the town probably in the early to mid-second century‹. At the southern bank of the canal stone pier-like revetments were excavated at Verulamium gate (Wacher/Salvatore 1998, 38–39). A stone bridge »carried the Fosse Way over the river‹ at the Verulamium Gate (Wacher/Salvatore 1998, 37–38; Rogers 2013, 64).
Canal type parallel. **Dimensions** Length c. 2 km. **Initiators and responsible agents** military; civic authorities(?).
References Rogers 2013, 59–66. – Holbrook/Wilkinson 1998. – Wacher/Salvatore 1998. – http://cirencester.gov.uk/the-roman-period/ (4.6.2018). – Caffyn 2010, 6–7.

29 Cnut's Dyke [magna lada?]

Latitude 52,4734, **Longitude** -0,0955. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Nene.
Written sources yes.
Construction/planning medieval. **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** yes.
Chronology According to Spoerry u. a. 2008, 199, »Cnute's Dyke probably served Ramsey from the 10. century‹. Gardiner 2007, 95 and Bond 2007, 181 also consider a possible and even likely construction in the 10th century. Nevertheless, Bond 2007, 181 mentions discussions concerning a Roman date, although dismisses this as unlikely. According to Oosthuizen 2017, 125, Cnut's Dyke and King's Dyke seem to be identical and »*Kingesdelf* (also called *Cynges delf*) forms part of an artificial route along which the River Nene was re-routed between Stanground and Benwick. It was reputedly dug (hence *delf*, ›to dig‹) by order of King Cnut but […] it was clearly present by 972‹. **Reliability of dating and chronology** low.
Description According to Bond 2007, 178. 181 »Cnut's Dyke bypassed the meandering course of the Nene through Whittlesey Mere‹ and the Abbey of Ramsey might have been responsible for the construction. In the 12th century, Ramsey Abbey was an important agent in inland navigation (Bond 2007, 187; Blair 2007a, 15).
Description of the written record A document from 1192 in the *Cartularium monasterii de Rameseia* describes a *magna lada*. The reference to Whittlesey and the conflict with Ramsey make it rather unlike-

ly that the document refered to the Monk's Lode as assumed by Bond 2007, 187–188 (see also Parsons 1991, 22; Spoerry u. a. 2008, 202). It seems much more plausible that the source refers to the King's Dyke or Cnut's Dyke. For the full source text, see *Cartularium monasterii de Rameseia*, ed. Hart, 166: Ad 1192 : »*Haec est finalis concordia* [...] *inter abbatem de Rameseia* [...] *et abbatem de Saltreya* [...] *inter Withlesmare et Ubbemare* [...] *quod omnes ladae, quas monachi de Saltreya fecerant, in illo marisco, obstupabuntur, excepta illa magna lada, qui vadit de Withlesmare versus Saltreyam, quae remanebit aperta, per quam ipsi monachi de Saltreya adducent lapides et caetera necessaria ad constructionem monasterii sui et aliarum officinarum suarum, et monachi de Saltreya habebunt unam parvam casam tantum super ipsam ladam, in qua adductores lapidum quiescere possint cum opus fuerit, et nullam aliam casam nec domum in marisco illo facient praeter illam solam, nec arbores plantabunt, nec curtilagium, nec ladas nec trencheias alterias facient ibi; nec parientur, ut piscatores sui intrent in maras monachorum de Rameseia piscandi causa* [...]«.

Canal type parallel/bypass canal. **Dimensions** Length c. 12 km. **Bank revetments and other infrastructure** huts for the rest of boatmen(?). **Initiators and responsible agents** monastery(?).

References Spoerry u. a. 2008, 199. – Chrisholm 2010, 126 fig. 2. – Oksanen 2019. – Bond 2007, 181. – Page u. a. 1926, 377–385. – *Cartularium monasterii de Rameseia*, ed. Hart, 166. – Oosthuizen 2017, 125.

30 Colne Ditch

Latitude 52,3700, **Longitude** 0,0369. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Old Ouse.

Archaeological sources yes.

Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed.

Chronology The canal is Roman according to Malim 2005, 147. 151 and Evans u. a. 2013, 14. According to Evans u. a. 2013, 203–216, the port at Colne Fen was used between sometime before AD 120 and c. AD 325.

Reliability of dating and chronology low.

Description The canal traversed the peat sediments of the Fenlands and »acted as a short-cut across a big loop in the course of the old Ouse« (Malim 2005, 151; Evans u. a. 2013, 14). A Roman inland harbour has been excavated at Colne Fen (Evans u. a. 2013). Several ditches rectangular to the canal have been identified as possible slipways/»docking ditches«, but the interpretation »cannot be considered absolute« (Evans u. a. 2013, 225).

Canal type parallel/bypass canal. **Dimensions** Length c. 4 km. **Bank revetments and other infrastructure** boat slip(?). **Initiators and responsible agents** indeterminate.

References Malim 2005, 147. 151. – Evans u. a. 2013.

31 Crowland Cut South Eau

Latitude 52,6757, **Longitude** -0,1682. **Reliability/precision of geographic location** low.

Connected to river, **Adjacent waterways** Welland; Cat's Water.

Written sources yes.

Construction/planning medieval. **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to Chrisholm 2010, 130 »we know that Crowland Cut existed early in the twelfth century and, independently of evidence about the Bridge, it probably existed in the tenth century.« Between 1280–1303 the canal was blocked by Abbot Richard of Crowland (Oksanen 2019). **Reliability of dating and chronology** low.

Description The canal is located in the Fens and connected to the rivers Welland and Cat's Water (Oksanen 2019; Chrisholm 2010, 129). According to Edwards 1987, 216, it was »a navigable drainage channel«. According to Chrisholm 2010, 127–130, the canal was cut by the Abbey of Crowland »for good communications into the Fens«.

Description of the written record According to Chrisholm 2010, 129, the first clear mention of the waterway in the written sources is in 1135–1154 as »the water of Crowland«. In 1311 sources document that the »common passage of boats from the places in the western fens [...] along South Eau or the Nene to Outwell, and from there along Well Creek to the Ouse at Salters Lode« has been blocked by »an obstruction at Outwell, south east of Wisbech« (Caffyn 2010, 324).

Canal type connection. **Dimensions** Length c. 3 km. **Initiators and responsible agents** monastery.

References Chrisholm 2010, 127–130. – Oksanen 2019. – Caffyn 2010, 324. – Edwards 1987, 216.

32 Darcey Lode Oxlode

Latitude 52,4316, **Longitude** 0,2042. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Old Croft River; Wellstream; Cam.
Written sources yes, **Archaeological sources** yes.
Construction/planning medieval. **13th cent. AD** yes.
Chronology The canal must have existed in 1251, when Dunham Hythe is mentioned in written sources (Hall 1996, 18). **Reliability of dating and chronology** low.
Description The canals are connected to the Old Croft River/Wellstream. The upstream section is called Oxlade, the downstream section is called Darcey Lode (see Hall 1992, 81; 1996, 112; Oksanen 2019; Bond 2007, 184). The canal links Ely Island and Downham Hythe »with the fen land network of canals and rivers« (Hall 1996, 18). The south-eastern end of the canal is located immediately at the edge of the Isle of Ely. At the head of the canal, a harbour/landing place was located. Large amounts of imported material, most likely »damaged cargoes from vessels« (Hall 1996, 18) have been found at Downham Hythe (see also Cessford u. a. 2006, 26).
Description of the written record Dunham Hythe is mentioned in written sources in 1251 (Hall 1996, 18). Darsey is mentioned in 1437 and may have been referred to as »*moneyeslode*« already in 1251 (Hall 1992, 81; Oksanen 2019).
Canal type dead-end. **Dimensions** Length c. 15.5 km.
Bank revetments and other infrastructure harbour/hythe at the head. **Initiators and responsible agents** indeterminate.
References Hall 1992, 81; 1996, 16. 18. – Oksanen 2019. – Bond 2007, 185. – Cessford u. a. 2006, 26.

33 Deeping Car Dyke

Latitude 52,6802, **Longitude** -0,3222. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Car Dyke Canal; Welland.
Archaeological sources yes.
Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed.
Chronology According to Bond 2007, 169 it »may [...] be of Roman date«. According to Hayes/Lane 1992, 189 »it can hardly be doubted that it is Roman« and Malim 2005, 147. 150 does also postulate a Roman date. **Reliability of dating and chronology** very low.
Description According to Rippon 2000, 70 the canal runs »from the fen-edge and across the peat to the siltland where [it joins] the tidal creek system that enters the Welland Estuary«, but »both ends of the watercourse are uncertain« (Hayes/Lane 1992, 189). A cross-section of the canal observed in a younger ditch revealed a width of c. 30 m (Hayes/Lane 1992, 189). Though its total length is unknown, Hayes/Lane 1992, 189 managed to trace it over a distance of c. 1 km (see also Malim 2005, 147).
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type indeterminate. **Dimension** Length min. 1 km, total width of the trench c. 30 m. **Initiators and responsible agents** indeterminate.
References Bond 2007, 169 fig. 32. – Hayes/Lane 1992, 189–190 fig. 114. – Rippon 2000, 67. 70 fig. 24. – Malim 2005, 147. 150.

34 Ebbsfleet

Latitude 51,3140, **Longitude** 1,3492. **Reliability/precision of geographic location** very low.
Connected to sea; river, **Adjacent waterways** North Sea; Wantsum.
Written sources yes.
Construction/planning 11th cent. AD. **11th cent. AD** yes, **12th cent. AD** no.
Chronology The canal's unsuccessful construction attempt is documented for 1038–1040 (Blair 2007a, 5; Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1147). **Reliability of dating and chronology** low.
Description Ebbsfleet is located at the northern end of the Stonar bank, a sand and gravel/shingle spit, in the Wantsum Channel between the Isle of Thanet and the mainland (see Tatton-Brown 1984, 4; Clarke u. a. 2010, 14–16; Brookes 2007, fig. 20). The canal course is not clearly described in the source. The canal was most likely a bypass canal to bridge Stonar Island and circumvent the river mouth of the Stour at Sandwich. A second possibility is a dead-end harbour canal connected only to the sea. The canal was cut by the monastery of St. Augustin in Canterbury under Abbot Ælfstan. According to the source, the purpose was to build a concurrent canal harbour to that in Sandwich and to participate in the tolls, which ships had to pay. The dimensions are not

mentioned, but it seems likely that the canal was intended for seagoing ships coming from the English Channel.

Description of the written record According to Blair 2007a, 5 in 1038–1040 a dispute is documented »between the communities of Christ Church and St Augustine's, Canterbury, over control of the port and fishery at Sandwich. Defeated hands down, the St Augustine's party retaliated by trying to establish a rival concern at Ebbsfleet, on their own side of the Wansum Channel.« The attempt was not successful: »During and after these [times], Ælfstan was abbot of St Augustine's and [...] he obtained the third penny of the toll at Sandwich [...]. When Archbishop Eadsige learnt of this and all the community at Christ Church, then they determined between them to send Ælfgar, a monk of Christ Church, to King Harold. [...] The king [...] swore by Almighty God and all the saints that it was neither his advice nor his decision that Sandwich should ever be taken from Christ Church. Then it was clearly evident that it was a scheme of other men, not of King Harold; and indeed Abbot Ælfstan's counsel was behind the men who decided [to take] it from Christ Church. [...] When Abbot Ælfstan was informed of this, he came to Archbishop Eadsige and requested his support with the community over the third penny. And then they both [went] to all the brethren and asked the community that Abbot Ælfstan should be entitled to the third penny of the toll and should pay the community ten pounds. But they all of them together refused unanimously that they should ever at all endure that, [even] though Archbishop Eadsige was more in his support than the community. And when he could not [get] further with this, he desired that he might make a wharf facing ›Mildrith's acre‹ to protect against the raging [tide], but the whole community refused this outright altogether and the archbishop left the matter entirely at their own discretion. Then Abbot Ælfstan came with a large supporting troop and had a great trench dug at Ebbsfleet and intended that ships should lie in a channel in there, just as they did in Sandwich. But that profited him nothing, because he labours all in vain who labours against the will of Christ. And the abbot left it all thus and the community took possession of their own in the sight of God and of St Mary and of all the saints who rest within Christ Church and at St Augustine's« (Sawyer, S 1467; see also Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1148–1149). The channel in Sandwich is called a »*scipryne*« (Sawyer, S 1467; Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1148). According to Tatton-Brown 1984, 19 »in 1038 Christ Church temporarily lost Sandwich to St. Augustine's [...], but by 1040 they had got it back again, and St. Augustine's were being advised to make their own harbour at Minster«. Charters of Chertsey Abbey, ed. Kelly, xx points to the fact that the S 1467 document is »a highly partisan account«. It is most likely »not [...] a contemporary account of the dispute« and it is »conceivable that the document as it stands was drawn up after the Conquest« according to Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1153.

Canal type indeterminate. **Bank revetments and other infrastructure** water toll/naval duties. **Initiators and responsible agents** monastery.

References Blair 2007a, 5. – Sawyer, S 1467. – Tatton-Brown 1984. – Clarke u. a. 2010. – Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1147–1153. – Brookes 2007, 41–45. – Charters of St. Augustine's Abbey, Canterbury and Minster-in-Thanet, ed. Kelly, lxxxv-cxv. 168. – Charters of Chertsey Abbey, ed. Kelly, xx.

35 Ely Cut

Latitude 52,3981, **Longitude** 0,2825. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Great Ouse.

Written sources yes.

Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** assumed.

Chronology There is no precise information concerning the time of construction. The *terminus post quem* is the foundation of the abbey in the later 10th century. According to Bond 2007, 185 »the most likely period for the diversion of the river would seem to be between 1150 and 1300«. **Reliability of dating and chronology** very low.

Description The canal is located in the Fen west of the old riverbed of the Great Ouse (Oksanen 2019). There are two possible agents, either the abbot of the abbey of Ely or – in case of a later construction – the bishop of Ely. If the Ely Cut is identical with the *Abbatis fossa* of the late 10th century, the primary purpose was not navigation according to the *Liber Eliensis* (*Liber Eliensis*, ed. Fairweather, 149).

Description of the written record It is not clear, if the canal is identical with the *Abbotesdelf* or in Latin *Abbatis fossa* (»the Abbots ditch«, see the *Liber Eliensis*, ed. Fairweather, 149; Oosthuizen 2017, 125), which is mentioned in the Liber Eliensis connected to the refoundation of the monastery in the 10th century (Bond 2007, 185; Salzman 1948, 199–210; *Liber Eliensis*, ed. Fairweather, 149).
Canal type parallel. **Dimensions** Length 6–9 km. **Initiators and responsible agents** monastery/bishop.
References Oksanen 2019. – Bond 2007, 178. 185–186. 189. – Salzman 1948, 199–210. – *Liber Eliensis*, ed. Fairweather, 145–148. – Oosthuizen 2017, 125.

36 Fen Causeway Canal

Latitude 52,5717, **Longitude** -0,0546. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Nene.
Archaeological sources yes.
Construction/planning 2nd cent. AD. **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** no.
Chronology According to Hall 1987, 66, the canals west of March »had silted up by the 2. century AD and one of them was converted into a road.« Bond 2007, 168 postulates that the canal was cut »probably during the second century« and »buried by silt deposits caused by one or more episodes of marine inundation in the later third century«. According to Silvester 1991, 113, the date of the eastern section of the canal »cannot be ascertained accurately, although the frequent occurrence of second-century material on both the northern and southern levees [...] implies a relatively early origin«. »A major flood led to the silting of the canal, the natural watercourses and many of the turbaries, and a further phase of Roman settlement can be detected on top of the flood silt« (Silvester 1991, x). The canal section excavated at Straw Hall Farm in 1994 was most likely constructed in the 2nd century and »still active in some form until at least the middle of the 3. century« (Crowson 1995, 25). **Reliability of dating and chronology** high
Description The canal or canals (two cuts) are connected to the Roman channel of the River Nene (Hall 1987, fig. 23; Bond 2007, fig. 32). The canal ran parallel to the road of the Fen Causeway (Bond 2007, 168). According to Hall 1987, 57, it crossed peat layers west of March and »rapidly filled up with mineral deposits«. A »substantial flood silt deposit« was accumulated most likely in the 3rd century (Crowson 1995, 25). At Straw Hall Farm, some indications for »timber shuttering« of the canal bank have been identified (Crowson 1995, 25). A »series of salterns lay on the bank of the canal« (Rippon 2000, 69). According to Hall 1987, 66 the canal was part of »the major cross-fen route from the Midlands to East Anglia, the Fen Causeway.«
Canal type parallel. **Dimensions** Length c. 20 km, fairway width c. 10 m, depth 1.5–1.7 m. **Bank revetments and other infrastructure** wooden revetments?
Initiators and responsible agents indeterminate.
References Bond 2007, 167–168 fig. 32. – Hall 1987, 41–42. 57. 66; 1996, fig. 102. – Silvester 1991, 97–115. – Rippon 2000, 67–71 fig. 24. – Malim 2005, especially colour pl. 26. – Sayer 2009. – Crowson 1995.

37 Fens Flaggrass Stonea Canal

Latitude 52,5442, **Longitude** 0,1046. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Nene tributary; Fen Causeway canal.
Archaeological sources yes.
Construction/planning Roman. **2nd cent. AD** yes, **3rd cent. AD** assumed.
Chronology According to Bond 2007, 168, the canal is most likely »of Roman origin, [and] silted up before the end of the Roman period«. According to Hall 1987, 43, the canal silted up »at an early stage« of the settlement, which dates to a period between the late 1st and the 4th century AD. **Reliability of dating and chronology** low.
Description The canal is connected to the Fen Causeway canal in the North and a river »that went from Stonea« and »must still have been navigable« in the South (Hall 1987, 42 fig. 23; 1996, fig. 102.). According to Bond 2007, 168 the canal »connected the north end of Stonea Island with the Fen Causeway«. According to Hall 1987, 42, the canal silted up very rapidly and was replaced by a road system.
Canal type parallel. **Dimensions** Length c. 3.2 km. **Initiators and responsible agents** indeterminate.
References Hall 1987, 42 fig. 23; 1996, fig. 102. – Bond 2007, 168 fig. 32. – Evans u. a. 2013, 427. – Malim 2005, especially colour pl. 26. – Sayer 2009.

38 Foss Dyke Lincoln-Torksey

Latitude 53,2512, **Longitude** -0,6020. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Witham; Trent.
Written sources yes.
Construction/planning 12th cent. AD. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD**, **4th cent. AD**, **5th cent. AD**, **6th cent. AD**, **7th cent. AD**, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The initial construction date is unclear. The reopening of the canal was ordered by the king in the 12th century. According to Bond 2007, 167 the canal is »likely to be of Roman origin«. Rogers 2013, 71 underlines that »the date at which the canal was created is still uncertain« and »although the redirection of the Till and the creation of the Fossdyke have traditionally been regarded as being Roman creations, there is as yet no evidence to support this«.
Reliability of dating and chronology very low.
Description The canal is located in the catchments of Trent and Witham and forms a connection of the two rivers Witham (at Lincoln) and Trent (at Torksey), crossing the watershed between both catchments (Bond 2007, 167. 175; Rogers 2013, 70–71). The canal course is s-shaped to avoid a section in Jurassic bedrock (Natural Environment Research Council 2011 [2018]; Oksanen 2019). In the 12th century, the reopening of the canal is ordered by the king. In the 14th century »the canal was so obstructed by silting and grass growth and by the actions of men [...] that boats could no longer pass through it to and from Lincoln« (Bond 2007, 176). In 1335, 1365, and 1376 commissions were appointed to resolve the problem – without success. »Despite one abortive attempt in 1518 the Foss Dyke was not reopened until 1672« (Bond 2007, 176). Harbour infrastructure and bank revetments have been excavated at the Lincoln end of the canal (Chitwood 1991).
Description of the written record The reopening of the Foss Dyke in 1121 is referred to in the *Historia Regum* of Symeon of Durham (Bond 2007, 175; Arnold 1885, 260). For AD 1121 it is described that »*Eodem anno Henricus rex, facto longa terrae intercisione fossato a Torkeseie usque Lincolniam, per derivationem Trentae fluminis fecit iter navium*« (Arnold 1885, 260). Water tolls on the canal (*de omnib. navib.* [...] *FOSDIK a LINC*) are documented for the 13th century in the Hundred Rolls (*Rotuli Hundredorum*, ed. Caley/Illingworth, 320; Bond 2007, 175–176; see also Frost 1827, 96.
Canal type connection/watershed canal. **Dimensions** Length c. 18 km. **Bank revetments and other infrastructure** water toll/naval duties. **Initiators and responsible agents** royal initiative.
References Bond 2007, 154. 167. 175–176. – Langdon 2007, 121. – Oksanen 2019. – Salway 1981, 564. – Arnold 1885, 260. – *Rotuli Hundredorum*, ed. Caley/Illingworth, 320. – Simmons u. a. 2004, 2. – Smith 1977, 77. – Rogers 2013, 71. – Chitwood 1991. – Campbell 2012, 223.

39 Glastonbury Anglo-Saxon Canal

Latitude 51,1421, **Longitude** -2,7217. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Brue.
Written sources yes, **Archaeological sources** yes.
Construction/planning early medieval. **10th cent. AD** assumed, **11th cent. AD** assumed.
Chronology A wood sample from the bank revetment has been dated by radiocarbon. The sample from »a sharpened wooden revetment stake from the canal edge in Trench IV« provided a »secure pre-Conquest date« (HAR-9207: 1120+-80; calibrated AD 690–1030 at 2sigma and AD 830–990 at 1sigma) (Hollinrake/Hollinrake 1993, 89–90; 2007, 237). According to Nancy and Charles Hollinrake (personal comm. 06/2018), a small round-wood has been dated, so a significant old-wood-effect is rather unlikely. Therefore, Hollinrake/Hollinrake 2007, 238 and Hollinrake/Hollinrake 1993, 92 argue for a construction in the mid-10th century »during the abbacy of Dunstan«. According to Gilchrist/Green 2015, 54. 385, there is »convincing evidence for a medieval canal system [...] in the ninth or tenth centuries«. A second sample belongs to a wooden stake »from primary silts« in one of the smaller ditches which have been excavated in Trench III and is therefore irrelevant for the canal itself (Hollinrake/Hollinrake 1993, 90). Nevertheless, the 2sigma date AD 540–890 points to an early medieval date for at least one of the smaller ditches next to the canal. »Twelfth- and thirteenth-century pottery from the upper fill« point to an abandonment in this period (Bond 2007, 177). According to Brunning 2013, 229 the canal was

finally silted in the 12th–14th centuries. **Reliability of dating and chronology** low.

Description The canal connects the monastic precinct to the River Brue. According to Nancy and Charles Hollinrake (personal comm.), the southern end of the canal has been identified at Northover Mill (see also Hollinrake/Hollinrake 2015, 3). Therefore, a portage/slipway must have existed on the terrace edged between the canal head and the old course of the River Brue, which is located several metres deeper down. Taking the latest excavations and observations into account, it seems like the canal was a double-dead-end canal or rather a long-stretched navigable pond (see Hollinrake/Hollinrake 2015). The canal was excavated in 1986/1987 and fully sectioned in two places (Hollinrake/Hollinrake 1993, 73; 2007, 235. 237). The banks were shored with wooden stakes (Hollinrake/Hollinrake 2007, 237). In trench IV, »the remains of more wooden stakes and timbers rammed into the base at this point indicated the probable location of wharves or landing stages« (Hollinrake/Hollinrake 1993, 89; 2007, 237). Nevertheless, this structure may also be of later date.

Description of the written record According to Cole 2013, 60, the canal is mentioned as Northload, which belongs to the group of early *lād* place-names. Nevertheless, there are »no early documentary references [...] to the canal« (Hollinrake/Hollinrake 1993, 79).

Critical remarks In case that there was no connection to the River Brue, the canal's navigability would be debatable.

Canal type dead-end. **Dimensions** Length c. 1.75 km, fairway width c. 5–6 m, depth c. 1 m. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** monastery.

References Page 1911, 82–99. – Charters of Glastonbury Abbey, ed. Kelly. – Gilchrist/Green 2015, 51–54. 385. – Brunning 2013, 229. – Rahtz 1993, 112–116. – Rippon 1997, 212; 2000, 240; 2004. – Hollinrake/Hollinrake 1993; 2007; 2015. – Bond 2007, 177–178.

40 Glastonbury Mill Stream

Latitude 51,1804, **Longitude** -2,8060. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Brue.

Written sources yes.

Construction/planning medieval. **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to Rippon 2007, 220, »the stretch as far as Meare Pool must have existed by 1091, when, according to William of Malmesbury, St Benignus' bones were carried from Meare to Glastonbury by boat on a river«. **Reliability of dating and chronology** low.

Description The canal is a canalised stretch of the River Brue from Northlode Bridge to Waterlease and has been cut in the estuarine alluvial sediments and peat deposits (Rippon 1997, 13. 236; 2007, 219 fig. 43). It was most likely constructed by the monastic community of Glastonbury. According to Rippon 2007, 221 the »original dimensions [...] are impossible to determine«, but there are several indicators that the canal has »not been subject to recent improvements«.

Description of the written record According to Rippon 2007, 220 the first reference to this canal is in 1091. For the 12th century, maintenance and drainage duties are documented and in the 13th century the canal is described with embankments.

Canal type parallel/bypass canal. **Dimensions** Length c. 10.7 km, width most likely 4–5 m, depth c. 3 m. **Bank revetments and other infrastructure** embankments. **Initiators and responsible agents** monastery(?).

References Rippon 1997, 212; 2004; 2007, 219–222. – Oksanen 2019.

41 Glastonbury New Brue

Latitude 51,2179, **Longitude** -2,9720. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Brue.

Written sources yes.

Construction/planning medieval. **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to Rippon 2007, 219, the canal was cut »certainly before the thirteenth century«. There are strong indications that a document describing drainage duties before 1189/1198 refers to this canal (Rippon 2007, 220). Therefore, it must have existed in the 12th century. According to Rippon 2007, 220, »it is not clear whether Pilrow and the new Brue west of Lichlake were dug at the same time«. **Reliability of dating and chronology** high.

Description The canal is a canalised stretch of the River Brue, but some sections are fully artificial (Rippon 2007, 220–221 fig. 43). The canal was most likely

constructed by the monastic community of Glastonbury. According to Rippon 2007, 221 the »original dimensions [...] are impossible to determine«, but there are several indicators that the canal has »not been subject to recent improvements«.

Description of the written record Before 1189/1198 a document describes drainage duties (Rippon 2007, 220).

Canal type parallel. **Dimensions** Length c. 12.6 km, fairway width most likely 4–5 m, depth c. 3 m. **Initiators and responsible agents** monastery.

References Rippon 2007, 219–222. – Oksanen 2019.

42 Glastonbury Pilrow Cut

Latitude 51,1985, **Longitude** -2,8590. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Brue.

Written sources yes, **Archaeological sources** yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.

Chronology According to Brunning 2013, 229, there are indications that the diversion of the River Brue westwards took place in cal AD 691–989. According to Rippon 1997, 213, the canal existed in the 13th century. In 1316, the Pilrow Cut »certainly extended to the Axe« and there are references to walls and dykes to preserve the course of the water (Rippon 1997, 213). Nevertheless, according to Rippon 2007, 220, the construction date is uncertain and it is clear only that it must have existed in 1235. **Reliability of dating and chronology** high.

Description According to Rippon 2007, 207. 219, the canal »linked Glastonbury with its port and watermill at Rooksbridge«, parts of the canal »followed the line of a natural stream«. The canal was most likely constructed by the monastic community of Glastonbury. According to Rippon 2007, 221, the »original dimensions [...] are impossible to determine«, but there are several indicators that the canal has »not been subject to recent improvements«. In 1235, maintenance duties of the canal in written sources specify that »Robert Malerbe was said to be responsible for maintaining Glastonbury Abbey's waterways as far as Mark Bridge« (Rippon 2007, 220). A »stone work« was constructed at the canal in 1322–1334 »to shut out the sea waves«, whilst two sluices were built in 1358/1359 »to keep the sea-water from ebbing and flowing« (Rippon 2007, 220). A transhipment harbour is documented for c. 1400 and for 1500 at Rooks Bridge on the Pilrow Cut, where goods were reloaded from large ships to smaller ones that were able to navigate the canal (Bond 2007, 204; Rippon 2007, 224).

Description of the written record Rippon 1997, 213 refers to 13th century sources describing the duties of tenants to »work on the ›Morditch‹, which is first recorded in the mid-13th century [and] may have been the Pilrow Cut«.

Canal type parallel/bypass canal. **Dimensions** Length c. 10.2 km, width most likely 4–5 m, depth c. 3 m. **Bank revetments and other infrastructure** wooden revetments (no date); embankments; water mill; sluices. **Initiators and responsible agents** monastery.

References Aston 1984, 178. – Brunning 2013, 229. – Rippon 1997, 213. 236; 2004; 2007, 220. – Bond 2007, 177–178. 196–197. – Oksanen 2019.

43 Glen Car Dyke

Latitude 52,7203, **Longitude** -0,3563. **Reliability/precision of geographic location** low.

Connected to river; sea, **Adjacent waterways** Glen; Car Dyke Canal; North Sea.

Archaeological sources yes.

Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed.

Chronology According to Bond 2007, 169, it »may [...] be of Roman date«. Hayes/Lane 1992, 136. 159 postulate a »late Roman canalization« (see also Rippon 2000, 71). **Reliability of dating and chronology** very low.

Description The canal is a »canalized outfall of the River Glen«, the western end is connected to the Car Dyke canal (Bond 2007, 169 fig. 32). The north-eastern end reaches the Roman shoreline of the Welland Estuary via tidal creeks (Bond 2007, 169 fig. 32; Rippon 2000, 67).

Critical remarks it is uncertain whether it was navigable/navigated.

Canal type connection. **Initiators and responsible agents** indeterminate.

References Bond 2007, 169 fig. 32. – Hayes/Lane 1992, 136. 146. 159. – Rippon 2000, 67. 70–71 fig. 24.

44 Itchen Canalisation

Latitude 50,9378, **Longitude** -1,3569. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Itchen.
Written sources yes.
Construction/planning 11th cent. AD. **10th cent. AD** assumed, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** assumed.
Chronology According to Oksanen 2019, the canalisation took place in the Anglo-Saxon period, in and around the 11th century. In 1276/1277 the »river was deemed unnavigable« (Oksanen 2019). According to Currie 2007, 245, the canalised branch of the river »came into being between 990 and 1045«. **Reliability of dating and chronology** low.
Description The River Itchen was canalised above Southampton in a new bed east of the old riverbed (Oksanen 2019; Currie 2007, fig. 55). It is indeterminate whether it represents a canalisation of an existing watercourse or the cut of an entirely new parallel/bypass canal (see Currie 2007, 251). The canalisation/canal may be connected to mills as »a channel bypassing Woodmill and Gater's Mill« (Currie 2007, 250–251). According to Oksanen 2019, there is »fieldwork evidence of an Anglo-Saxon canalised section« of the river. According to Currie 2007, 247–249, the remaining depression of the canal is 10–20 m wide. The canal/canalised section of the Itchen is »apparently large enough to allow small flat-bottomed boats to pass« (Currie 2007, 251).
Description of the written record According to Currie 2007, 245 the canalisation most likely receives mention in a charter of 1054 as a »new river« (»*niwan ea*«), which »suggests a man-made channel«.
Canal type parallel. **Dimensions** Length c. 1.5 km. **Initiators and responsible agents** indeterminate.
References Oksanen 2019. – Currie 2007.

45 Kings Dyke [magna lada?]

Latitude 52,5523, **Longitude** -0,1304. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Nene.
Written sources yes.
Construction/planning medieval. **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Bond 2007, 181, the canal may have been constructed in the 10th century. Nevertheless, more reliable proof predating 1192 is lacking, as it was only that the canal is referred to indirectly in a charter to settle a conflict between the monasteries of Ramsey and Sawtrey (Parsons 1991, 22; Bond 2007, 187; Spoerry u. a. 2008, 202; *Cartularium monasterii de Rameseia*, ed. Hart, 166). According to Oosthuizen 2017, 125, Cnut's Dyke and King's Dyke seem to be identical and »*Kingesdelf* (also called *Cynges delf*) forms part of an artificial route along which the river Nene was re-routed between Stanground and Benwick. It was reputedly dug (hence *delf*, ›to dig‹) by order of King Cnut but […] it was clearly present by 972«. **Reliability of dating and chronology** low.
Description The canal is connected to the River Nene in the Fenlands (Oksanen 2019; Hall 1987, 46. 66). According to Bond 2007, 181, the canal »provided a […] cut across the great loop of the Nene«. According to Bond 2007, 181, drainage may have been an important purpose, too. According to Gardiner 2007, 98, there is proof for a »building which was constructed on the lode leading from Sawtry Abbey to Whittlesey Mere. It provided accommodation for the sailors of the barges carrying stone for the construction of the abbey«. This refers to a document in the *Cartularium monasterii de Rameseia* to the year 1192: »[…] *magna lada, qui vadit de Withlesmare versus Saltreyam* […] *et monachi de Saltreya habebunt unam parvam casam tantum super ipsam ladam, in qua adductores lapidum quiescere possint cum opus fuerit* […]« (*Cartularium monasterii de Rameseia*, ed. Hart, 166).
Description of the written record According to Parsons 1991, 22, »In 1192, after a great deal of unpleasantness, the monks Ramsey prevented the brethren of Sawtrey from using channels which they had made in the Fens, with the sole exception of the channel from Whittlesey to Sawtrey, which was specifically stated to be for the transport of building materials« (see also Bond 2007, 187; Spoerry u. a. 2008, 202). The reference to Whittlesey and the conflict with Ramsey make it rather unlikely that the document refers to the Monk's Lode as argued by Bond 2007, 187–188. The source seems more to do with the King's Dyke or Cnut's Dyke. For the full source text, see *Cartularium monasterii de Rameseia*, ed. Hart, 166: Ad 1192 : »*Haec est finalis concordia* […] *inter abbatem de Rameseia* […] *et abbatem de Saltreya* […]

inter Withlesmare et Ubbemare […] *quod omnes ladae, quas monachi de Saltreya fecerant, in illo marisco, obstupabuntur, excepta illa magna lada, qui vadit de Withlesmare versus Saltreyam, quae remanebit aperta, per quam ipsi monachi de Saltreya adducent lapides et caetera necessaria ad constructionem monasterii sui et aliarum officinarum suarum, et monachi de Saltreya habebunt unam parvam casam tantum super ipsam ladam, in qua adductores lapidum quiescere possint cum opus fuerit, et nullam aliam casam nec domum in marisco illo facient praeter illam solam, nec arbores plantabunt, nec curtilagium, nec ladas nec trencheias alterias facient ibi; nec parientur, ut piscatores sui intrent in maras monachorum de Rameseia piscandi causa* […]«.

Canal type parallel/bypass canal. **Dimensions** Length c. 14 km. **Bank revetments and other infrastructure** huts for the rest of boatmen (?). **Initiators and responsible agents** monastery (?).

References Oksanen 2019. – Hall 1987, 46. 56–57. 66 fig. 46. – Bond 2007, 181. 187–188 fig. 37. – Chrisholm 2010, 126 fig. 2. – Parsons 1991, 22. – Spoerry u. a. 2008, 202. – Hutchinson 1997, 121. – *Cartularium monasterii de Rameseia*, ed. Hart, 166. – Oosthuizen 2017, 125.

46 Kings Lynn Nar

Latitude 52,7515, **Longitude** 0,3997. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Nar; Great Ouse.

Written sources yes.

Construction/planning High Middle Ages. **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.

Chronology According to Bond 2007, fig. 37, the canal is early medieval. **Reliability of dating and chronology** very low.

Description The canal is connected to the River Nar and the Great Ouse (Oksanen 2019). It offers direct access from the Nar to the important sea port of King's Lynn without much detour.

Description of the written record not specified.

Canal type parallel. **Dimensions** Length c. 6.4 km. **Initiators and responsible agents** indeterminate.

References Bond 2007, fig. 37. – Oksanen 2019.

47 London Bridge

Latitude 51,5081, **Longitude** -0,0864. **Reliability/precision of geographic location** low.

Connected to river, **Adjacent waterways** Thames.

Written sources yes.

Construction/planning 11th cent. AD. **11th cent. AD** yes.

Chronology The canal was built in 1016 AD. **Reliability of dating and chronology** high

Description According to the Anglo-Saxon Chronicle, the canal was located on the south bank of the River Thames, where it bypassed London bridge from east to west (Anglo-Saxon chronicle, ed. O'Brien O'Keeffe, 101 and translation Swanton, 149; Blair 2007a, 5). The question as to whether the canal was dug over its entire length or whether existing waterways were partially used is subject to debate (see e. g. Walford 1878, 341–368). According to Watson 2001, 54, the canal was cut »through the marshes and creeks of low-lying southern Southwark, avoiding the defended bridgehead« at the river-bank. The canal was dug by a Danish army led by King Cnut. The king wanted to bypass London bridge with a huge fleet of warships to lay siege on London. As it was constructed to carry ships of the Danish fleet, a substantial fairway width of at least 8–10 m has to be assumed.

Description of the written record The construction of the canal is described in detail in different versions of the Anglo-Saxon Chronicle of the year 1016 (Anglo-Saxon chronicle, ed. O'Brien O'Keeffe 101 and translation Swanton, 149). An early version, the so-called C-text of the chronicle, was copied in the 11th century (Anglo-Saxon chronicle, ed. O'Brien O'Keeffe; http://britishlibrary.typepad.co.uk/digitisedmanuscripts/2016/02/anglo-saxon-chronicles-now-online.html). The original text describes that the Danish ships »*gewendon to Lundene, [and] hi ða dulfon ane mycle dic on suðhealfe [and] drogon hiora scypo on westhealfe þære bricge*« (Anglo-Saxon chronicle, ed. O'Brien O'Keeffe, 101).

Canal type parallel/bypass canal. **Dimensions** Length most likely max. 1 km. **Initiators and responsible agents** military/royal initiative.

References Blair 2007a, 5. – Skeat 1910, 169. – Walford 1878. – Anglo-Saxon chronicle, ed. O'Brien O'Keeffe, 101. – Swanton 2000, 146–149. – Ross/Clark 2011, 57. – Vince 1990, 32. – Rogers 2013, 37–38. – Baker/Brookes 2013, 295. 306. 327. – Watson 2001, 54. 57.

48 Meaux Abbey Eschedike

Latitude 53,8247, **Longitude** -0,3645. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Hull.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Bond 2007, 195, the canal was cut »between 1160 and 1182«. In the »later fourteenth century several complaints were made against the abbey over its inadequate maintenance of the Eschedike [...] though by this time the concerns seem to be drainage rather than navigability.« (Bond 2007, 196). **Reliability of dating and chronology** high.
Description The canal is located in the Hull catchment and connected to the River Hull, north of the Humber estuary. It was built by Meaux Abbey and connects the abbey to the River Hull (Bond 2007, 195; Oksanen 2019). Meaux Abbey is part of a group of Cistercian foundations between 1130 and 1150 in Yorkshire (Rüffer 2001, 531–540; 2007, 55). According to the *Chronicon monasterii de Melsa*, the canal was built for transportation, »*ad necessaria nostra* [...] *transvehenda*« (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 160). The canal is part of a complex network of artificial and natural waterways around Meaux Abbey which developed between the late 12th and the earlier 13th century.
Description of the written record The construction of the canal in the time of the second abbot Philip (1160–1182) is described in the *Chronicon monasterii de Melsa*, an extremely detailed chronicle of the abbey from the late 14th century (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond; for the author and reliability, see Rüffer 2007, 72 fn. 57). According to the *Chronicon* (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 160) »*et ad faciendum in feodo suo per mariscum de Waghna usque in Hullum, ad necessaria nostra per dictum fossatum transvehenda suam licentiam impertivit. Tunc quidem incepimus facere ibidem fossatum quod nunc Eschedyk nuncupatur*«.
Canal type dead-end (initially). **Dimensions** Initial length c. 2 km. **Initiators and responsible agents** monastery.
References Bond 2007, 178. 195. – Oksanen 2019. – *Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 160 [not p. 60 as cited by Bond 2007, 195]. – Rüffer 2001, 531–540. – Oksanen 2019.

49 Meaux Abbey Forth Dyke

Latitude 53,8049, **Longitude** -0,3099. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Hull.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Bond 2007, 195, the canal was cut between 1221 and 1235 (see *Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 409–412).
Reliability of dating and chronology high.
Description The canal was connected to the River Hull and the Monk Dyke. It was part of a complex network of artificial and natural waterways around Meaux Abbey, which developed between the late 12th and the earlier 13th century. The canal mainly cuts through Holocene floodplain deposits (Natural Environment Research Council 2011 [2018]; Bond 2007, 195). According to the *Chronicon*, Meaux Abbey had the canal built for various purposes, among which navigation and also water supply for the mills. The canal represents a hybrid form between a parallel canal and a connection canal, as it not only bypasses a detour via the Eschedike, but furthermore cuts across a small local watershed. According to the *Chronicon*, the canal was 16 ft (c. 4.7–5 m) wide and »*sex pedum in profunditate*«, in other words c. 1.7 m deep (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 409–412). According to the *Chronicon*, two bridges were constructed to allow for an easy crossing (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 410). The bridges had to be sufficiently high to leave headroom for vessel without projecting structures (*naviculae sine rostris*) to pass below without constraint.
Description of the written record The construction of the canal in the time of the seventh abbot Ricardus 1221–1235 is described in great detail in the *Chronicon monasterii de Melsa*, a very detailed late 14th century chronicle of the abbey (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond; concerning author and reliability see Rüffer 2007, 72 fn. 57). According to the *Chronicon* (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond) »*ut haberetur unum fossatum, xvi. pedum in latitudine et sex pedum in profunditate, pro certa divisa inter Waghnam et Suttonam, a firma terra super Hullo juxta piscariam* [...] *ut partes utraeque usum navicularum suarum in eo* [...] *Ultra quod fossatum forent duo pontes; unus adque Forth-*

crosse sufficiens carectis et transeuntibus, communi custu partium faciendus et reparandus ; et nos alium pontem ad usus nostros iuxta piscarium nostrum versus meridiem, per quem animalia nostra transire possent a dicta piscaria usque ad Westkerre [...] *Qui pontes ita in altum erigerentur ut naviculae sine rostris subtus eos transire possent* [...] *Ubi ad stagnum nostrum de Forthdyk clausa habeatur* [...] *ad usus molendinorum*«. The mill pond and sluices/locks are connected to the canal (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 411). Furthermore, one of the *clausa* (sluices/locks) was used to collect water upstream for specific use (»*ad recipiendam aquam desuper venientem ad usus nostros*«), whereas the second sluice/lock was used as a flood-gate to hold back rising water from the River Hull (»*ad retinendam aquam quae de fluctu de Hullo* [...] *ascendit*«) (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 411).

Canal type connection; parallel. **Dimensions** Length c. 7 km, fairway width 16 ft (c. 5 m), depth 6 ft (c. 1.7 m). **Bank revetments and other infrastructure** bridge. **Initiators and responsible agents** monastery.

References Bond 2007, 178. 195. – Oksanen 2019. – *Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 409–412. – Rüffer 2001, 531–540.

50 Meaux Abbey Monk Dyke

Latitude 53,8587, **Longitude** -0,3179. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Hull.

Written sources yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.

Chronology According to Bond 2007, 195 the canal was cut between 1210 and 1220 (see *Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 354–356). In the »later fourteenth century several complaints were made against the abbey over its inadequate maintenance of the [...] Monk Dyke [...] though by this time the concerns seem to be drainage rather than navigability.« (Bond 2007, 196). **Reliability of dating and chronology** high.

Description The canal was connected to the River Hull via the Eschedike, an older canal from the River Hull to Meaux Abbey. It mainly crosses Holocene floodplain deposits (Natural Environment Research Council 2011 [2018]; Bond 2007, 195). As from a period between 1221 and 1235, it was also connected to the River Hull further downstream by the Forth Dyke (see Bond 2007, 195). It therefore became part of a complex network of artificial and natural waterways around Meaux Abbey, which developed between the late 12th and earlier 13th century. According to the *Chronicon*, the canal was 22 ft (c. 6.5 m) wide and commissioned by Meaux Abbey for navigation, but it was also used for other purposes such as fishing (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 354). According to the *Chronicon*, a bridge was built to allow carts and animals (*carectas et animalia*) a convenient crossing (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 355).

Description of the written record The construction of the canal in the time of the fifth abbot Hugo (1210–1220) is described in the *Chronicon monasterii de Melsa*, a very detailed late 14th century chronicle of the abbey (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond; concerning author and reliability see Rüffer 2007, 72 fn. 57). According to the *Chronicon* (*Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 354–356), several *domini*/men »*concesserunt nobis licentiam ut faceremus unum fossatum, ad latitudinem XX. pedum, per medium terrarium suarum* [...] *et idem fossatum pro libitu nostro mundaremus, et omnem terram ejus poneremus ex utraque parte et ejus piscationem liberam et quietam haberemus; et, si naves in ea haberemus, ex utraque parte ejus incidere possemus, ad ipsas naves trahendas, et alia nostra negotia facienda.* [...] *Et nos insuper faceremus unum pontem ultra praedictum fossatum, ad carectas et animalia in loco convenienti inter Arnalliam et Benyngholmum; salvis tantum ipsi domini Waltero de Falconberge et Baldewino de Rowtona et heredi suo, usu suo ex utraque parte ejusdem fossati et navigatione in eodem.*«

Canal type dead-end. **Dimensions** Length 6–7 km, fairway width 22 ft (c. 6 m). **Initiators and responsible agents** monastery.

References Bond 2007, 178. 195. – Oksanen 2019. – *Chronicon Monasterii de Melsa* Rolls Series 43.i, ed. Bond, 354–356. – Rüffer 2001, 531–540.

51 Meaux Abbey Skerndike

Latitude 53,9748, **Longitude** -0,3932. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Hull.

Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Bond 2007, 195, the canal was cut between 1249 and 1269 (see *Chronicon Monasterii de Melsa* Rolls Series 43.iii, ed. Bond, 110). **Reliability of dating and chronology** high.
Description The canal was connected to the River Hull. It was part of a complex network of artificial and natural waterways around Meaux Abbey, which developed between the late 12th and earlier 13th century. The canal crosses mainly through solid boulder clay (Natural Environment Research Council 2011 [2018]). According to the *Chronicon*, the canal was built for water transport (*ad cariagia nostra* […] *per navem*) from a *grangia* (= large estate) of the monastery to the river, but also for fishery and other purposes (*ac alia necessaria*). According to the source, the canal was 20 ft (c. 6 m) wide (*Chronicon Monasterii de Melsa* Rolls Series 43.ii, ed. Bond, 110).
Description of the written record The construction of the canal in the time of the ninth abbot Willelmus 1249–1269 is described in the *Chronicon monasterii de Melsa*, a very detailed late 14th century chronicle of the Abbey (*Chronicon Monasterii de Melsa* Rolls Series 43.ii, ed. Bond; concerning author and reliability see Rüffer 2007, 72 fn. 57). The *Chronicon* (*Chronicon Monasterii de Melsa* Rolls Series 43.ii, ed. Bond, 110) has: »*Tunc vero fecimus nobis unum fossatum, in latitudine XX. pedes, a dicta nova grangia nostra usque ad aquam fluvii de Skyrena ad cariagia nostra in dicto fossato per navem, et piscariam ac alia necessaria in eodem fossato facienda*«.
Canal type dead-end. **Dimensions** Length c. 2.5 km, width 20 ft (c. 6 m). **Initiators and responsible agents** monastery.
References Bond 2007, 178. 195–196. – Oksanen 2019. – *Chronicon Monasterii de Melsa* Rolls Series 43.ii, ed. Bond, 110. – Rüffer 2001, 531–540.

52 Nene Diversion

Latitude 52,5498, **Longitude** 0,0875. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Nene; Old Croft.
Other sources Topography.
Construction/planning medieval. **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** yes. **Chronology** According to Hall 1987, 46, the diversion of the Nene through the centre of March took place in the Saxon period, »probably in the Late Saxon period« respectively in the 10th/early 11th century. **Reliability of dating and chronology** low.
Description The canal was »dug through a narrow neck of land at Marsh in order to link the Nene and the Old Croft rivers« (Rippon 2000, 209).
Canal type connection. **Dimensions** Length c. 12 km. **Initiators and responsible agents** indeterminate.
References Hall 1987, 46 fig. 25. – Rippon 2000, 209.

53 Norwich Cathedral Canal

Latitude 52,6316, **Longitude** 1,3007. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Wensum.
Written sources yes, **Archaeological sources** assumed, **Other sources** topography.
Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology The canal was most likely cut in the 13th century and remained operational into the 18th century (Ayers 1990, 223. – Bond 2007, 197). The construction of the cathedral began in 1096 (https://historicengland.org.uk/listing/the-list/list-entry/1051330), which may serve as a *terminus post quem*. **Reliability of dating and chronology** low.
Description The canal was cut »from the Wensum to the Lower Close« near the construction site of the cathedral (Ayers 1990, 223; Bond 2007, 197). According to Bond 2007, 197 and Ayers 1990, 223, the canal was built most likely »in order to facilitate the carriage of building stone« coming from Caen and Barnack for the construction of the Norman cathedral. According to Ayers 1990, 223, the construction of Norwich cathedral in the 13th century »involved the movement of stone on a colossal scale« and »water transport was heavily utilized«, according to written sources.
Description of the written record In 1280, the Communar Rolls of the cathedral priory recorded the transport of building stone by boat from Yarmouth to Norwich (Bond 2007, 197).
Canal type dead-end. **Dimensions** Length c. 0,2 km. **Initiators and responsible agents** bishop(?).
References Ayers 1990, 223; 1991. – Bond 2007, 178. 197. – https://historicengland.org.uk/listing/the-list/list-entry/1051330 (20.6.2018).

54 Old Tillage Canal

Latitude 52,2426, **Longitude** 0,1834. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Cam; Old West River.
Archaeological sources yes.
Construction/planning 2nd cent. AD. **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** assumed, **5th cent. AD** no.
Chronology The canal was constructed in the early 2nd century AD, according to Simmons u. a. 2004, 162–163. Bond 2007, 166 reports that »it remained in use until the middle or late fourth century« – and therefore longer than until recently assumed (see also Macaulay/Reynolds 1993, 65). Macaulay/Reynolds 1993, 67 state that in the excavated section near Waterbeach »pottery from all deposits dates to the Antonine period, AD 140–180«. Macaulay/Reynolds 1993, 68 suggest »a later date for the construction [...] during the Antonine period«. According to Cole 2013, 60, the canal is mentioned as »Tillinge« in 1235. **Reliability of dating and chronology** high.
Description The canal »appears to link the River Cam with the Ouse and Old West River« (Rippon 2000, 70). According to Simmons u. a. 2004, 162, it was long thought to be part of the Car Dyke, although there is no connection (see also Bond 2007, 165 fig. 32). According to Rippon 2000, 70, the canal »would have considerably reduced the distance by river between Cambridge and Godmanchester«. Several sections of the canal have been excavated (see Bond 2007, 165; Macaulay/Reynolds 1993, 65–66). In 1926, an early Saxon building cutting through the silt in the canal fairway was excavated down to the gravel below (Bond 2007, 165).
Canal type connection. **Dimensions** Length 8–17 km, fairway width 5 m; trench 24 m wide and 4 m deep.
Initiators and responsible agents military(?).
References Simmons u. a. 2004. – Smith 1977, 77. – Bond 2007, 164 fig. 32. – Macaulay/Reynolds 1993. – Rippon 2000, 70–71 fig. 24. – Wawrzinek 2014, 413. – Evans u. a. 2013, 11 ff. fig. 4.53. – Malim 2005, 142–152. – Sayer 2009. – Cole 2013, 60.

55 Ramsey Abbey Lode

Latitude 52,4488, **Longitude** -0,0985. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Great Whyte.
Archaeological sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Spoerry u. a. 2008, 186–188, the canal's earliest phase 1 dates to the mid-12th to 13th centuries and the second phase to the 13th century (Spoerry u. a. 2008, 190). The date of its abandonment is uncertain, but it was most certainly filled in by 1539 (Spoerry u. a. 2008). Nevertheless, evidence for the canal's first phase is scarce as it is »first clearly present« in the second phase; »The dating of material found in its fills (most of the pottery being 13th century) is unlikely to indicate closely its date of construction, due to the combined effects of cleaning episodes and later refuse deposition« (Spoerry u. a. 2008, 200). To summarise, Spoerry u. a. 2008, 200 argue that »it is possible that the excavated lode and ›wharf‹ were established by AD 1200 and may have continued in use in some form until the Dissolution« in 1539. **Reliability of dating and chronology** high.
Description The canal is connected to the river Great Whyte and the network of waterways in the Fens (Spoerry u. a. 2008). It approaches the abbey precinct and the gravel island from the north, and the canal head is located east of the abbey church (Spoerry u. a. 2008, fig. 3). The abbey, where the canal ends, is located on a gravel island in the peatland fens (Spoerry u. a. 2008, 174; Oosthuizen 2012, 210–211). »One of the primary functions of this waterway was probably to import building stone for the many documented building programmes that characterise the abbey's history from the 12th century« (Spoerry u. a. 2008, 200). The head of a dead-end canal leading to the abbey was excavated in 1998–2002 over a length of c. 45 m (Spoerry u. a. 2008). East of the canal head, the remains of a contemporary large wooden building have been interpreted as »a store or other ancillary building«. Several beamslots and postholes may be part of the canal infrastructure »such as platforms and jetties« (Spoerry u. a. 2008, 188). A feature close to the canal with three postholes »forming a tripod structure [has been] interpreted as a possible crane setting« (Spoerry u. a. 2008, 192).

Canal type dead-end. **Dimensions** Length c. 3.4 km, Phase 1: width c. 4.6 m; depth 1.9 m; Phase 2: width 8.7 m, depth 1.4 m.
Bank revetments and other infrastructure store house, wooden features. **Initiators and responsible agents** monastery.
References Spoerry u. a. 2008. – Oosthuizen 2012, 210–211.

56 Reach Lode

Latitude 52,2744, **Longitude** 0,2922. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Cam; Burwell Lode.
Written sources yes.
Construction/planning medieval. **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Oksanen 2019, the canal was »probably constructed in the Anglo-Saxon period«. It was used for navigation until the 19th century (Bond 2007, 185). According to Hall 1996, 112, the canal cuts through a Roman villa and is consequently post-Roman. According to Malim 2005, 151, the canal is most likely Roman. According to Oosthuizen 2017, 125, »Reach and Chear Lodes are conventionally regarded as the earliest Cambridgeshire canals for which there is documentary evidence«. **Reliability of dating and chronology** low.
Description The canal is located at the edge of the fen (Bond 2007, 183. 185). It connects to Burwell Lode and the River Cam (Bond 2007, fig. 37; Oksanen 2019). The harbour of Reach is located at the head of the canal, which thus qualifies the latter primarily as a harbour inlet. According to Bond 2007, 183. 185, the purpose of the canal was to connect Reach to a navigable waterway. Therefore, the canal connected the nearby villages »directly to the Fenland waterway system and so with the sea port at King's Lynn« (Hall 1996, 112). According to Oosthuizen 2012, 215 the canal was »large enough to take a fair-sized craft«.
Description of the written record According to Bond 2007, 183, Reach Lode is mentioned »in a document of the late eleventh century«. Hall 1996, 107 mentions a record from 1279.
Canal type dead-end. **Dimensions** Length c. 3.3 km. **Initiators and responsible agents** indeterminate.
References Bond 2007, 183–185. – Oksanen 2019. – Hall 1996, 106–107. 112–113. – Fowler 1933, 113–114. – Oosthuizen 2012, 213. 218–219; 2017, 125. – Malim 2005, 151 colour pls 24. 26. – Sayer 2009, 141–143.

57 Reading

Latitude 51,4536, **Longitude** -0,9713. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Kennett.
Archaeological sources yes.
Construction/planning 13th cent. AD. **12th cent. AD** assumed, **13th cent. AD** yes.
Chronology From the mid-11th century onwards, several canals were dug into the floodplain deposits, mainly to feed water mills (Ford u. a. 2013, 57–290). In the later 13th and early 14th century, a »phase of substantial river channel engineering took place downstream in association with the Abbey mill. Here, the main channel of the Kennet was reorientated towards a more direct south-north alignment, an extensive new revetment was installed, and wharfage was developed [...] dendrochronological dates suggest that the new revetment was installed during the period 1296–1323 [but] it is clear that the abbey had wharfage in this area from much earlier date« (Ford u. a. 2013, 288). This canalisation is most likely connected to navigation and the abbey quay (Ford u. a. 2013, 287–288). **Reliability of dating and chronology** high.
Description The canal(s) is located at the River Kennet near Reading. There have been large-scale excavations, and many dendrochronological dates offer a precise chronological framework (Ford u. a. 2013). Reading grew to wealth swiftly from the second half of the 12th to the 14th century, whilst also land reclamation occurred in the floodplain (Ford u. a. 2013, 284–290). Canal construction was therefore part of this urban expansion.
Description of the written record A quay (*kaio*) is mentioned in a document dated from the period 1186–1213 (Ford u. a. 2013, 287).
Canal type parallel. **Dimensions** Width max. 5–7 m. **Bank revetments and other infrastructure** wooden revetments; quay; water mills. **Initiators and responsible agents** monastery.
References Ford u. a. 2013. – Oksanen 2019.

58 Rhee Wall

Latitude 51,0255, **Longitude** 0,7890. **Reliability/precision of geographic location** high.

Connected to river; sea, **Adjacent waterways** Rother; North Sea/Channel.

Written sources yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.

Chronology The date of the north-westernmost section is uncertain. The section between Snargate and Old Romney was constructed between c. 1190 and 1258 according to Eddison 2002, 132. The easternmost section between Old Romney and New Romney was cut »in or very soon after 1258« (Eddison 2002, 132). According to Eddison 2002, 131, the north-western section was undoubtedly blocked most of the time after 1287/1288, but »probably remained accessible to high tides until around 1400«. **Reliability of dating and chronology** high.

Description The canal was in all probability connected to the River Rother and a »sheltered marine inlet on which the medieval port of Romney was based« (Eddison 2002, 127). The harbour of Romney had an important strategic position, because it was well protected and offered the »shortest crossing to the Continent« (Eddison 2002, 128). Coming from the uplands, it crosses Romney Marsh. In its first phase, it connected Appledore and Snargate, and later it was extended to Old Romney and finally, to New Romney (Eddison 2002, 137). The canal ends in a tidal inlet, which was protected from the sea by a barrier of flint shingle (Eddison 2002, 128). The inlet became exposed to massive silting through alterations in the tidal movements. Geoarchaeological research indeed established that the silting in the inlet occurred during the 12th and 13th centuries and that »between AD 1161 and 1291 high energy conditions in the channel changed swiftly to much quieter conditions« (Eddison 2002, 130). A detailed source of 1258 describes that the latest part of the canal »was constructed to supply water to scour away the silt being deposited by the tides in the harbour of New Romney, and that [...] the citizens of New Romney were responsible for constructing and operating it« (Eddison 2002, 128). These citizens were also bound »to finance the operation of the whole system« (Eddison 2002, 130). Nevertheless, the purpose of the older parts of the canal seems less evident and navigation may have played a major role as well. In the latest phase after the building activity in 1258, several locks were integrated to the construction (Eddison 2002, 138).

Description of the written record A patent roll of 1258 authenticating »the king's confirmation of a petition by the people of New Romney« describes the construction of the canal's last section (Eddison 2002, 127. 130. 137–138). The source states that: »[...] the port of Rumenal is perishing [...] unless the course of the river of Newenden, upon which the said port was founded, and which has been diverted by an inundation of the sea be brought back to the said port, and now hears by inquisition made by Nicholas de Haudlo whom he sent to those parts to provide measures for bringing the river back to the port by the old course or by another, that the river cannot be brought back or the port saved unless the obstructions in the old course be removed, and a new course made [...] so that a sluice be made below Appledore to receive the salt water entering the river by inundation of the sea from the parts of Winchelsea. and retain it in the ebb of the sea, that such water with the water of the river may come together by the ancient course to the new course, and so by that course fall directly into the said port; and so that a second sluice be made at Sneregate and a third by the port where the said water can fall into the sea. to retain merely the water of the sea's inundation on that side that it enter not into the said course reserving nevertheless the ancient and oblique course from the said cross to the port. The king therefore commands the said Nicholas to go to the said port and by jury of 24 knights and others of the vicinage make an estimate of how much of the land of other persons would have to be taken to make the new said course and sluices and the value of such land and to assign to the tenants of such land of equal value or more out of land or money of the barons and good men of the said port, to remove the obstructions of the old course, and to cause the new course and sluices to be made in the lands of any persons whatsoever where it is expedient that they should be made for the common utility and improvement of the port and town; and the sheriff [of Kent] is to be aiding herein.« (Eddison 2002, 137–138). In 1337 another source gives proof for navigation in the canal. It describes that an »old trench« – most likely the Rhee canal – »was said to have been so obstructed by shingle and sand for 30 years that ships could no longer pass by it to Romney ›as they used to do‹«. The old trench was filled in and a new trench, 2.5 km long and 100 m wide was cut,

as against the old trench which was only 50 m wide (Eddison 2002, 135).

Critical remarks it is uncertain whether it was navigable/navigated before c. 1300.

Canal type indeterminate. **Dimensions** Length max. c. 12 km. **Bank revetments and other infrastructure** three sluices. **Initiators and responsible agents** civic authorities.

References Eddison 2002. – Oksanen 2019. – Rippon 2007, 213. – Cole 2007, 62.

59 Rhuddlan Clwyd Canal

Latitude 53,2911, **Longitude** -3,4694. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Clwyd.

Written sources yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.

Chronology The construction of the canal started in summer 1277 and work continued for several years (Bond 2007, 201–202). According to Brown u. a. 1963, 319, it is unclear »how early this project was planned«. Significant work at the canal has been verified until September 1280, and in 1281 the construction seems to have finished (Brown u. a. 1963, 319–321). **Reliability of dating and chronology** high.

Description The waterway is a canalised stretch of the River Clwyd, which forms a dead-end canal at the castle of Rhuddlan through the »straighten[ing] out the lower reaches of the river Clwyd between the castle and the sea« (Bond 2007, 201; Brown u. a. 1963, 319). The canal was built on behalf of king Edward I during his first campaign against Llywelyn ap Gruffydd in Wales (Bond 2007, 201). The purpose of the canal was to allow for »the import of building materials and the subsequent provisioning of the [newly constructed] castle by sea« with large seagoing ships (Bond 2007, 201–202; Brown u. a. 1963, 319). According to Bond 2007, 202, »a short arm was led off the river immediately below the south wall of the castle to form a dock, accessible from the outer ward by means of a postern defended by a tower«.

Description of the written record The construction of the canal is described in great detail in written sources such as royal pay rolls (Bond 2007, 201). According to the pay rolls, 300 ditch-diggers recruited in Lincolnshire in July 1277 »marched up to north Wales from the Fens under armed guard«. In September 1277 a total of »968 ditch-diggers appear on the royal payroll at Rhuddlan« for work at the canal and the castle moat (Bond 2007, 201). As from 1277 the work was under the supervision of a master *fossator* named William (Brown u. a. 1963, 319). For 1277 and 1280 the records discloses the wages of the diggers of the *fossa maris*, or the »*magnum fossatum… mari usque castrum*«, (Brown u. a. 1963, 319). According to Brown u. a. 1963, 319, the pay rolls reveal »an average of 66 diggers six days a week« hired over a period of three years. From September to November 1277, 65 % of the total costs went to the *fossatores*, 22 % to the carpenters and 4 % to the masons (Brown u. a. 1963, 320). Most of the work at the canal took place in 1278 and »54 per cent of the [total] Clwyd canal expenditure was […] incurred in this period«. King Edward himself visited Rhuddlan and the construction site for three months in autumn 1277 (Brown u. a. 1963, 319).

Canal type dead-end; parallel. **Dimensions** Length c. 4,5 km. **Initiators and responsible agents** royal initiative.

References Bond 2007, 201–202. – Brown u. a. 1963, 319–327. – Taylor 1986, 26–35.

60 Rippingale Car Dyke

Latitude 52,8385, **Longitude** -0,3668. **Reliability/precision of geographic location** low.

Connected to river, **Adjacent waterways** Car Dyke Canal(?).

Archaeological sources yes.

Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed.

Chronology According to Bond 2007, 169 it »may […] be of Roman date«. Hayes/Lane 1992, 80. 84 fig. 46 as well as Malim 2005, 147, as well, advocate the Roman date. **Reliability of dating and chronology** very low.

Description According to Bond 2007, fig. 32, the western end of the canal was connected to the Car Dyke canal, but according to Hayes/Lane 1992, 84 fig. 46, the canal »does not seem to join the Car Dyke, stopping short of it by about a field, and does not lead from or to anywhere in particular«. Hayes/Lane 1992, 84 argue that the canal »looks like a drainage channel«, but according to Rippon 2000, 71 and Bond 2007, 169, navigability seems likely.

Critical remarks it is uncertain whether it was navigable/navigated.
Canal type dead-end. **Dimensions** Length c. 2 km. **Initiators and responsible agents** indeterminate.
References Bond 2007, 169 fig. 32. – Hayes/Lane 1992, 80. 84 fig. 46. – Rippon 2000, 70 fig. 24. – Malim 2005, 147.

61 Sandwich Scipryne

Latitude 51,2742, **Longitude** 1,3432. **Reliability/precision of geographic location** very low.
Connected to river; sea, **Adjacent waterways** Watsum Channel; Stour.
Written sources yes.
Construction/planning early medieval. **11th cent. AD** yes.
Chronology The canal was cut in AD 1038–1040. **Reliability of dating and chronology** high.
Description The canal is located in the Wantsum channel close to the coast. The Wantsum channel »enabled vessels to reach the outer Thames estuary from the English Channel, and the east mouth of the Stour formed a calm anchorage« (Clarke u. a. 2010, 11). It has been classified as a possible canal by Blair 2007a, 5 because a »*scipryne*« is mentioned in 1038–1040. The specific location and course of this ship-canal is unknown, but it must have been close to Sandwich, whilst it is evident that it also functioned as a canal harbour for seagoing ships. From 1023 onwards, the harbour and no later than 1040 (1037 according to Clarke u. a. 2010, 29) the »*scipryne*« as well were signed over to Christ Church in Canterbury, so that the monastery there became in charge of maintenance, whilst acquiring »monopoly on tolls charged on vessels travelling along the rivers Wantsum and Stour« (Clarke u. a. 2010, 29). It seems that the canal was connected to a toll station (Clarke u. a. 2010, 23. 29). Between the 9th and the 11th century war fleets were assembled at Sandwich (Clarke u. a. 2010, 16. 25).
Description of the written record The canal is mentioned in 1038–1040 in a conflict between the two monasteries of Christ Church and St. Augustine's in Canterbury (Sawyer, S 1467; Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1147–1148). The account on the restoration of Sandwich to Christ Church mentions the following: »Then Abbot Ælfstan came with a large supporting troop and had a great trench dug at Ebbsfleet and intended that ships should lie in a channel [*scipryne*] in there, just as they did in Sandwich. But that profited him nothing [...]« (Sawyer, S 1467; Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1148–1149). According to Tatton-Brown 1984, 19, »in 1038 Christ Church temporarily lost Sandwich to St. Augustine's [...], but by 1040 they had got it back again, and St. Augustine's were being advised to make their own harbour at Minster«. Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1150 discusses that Sandwich had in fact been seized by King Harold. According to Clarke u. a. 2010, 29 »this may be a later forgery, devised by Christ Church to denigrate its great Canterbury rival«.
Canal type indeterminate. **Bank revetments and other infrastructure** water toll/naval duties. **Initiators and responsible agents** monastery.
References Blair 2007a, 5. – Sawyer, S 1467. S959. – Tatton-Brown 1984. – Clarke u. a. 2010. – Charters of Christ Church Canterbury, ed. Brooks/Kelly, 1147–1153. – Brookes 2007, 37–48. 65–67.

62 Sawtry Abbey Monks Lode

Latitude 52,4331, **Longitude** -0,2353. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Nene.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** assumed.
Chronology According to Bond 2007, 187, »in 1176 the pope confirmed the right of the Cistercian monks of Sawtry to the watercourse which they had made at their own cost to carry building stone to their church. This was the canal now known as the Monks' Lode«.
Reliability of dating and chronology high.
Description The canal connects the Sawtry Abbey precinct with the River Nene. It was built by the monks of Sawtry »at their own cost« to transport building stone to their church (Bond 2007, 187–188).
Description of the written record According to Bond 2007, 187–188, the canal is mentioned in a confirmation of rights by the pope in 1176. By 1342 »an inquiry into the obstruction of various watercourses [...] found that the Monks' Lode had become blocked through neglect of repair and a season of drought« (Bond 2007, 188). This suggests that it was perhaps still navigable in times of high water (see also Ok-

sanen 2019). For the source text, see *Cartularium monasterii de Rameseia*, ed. Hart, 175 Ad 1342 : »*diversea ladae et trencheae in villis de Waltone, Sautre et Conyngtone* [...] *easdem ladas et trencheas* [...] *sunt* [...] *obstructae* [...] *quod naves seu batelli aliqui per easdem navigari* [...] *non poterunt* [...]«. According to Parsons 1991, 22, »In 1192, after a great deal of unpleasantness, the monks Ramsey prevented the brethren of Sawtrey from using channels which they had made in the Fens, with the sole exception of the channel from Whittlesey to Sawtrey, which was specifically stated to be for the transport of building materials« (see also Bond 2007, 187). It seems however uncertain whether the source indeed refers to the Monk's Lode (as suggested by Bond 2007, 187–188) or rather to the King's Dyke/Cnut's Dyke further north. In fact, the reference to Whittlesey and the conflict with Ramsey sheds doubt on the document's allusion to the Monk's Lode. For the full source text, see *Cartularium monasterii de Rameseia*, ed. Hart, 166: Ad 1192 : »*Haec est finalis concordia* [...] *inter abbatem de Rameseia* [...] *et abbatem de Saltreya* [...] *inter Withlesmare et Ubbemare* [...] *quod omnes ladae, quas monachi de Saltreya fecerant, in illo marisco, obstupabuntur, excepta illa magna lada, qui vadit de Withlesmare versus Saltreyam, quae remanebit aperta, per quam ipsi monachi de Saltreya adducent lapides et caetera necessaria ad constructionem monasterii sui et aliarum officinarum suarum, et monachi de Saltreya habebunt unam parvam casam tantum super ipsam ladam, in qua adductores lapidum quiescere possint cum opus fuerit, et nullam aliam casam nec domum in marisco illo facient praeter illam solam, nec arbores plantabunt, nec curtilagium, nec ladas nec trencheias alterias facient ibi; nec parientur, ut piscatores sui intrent in maras monachorum de Rameseia piscandi causa* [...]«.

Canal type dead-end. **Dimensions** Length c. 7–8 km. **Initiators and responsible agents** monastery.

References Rippon 2000, 209. – Gardiner 2007, 98. – Bond 2007, 178. 187–188. – Oksanen 2019. – *Cartularium monasterii de Rameseia*, ed. Hart, 166. 175.

63 Selby Abbey Monk Fryston Canal of Abbot Hugh

Latitude 53,7839, **Longitude** -1,0673. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Ouse.

Written sources yes.

Construction/planning 12th cent. AD. **12th cent. AD** assumed, **13th cent. AD** yes.

Chronology The chronology of the canal is very uncertain. Bond 2007, 190 and Gardiner 2007, 91 assume that the canal was built between 1097 and 1123. This is convincing, although clear proof for the assumption is missing. **Reliability of dating and chronology** low.

Description The canal is located in the Ouse catchment and is connected to the River Ouse. According to Bond 2007, 190, the canal starts at the »quarries at Monk Fryston, 12 km to the west [of Selby Abbey]«. Northwest of the abbey and at the north-eastern end of the canal, there was a large navigable *stagnum* (basin/pond), according to Hass 2006, 68. 79. The canal cuts through alluvial fills (Natural Environment Research Council 2011 [2018]; British Geological Survey 2013). According to Bond 2007, 190 and Gardiner 2007, 91, the canal was used to ship stone and wood to Selby Abbey. Selby Abbey was founded in 1069/1070 by a monk from the monastery of Auxerre in France, most likely on the initiative of William the Conqueror (Hass 2006, 1–3. 68; *Historia Selebiensis Monasterii*, ed. Burton/Lockyer, xxix)

Description of the written record not specified.

Canal type dead-end. **Dimensions** Length c. 12 km. **Bank revetments and other infrastructure** basin/pond. **Initiators and responsible agents** monastery.

References Bond 2007, 178. 190. – Gardiner 2007, 91. – Moorhouse 2003, 194–195; 2007, 308–309. – Hass 2006. – *Historia Selebiensis Monasterii*, ed. Burton/Lockyer. – Oksanen 2019.

64 Slade Lode Leam

Latitude 52,4600, **Longitude** 0,0415. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Nene; Great Ouse.

Written sources yes.

Construction/planning medieval. **13th cent. AD** assumed.

Chronology The southern part of the canal called Slade Lode is mentioned in the 13th century, but may have been built earlier (Oksanen 2019; Hall 1992, 94). For the northern part, there are no clear chronological indicators, but it too is thought to be medieval (Hall 1987, 47). **Reliability of dating and chronology** very low.

Description The canal is located in the Wash fenlands and connected to the rivers Nene and Great Ouse (Oksanen 2019; Hall 1987, 46–47; 1992). The section from the West Water/Great Ouse to Chatteris is called Slade Load, the section from Chatteris to the River Nene is called Elm River or Doddington Leam (Oksanen 2019). Both sections are summarised here. According to Hall 1992, 94, »there was a medieval landing place […] on Chatteris island at the slade lode«, which was mentioned in 1251 as *wilihethe*.
Description of the written record According to Hall 1992, 94, the *sladelode* is mentioned in 13th century documents.
Canal type parallel/shortcut canal. **Dimensions** Length c. 16 km. **Bank revetments and other infrastructure** harbour/hythe. **Initiators and responsible agents** indeterminate.
References Hall 1987, 46–47 fig. 25; 1992, 94 fig. 56. – Oksanen 2019. – Chrisholm 2010, fig. 2.

65 Swaffham Lode

Latitude 52,2454, **Longitude** 0,2764. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Cam.
Written sources yes.
Construction/planning medieval. **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** yes.
Chronology According to Hall 1996, 112 »there seems little reason to doubt that the lodes are of late Saxon or early medieval date«. According to Oksanen 2019, the canal was »probably constructed in the Anglo-Saxon period [and] still in use in the fifteenth century«. The canal already existed in 1279 (Bond 2007, 185). **Reliability of dating and chronology** low.
Description The canal is located at the edge of the Fen and ends at Lode. It is connected to the River Cam (Hall 1996, fig. 113; Bond 2007, 183. 185). The canal connected the villages nearby »directly to the Fenland waterway system and so with the sea port at King's Lynn« (Hall 1996, 112).
Description of the written record According to Bond 2007, 185, Swaffham Lode is »recorded by name in the Hundred Rolls of 1279«. In 1376 »villagers at Swaffham Bulbeck ›asserted their immemorial right to carry merchandise along [Swaffham Lode] by boat‹« (Oosthuizen 2012, 212).
Canal type dead-end. **Dimensions** Length c. 5.3 km. **Initiators and responsible agents** indeterminate.
References Hall 1996, 112 fig. 58. – Oksanen 2019. – Fowler 1933, 113–114. – Bond 2007, 183. 185. – Oosthuizen 2012, 212–213.

66 Swavesey Lodes

Latitude 52,3010, **Longitude** -0,0054. **Reliability/precision of geographic location** low
Connected to river, **Adjacent waterways** Great Ouse.
Archaeological sources yes.
Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology According to Spoerry u. a. 2008, 200, the canal dates »to the high Middle Ages«. According to Sayer 2009, 140–141, the canals date to the 12th century and later. **Reliability of dating and chronology** low.
Description The lodes are connected to the system of waterways in the Fenlands and the Great Ouse (see Oksanen 2019). According to Sayer 2009, 141, the town ditch was made navigable and several dead-end lodes connected the hinterland with the navigable waterways. A short section of the canal has been excavated (Spoerry u. a. 2008, 200).
Canal type dead-end. **Dimensions** Width 8 m, depth 1 m. **Initiators and responsible agents** indeterminate, civic authorities (?).
References Spoerry u. a. 2008, 200. – Sayer 2009, 140–141. – Spoerry 2005, 95–99.

67 Tupholme Abbey Canal

Latitude 53,1984, **Longitude** -0,2887. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Witham.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes.
Chronology According to Bond 2007, 178, the canal was built in c. 1154–1189. As the monastery was founded between 1155 and 1165, Colvin 1951, 101 concludes that the *terminus post quem* must be 1155/1165.
Reliability of dating and chronology high.
Description According to Bond 2007, 178, the canal connects the monastery of Tupholme with Witham River. It was dug into quaternary alluvial fills (Natural Environment Research Council 2011 [2018]). The purpose of the canal was to ship building material to the monastery (Bond 2007, 196; Colvin 1951, 101).

Description of the written record The *fossatum* is mentioned in a charter of Henry II (1145–1189), according to Bond 2007, 196. According to Colvin 1951, 101, Henry II consented »one watercourse (*fossatum*) so large that vessels can come and go from the River Witham as far as Tupholme« and points to the fact that this »must have been of considerable value to a community about to undertake extensive building operations«.
Canal type dead-end. **Dimensions** Length c. 2 km. **Initiators and responsible agents** monastery.
References Bond 2007, 178. 196. – Page 1906, 206–207. – Everson/Stocker 2011. – https://historicengland.org.uk/listing/the-list/list-entry/1017403 (3.4.2018). – www.pastscape.org.uk/hob.aspx?hob_id=351367 (3.4.2018). – Colvin 1951, 101. – Oksanen 2019.

68 Ubbemaerelade/Merelade

Latitude 52,4673, **Longitude** -0,1294. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Nene; Ugg and Whittlesey Meres.
Written sources yes.
Construction/planning early medieval. **10th cent. AD** yes, **11th cent. AD** assumed.
Chronology According to Oosthuizen 2017, 125, the *Ubbemaerelade* and the *Merelade* are mentioned in 972 and must therefore be earlier. **Reliability of dating and chronology** low.
Description The canal in the Fenlands was connected to the »now vanished Ugg and Whittlesey Meres« and linked up the River Nene with the area around Ramsey (Oosthuizen 2017, 125). Oksanen 2019 mapped it as part of the old course of the River Nene. According to the map in Oosthuizen 2017, 125, *Ubbemaerelade* and *Merelade* seem to be part of the same waterway, and they are therefore treated together in this entry. It is not clear whether the canals were actually used for navigation.
Description of the written record According to (Oosthuizen 2017, 125 the *Ubbemaerelade* and the *Merelade* are mentioned in a charter of King Edgar with which he »endowed Peterborough Abbey with extensive estates in the south-west fen basin« in 972.
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type parallel. **Dimensions** Length min. 2 km.
Initiators and responsible agents indeterminate.
References Oosthuizen 2017, 125–126. – Oksanen 2019.

69 Waltham Abbey Canal of Abbot Walter

Latitude 51,6888, **Longitude** -0,0026. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Lea.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The canal was cut in or soon after 1190/1191, when the abbot was granted the right to build it (Charters of Waltham Abbey, ed. Ransford, 200–201). **Reliability of dating and chronology** high.
Description The so-called »Cornmill Stream« is connected to the River Lea and diverts from the main channel north-northwest of the abbey before heading south-southeast towards the abbey and returning to the River Lea (Natural Environment Research Council 2011 [2018]; Oksanen 2019; Huggins 1970, 127; 1972, 31. 36. 81). According to Bond 2007, 190, Abbot Walter asked for the permission to cut a canal and divert the River Lea. The answer was positive as declared in a writ issued by the Bishop of Ely to the Sheriff of Essex in 1190/1191 (Charters of Waltham Abbey, ed. Ransford, 200–201; Bond 2007, 190). The main purpose was to provide water for one of the abbey mills, although the canal was also used for navigation, which is confirmed by archaeological evidence of harbour infrastructure at the canal northeast of the abbey (Bond 2007, 190). Perhaps only the northern part leading to the mill was navigable similar to a dead-end canal. In 1428 written sources describe the entrance to the canal from the River Lea as »16 ft (4.9 m) wide where it should only be 4ft (1.2 m) wide« (Bond 2007, 191). The excavated dock consisted of »an opposed slipway arrangement [...] to enable boats to be drawn up from the Cornmill stream«, made of wood and a stone pavement (Huggins 1972, 84). In a second phase, »the Phase I arrangement [the dock] was abandoned and a timber wharf was built«. The canal functioned as a mill leat and most likely also as a freshwater supply for the fishponds north of the abbey, thereby revealing its genuine truly multi-functional purpose (Huggins 1970, 126–127. 140; Bond 2007, 190).

Description of the written record In 1190/1191, Abbot Walter was granted the right to alter the course of the River Lea without »inconvenience to shipping«: »*licentiam abbati de Waltham avertendi cursum aque de la Lui in villa Waltham sicut voluerit sine dampno alicuius et ad commodum navigii*« (Charters of Waltham Abbey, ed. Ransford, 200–201).
Canal type parallel. **Dimensions** Length c. 2,5 km, fairway width 4.9 m. **Bank revetments and other infrastructure** wharf/quay; dock/shipyard. **Initiators and responsible agents** monastery.
References Short 2011, 46–47. – Charters of Waltham Abbey, ed. Ransford, 200–201. – Huggins 1970, 126–129; 1972. – Bond 2007, 190–191. – Page/Horace Round 1907. – Cessford u. a. 2006, 26. – Goodburn 2016. – Halsey/Watson 2011, 13–16.

70 Well Creek

Latitude 52,6105, **Longitude** 0,2334. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Great Ouse; Nene.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology The construction is evidenced to a period in the mid to late 13th century (Bond 2007, 186; Oksanen 2019). In 1301, the waterway »had become obstructed« (Bond 2007, 186). According to Chrisholm 2010, 136, Well Creek had »existed earlier than has hitherto been thought«, which hence would sponsor a date in the 12th century. **Reliability of dating and chronology** high.
Description The Well Creek is a »diversion of the Nene and Wellstream waters towards the new course of the Great Ouse« (Oksanen 2019). According to Bond 2007, 186, »the Well Creek had become an important route between the River Nene and King's Lynn« by the late 13th century.
Description of the written record The earliest written source dates to the mid- and late 13th century, but without furnishing many details (Bond 2007, 186).
Canal type connection(?). **Dimensions** Length c. 8.6 km. **Initiators and responsible agents** indeterminate.
References Bond 2007, 186–187. – Oksanen 2019. – Chrisholm 2010, 126–127.

71 West Water

Latitude 52,3526, **Longitude** 0,0437. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Great Ouse.
Written sources assumed.
Construction/planning medieval. **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Oksanen 2019, the canalised section of the river most likely already existed in 1066. According to Chrisholm 2010, 133 »we know the channel was navigable in the early post-Conquest years«. It »may have declined by 1200« but several written sources and connected sites such as the Slade Lode also point to navigation occurring in the 13th and 14th centuries (Oksanen 2019; see also Chrisholm 2010, 133). According to Hall 1992, 94, »the West Water [...] was still navigable [...] in 1240«.
Reliability of dating and chronology high.
Description The West Water is a »canalised branch of the Great Ouse« in the Fens (Oksanen 2019). According to Chrisholm 2010, 133, the West Water »offered an alternative route from the Old Nene to Lynn«.
Canal type parallel. **Dimensions** Length c. 18 km. **Initiators and responsible agents** indeterminate.
References Oksanen 2019. – Hall 1992, 94. – Cole 2007, 77; 2013, 60. – Chrisholm 2010, 126–136.

72 Wimblington

Latitude 52,5137, **Longitude** 0,0800. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Old Nene.
Archaeological sources yes, **Other sources** Topography.
Construction/planning Roman. **2nd cent. AD** assumed, **3rd cent. AD** assumed.
Chronology According to Bond 2007, 168, the canal »appear[s] to be of Roman origin, but [was] silted up before the end of the Roman period«. Hall 1992, 71 states that the canal was »filled with silt before the end of the Roman period«. **Reliability of dating and chronology** very low.
Description The canal is located southwest of the island of Stonea in the Fens and was connected to the Old River Nene and another active river (Bond 2007, 168; Hall 1992, 71). The canal cuts through peat layers and is filled with silt (Hall 1992, 71).

Critical remarks it is uncertain whether it was navigable/navigated.
Canal type connection. **Dimensions** Length c. 0.5 km.
Initiators and responsible agents indeterminate.
References Bond 2007, 168 fig. 32. – Hall 1992, 71. – Rippon 2000, 71.

73 Yaxley Lode

Latitude 52,5125, **Longitude** -0,2477. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Nene.
Written sources yes.
Construction/planning early medieval. **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Oosthuizen 2017, 126, the canal was mentioned in 956 and was hence built earlier (see also Cole 2007, 74). According to Oksanen 2019, the canal was »opened before 1227« and still navigated in the 14th century. **Reliability of dating and chronology** low.
Description The canal in the Fenlands is connected to the River Nene and perhaps also to the *Ubbemaerelade* (Oosthuizen 2017, 125–126; Oksanen 2019). According to the charter of 956, harbours/landing places were in place on both sides of the canal (sudhythe and nordhythe), see Oosthuizen 2017, 126.
Description of the written record According to Oosthuizen 2017, 126, the canal is mentioned in a charter dated to 956 which also mentions a *sudhythe* and a *nordhythe*, in other words, landing places on both sides of the canal (see also Cole 2007, 74).
Canal type dead-end. **Dimensions** Length c. 4 km.
Bank revetments and other infrastructure harbours; landings. **Initiators and responsible agents** indeterminate.
References Oosthuizen 2017, 126. – Oksanen 2019. – Cole 2007, 74.

France

74 Amiens

Latitude 49,8938, **Longitude** 2,2956. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Somme.
Written sources yes.
Construction/planning early medieval. **10th cent. AD** assumed, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The canal construction started in the Early Middle Ages, but there is no proof for navigation before the 12th century. **Reliability of dating and chronology** low.
Description In Amiens there is proof for large-scale early medieval canals. They supplied water for the mills in the 11th century and must have been cut significantly earlier. Nevertheless, clear proof for navigation predating the 12th century in some of these canals is missing. In this period, one of the canals was equipped with a stone quay wall (Lohrmann 1988, 169; Bayard 1999, 201. 204; Guillerme 2013, 47. 69–74).
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 0.4 km, depth c. 6 m. **Bank revetments and other infrastructure** quay. **Initiators and responsible agents** church; civic authorities (?).
References Lohrmann 1988, 169. – Bayard 1999, 201. 204. – Guillerme 2013, 47. 69–74.

75 Anchin Monastery

Latitude 50,3789, **Longitude** 3,2120. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Scarpe.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** assumed.
Chronology According to Espinas 1902, 400, the canal is mentioned in 1112–1117. **Reliability of dating and chronology** high.
Description In 1112–1117 the abbey of Anchin was granted the right to build a mill. A precondition was to cut a navigable canal to bypass this mill (Lohrmann 1984, 180; Bond 2007, 173; Espinas 1902, 400–402).
Description of the written record The construction of the canal is granted in a charter of the countess of Flanders to the abbey of Anchin. The charter states

that: »*ego, Clementia, Flandrensium comitissa, pro animabus domini mei, Roberti, et duorum filiorum meorum, et pro remedio anime mee, Aquicinensi ecclesie concesserim ut fratres ejusdem ecclesie, a villa que dicitur Lalain usque ad locum qui vocatur Kevirons, tale fossatum faciant per quod naves tam libere quam prius per Scarpum transire valeant. Quod si tale fossatum non fuerit, et hoc comprobatum sub testimonio legitimorum virorum et scabinorum Duacensium fuerit, irritum fiet. Facto vero fossato, ut predictum est, ipsius aque priorem cursum usque ad molendinum infra ambitum ejusdem cenobii situm, deducant.*« (after Espinas 1902, 401–402).

Canal type parallel/bypass canal. **Initiators and responsible agents** monastery.

References Lohrmann 1984, 180. – Espinas 1902, 400–402. – Sproemberg 1964, 1208. – Bond 2007, 173.

76 Autun Le Canal du Touron

Latitude 46,9730, **Longitude** 4,2650. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Celle.

Archaeological sources yes.

Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed.

Chronology Dated to antiquity. **Reliability of dating and chronology** low.

Description According to Foucher 2020, ID 1331, implicit/highly interpretive archaeological features have been excavated. According to Wawrzinek 2014, 406, there was a Roman canal in Autun.

Critical remarks it is uncertain whether the canal was navigable/navigated.

Canal type indeterminate. **Initiators and responsible agents** indeterminate.

References Wawrzinek 2014, 406; BDD PATRIARCHE-71 014 0108 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 1331.

77 Bar-le-Duc

Latitude 48,7742, **Longitude** 5,1644. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Canal.

Archaeological sources yes.

Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed.

Chronology Dated to antiquity. **Reliability of dating and chronology** low.

Description According to Foucher 2020, ID 981, implicit/highly interpretive archaeological features of a canal have been excavated.

Critical remarks uncertain whether it was a genuine canal and whether it was navigable/navigated. Insufficient information. **Initiators and responsible agents** indeterminate.

References BDD PATRIARCHE-55 029 0020 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 981.

78 Beauvais Gonard Canal

Latitude 49,4325, **Longitude** 2,0816. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Thérain.

Written sources yes, **Archaeological sources** yes.

Construction/planning Roman. **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.

Chronology According to Guillerme 2013, 35, the canal was cut in the 3rd century. All the same, the chronology seems ambiguous. **Reliability of dating and chronology** low.

Description Canal construction possibly began in antiquity at Beauvais (Guillerme 2013, 35; Bromwich 2003, 44–47). However, it is uncertain which of the canals was navigated. Guillerme 2013, 7 and Fémolant 1999, 147 also mention canal construction and river diversions in the Early Middle Ages. A 10 m wide canal has been identified and dated to the Early Middle Ages based on excavations (Fémolant 1999, 147). In the 11th century, »branches of the River Thérain were diverted through the city in the early eleventh century« (Bond 2007, 172). The Gonard canal was cut »to surround the city with water« (Guillerme 2013, 8). Yet, the entire process is indistinct and navigation may not have been among its main purposes.

Description of the written record not specified.
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type parallel. **Dimensions** Length indeterminate, width of one of the canals 10 m. **Initiators and responsible agents** civic authorities(?).
References Bond 2007, 172. – Fémolant 1999, 147. – Guillerme 2013, 7–8. 35. 47 fig. 15. – Bromwich 2003, 44–47.

79 Boigny-sur-Bionne Le Grand Bouland

Latitude 47,9371, **Longitude** 2,0148. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Bionne.
Archaeological sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The canal is dated to the 12th century and later. **Reliability of dating and chronology** high.
Description According to Foucher 2020, ID 778, explicit archaeological features of a canal have been excavated.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-45 034 0037 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 778.

80 Bonnefamille

Latitude 45,5888, **Longitude** 5,1315. **Reliability/precision of geographic location** high.
Connected to lake, **Adjacent waterways** Étang des Dames.
Archaeological sources assumed.
Construction/planning medieval. **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology The canal is dated to the Middle Ages and was used until recently. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 639, implicit/highly interpretive archaeological features of a canal have been excavated.
Critical remarks it is uncertain whether it was a genuine canal and whether it was navigable/navigated.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-38 048 0005 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 639.

81 Bouxwiller

Latitude 48,8239, **Longitude** 7,4823. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** indeterminate.
Written sources yes, **Archaeological sources** assumed.
Construction/planning medieval. **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology The canal is dated to the Middle Ages. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 1197, there is historical proof for the canal.
Description of the written record not specified.
Critical remarks insufficient information.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-67 061 0012 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 1197.

82 Caen Nouvelle Odon

Latitude 49,1832, **Longitude** -0,3525. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Odon.
Written sources yes.
Construction/planning 11th cent. AD. **11th cent. AD** yes, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology According to Lohrmann 1988, 170–171, the canal was built under Lanfranc between 1063 and 1070. Guillerme 2013, 54 states that the construction was finished after 14 years. Bond 2007, 173, suggests that it was »probably completed between 1066 and 1083«. **Reliability of dating and chronology** high.

Description The canal is connected to the rivers Orne and Odon and was built in a difficult peaty area (Lohrmann 1988, 170; Guillerme 2013, 56). According to Bond 2007, 173, the »Odon was diverted into a canalized course, the Nouvel Odon, cutting off a large meander loop along the southern side of the town between the abbey and the bridge of Saint-Pierre« (see also Guillerme 2013, fig. 14). According to Guillerme 2013, 54, the canal »was very probably the result of cooperation between William the Conqueror and Abbot Lanfranc«. Bond 2007, 173 argues that the intention was »to develop a port suitable for seagoing ships«. The canal construction followed »the selection of Caen by William of Normandy and his wife Matilda as a principal ducal residence, and their foundation of the two great abbeys of Saint-Etienne and La Trinite there in 1062–3«. Guillerme 2013, 56 mentions the other purpose to drain the peaty landscape. According to Lohrmann 1988, 170, the canal construction was part of a systematic approach to improve the waterways and the harbour in Caen after the town had become the main residence of William the Conqueror in 1066.
Description of the written record According to Lohrmann 1988, 170–171 the canal construction is documented in the charters of Lanfranc which specify land acquisitions and the right to carry out earthworks at the river.
Canal type parallel. **Dimensions** Length c. 1 km, Lanfranc and Robert canals together c. 3 km. **Initiators and responsible agents** monastery; royal initiative(?).
References Lohrmann 1988, 170–171. – Bond 2007, 171. 173. – Guillerme 2013, 54. 56. 73.

83 Caen Robert Canal

Latitude 49,1832, **Longitude** -0,3525. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Orne; Odon.
Written sources yes.
Construction/planning 11th cent. AD. **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Lohrmann 1988, 170, the canal was finished in 1104. **Reliability of dating and chronology** high.
Description The canal is connected to the rivers Orne and Odon and was cut into peat sediments. Lohrmann 1988, 170 places it southeast of the canal of Lanfranc. The canal served as a harbour for seagoing ships. It was »fitted with docks during the first half of the twelfth century« (Guillerme 2013, 56). According to Guillerme 2013, 56, »the Orne was divided into two channels«. According to Bond 2007, 173, the canal was »later enlarged into what is now the Bassin Saint-Pierre«. Lohrmann 1988, 170 believes that the canal reduced the tidal impact on the River Orne and, due to the additional inflow of the redirected Petite Orne, the canal and harbour were filled with water also during low tide. Bond 2007, 171 states that the construction is connected to Robert Curthose. Lohrmann 1988, 170 thinks the canal construction was part of a systematic approach to improve the waterways and the harbour in Caen after the town had become the main residence of William the Conqueror in 1066.
Description of the written record not specified.
Canal type parallel/dead-end. **Dimensions** Length c. 1 km, Lanfranc and Robert canals together c. 3 km.
Bank revetments and other infrastructure harbour; docks. **Initiators and responsible agents** nobility.
References Bond 2007, 171. – Lohrmann 1988, 170–171. – Guillerme 2013, 39. 56. 73.

84 Calais

Latitude 50,9559, **Longitude** 1,8607. **Reliability/precision of geographic location** very low.
Connected to sea, **Adjacent waterways** English Channel; North Sea.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology Constructed in 1190. **Reliability of dating and chronology** high.
Description According to Derville 2002, 32, a new harbour and a canal were built in 1190.
Description of the written record not specified.
Critical remarks insufficient information.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Derville 2002, 32.

85 Canal de la Colme

Latitude 50,9715, **Longitude** 2,4324. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Aa; Bergenvaart/Canal du Bergues.
Sources indeterminate.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology The canal was cut in the 12./13. century.
Reliability of dating and chronology low
Description The canal is located in the polder area of Flanders and most likely served a dual purpose for drainage and navigation (Ravinet 1824, 68; https://fr.wikipedia.org/wiki/Canal_de_la_Colme [26.2.2019]). Further information is missing.
Critical remarks insufficient information.
Canal type parallel. **Dimensions** Length c. 24 km, width 7–13 m, depth c. 1.8 m (modern period, unreliable). **Initiators and responsible agents** indeterminate.
References Ravinet 1824, 68. – https://fr.wikipedia.org/wiki/Canal_de_la_Colme (26.2.2019).

86 Canal Poitou

Latitude 46,5819, **Longitude** 0,3405. **Reliability/precision of geographic location** very low.
Connected to river.
Written sources assumed.
Construction/planning 12th cent. AD. **12th cent. AD** yes.
Chronology Between 1175 and 1275 according to Bond 2007, 173. **Reliability of dating and chronology** low.
Description Bond 2007, 173 states that: »Marshland drainage again sometimes produced navigational benefits: renewed attempts to drain the marshes of Poitou between 1175 and 1275 involved the use of movable gates or sluices, permitting boats to travel along some streams«.
Critical remarks insufficient information.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Bond 2007, 173.

87 Châlons-en-Champagne/Marne

Latitude 48,9561, **Longitude** 4,3621. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Marne.
Written sources assumed.
Construction/planning 11th cent. AD. **10th cent. AD** assumed, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Guillerme 2013, 35 and Lohrmann 1988, 165, the canals were cut before 1028/1043. **Reliability of dating and chronology** low.
Description According to Guillerme 2013, 33, the Mau and the Nau, which flow into Chalôns-sur-Marne are artificial canals and already existed in the first half of the 11th century. According to Lohrmann 1988, 165, the main purpose was drainage. There is no clear proof that they were used for navigation.
Critical remarks it is uncertain whether it was a genuine canal and whether it was navigable/navigated.
Canal type parallel. **Initiators and responsible agents** indeterminate.
References Lohrmann 1988, 165. – Guillerme 2013, 33–37. 68. 73.

88 Château-Thierry

Latitude 49,0446, **Longitude** 3,4038. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Marne.
Archaeological sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology Dated to the 13thcentury. **Reliability of dating and chronology** high.
Description According to Nilles 2002, 47 clear archaeological features of a canal have been excavated.
Critical remarks insufficient information.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Nilles 2002, 47.

89 Colmar Place du 2 février

Latitude 48,0763, **Longitude** 7,3621. **Reliability/precision of geographic location** low.
Connected to river.
Archaeological sources yes.

Construction/planning medieval. **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology Dated to the Middle Ages. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 1207, features of the excavation were interpreted as a canal. However, the interpretation seems to be hesitant.
Critical remarks it is uncertain whether it is a canal and if it was navigable/navigated.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-68 066 0198 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 1207.

90 Conteville *Fossa Herluini*

Latitude 49,4162, **Longitude** 0,3931. **Reliability/precision of geographic location** low.
Connected to river; sea, **Adjacent waterways** Seine.
Written sources yes.
Construction/planning 11th cent. AD. **11th cent. AD** yes, **12th cent. AD** assumed.
Chronology According to Mouchard 2008, 117, the *fossa Herluini* is mentioned in 1021–1025. Bates 2016, 29 argues that it is likely that Herluin of Conteville »may well have overseen the construction«. **Reliability of dating and chronology** low.
Description According to Mouchard 2008, 117–118, the canal is located in or around Conteville in a strategic position in the Seine estuary where the dukes could control navigation. According to Bates 2016, 29, it is likely that Herluin of Conteville was behind the construction. Bates 2016, 28–29 states that Herluin of Conteville »was someone of sufficient importance to attend the court quite often«. It was he who married Herleva, the mother of William the Conqueror, around 1030, whilst their son Odo was made bishop of Bayeaux in 1049/1050.
Description of the written record According to Mouchard 2008, 117. fn. 51, the canal is mentioned in a charter of 1021–1025 (12th century copy, Saint-Père-de-Chartres), in which Richard II grants possessions to the abbey of Saint-Père of Chartres: »*duarum scilicet in portu Dancs et quatuor in portu // Guellebo, duarum ad fossam Herluini et ut in omnibus mercimoniis ubivis locorum mea potestatis agendis nichil telonei persolvant, pro christi amore // perpetualiter perdonavi.*«
Canal type indeterminate. **Initiators and responsible agents** nobility(?).
References Bates 2016, 29. – Mouchard 2008, 117–118.

91 Corneillan near Lunel

Latitude 43,6610, **Longitude** 4,1560. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Vidourle.
Written sources yes.
Construction/planning 11th cent. AD. **11th cent. AD** yes.
Chronology Dated to the late 11th century by written sources. **Reliability of dating and chronology** high.
Description In Corneillan near Dassargues, where a 10th century canal has been excavated, a late 11th century charter mentions a navigable canal connected to the River Vidourle (Garnier u. a. 1995, 49–50). This multi-functional canal was made for drainage, but was also navigable, and offered a waterway to the village.
Description of the written record The canal is mentioned in a late 11th century charter in the Cartulaire de l'abbaye de Psalmodi f° 89, according to Garnier u. a. 1995, 49: »*pro incremento et melioratione villae Sancti Iuliani, facerent ibidem aquae decursum, id est Capauleriam, qua possint vire et redire navigia ab eodem villa uisque ad stagnum et uisque ad paludem*«.
Canal type indeterminate. **Initiators and responsible agents** monastery(?).
References Garnier u. a. 1995, 49–50.

92 Dassargues near Lunel

Latitude 43,6847, **Longitude** 4,1544. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Vidourle.
Archaeological sources yes.
Construction/planning 10th cent. AD. **10th cent. AD** yes, **11th cent. AD** yes.
Chronology Excavations have shown that the quay along the canal was used in the 10th century. **Reliability of dating and chronology** high.
Description According to Garnier u. a. 1995, 47–50, a canal connected to the River Vidourle was cut in the 10th century in the village of Dassargues. Excavations furnished proof for stone revetments that served as

a quay. Despite the small diameter, the canal was clearly used for navigation.
Canal type parallel(?). **Dimensions** Width 3–6 m, depth min. 0.7 m. **Bank revetments and other infrastructure** quay. **Initiators and responsible agents** indeterminate.
References Garnier u. a. 1995, 47–50.

93 Doaui Scarpe Vitry

Latitude 50,3249, **Longitude** 2,9805. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Scarpe.
Written sources yes.
Construction/planning 10th cent. AD. **10th cent. AD** assumed, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Lohrmann 1988, 173, the canal was cut in 950–960. **Reliability of dating and chronology** high.
Description The canal is connected to the River Scheldt. The confluence with the Scheldt was re-located to Mortagne, at a position 20 m lower than the previous one (Lohrmann 1984, 179). According to Lohrmann 1988, 173, a bedrock barrier (limestone) was cut over a distance of c. 3 km. Lohrmann 1984, 171 believes that the count of Flanders probably initiated the construction of the new canalised course of the River Scarpe, possibly together with the active participation of some monasteries (Lohrmann 1984, 173). The main purpose was to increase the energy supply for water mills, as the new confluence with the River Scheldt at Mortagne was now 20 m lower down compared to the one before (Lohrmann 1984, 179). According to Lohrmann 1988, 173, the purpose of the canal was to supply sufficient water for the newly founded town of Douai and its harbour serving the transshipment of grain to the Scheldt and to provide for the operability of powerful water mills. In the 11th century, written sources testify to boat traffic on the Scarpe and Scheldt to Gent (Lohrmann 1984, 176). The higher inflow downstream from Douai by means of the canals had a positive impact on navigation (Lohrmann 1984, 180). However, the canal's main purpose was nonetheless probably not navigation.
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 10 km (Vitry-Douai). **Bank revetments and other infrastructure** water mills. **Initiators and responsible agents** nobility; monastery.
References Lohrmann 1984, 170–172; 1988, 171–173. – Verhulst 1999, 95.

94 Douai Scarpe Arleux

Latitude 50,2809, **Longitude** 3,1032. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Scarpe.
Written sources yes.
Construction/planning 11th cent. AD. **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes. **Chronology** According to Lohrmann 1984, 177, the canal's construction most likely dates to the mid-11th century. Later he specifies (Lohrmann 1988, 173) that this part of the canalisation scheme was carried out in 1060–1070. **Reliability of dating and chronology** high.
Description The canal directed water to Douai »via the old Talweg« from the swamps of Biache (Lohrmann 1984, 173). Lohrmann 1988, 173 alleges that the canal's purpose was to assure the supply water for the newly founded town of Douai and its grain transit harbour to the Scheldt and to create adequate conditions for the operation of its powerful water mills. In the later Middle Ages, this canal course was also navigated (Lohrmann 1984, 173).
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 10 km (Arleux-Douai). **Bank revetments and other infrastructure** water mills. **Initiators and responsible agents** nobility(?).
References Lohrmann 1984, 170–172; 1988, 171–173.

95 *Fossa Augusta* Orange

Latitude 44,9359, **Longitude** 4,8790. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Rhône.
Other sources inscription/map.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed.
Chronology According to Felici 2016, 185–186, the canal's construction may possibly date to the Augustan period. **Reliability of dating and chronology** high.
Description The *Fossa Augusta* south of Orange is documented in an epigraphic source, the so-called »cadaster C« (Leveau 1999, 101–102; Leveau 2004,

372; Felici 2016, 185–186). Its accurate location near Orange hasn't been determined (Salviat 1986, 110; Leveau 2004, 372). The canal was c. 30 m wide and offered a bypass averting a problematic stretch of the Rhône (Leveau 2004, 372; Salviat 1986, 110). According to Felici 2016, 185–186, it was also built for drainage.

Description of the written record The *Fossa Augusta* is documented in the so-called »cadaster C« of Orange (Leveau 1999, 101–102; 2004, 372; Felici 2016, 185–186).

Canal type parallel/bypass canal. **Dimensions** Length unknown, width c. 30 m. **Initiators and responsible agents** military(?).

References Leveau 1999, 101–102; 2004, 372. – Salviat 1986, 110. – Felici 2016, 185–186.

96 *Fossa Mariana* Rhône Delta

Latitude 43,4370, **Longitude** 4,9420. **Reliability/precision of geographic location** very low.

Connected to sea; river, **Adjacent waterways** Mediterranean Sea; Rhône.

Written sources yes, **Archaeological sources** yes.

Construction/planning pre-1st cent. BC. **pre-1st cent. BC** yes, **1st cent. BC** yes, **1st cent. AD** assumed, **2nd cent. AD** no.

Chronology The canal was cut in the latest 2nd century BC and silted in the 1st century AD. **Reliability of dating and chronology** high.

Description The canal is located in the Rhône delta. It was constructed to bypass a difficult stretch where »obstacles obstructed the navigation of ships« and to avoid the dangerous Rhône estuary (Provansal u. a. 2003, 276; Bond 2007, 160–161; Smith 1977, 78–79; Campbell 2012, 224). According to Strabo and Plutarch, Marius ordered to build the canal in 104/103 BC to guarantee the supply for his troops from the sea (Schwarz 2006, 57; Smith 1977, 78–79; Felici 2016, 182; Campbell 2012, 224). The work was carried out by his troops (Smith 1977, 79). According to Felici 2016, 183, the term »*Fossis Marianis, portus*« points to the use of the canal or its mouth as a harbour.

Description of the written record The canal is mentioned in Plutarch's life of Caius Marius as well as in Strabo IV, 1, 8 (Smith 1977, 78–79; Felici 2016, 182–184).

Canal type parallel/bypass canal. **Initiators and responsible agents** military.

References Leveau 1999, 101–102; 2004, 366–372; 2014, 12–24. – Provansal u. a. 2003. – Badan 2013. – Bond 2007, 160–161. – Schwarz 2006, 57. – Smith 1977, 78–79. – Hadfield 1986, 20. – Felici 2016, 182–184. – Vella u. a. 1999. – Rousse 2005, 61. – Coulon/Golvin 2018, 19–21. – Marty 2002. – Campbell 2012, 224.

97 Fréjus

Latitude 43,4281, **Longitude** 6,7457. **Reliability/precision of geographic location** very low.

Connected to sea, **Adjacent waterways** Mediterranean Sea.

Archaeological sources assumed.

Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed.

Chronology Dated to antiquity according to Bond 2007, 160. **Reliability of dating and chronology** low.

Description According to Bond 2007, 160, there was a canal at the harbour of Fréjus, although, this seems quite uncertain.

Critical remarks Insufficient information.

Canal type indeterminate. **Dimensions** Length c. 1 km. **Initiators and responsible agents** indeterminate.

References Bond 2007, 160.

98 La Celle-en-Morvan Polroy

Latitude 46,8937, **Longitude** 5,0443. **Reliability/precision of geographic location** high.

Connected to river.

Archaeological sources yes.

Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed.

Chronology Dated to antiquity. **Reliability of dating and chronology** low.

Description Explicit archaeological features of a canal have been excavated.

Critical remarks Insufficient information.

Canal type indeterminate. **Initiators and responsible agents** indeterminate.

References BDD PATRIARCHE-71 509 0006 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 1365.

99 Lattes

Latitude 43,5720, **Longitude** 3,8981. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Lez.
Written sources yes, **Archaeological sources** yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Arthuis/Monteil 2015a, the canal was built in the first half of the 13th century AD. **Reliability of dating and chronology** high.
Description According Arthuis/Monteil 2015a, the canal is connected to the River Lez at Lattes. It is 6.5 m wide and 3.5 m deep. According to Foucher 2020, ID 562, there is also explicit historical proof for a canal/dyke.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Arthuis/Monteil 2015a. – BDD PATRIARCHE-34 129 0073 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 562.

100 Lattes la Cereirede

Latitude 43,5824, **Longitude** 3,9044. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Lez.
Archaeological sources yes.
Construction/planning pre-1st cent. BC. **pre-1st cent. BC** yes, **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes.
Chronology Dated by archaeological finds. **Reliability of dating and chronology** high.
Description According to Foucher 2020, ID 563, features unearthed in the excavation have been interpreted as belonging to a canal. This, however, seems debatable.
Critical remarks it is uncertain whether it was a genuine canal and whether it was navigable/navigated.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-34 129 0078 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Bel nach 2002. – Foucher 2020, ID 563.

101 Lyon

Latitude 45,7593, **Longitude** 4,8301. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Saône.
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** no.
Chronology According to Le Mer/Chomer 2007, 372, this potential canal was cut in the early 1st century AD and began to silt up already under the reign of Tiberius in the 1st century. **Reliability of dating and chronology** high.
Description The canal is located in 1 rue du Colonel Chambonet and connects to the River Saône (Le Mer/Chomer 2007, 372). A 10 m wide depression with stone revetments has been excavated, but the interpretation as a navigable canal is unsure.
Critical remarks it is uncertain whether the canal was navigable/navigated.
Canal type indeterminate. **Dimensions** Width 10 m. **Bank revetments and other infrastructure** stone revetments; ford. **Initiators and responsible agents** indeterminate.
References Le Mer/Chomer 2007, 372–373. – Foucher 2020, ID 1239.

102 Metz Place Mazelle

Latitude 49,1139, **Longitude** 6,1837. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Seille.
Written sources yes, **Archaeological sources** yes, **Other sources** iconography.
Construction/planning 13th cent. AD. **12th cent. AD** assumed, **13th cent. AD** yes.
Chronology The canal is dated with dendrochronology to the mid-13th century. An initial phase in the 12th century is possible. It was used and repaired until the 17th century. **Reliability of dating and chronology** high.
Description According to Brkojewitsch u. a. 2013a, 283, the canal's construction is connected to the construction of a new town wall in the 12th century. The main purpose was to supply the moat with

water, but it may have been navigable, as well. Different bank revetments of wood have been excavated (Foucher 2020, ID 1046).

Description of the written record According to Foucher 2020, there are several written sources as from the 13th century. In the mid-13th century, a »*canalis*« is first mentioned (obituary column of Saint Clément; nécrologie de Saint-Clément).

Critical remarks it is uncertain whether the canal was navigable/navigated.

Canal type parallel. **Dimensions** width 6–12 m. **Bank revetments and other infrastructure** wooden revetments; masonry revetments. **Initiators and responsible agents** civic authorities(?).

References Brkojewitsch u. a. 2013a, 297–306. – Foucher 2020, ID 1046.

103 Montrelais/Varades Le Canal Torse

Latitude 47,3821, **Longitude** -0,9867. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Loire.

Archaeological sources yes.

Construction/planning High Middle Ages. **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** yes.

Chronology The canal was constructed in the 11th–13th centuries (Arthuis u. a. 2015). The chronology is based on ^{14}C dating. **Reliability of dating and chronology** high.

Description Between Anetz, Varades, and Montrelais, a navigable canal was cut parallel to the river bed of the Loire over a distance of c. 15 km. It ran along the northern edge of the floodplain which is characterised by highly dynamic sandy deposits and peaty areas. Some sections of the canal are still visible in the field and not completely filled with sediments. In a map from 1765, the course of the canal is precisely indicated. Its remains have been studied intensively in numerous (geo-)archaeological trenches. No revetments were found along the canal itself, even though additional ditches of up to 5 m width with wooden facings have been recorded and connected to the canal (Arthuis u. a. 2015). Arthuis u. a. 2015, 167 suggest that navigation on the canal was less hazardous than on the main river.

Canal type parallel/bypass canal. **Dimensions** length c. 15 km, width 20–30 m, depth c. 2–3 m. **Initiators and responsible agents** indeterminate.

References Arthuis u. a. 2015.

104 Nantes

Latitude 47,2174, **Longitude** -1,5527. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Loire(?).

Written sources yes.

Construction/planning 6th cent. AD. **6th cent. AD** yes.

Chronology The canalisation is attributed to Felix of Nantes (bishop of Nantes 548–582), but its chronology is unclear. **Reliability of dating and chronology** low.

Description Venantius Fortunatus describes major canalisation works and the re-direction of a river in Nantes, including the construction of dams. Navigation is mentioned, but not clearly in connection with the canal, and the authenticity of the description is doubtful.

Description of the written record The canalisation is described by Venantius Fortunatus in his poem about Felix, bishop of Nantes (Venantius Fortunatus, ed. Fels, 66–67). In book 3, poem 10 Venantius writes (translation Venantius Fortunatus, ed. Fels, 66–67): »10 Bischof Felix von Nantes reguliert einen Fluß. Weg mit den alten Poeten, was auch immer sie erzählen: Mancherlei Dinge von heut schlagen die Taten von einst. Hätte damals Homer geschaut, dass man eindämmt die Flüsse, hätte er sein reizendes Werk lieber mit so etwas gefüllt: Alle läsen jetzt Felix, keiner Achill, unter dessen Namen der Ruhm seiner Kunst überall wuchs in der Welt; tüchtig auf Grund des Talentes, verändert durch bessere Führung, läßt Du den Fluß laufen nach neuem Gesetz. Durch den Bau eines Dammes beseitigst Du Strudel im Flußlauf, zwingst ihn zu nehmen den Weg, wo die Natur es versagt. Hier erbaust Du, indem du anlegst ein Tal, einen Hügel, und wenn der Wandel vollbracht, geht dieser hoch, jenes sinkt. Eine Erscheinungsform ging ins Bild einer anderen über: Unten im Tal sitzt der Berg, und in der Höhe steigt das Tal. Wo früher reißende Flut, wuchs Erde zu reglosem Damme, und wo früher das Schiff, fahren jetzt Lastwagen hin. Wogen leitest Du um und führst sie trotz Hügelland abwärts, und den fügsamen Fluß lenkst Du trotz hindernden Bergs. Wo er reißend dahinschoß, kam der Strom rasch und hielt inne, wandte den Lauf an dem Berg, der sich da plötzlich erhob. Wasser, die vorher ungestüm abflossen, gleichsam wie nutzlos, haben jetzt für das Volk lebenserhaltenden Zweck. Aus dem Fluß wird neue Saat für die Menschen geerntet, wenn die Welle durch dich Nahrung erzeugt für das Volk. Wie verstehst du die schwankenden

Triebe der Menschen zu lenken, der du gar reißende Flut zügelst nach deinem gebot! Makellos bleibe für immer dein frommes Leben dir, Felix, der du dem Wasser befahlst, daß es verlegte den Lauf.«

Critical remarks It is not clear whether the artificial waterway was really navigated.

Canal type parallel(?). **Initiators and responsible agents** bishop.

References Felici 2016, 186. – Venantius Fortunatus, ed. Fels, 66–67. – Arthuis/Monteil 2015b.

105 Narbonne Lagoon

Latitude 43,1264, **Longitude** 3,0152. **Reliability/precision of geographic location** high.

Connected to sea; river, **Adjacent waterways** Mediterranean Sea; Aude; Étang de Bages et de Sigean.

Archaeological sources yes.

Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes.

Chronology According to Jézégou u. a. 2016, 33, the canal was built in the second half of the 1st century AD and »maintained without interruption until Late Antiquity«. According to Sanchez u. a. 2013, 39, the canal was used for more than four centuries. In the late 4th or early 5th century, one of the damaged piers along the canal was repaired by using a sunken boat (Jézégou u. a. 2016, 33). According to Carayon u. a. 2018, 160, the canal was operational until the 5th century AD. **Reliability of dating and chronology** high.

Description The canal is connected to the Mediterranean Sea and the River Aude. The main purpose was to channel the water of the River Aude »as it emptied into the lagoon« (Jézégou u. a. 2016, 34). According to Sanchez/Jézégou 2016, 511, the canal provided access for ships coming from the sea and assured the transfer of goods to river boats. The canal was used as a canal harbour (Sanchez u. a. 2013). According to Carayon u. a. 2018, 160, »the original purpose of this infrastructure work was to ensure continued fluvial access to the city of Narbonne and, thereby, to facilitate the transshipment of cargoes«. The canal is flanked by two parallel piers of 15–20 m width (Sanchez/Jézégou 2016, 510; Jézégou u. a. 2016, 33). A towpath helped to link the canal to the warehouses on the mainland (Sanchez/Jézégou 2016, 511).

Canal type parallel. **Dimensions** Length c. 2 km, width c. 50 m, depth c. 3.5 m. **Bank revetments and other infrastructure** massive piers; towpath. **Initiators and responsible agents** civic authorities(?); military(?).

References Sanchez/Jézégou 2016. – Sanchez u. a. 2013; 2016. – Carayon u. a. 2018, 159–160. – Faïsse u. a. 2018. – Smith 1977, 79. – Felici 2016, 184–185. – Rousse 2005, 61. – BDD PATRIARCHE-11 262 0413 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 166.

106 Narbonne Saint-Loup

Latitude 43,1851, **Longitude** 3,0178. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Aude.

Archaeological sources yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** no.

Chronology According to Carayon u. a. 2018, 157, the canal was constructed in the Augustan period (17 BC-AD 14). According to Carayon u. a. 2018, 160, »during the late 2. and early 3. centuries AD, the system clearly began to undergo changes [...]. Even if the canal was maintained, the port site of Saint-Martin and Saint-Loup embarked upon a period of decline [...]. The harbour system that had developed following the foundation of the colonia Narbo Martius came to an end during the 3. century AD.« **Reliability of dating and chronology** high.

Description The canal which connects to the River Aude is at the same time a transformed segment of the River Aude flowing through Narbonne, whilst »there is no information about the canal upstream at Saint-Loup« (Carayon u. a. 2018, 157). According to Carayon u. a. 2018, 157, the canal »crossed the Augustan colony of Narbo Martius and was used as a harbour«. According to Carayon u. a. 2018, 157, »excavations at Saint-Loup revealed one bank of a waterway as well as a quay wall and a canal«.

Canal type parallel. **Dimensions** indeterminate. **Bank revetments and other infrastructure** quay wall. **Initiators and responsible agents** civic authorities(?); military(?).

References Carayon u. a. 2018, 157. – Felici 2016, 184–185. – Ambert 2000; 2011. – Cavero u. a. 2010. – Sanchez u. a. 2013.

107 Oedenburg Biesheim Riedgraben

Latitude 48,0435, **Longitude** 7,5097. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Rhine; Riedgraben.
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes.
Chronology The canal is dated by dendrochronology to the 1st century AD. **Reliability of dating and chronology** high.
Description The Riedgraben at the Roman site of Oedenburg-Biesheim was thoroughly canalised and re-directed as from AD 19 (Reddé 2011, 56–57). A northern branch was canalised around AD 41. Wooden revetments and quay-like installations have been excavated.
Canal type parallel. **Dimensions** Length several hundred metres, width less than 10 m. **Bank revetments and other infrastructure** wooden revetments; quay. **Initiators and responsible agents** military(?).
References Reddé 2011, 37–57. – Reddé u. a. 2005, 235–237. – Muntenau 2011, 201.

108 Orange

Latitude 44,1407, **Longitude** 4,8042. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Eygues(?).
Archaeological sources yes.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed.
Chronology Dated to antiquity. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 1694/1696, excavated archaeological evidence clearly points to an ancient canal in the Avenue de l'Arc de Triomphe.
Critical remarks insufficient information.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-84 087 0273 (Patriarche: national inventory of excavations and archaeological discoveries, France). – BDD PATRIARCHE-84 087 0274 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 1694/1696.

109 Pontorson Couesnon

Latitude 48,5527, **Longitude** -1,5135. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Couesnon.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes.
Chronology Indeterminate, perhaps 1158 (Bond 2007, 171). **Reliability of dating and chronology** low.
Description According to Bond 2007, 171. 173, the canal was diverted from the River Couesnon at Pontorson. It is connected to the construction of a castle by Henry II of England.
Description of the written record not specified.
Critical remarks it is uncertain whether the canal was navigable/navigated.
Canal type parallel. **Dimensions** Length c. 7 km. **Initiators and responsible agents** royal initiative.
References Bond 2007, 171. 173.

110 Rosières-aux-Salines

Latitude 46,5927, **Longitude** 6,3480. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Meurthe.
Archaeological sources yes.
Construction/planning indeterminate. **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology indeterminate, most likely post-classical. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 975, implicit/highly interpretive archaeological features of a canal have been excavated.
Critical remarks it is uncertain whether it was a genuine canal and whether it was navigable/navigated.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-54 462 0007 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 975.

111 Saint-Lyphard Rue des Gros Fosses

Latitude 47,4018, **Longitude** -2,3086. **Reliability/precision of geographic location** high.
Connected to river; sea, **Adjacent waterways** indeterminate.
Archaeological sources yes.
Construction/planning medieval. **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology Dated to the Middle Ages. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 768 explicit archaeological features of a canal have been excavated.
Critical remarks insufficient information.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-44 175 0042 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 768.

112 Saint-Omer

Latitude 50,7495, **Longitude** 2,2645. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Aa.
Archaeological sources yes.
Construction/planning 10th cent. AD. **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The earliest archaeological remains of canals at Caserne Foche most likely date to the second half of the 10th or the 11th century (Barbé u. a. 1998, 45). According to Derville 1995, 67, the canals in Saint-Omer already existed at the time of the work on the new course of the River Aa in and around 1100. As the finds from the infill date to the 14th/ 15th centuries (Barbé u. a. 1998, 37), the canal was probably abandoned at this time. By the 16th century, the canal had definitely disappeared (Barbé u. a. 1998, 37). The western bank of another canal or canalised section of the River Aa dating to the 10th century and used until the 12th century was excavated at Quay des Salines (Barbé u. a. 1998, 11. 15). The earliest dendrochronological probes on the bank revetment furnished a date range between 963 and 975 with repairs until at least 1177 (Barbé u. a. 1998, 12–15). According to Barbé u. a. 1998, 15, these are the earliest traces of floodplain management in Saint-Omer (»les premiers vestiges matériels de l' anthropisation du réseau hydrographique«). **Reliability of dating and chronology** low.
Description The canals in Saint-Omer were connected to the River Aa. According to Barbé u. a. 1998, 47, the 10th century canals »had to communicate via the marsh and the Flemish Maritime Plain, with the North Sea«. Saint-Omer was an important harbour for maritime traffic. According to Barbé u. a. 1998, 47, there is proof for close links with England in the 10th and first half of the 11th century. The canals were all located outside the later town centre with the city wall (Barbé u. a. 1998). According to Barbé u. a. 1998, 46, it is very likely that the canals were built on the initiative of the count and civic agency. Excavations furnished evidence for at least two artificial canals (the site at Caserne Foche) and a third canal or a canalised section of River Aa (the site at Quay des Salines) (Barbé u. a. 1998). The cleared remains of wooden revetments made of piles along the bank of one of the two excavated canals (Fossé 3) at Caserne Foche (Barbé et al. 1998, 37) may have been part of a quay-like structure or pontoon. At Quay des Salines, the earliest wooden bank revetment is dated by dendrochronology (without sapwood) after 963–975 (Barbé u. a. 1998, 12. 14). It consisted of a row of wooden piles rammed into the clay.
Canal type indeterminate, most likely parallel. **Dimensions** Excavated canal width (base) 3–6 m, depth 2–2.5 m. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** nobility(?); civic authorities(?).
References Barbé u. a. 1998. – Derville 1995, 67.

113 Saint-Omer Nouvelle Aa

Latitude 50,7607, **Longitude** 2,2507. **Reliability/precision of geographic location** low.
Connected to river; sea, **Adjacent waterways** Aa; North Sea.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Barbé u. a. 1998, 45, intensive canal building activities including the River Aa occurred in and around 1100. According to Derville

1995, 67–69, most of the work dates to around 1100. The River Aa was canalised further around 1165 to provide access for large seagoing ships of 600 tons. **Reliability of dating and chronology** high.

Description The canal was newly dug, and the Aa was subsequently canalised. The canal was cut through the marshland and gave access to the sea at Watten (Derville 1995, 66). According to Derville 1995, 66, the canal was built by the new town community at Saint-Omer whose harbour was much involved in maritime trade. Following the large canal building project and the canalisation of the river, the harbour became accessible for large seagoing ships by the 12th century (Barbé u. a. 1998, 47). According to Derville 1995, 62, Saint-Omer became a sea-port after the canalisation of the River Aa, which now was accessible for ships of up to 600 tons.

Description of the written record A document furnishes indirect proof for the existence of the new course of the River Aa for the year 1139 (Derville 1995, 66).

Canal type parallel. **Dimensions** Length c. 15 km, significant width and depth. **Initiators and responsible agents** civic authorities.

References Barbé u. a. 1998. – Derville 1995, 57–73. – Verhulst 1999, 94. – Hadfield 1986, 25.

114 Saône-Mosel-Canal

Latitude 48,1622, **Longitude** 6,3109. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Mosel; Saône.

Written sources yes.

Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** no.

Chronology The canal's planning phase dates to AD 55/56. **Reliability of dating and chronology** high.

Description According to Tacitus, there were plans in AD 55/56 that foresaw a canal that was to bridge the watershed between the Mosel and the Saône. The purpose was to solve the problems resulting from of a discontinuous waterway between the Mediterranean and the North Sea: »*difficultatibus navigabilia inter se Occidentis Septentrionisque litora*«. Due to political changes, the project was never implemented (Eckoldt 1980b; Smith 1977, 80; Felici 2016, 178).

Description of the written record Tacitus, Annalen, ed. Heller 13, 53.

Canal type connection. **Initiators and responsible agents** military.

References Rogers 2013, 109. – Eckoldt 1980b. – Smith 1977, 80. – Coulon/Golvin 2018, 34. – Russell 2013, 107. – Allen 1933. – Hadfield 1986, 21. – Felici 2016, 178. – Muntenau 2011, 159–160. – Hanel 1995, 107. – Campbell 2012, 223. – Tacitus, Annalen, ed. Heller 13, 53.

115 Senlis canal Nouvelle Rivière

Latitude 49,2074, **Longitude** 2,5876. **Reliability/precision of geographic location** low.

Connected to river, **Adjacent waterways** Nonette.

Written sources yes.

Construction/planning High Middle Ages. **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** assumed.

Chronology According to Guillerme 2013, 26 the canal was first mentioned in 1141, but he assumes that is was cut already in the late 9th/10th century, »at least as early as 1068«. **Reliability of dating and chronology** very low.

Description According to Bond 2007, 172, »the waters of the River Nonette south of the city [were] diverted into a contour channel« which »served a dual function of draining marshy land to the east of the city while at the same time making it possible to flood the main valley in time of military emergency«. Therefore, there is no clear proof for navigation. According to Guillerme 2013, 26–27, the canal was first mentioned in 1141 in connection with a water mill.

Description of the written record not specified.

Canal type parallel. **Dimensions** Length c. 3 km. **Bank revetments and other infrastructure** earth embankment. **Initiators and responsible agents** indeterminate.

References Bond 2007, 172. – Guillerme 2013, 26–27. 73.

116 Tendu

Latitude 46,6358, **Longitude** 1,5782. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Bouzanne.
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes.
Chronology The canal is dated to the first half of the 1st century AD (Pichon 2002). **Reliability of dating and chronology** high.
Description According to Pichon 2002, the canal was cut to connect a stone quarry with the River Bouzanne. The canal is equipped with a consolidated towpath and a quay wall.
Canal type dead-end. **Dimensions** Length c. 0,1 km, fairway width 5 m, water depth 1–1.2 m. **Bank revetments and other infrastructure** towpath; quay wall. **Initiators and responsible agents** indeterminate.
References Pichon 2002. – Felici 2016, 186–187.

117 Troyes

Latitude 48,3041, **Longitude** 4,0826. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Seine.
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes.
Chronology The canal was most likely built in the 1st century, and according to Deborde 1997, 57, the area was in ruin in the last quarter of the 3rd century. **Reliability of dating and chronology** high
Description The canal was connected to the River Seine and probably cut one of its meanders. Excavations have taken place at two sites located at c. 360 m distance from each other (Deborde 1997, 52. 55). A towpath runs next to the fairway.
Canal type parallel. **Dimensions** Length min. 0.36 km, total width 10 m, bottom width of fairway c. 4 m, depth c. 2 m. **Bank revetments and other infrastructure** towpath. **Initiators and responsible agents** civic authorities(?).
References Deborde 1997. – Bromwich 2003, 335.

118 Troyes Canal de Jaillard

Latitude 48,3035, **Longitude** 4,0821. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Seine.
Archaeological sources yes.
Construction/planning medieval. **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology Dated to the 12th-16th centuries, based on archaeological evidence. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 150, archaeological features of a medieval canal have been excavated, but the connection to the Seine is uncertain.
Critical remarks insufficient information.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-10 387 0178 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 150.

119 Vienne Rue Victor Faugier

Latitude 45,5256, **Longitude** 4,8845. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Gere.
Archaeological sources assumed.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed.
Chronology Dated to antiquity. **Reliability of dating and chronology** low.
Description According to Foucher 2020, ID 652, implicit/highly interpretive archaeological features of a canal have been excavated.
Critical remarks it is uncertain whether it was a genuine canal and whether it was navigable/navigated.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References BDD PATRIARCHE-38 544 0025 (Patriarche: national inventory of excavations and archaeological discoveries, France). – Foucher 2020, ID 652.

Germany

120 Calbe Stift Gottesgnaden

Latitude 51,9018, **Longitude** 11,7774. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Saale.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes.
Chronology The canal existed in 1151. **Reliability of dating and chronology** high.
Description Written evidence from Calbe testifies to a navigable canal bypassing a mill at the River Saale (Elmshäuser 1992, 4. 18; Urkunden Konrad III., ed. Hausmann, 458–460, Nr. 265).
Description of the written record Urkunden Konrad III., ed. Hausmann, 458–460, Nr. 265: »*molendinum in Calua* [...] *et ipsius fluminis Sale* [...] *Et quoniam idem molendinum retineri non potest nisi aqua in unum collecta transitum per canale, qui ob hoc ibidem navigantibus satis commode preparatus est*«.
Canal type parallel/bypass canal. **Bank revetments and other infrastructure** water mill. **Initiators and responsible agents** monastery.
References Elmshäuser 1992, 4. 18. – Urkunden Konrad III., ed. Hausmann, 458–460, Nr. 265.

121 Karlsgraben/*Fossa Carolina*

Latitude 48,9799, **Longitude** 10,9130. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Altmühl; Rezat.
Written sources yes, **Archaeological sources** yes, **Other sources** yes.
Construction/planning 8th cent. AD. **8th cent. AD** yes, **9th cent. AD** no.
Chronology The canal is dated by dendrochronology to 792/793. **Reliability of dating and chronology** high.
Description The *Fossa Carolina* was built to bridge the watershed between Rhine and Danube. King Charlemagne gave the order to build the canal in 792, but the project had to be abandoned in winter 793. There is diverse (geo-)archaeological proof for the construction. The banks were consolidated with wooden revetments, and the canal had a summit level.
Description of the written record *Annales regni Francorum*; *Annales qui dicuntur Einhardi*; *Annales Alamannici*; *Annales Guelferbytani*; *Annales Mosellani* et al. (see Nelson 2015; Hack 2014a; Beck 1911).
Canal type connection. **Dimensions** Length c. 3 km, fairway width c. 5,2 m, water depth less than 1 m. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** royal initiative.
References Beck 1911. – Koch 1993a; 2002. – Koch/Leininger 1993b. – Hofmann 1965. – Nelson 2015. – Ettel u. a. 2014. – Hausmann u. a. 2018. – Kirchner u. a. 2018. – Schmidt u. a. 2018. – Werther 2016. – Werther u. a. 2015; 2020. – Zielhofer u. a. 2014. – Hack 2014a.

122 Landgraben Hessisches Ried

Latitude 49,9060, **Longitude** 8,4465. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Neckar.
Written sources assumed, **Archaeological sources** yes.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed.
Chronology The canal is most likely Roman (Hanel 1995; Maurer 2011, 320–323). According to Maurer 2011, 59, it was most probably dug in the early Flavian period, after AD 68. Hanel 1995, 114, holds that the canal was almost certainly still operational and filled with water in the 3rd century AD. In 2022, a research project funded by the German Research Foundation (DFG) titled »Archäologische, geoarchäologische und geophysikalische Untersuchungen zu Eingriffen der Römer ins Fließgewässernetz zwischen Odenwald und Rhein im Bereich des heutigen Landgrabens (Hessisches Ried) – LANDGRABEN –« was launched to verify the chronology based on new field data. **Reliability of dating and chronology** low.
Description The so-called Riedgraben is at least partially an artificial waterway that no doubt connected the Roman fort in Groß-Gerau with the Rhine network (Hanel 1995; Maurer 2011, 59. 105. 320–323). According to Maurer 2011, 59, the canal was navigable in the Roman period. In 1934–1937 wooden revetments and a large number of Roman artefacts were discovered in the canal (Maurer 2011, 320; Hanel 1995). According to Maurer 2011, 320–323, there are indications that at least some parts of the canal were

silted up no later than the Early Middle Ages. Nevertheless, from the 13th century onwards, written sources once again point to a watercourse (Maurer 2011, 322).
Canal type dead-end. **Dimensions** Length c. 6 km. **Initiators and responsible agents** military(?).
References Hanel 1995. – Maurer 2011, 59. 105. 320–323. – Muntenau 2011, 160–163. – Becker 2023. – https://gepris.dfg.de/gepris/projekt/491982391?context=projekt&task=showDetail&id=491982391&0= (9.9.2024).

123 Müritz Canal

Latitude 53,4217, **Longitude** 12,7027. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Müritz.
Written sources yes.
Construction/planning High Middle Ages. **13th cent. AD** assumed.
Chronology Construction probably from the 13th century, according to Bleile 2012, 39. **Reliability of dating and chronology** low.
Description According to Bleile 2012, 39, charter evidence points to the construction of a canal at the River Müritz in the 13th century.
Description of the written record charter, not specified.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Bleile 2012, 39.

124 Passau

Latitude 48,5745, **Longitude** 13,4338. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Danube; Inn.
Other sources assumed.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Wanderwitz 1984, 285–286, the canal existed in the 13th century. **Reliability of dating and chronology** low.
Description According to Wanderwitz 1984, 285–286, the small peninsula between the rivers Inn and Danube was connected by means of an artificial waterway. A salt store was located at this canal as from the mid-13th century (Wollenberg 2024, 107). According to the latest analysis by Wollenberg 2024, 107–108, the canal rather forms a natural channel which was navigable only during seasonal flooding. However, as the situation is ambiguous, it was not deleted from this catalogue.
Canal type parallel/connection. **Bank revetments and other infrastructure** salt store. **Initiators and responsible agents** indeterminate, most likely the bishop.
References Wanderwitz 1984, 285–286. – Wollenberg 2024, 107–108.

125 Recknitz-Trebel Canal

Latitude 54,0993, **Longitude** 12,7555. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Recknitz; Trebel.
Written sources yes.
Construction/planning High Middle Ages. **13th cent. AD** assumed.
Chronology According to Bleile 2011, 223, plans for a canal construction are first mentioned in 1298. **Reliability of dating and chronology** low.
Description In 1298, Nicolaus von Rostock pledged to build a canal between the rivers Recknitz and Trebel for the citizens of Bad Sülze, but it is not clear whether the project was ever carried out (Bleile 2011, 223).
Description of the written record Charters, not specified.
Canal type connection. **Initiators and responsible agents** nobility; civic authorities.
References Bleile 2011, 223; 2012.

126 Regensburg Donaumarkt

Latitude 49,0202, **Longitude** 12,1024. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Danube.
Archaeological sources yes.
Construction/planning 10th cent. AD assumed. **9th cent. AD** assumed/yes, **10th cent. AD** assumed/yes, **11th cent. AD** assumed, **12th cent. AD**.
Chronology The dendrochronological analyses of the bank revetments and ^{14}C-samples of underlying alluvial sediments point to a functional period in the

10th-11th centuries. **Reliability of dating and chronology** high.

Description A channel has been documented for the 10th to 11th centuries at Regensburg. It ran parallel to the riverbed of the Danube along the town's north-eastern corner. The watercourse was flanked with wooden huts and walkways that may have served as a harbour. Preliminary findings have pointed to an artificial canal, which why the structure has been included to this catalogue. However, it is uncertain whether the watercourse was artificial or whether it was a modified natural channel with revetments (Nießen/Wollenberg 21.–24. Februar 2018; Codreanu-Windauer/Herzig 2015; Nießen/Wollenberg 2019; Wollenberg u. a. 2019, 216–225; Dallmeier/Kirpal 2011; Codreanu-Windauer/Dallmeier 2015). According to the final analysis by Nießen 2023, 75–79. 89–145, it more likely represents a natural, 12 m wide and c. 2 m deep side channel of the Danube that, to judge by the evidence, was not only used for navigation but also for other purposes. However, owing to the slightly ambiguous findings, it was not deleted from this catalogue, even though it was neither counted nor mapped as a 10th century construction and hence excluded from the statistics concerning the fairway dimensions.

Critical remarks it is uncertain whether it was truly artificial.

Canal type parallel. **Dimensions** Fairway width c. 12 m. **Bank revetments and other infrastructure** wooden revetments; wooden buildings. **Initiators and responsible agents** indeterminate.

References Nießen 2023. – Personal comm. Iris Nießen/Doris Wollenberg (2018). – Nießen/Wollenberg 21.–24. Februar 2018. – Codreanu-Windauer/Herzig 2015. – Nießen/Wollenberg 2019. – Wollenberg u. a. 2019, 216–225. – Dallmeier/Kirpal 2011. – Codreanu-Windauer/Dallmeier 2015.

127 Regensburg Steinerne Brücke

Latitude 49,0212, **Longitude** 12,0971. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Danube.

Archaeological sources yes.

Construction/planning High Middle Ages. **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.

Chronology According to Hensch/Dallmeier 2011, 29, the presumed canal dates before 1226. **Reliability of dating and chronology** high.

Description There has been a long-lasting debate about the existence of a navigable canal at the »Steinerne Brücke« parallel to the River Danube in Regensburg that goes back to a drawing of the city by Schedel dated to 1493 (Wollenberg 2024, 104–107). In recent years, remains of a possible canal have been excavated close to the »Steinerne Brücke« (Hensch/Dallmeier 2011, 29; Wollenberg 2024, 107–117). However, the potential fairway is very narrow, the chronology ambiguous, and its purpose for navigation has not been verified. According to the latest discussion in Wollenberg 2024, 107, it is not a canal in strict terms but rather a fairway separated from the Danube's major channel between two bridges. It was levelled and built over no later than the 13th century. According to Wollenberg 2024, 115–117, it is more likely that a natural sandbar was misinterpreted in the medieval period. Wollenberg 2024, 111–112 argues that the stone features, which previously were considered as the stone revetments of a canal, are more likely the repositioned remains of the bridge armouring (»Brückenbeschlächt«).

Critical remarks In the light of the latest analysis, it is possible that it wasn't a canal at all. Although the original entry was not removed from the catalogue, it was neither viewed nor mapped as a 12th and 13th century construction and thus excluded from the fairway dimensions statistics.

Canal type parallel. **Dimensions** Length c. 0.1 km. **Initiators and responsible agents** civic authorities (?).

References Hensch/Dallmeier 2011. – Wollenberg 2024, 104–1117.

Italy

128 Altino

Latitude 45,5419, **Longitude** 12,3938. **Reliability/precision of geographic location** high.
Connected to river; sea, **Adjacent waterways** Venice lagoon; Sile.
Archaeological sources yes.
Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** assumed.
Chronology According to Tirelli 2011, 60–62, the canals were built in the 1st century BC (see also Wawrzinek 2014, 214; Tirelli 2001, 301–302). Wawrzinek 2014, 214–215 assumes that the latest features were still in use in late antiquity. **Reliability of dating and chronology** high.
Description The canals in Altino/*Altinum* were connected to two palaeo-channels, the Canale S. Maria and the Canale Sioncello, which were part of the Venice Lagoon (Cresci Marrone/Tirelli 2011, Tav. 6. Tav. 1). The east-west canal, or *Fossa Magna,* ran through the city centre (Cresci Marrone/Tirelli 2011, Tav. 1; Tirelli 2011, 60). It was connected to a second navigable canal, which ran along the western edge of the harbour area (Tirelli 2011, 60). *Altinum* was »one of the main Roman harbours of the area« (Marano 2011, 183). Due to their location at the intersection with important overland routes, the canals and the harbour of *Altinum* formed an important transfer hub between the Mediterranean Sea and the inland routes of the northern provinces. The canals have been extensively excavated and surveyed (see Cresci Marrone/Tirelli 2011; Wawrzinek 2014, 214–215; Tirelli 2001). According to Tirelli 2011, 60, the east-west canal, or *Fossa Magna,* was 26 m wide and at least 360 m long. Large sections of the canals had been consolidated with stone masonry and wooden revetments (Wawrzinek 2014, 214; Kreuz 2020, 17). According to Tirelli 2011, 60, the east-west canal, or *Fossa Magna,* was crossed by at least two bridges. Monumental mooring facilities and an impressive gate have been cleared at the northern end (Tirelli 2011, 66 fig. 9; Mozzi u. a. 2011, tab. 2; Tirelli 2001, 304–305; Mozzi u. a. 2011, tab. 3; Wawrzinek 2014, 214). According to Tirelli 2011, 60, the canal along the western edge of the harbour area was equipped with quay walls and moles. Rich ornamental features of terracotta and *portici* have been documented as well (Tirelli 2001, 304–307; Wawrzinek 2014, 215). Along both banks the investigations furthermore recorded stone buildings which had been accessible from the canal (Tirelli 2001, 310–312).
Canal type dead-end; parallel. **Dimensions** Length c. 2 km (several segments), width of the *Fossa Magna* 26 m. **Bank revetments and other infrastructure** massive wooden revetments; stone revetments; quay wall; road parallel to one of the canals; bridges. **Initiators and responsible agents** civic authorities(?); military(?).
References Cresci Marrone/Tirelli 2011. – Calaon u. a. 2014, 118. 121. – Tirelli 1993; 2011, 60–62. – Zabeo 2010, 103. – Scarfì 1976. – Wawrzinek 2014, 213–214. – Kreuz 2020, 16.

129 Aquileia Canale Anfora

Latitude 45,7690, **Longitude** 13,3520. **Reliability/precision of geographic location** high.
Connected to sea, **Adjacent waterways** Mediterranean Sea.
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** no.
Chronology According to Rousse 2005, 57, the waterways in Aquileia were canalised and consolidated with revetments as from the mid-1st century AD. According to Auriemma u. a. 2016, 381, the Canale Anfora was cut during the Flavian period towards the last third of the 1st century AD and used until the late 3rd century. According to Groh 2016, 193, »The Canale Anfora and its ports infrastructure was in function from the 1. to the 3. c. AD«. **Reliability of dating and chronology** high.
Description The canal connected the harbour of Aquileia to the Mediterranean Sea. According to Rousse 2005, 58, it followed a straight line perpendicular to the city's *cardo maximus* from the town to the Marano Lagoon (see also Groh 2012). According to Felici 2016, fig. 107, it crossed the River Terzo west of Aquileia on its way to the lagoon. Groh 2012 thinks that »the canal seems to have connected to a tributary of the Natisone in the town's centre«. The canal was c. 5–6 km long (Groh 2012; Rousse 2005, 58). »The ›Canale Anfora‹, parts of which have been excavated east of its mouth in the Terzo in 1987–1988, had an av-

erage width of 16 m and was about 4 m deep« (Groh 2012). A stratigrafic sequence has been published in Auriemma u. a. 2016, 381. Quays, massive stone revetments, and parts of a bridge have been documented along the canal (Carre/Scotti 2001; Rousse 2005, 57; Felici 2016, 203–204). From Aquileia, Mediterranean goods were shipped to the province of *Noricum* before its loss in late antiquity (Marano 2011, 188). Large, state-owned *horrea* used for grain storage and redistribution have been located in Aquileia (Marano 2011, 188), whilst boat parts have been recovered from the canal itself (Beltrame/Gaddi 2013).
Canal type dead-end(?). **Dimensions** Length 5–6 km, width c. 16 m, depth c. 4 m. **Bank revetments and other infrastructure** stone revetments; quay; bridge; road parallel to the canal; storehouses. **Initiators and responsible agents** civic authorities(?); military(?).
References Rousse 2005. – Groh 2011; 2012; 2016. – Auriemma u. a. 2016. – Kreuz 2020, 16–17. – Marano 2011, 187–188. – Beltrame/Gaddi 2013. – D'Agostino/Medas 2010. – Felici 2016, 203–204. – Medas 2013. – Arnaud-Fassetta u. a. 2003. – Beltrame 2001. – Christie 2006, 292. – Bertacchi 1980.

130 Ariano nel Polesine

Latitude 44,9472, **Longitude** 12,1225. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po.
Archaeological sources yes.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** yes.
Chronology According to Rousse 2005, 63, a canalised waterway was functional between the late 1st century BC and the first half of the 1st century AD. **Reliability of dating and chronology** low.
Description According to Rousse 2005, 63, the archaeological evidence reveals a canalised waterway/canal with bank revetments near a Roman *villa rustica*. Nevertheless, there seems to be no proof for its navigability (Dalemulle 1986, 187).
Critical remarks it is uncertain whether it was a genuine canal and whether it was navigable/navigated.
Canal type indeterminate. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** indeterminate.
References Rousse 2005, 63. – Dalemulle 1986, 187. – https://it.wikipedia.org/wiki/Ariano_nel_Polesine (3.2.2019).

131 Bologna – Argenta canal

Latitude 44,5091, **Longitude** 11,5746. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po.
Written sources yes.
Construction/planning medieval. **12th cent. AD** assumed, **13th cent. AD** yes.
Chronology The canal existed in the 13th century. **Reliability of dating and chronology** low.
Description According to Schumann 1977, 66, a canal was cut from Argenta via »*Vicus Canali*« to Bologna, which sometimes is called *Canal de Medicina*. It most likely was in its best condition in the 13th century, but the date of its construction as yet remains unverified.
Description of the written record not specified.
Canal type indeterminate. **Initiators and responsible agents** civic authorities(?).
References Schumann 1977, 66.

132 Brescia

Latitude 45,5384, **Longitude** 10,2198. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Mella(?).
Archaeological sources assumed.
Construction/planning early medieval. **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed.
Chronology The presumed canal is thought to be early medieval, according to Brogiolo 2010. 73. **Reliability of dating and chronology** low.
Description According to Brogiolo 2010, 73, the river harbour of Brescia was probably built along a canal that was fed by a moat in late antiquity and in the early Middle Ages.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Brogiolo 2010, 73.

133 Brescia Naviglio Civico

Latitude 45,5370, **Longitude** 10,2208. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Oglio.
Written sources yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology An early canal ditch was mentioned in 951, but for drainage only. It was made navigable in the mid-13th century. **Reliability of dating and chronology** high.
Description The canal is connected to the rivers Chiese and Oglio (Brönnimann 1997, map 4; Schumann 1977, 57). It starts at the Chiese river north of Brescia, passes through the town, continues further to the south, and joins the Oglio close to the confluence of Oglio and Chiese. The canal was first mentioned in the 19th century as a drainage ditch (Schumann 1977, 56) but was made navigable already after 1253 (Menant 1993, 174. 198–199). Among its other purposes was the supply of timber for Brescia (Brönnimann 1997, 147).
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 70 km. **Initiators and responsible agents** civic authorities.
References Schumann 1977, 56. – Brönnimann 1997, 147. – Menant 1993, 174. 198–199.

134 Canale delle Bebbe

Latitude 45,1371, **Longitude** 12,1239. **Reliability/precision of geographic location** high.
Connected to sea; river, **Adjacent waterways** Etsch/Adige; Brenta; Venice Lagoon.
Written sources yes.
Construction/planning early medieval. **10th cent. AD** yes, **11th cent. AD** yes.
Chronology The canal is mentioned in 912, but the date of construction remains unclear. **Reliability of dating and chronology** high.
Description According to Brogiolo 2016b, 467, the canal offered a connection between the River Etsch/Adige and the Venice lagoon. It was an important navigable waterway.
Description of the written record Diploma of Henry IV from 912 (14. century copy), (*Codice diplomatico padovano*, ed. Gloria, 41–45 Nr. 28. – Brogiolo 2016b, 466–467).
Canal type parallel. **Initiators and responsible agents** indeterminate.
References Brogiolo 2016b, 466–467. – *Codice diplomatico padovano*, ed. Gloria, 41–45 Nr. 28.

135 Circeo Lago di Sabaudia/Paola

Latitude 41,2485, **Longitude** 13,0398. **Reliability/precision of geographic location** high.
Connected to lake; sea, **Adjacent waterways** Mediterranean Sea; Lago di Sabaudia/Paola.
Written sources yes, **Archaeological sources** yes.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** yes.
Chronology According to Felici 2016, 237–239, a construction in the 1st century AD seems likely, but the chronology remains unverified. **Reliability of dating and chronology** low.
Description Several Roman canals have been evidenced at Lago di Sabaudia, one of which bypassing the mountains along an inland route (Felici 2016, 237–238). The material evidence includes quays and bank revetments.
Description of the written record inscription.
Canal type parallel. **Dimensions** Length of the bypass c. 5 km, width c. 16 m(?). **Bank revetments and other infrastructure** quay; bank revetments. **Initiators and responsible agents** indeterminate.
References Felici 2016, 237–239.

136 Comacchio

Latitude 44,6938, **Longitude** 12,1818. **Reliability/precision of geographic location** low.
Connected to river; sea, **Adjacent waterways** Mediterranean Sea; Po.
Archaeological sources yes.
Construction/planning 8th cent. AD. **7th cent. AD** assumed, **8th cent. AD** yes, **9th cent. AD** yes.
Chronology According to Gelichi u. a. 2012, 196, »the structures for the river traffic, including platforms and warehouses« were built »between the end of the 7. and the beginning of the 8. centuries«. According to Gelichi u. a. 2012, 189 the harbour and canal infrastructure was destroyed by a fire in the late 9th century and never rebuilt. **Reliability of dating and chronology** high.
Description Navigation in the harbour of Comacchio was based on natural waterways and an artificial canal (Greci 2016, 240; Gelichi u. a. 2012, 186–188; Gelichi/Calaon 2007, 554. 556). The harbour was equipped with wooden mooring platforms for maritime and fluvial traffic.

Canal type parallel. **Dimensions** indeterminate. **Bank revetments and other infrastructure** wooden bank revetments; slipway. **Initiators and responsible agents** indeterminate.
References Greci 2016, 240. – Gelichi/Calaon 2007, 554–556. – Gelichi u. a. 2006, 85–100; 2012, 186–199. – Rucco 2015. – Gelichi 2008, 312–313.

137 Comacchio Canale Pallotta/Girata

Latitude 44,6792, **Longitude** 12,1306. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** indeterminate.
Written sources assumed, **Archaeological sources** yes, **Other sources** old map.
Construction/planning indeterminate. **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed.
Chronology Gelichi u. a. 2006, 85 suggest that the canal dates to the 7th – 8th centuries. Nevertheless, according to Felici 2016, 216, the chronology is indeterminate. **Reliability of dating and chronology** low.
Description The canal, which is called Girata or Pallotta, is located in the hinterland of Comacchio (Gelichi u. a. 2006, 85; 2012, 186; Felici 2016, 216). It is artificial according to Gelichi u. a. 2012, 186 and was navigable in the early Middle Ages.
Canal type parallel. **Initiators and responsible agents** indeterminate.
References Felici 2016, 216. – Rucco 2015, 58–67. 121–122. – Quilici 1995, 47. – Gelichi u. a. 2006, 85; 2012, 186. – Stillwell 1976, 857.

138 Corte Cavanella [Mansio Fossis]

Latitude 45,1019, **Longitude** 12,2369. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Adige.
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. BC** assumed, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes.
Chronology The construction dates between the late 1st century BC and the mid-1st century AD. **Reliability of dating and chronology** high.
Description A Roman dock with wooden revetments was excavated in Corte Cavanella that was connected to the River Adige by means of an artificial canal (Felici 2016, 212; Wawrzinek 2014, 249). A shipwreck was found in the dock.
Canal type dead-end(?). **Dimensions** indeterminate. **Bank revetments and other infrastructure** wooden bank revetments; boathouse/ship shed; shipwreck. **Initiators and responsible agents** indeterminate.
References Zabeo 2010, 102. – Felici 2016, 212. – Wawrzinek 2014, 249. – D'Agostino/Medas 2010, 287. – Rousse 2005, 63.

139 Cremona Cremonella

Latitude 45,1307, **Longitude** 9,9970. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Oglio.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Menant 1993, 174, the canal was made navigable in 1260–1262. **Reliability of dating and chronology** high.
Description The canal is connected to the rivers Po and Oglio. It runs from the Po in Cremona eastwards to the Oglio, which it joins a little further downstream of the confluence with the Chiese (Schumann 1977, 57). Initially, it was conceived for irrigation but was made navigable in the 1260s (Menant 1993, 174).
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 35 km. **Bank revetments and other infrastructure**. **Initiators and responsible agents** civic authorities(?).
References Menant 1993, 174. – Schumann 1977, 57.

140 Cremona Taleata/Tagliata Canal

Latitude 44,9210, **Longitude** 10,6549. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Patitucci Uggeri 2002, 52, the canal was cut in the late 12th century. According to Menant 1993, 175, it was planned in 1203 and cut in 1218–1223. **Reliability of dating and chronology** high.

Description The canal is connected to the River Po and the River Panaro, a southern tributary of the Po. According to Patitucci Uggeri 2002, 52, the canal runs from Guastalla next to the Po to Bondeno at the River Panaro and was built by the city of Cremona in agreement with the city of Reggio to avoid control from the city of Mantova. In the 14th century the statutes of Cremona mention an official who was responsible for the maintenance of the »*navilium*« (Campopiano 2013b, 391).
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 70 km. **Initiators and responsible agents** civic authorities.
References Patitucci Uggeri 2002, 52. – Menant 1993, 175. – Bond 2007, 174. – Campopiano 2013b, 391. – Schumann 1977, 57.

141 Este Canale Bisatto

Latitude 45,2248, **Longitude** 11,6587. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Etsch; Canale Sirone; Bacchiglione.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes.
Chronology According to Patitucci Uggeri 2002, 52, the canal was dug in 1140–1143. According to Brogiolo 2016a, fig. 2, it dates to 1139. **Reliability of dating and chronology** high.
Description The canal was connected to the River Etsch/Adige. Patitucci Uggeri 2002, 52 states that the canal ran from the city of the Vicentini to Este. According to Brogiolo 2016a, fig. 2, the canal was a parallel canal which began at the Sirone River in Este. According to Patitucci Uggeri 2002, 52, it was built by the »Vicentini«.
Description of the written record not specified.
Canal type parallel. **Initiators and responsible agents** civic authorities.
References Brogiolo 2016a, fig. 2. – Patitucci Uggeri 2002, 52.

142 Este Canale Sirone

Latitude 45,2248, **Longitude** 11,6587. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Etsch/Adige.
Other sources assumed.
Construction/planning medieval. **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed.
Chronology According to Patitucci Uggeri 2002, 52, the Canale Sirone is very old and existed already at the time of the construction of the Canale Bisatto in c. 1140. According to Brogiolo 2016a, 418, it most likely is early medieval. **Reliability of dating and chronology** low.
Description The canal is connected to the river Etsch/Adige and the later Canale Bisatto. According to Brogiolo 2016a, 418, a canal harbour was located in Sirone.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Patitucci Uggeri 2002, 52. – Brogiolo 2016a, 418.

143 Etsch/Adige canal under Augustus

Latitude 45,1471, **Longitude** 12,3217. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Adige.
Written sources yes.
Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes.
Chronology According to Smith 1977, 77, the canal was constructed after the victory of Augustus at the Battle of Actium in 31 BC. **Reliability of dating and chronology** high.
Description According to Smith 1977, 77, »Navigation canals based on the Adige were built in the region between Ferrara and Padua« by soldiers in/after 31 BC.
Description of the written record The construction of the canal is described in an inscription discovered at Este in 1907 (Smith 1977, 77). The inscription reads: »The squad of Quintus Arruntius Sura acting under the orders of Quintus Arruntius Sura and Gaius Sabellus and under contract to Titus Arrius built a work a total of 4214 feet long each of 98 men building 43 feet each«.
Canal type indeterminate. **Dimensions** Length 4214 ft (c. 1.2 km). **Initiators and responsible agents** military.
References Smith 1977, 77.

144 Ferrara – Bologna Naviglia canal

Latitude 44,6824, **Longitude** 11,5142. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po.
Written sources yes.
Construction/planning High Middle Ages. **12th cent. AD** assumed, **13th cent. AD** yes.
Chronology The canal existed in the 13th century. **Reliability of dating and chronology** low.
Description According to Schumann 1977, 67, the canal connected Ferrara with Bologna via the *Torre della Fossa*. The latter was essential for Ferrara to control the traffic coming from Bologna.
Description of the written record not specified.
Canal type parallel(?). **Initiators and responsible agents** civic authorities.
References Schumann 1977, 67.

145 *Fossa Clodia/Claudia*

Latitude 45,1721, **Longitude** 12,2734. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po, *Fossa Augusta*, *Fossa Flavia*.
Written sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes, **10th cent. AD** yes.
Chronology The canal was operational during the rule of Emperor Claudius. **Reliability of dating and chronology** high
Description The canal is connected to the River Po and is an extension of the *Fossa Augusta* and the *Fossa Flavia* with a coast-parallel route (Patitucci Uggeri 2002, 34–35; 2005, fig. 15; Felici 2016, 203–207).
Description of the written record Pliny the Elder Ill. 16.120 (after Felici 2016, 203–207; Smith 1977, 77).
Canal type parallel. **Initiators and responsible agents** military(?).
References Patitucci Uggeri 2002, 34–35; 2005, fig. 15. – Uggeri 1997. – Zabeo 2010, 138. 164. 168. – Malmberg 2016. – Medas 2017, 146–151. – Felici 2016, 203–207. – Rousse 2005, 63. – Smith 1977, 77. – Campbell 2012, 221.

146 *Fossa Flavia*

Latitude 44,7521, **Longitude** 12,1309. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po, *Fossa Augusta*, *Fossa Clodia/Claudia*.
Written sources yes.
Construction/planning 1st cent. AD. **pre-1st cent. BC** assumed, **1st cent. BC** assumed, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes, **10th cent. AD** yes.
Chronology According to Felici 2016, 207, the canal was cut in the imperial period »probably by Vespasian« to connect the *Fossa Augusta* and the *Fossa Clodia*. According to Campbell 2012, 221, the construction was »originally begun by the Etruscans«. Patitucci Uggeri 2002, 34–35 points to the fact that the canals between Ravenna and Venice – among them the *Fossa Augusta*, the *Fossa Claudi*a, and the *Fossa Flavia* – were still in use in the 10th century, when bishop Liutprand of Cremona travelled the Po River and the canals from Ravenna to Venice. **Reliability of dating and chronology** high.
Description The canal is connected to the River Po and thus also to the *Fossa Augusta* and the *Fossa Flavia*. It is located between the *Fossa Augusta* and the *Fossa Clodia*, and its course is parallel to the coast (Patitucci Uggeri 2002, 34–35; 2005, 283–285; Felici 2016, 205–207).
Description of the written record Pliny the Elder III. 16.120 (after Felici 2016, 207; Smith 1977, 77).
Canal type parallel. **Initiators and responsible agents** military(?).
References Patitucci Uggeri 2002, 34–35; 2005, 283–285. – Felici 2016, 207. – Uggeri 1997. – Zabeo 2010, 163. – Malmberg 2016. – Medas 2017, 146–151. – Felici 2016, 205–207. – Smith 1977, 77. – Campbell 2012, 221.

147 Heracleia Cittanovia

Latitude 45,5818, **Longitude** 12,6823. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Piave.
Archaeological sources yes.
Construction/planning indeterminate, **7th cent. AD** possible. **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** yes, **8th cent. AD** yes.

Chronology The chronology is ambiguous since the canal network has Roman origins, whereas new constructions and significant modifications of existing waterways in the 7th century seem possible. **Reliability of dating and chronology** low.

Description The canal is connected to the Piave. It is not exactly clear whether the main canal/channel is actually artificial, whether it was cut already in the Roman period and only re-used in the Early Middle Ages, or whether a new trench was dug in the 7th century (see Gelichi 2007, 88–93; Calaon 2006, 217. 219; Heher 2009, 81–82). According to Gelichi 2007, 92, the excavations at the canal's waterfront were able to clear »wooden docks« .

Critical remarks it is uncertain whether it was a genuinely artificial canal.

Canal type indeterminate. **Bank revetments and other infrastructure** wooden docks/quays. **Initiators and responsible agents** indeterminate.

References Gelichi 2007, 88–93; 2008, fig. 21. – Squatriti 2000, 221. – Calaon 2006, 217. 219. – Heher 2009, 81–82.

148 Imola Conselice

Latitude 44,3535, **Longitude** 11,7112. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** indeterminate.

Written sources yes.

Construction/planning 11th cent. AD. **11th cent. AD** yes.

Chronology According to Fasoli 1978, 603, the request to build the canal was made in 1083. According to *Chartularium imolense*, ed. Gaddoni/Zaccherini, no. 731, the document dates to 1084. **Reliability of dating and chronology** high.

Description The canal was connected to the River Silaro (Fasoli 1978, 603), a tributary of the Reno which flows into the Mediterranean. According to Fasoli 1978, 603, the citizens of Imola asked the bishop for the right to reduce the fees in the harbour of Conselice, which was held by the bishop (*portus mei, silicet Caput Silicis*), and to open a canal (»l'apertura di un canale«) in order to connect their city to this harbour (see *Chartularium imolense*, ed. Gaddoni/Zaccherini, Nr. 731).

Description of the written record The canal is documented in a charter of 1083/1084 (Fasoli 1978, 603; *Chartularium imolense*, ed. Gaddoni/Zaccherini, Nr. 731).

Canal type indeterminate. **Dimensions** Length c. 18 km. **Initiators and responsible agents** civic authorities.

References Fasoli 1978, 603. – *Chartularium imolense*, ed. Gaddoni/Zaccherini, Nr. 731.

149 Iulia Concordia/Concordia Sagittaria

Latitude 45,7560, **Longitude** 12,8439. **Reliability/precision of geographic location** low.

Connected to river, **Adjacent waterways** Lemene; Reghena.

Written sources yes, **Archaeological sources** yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed.

Chronology According to Laird 2015, 240, the *colonia* was founded in 42 or 40 BC which gives a *terminus post quem* for the construction of the canal. **Reliability of dating and chronology** low.

Description The town of Iulia Concordia which »served as a shipping hub« (Laird 2015, 240) was divided by a canal in a southern and a northern part. This canal »constituted an important part of Iulia Concordia's infrastructure and perhaps its public identity« (Laird 2015, 261). It was »connected with another waterway that passed the quay, warehouses, and commercial structures near the colony's eastern gate« (Laird 2015, 261). According to Kreuz 2020, 25, »a commercial use of the canal for the inner-city handling of goods is likely«. The canal was flanked by a road. Both banks were consolidated with stone masonry revetments, the northern wall with several monumental stone steps. The waterway was furthermore equipped with monumental canal gates and bridges (Vigoni 2006; Laird 2015, 238–240. 254–261; Pettenò/Vigoni 2015, 95–114).

Description of the written record inscription with reference to the bridges.

Canal type dead-end(?). **Dimensions** Length c. 750 m, width 7.5–9 m, depth c. 1.5 m. **Bank revetments and other infrastructure** bridges; road along the canal, stone revetments with monumental steps, canal gates. **Initiators and responsible agents** civic authorities(?).

References Laird 2015, 238–240. 254–261. – Pettenò/Vigoni 2015, 95–114. – Vigoni 2006. – Kreuz 2020, 23.

150 Iuvenalta/Genivolta

Latitude 45,3323, **Longitude** 9,8796. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Oglio.
Written sources yes.
Construction/planning early medieval. **9th cent. AD** yes.
Chronology According to Elmshäuser 1992, 3, the canal was mentioned in 852. Its date of construction is unknown. **Reliability of dating and chronology** low
Description The canal was located in *Ecclesie Juvenalte* near Cremona, which seems to be identical with modern Genivolta west of the River Oglio, according to RI II,3 n. 1298c (www.regesta-imperii.de/id/0998-11-00_1_0_2_3_0_951_1298c [3.9.2025]). It is therefore most likely that the canal was connected to the River Oglio. According to Elmshäuser 1992, 3, the canal served the purposes of supporting both a mill and fluvial traffic. The agent for its construction and maintenance was the church at Juvenalta.
Description of the written record The canal is documented in a charter of Ludwig II from 852 (Elmshäuser 1992, 3; *Antiquitates Italicae Medii Aevi*, ed. Muratori, 867–868). The king confirms the possessions of the *Ecclesie Juvenalte* near Cremona: »*confirmamus eidem Sancto loco aquaeductus tam ad diversa molendina, quamque ad navigia deducenda*« (*Antiquitates Italicae Medii Aevi*, ed. Muratori, 867–868).
Canal type parallel/bypass canal(?). **Bank revetments and other infrastructure** water mill. **Initiators and responsible agents** church/bishopric.
References *Antiquitates Italicae Medii Aevi*, ed. Muratori, 867–868. – Elmshäuser 1992, 3.

151 Lago di Fogliano

Latitude 41,3938, **Longitude** 12,9128. **Reliability/precision of geographic location** very low.
Connected to lake; river; sea, **Adjacent waterways** Lago di Fogliano; Mediterranean Sea.
Written sources yes.
Construction/planning Roman. **1st cent. AD** yes.
Chronology According to Felici 2016, 232–233, the canal is dated to the 1st century AD. **Reliability of dating and chronology** low.
Description According to Felici 2016, 232–233, a Roman canal at the Lago di Fogliano is indicated by an inscription.
Description of the written record An inscription points to a Roman canal (Felici 2016, 232–233).
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Felici 2016, 232–233.

152 Lago d'Averno Canal of Agrippa

Latitude 40,8321, **Longitude** 14,0796. **Reliability/precision of geographic location** very low.
Connected to sea; lake, **Adjacent waterways** Mediterranean Sea; Lake Avernus.
Written sources yes.
Construction/planning 1st cent. BC. **1st cent. BC** yes.
Chronology The canal was constructed after 37 BC. **Reliability of dating and chronology** high.
Description The canal built by Marcus Agrippa forms a navigable connection between the Mediterranean and Lake Avernus. The intention was »to provide ships with a safe and spacious inland anchorage« (Smith 1977, 80).
Description of the written record Tacitus; Diodorus; Strabo et al. (see Felici 2016, 239–243).
Canal type connection. **Dimensions** Length less than 1.5 km. **Initiators and responsible agents** military.
References Coulon/Golvin 2018, 33. – Smith 1977, 80. – Felici 2016, 239–243. – Morhange u. a. 2015, fig. 8.

153 Milano/Mailand

Latitude 45,4642, **Longitude** 9,1896. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Olona(?); Lambro(?).
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** assumed.
Chronology Radiocarbon dates and archaeological finds confirm canal construction activities starting

in the 1st century AD at the latest. **Reliability of dating and chronology** high.
Description In Milan there is proof for a highly complex and multi-purpose system of artificial waterways in antiquity (Fedeli 2015, 32–34; Felici 2016, 214–216; Kreuz 2020, 16). Some of these canals exhibit proof for harbour infrastructure such as stone quay walls, thus testifying to their navigability.
Canal type indeterminate. **Dimensions** Different widths from 4.25–8 m, depth up to 2 m. **Bank revetments and other infrastructure** wooden revetments; quay walls. **Initiators and responsible agents** civic authorities(?).
References Fedeli 2015, 32–34. – Felici 2016, 214–216. – Mori 2003. – Luciano 2017, 192–193. – Kreuz 2020, 16.

154 Milano/Mailand Naviglio Grande

Latitude 45,4104, **Longitude** 9,0460. **Reliability/precision of geographic location** very low.
Connected to river; lake, **Adjacent waterways** Ticino.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The work at the canal started in 1177/79 (Patitucci Uggeri 2002, 52; Lohrmann 2000, 14; Campopiano 2013a, 325). According to Bricchetti o. J. construction work began on the left bank of the Ticino near Panperduto; the first section ending at Trezzano was opened in 1187, the second section to Milan in 1211, a third section to Gaggiano in 1253, and a final section in 1257. According to Lohrmann 2000, 14, the canal didn't become important for navigation before c. 1270. According to Hourihane 2012, 285, »from 1269 the Naviglio Grande was completely navigable«. **Reliability of dating and chronology** high.
Description The canal is connected to the River Ticino. It connects Milan with the Lago Maggiore (Lohrmann 2000, 14). It starts at the Ticino near Tornavento and ends at Milan. The original purpose before it was made navigable was irrigation and water supply (Campopiano 2018, 29). The canal is 50 km long and not less than 12 m, while displaying a height differential of 34 m between both ends (Cattaneo 1971; Bricchetti o. J.; Campopiano 2018, 29). According to Campopiano 2013b, 389–390, a tax was levied by Milan for the enlargement of the Naviglio canal in 1269.
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 50 km(?).
Initiators and responsible agents civic authorities.
References Schenk 2018, 133. – Lohrmann 2000, 14. – Hourihane 2012, 285. – Campopiano 2013a, 325; 2018, 29. – Bond 2007, 174. – Bricchetti o. J.

155 Milano/Mailand Piazza Resistenza Vettabbia/Vepra canal

Latitude 45,4589, **Longitude** 9,1777. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Olona; Lambro.
Archaeological sources yes.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed.
Chronology The chronology is not clear, but according to Fedeli 2015, 35, the canal was used in antiquity and in the Early Middle Ages. **Reliability of dating and chronology** low.
Description Remains of the Vettabbia/Vepra canal have been excavated at Piazza Resistenza, to the south of the city (Fedeli 2015, 35). The canal was 12–14 m wide and up to 4 m deep and there is proof for wooden revetments.
Canal type indeterminate. **Dimensions** Width 12–14 m, depth 2–4 m. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** civic authority(?).
References Fedeli 2015, 35. – Patitucci Uggeri 2005, 274. – Felici 2016, 215.

156 Milano/Mailand Porta Tosa Canal

Latitude 45,4621, **Longitude** 9,1913. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** indeterminate.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes.
Chronology According to Chiodi 2008, 548–549, the canal was mentioned in 1183. **Reliability of dating and chronology** high.
Description According to Chiodi 2008, 548–549, the Porta Tosa canal is mentioned in a dispute between

several families and individuals concerning a complex irrigation system with sluices which underwent hydrological changes following the canal's construction.
Description of the written record not specified.
Canal type parallel(?). **Bank revetments and other infrastructure** sluices. **Initiators and responsible agents** civic authorities.
References Chiodi 2008, 548–549. 555–556. – https://it.wikipedia.org/wiki/Porta_Tosa_(medievale) (26.2.2019).

157 Mantua

Latitude 45,1646, **Longitude** 10,7949. **Reliability/precision of geographic location** low.
Connected to river, lake. **Adjacent waterways** Mincio; Lago Superiore.
Archaeological sources assumed.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed.
Chronology According to Patitucci Uggeri 2005, 277, the canal is Roman. **Reliability of dating and chronology** very low.
Description The canal is connected to the River Mincio and by extension to Lago Superiore. According to Patitucci Uggeri 2005, 277, it was navigable.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Patitucci Uggeri 2005, 277.

158 Mantua Canal Mincio – Adige

Latitude 45,1618, **Longitude** 10,8066. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Mincio; Adige.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** assumed.
Chronology According to Patitucci Uggeri 2002, 52 work started in 1191. **Reliability of dating and chronology** high.
Description The canal is connected to the rivers Adige/Etsch and Mincio in the territory of Verona (Patitucci Uggeri 2002, 52). According to Patitucci Uggeri 2002, 52, the canal was constructed by the city of Mantova to avoid the control of the Po by the city of Ferrara.
Description of the written record not specified.
Canal type parallel. **Dimensions** Length min. 40 km.
Initiators and responsible agents civic authorities.
References Patitucci Uggeri 2002, 52.

159 Modena Po Canal

Latitude 44,6473, **Longitude** 10,9278. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Po.
Written sources yes.
Construction/planning 11th cent. AD. **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The right to build the canal was granted between 1077 and 1106. **Reliability of dating and chronology** high.
Description The canal of Modena is connected to the rivers Po and Panaro (Schumann 1977, 54). According to Schumann 1977, 54–55, the canal which is mentioned in the 12th/13th century runs from Modena via Salara to Bondeno at the Po. The purpose of the canal from Modena to the Po was to facilitate navigation and to improve trade with Venice, Ravenna, and other ports (Greci 2016, 241). According to Schumann 1977, 67, the canal was protected by the fort at Solara between 1121 and 1327.
Description of the written record A charter of Henry IV grants the bishop and citizens of Modena the right to build a canal/*navigium* to the Po to facilitate trade with Ravenna and Venice (Fasoli 1978, 603; Greci 2016, 241). For the full text, see Urkunden Heinrich IV., ed. Gladiss, 587: »*episcopo quam civibus presentibus et futuris facultatem faciendi navigium usque ad Padum, prout melius eis visum fuerit, et secure navigandi et omnium mercium et specierum genera Veneciam et Rauennam et per ceteros portus et loca deferendi et inde Mutinam reportandi*«. According to Urkunden Heinrich IV., ed. Gladiss, 586, the charter has no date, even though it was probably issued sometime between 1077 and 1106. In 1277 the canal is mentioned as Naviglio Modenese (Schumann 1977, 60).
Canal type parallel. **Initiators and responsible agents** civic authorities(?).
References Fasoli 1978, 603. – Schumann 1977, 54–55. 60. 67. – Greci 2016, 241. – Urkunden Heinrich IV., ed. Gladiss, 586–587.

160 Modena canals

Latitude 44,6458, **Longitude** 10,9260. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Secchia; Panaro.
Archaeological sources yes.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed.
Chronology The canals in Modena date back to the Roman period (Felici 2016, 216; Museo Civico Archeologico Etnologico). Squatriti 2000, 221 also mentions canal construction activities in the 8th century.
Reliability of dating and chronology low.
Description There is evidence for several waterways in and around Modena in the Roman period. At least some are prone to be artificial and also navigable (Felici 2016, 216; Museo Civico Archeologico Etnologico). Squatriti 2000, 221 mentions canal constructions in the 8th century, but it is not clear if these canals were navigable.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Felici 2016, 216. – Museo Civico Archeologico Etnologico. – Squatriti 2000, 221.

161 Muzza-Canal near Cassano

Latitude 45,5236, **Longitude** 9,5211. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Adda.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Patitucci Uggeri 2002, 52, the canal was opened in 1245. According to Menant 1993, 175, it was used until the modern period. **Reliability of dating and chronology** high.
Description The canal was connected to the River Adda and ran from Cassano to Paùllo (Cattaneo 1971; Patitucci Uggeri 2002, 52; Menant 1993, 175). According to Cattaneo 1971, the height differential between both ends of the canal is 70 m.
Description of the written record not specified.
Canal type indeterminate. **Dimensions** Length 58 km, width max. 48 m. **Initiators and responsible agents** civic authorities(?).
References Cattaneo 1971. – Patitucci Uggeri 2002, 52. – Bond 2007, 174. – Menant 1993, 175.

162 Nonantola

Latitude 44,6779, **Longitude** 11,0427. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** indeterminate.
Written sources assumed.
Construction/planning indeterminate. **9th cent. AD** assumed.
Chronology Most likely 9th century. **Reliability of dating and chronology** low.
Description According to Marco Panato (pers. comm.), a 9th century navigable canal in the surroundings of Nonantola is mentioned in written sources, which, however, has not been possible to verify as yet.
Description of the written record not specified.
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type indeterminate. **Initiators and responsible agents** monastery(?).
References Personal comm. Marco Panato (2018).

163 Oderzo

Latitude 45,7808, **Longitude** 12,4960. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Navisego Vecchio-Piavon; Lia.
Archaeological sources yes.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** assumed, **4th cent. AD** assumed.
Chronology The canal was built in the Roman period.
Reliability of dating and chronology low.
Description An important node in the network of waterways was at Oderzo, where the riverbed of a branch of the Piave was canalised on a large scale in order to connect the town to the routes leading to the sea (Felici 2016, 208). Excavations revealed the remains of a quay with wooden revetments and a limestone pavement (Felici 2016, 208; Cipriano/Sandrini 2001; Wawrzinek 2014, 326–328).

Canal type parallel(?). **Bank revetments and other infrastructure** revetments of oak piles and a massive layer of pebbles; quay wall. **Initiators and responsible agents** indeterminate.
References Felici 2016, 208. – Cipriano/Sandrini 2001. – Wawrzinek 2014, 326–328.

164 Ostia-Puteoli *Fossa Neronis*

Latitude 41,0354, **Longitude** 13,9448. **Reliability/precision of geographic location** high.
Connected to river; sea, **Adjacent waterways** Tiber; Mediterranean Sea.
Written sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** no.
Chronology The planning phase dates to the rule of Nero, but the project was abandoned after AD 68/69 (Campbell 2012, 220). **Reliability of dating and chronology** high.
Description The canal which was planned under Emperor Nero but never was finished, was intended to offer a continuous inland waterway between the Tiber at Ostia in the north and the Mediterranean Sea at Puteoli in the south. »The southern end of this gigantic navigation was intended to be Lake Avernus and from there to the sea vessels would have made use of an already existing canal« (Smith 1977, 79–80). According to Campbell 2012, 220, »the primary objective was to ensure the safe shipment of grain to the capital«. Work started, but the project was abandoned after AD 68/69 (Campbell 2012, 220).
Description of the written record According to Smith 1977, 79–80, »Suetonius (Nero, 31.3) tells us: ›Another project would have connected Lake Avernus with Ostia by a ship canal 160 miles long, and broad enough for two quinqueremes to pass. Prisoners from every part of the Empire were to be used for this task, even those convicted of capital crimes.‹ The account by Tacitus, (Annals, XV, 42) is more critical: ›They [the engineers Severus and Celer] had actually undertaken to sink a navigable canal from the Lake Avernus to the mouths of the Tiber along a barren shore or through the face of hills, where one meets with no moisture which could supply water, except the Pontine marshes. The rest of the country is broken rock and perfectly dry. Even if it could be cut through, the labour would be intolerable, and there would be no adequate result. Nero, however, with his love of the impossible, endeavoured to dig through the nearest hills to Avernus, and there still remain the traces of his disappointed hope.‹«
Canal type parallel. **Dimensions** Length c. 236 km or 160 miles. **Initiators and responsible agents** royal initiative.
References Smith 1977, 79–80. – Felici 2016, 224–225. 233–237. – Morhange u. a. 2015, 125. – Bond 2007, 160. – Campbell 2012, 220.

165 Padua-Monselice Canale di Battaglia

Latitude 45,2461, **Longitude** 11,7504. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Bacchiglione.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Patitucci Uggeri 2002, 52, the canal was cut in 1172–1189. **Reliability of dating and chronology** high.
Description The Canale di Battaglia formed a navigable link between Padua and Monselice. According to Patitucci Uggeri 2002, 52, the initiative for its construction came from the Milanese Guglielmo da Osa. According to Patitucci Uggeri 2002, 52, waterways had replaced the roads to become the most important means of transport in 13th century Padua.
Description of the written record not specified.
Canal type indeterminate. **Dimensions** Length c. 18 km. **Initiators and responsible agents** civic authorities.
References Patitucci Uggeri 2002, 52. – Bond 2007, 174. – https://it.wikipedia.org/wiki/Canale_Battaglia (2.3.2019).

166 Parma Po Canal

Latitude 44,7921, **Longitude** 10,4226. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po.
Written sources yes.
Construction/planning pre-1st cent. BC. **pre-1st cent. BC** yes, **1st cent. BC** yes, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed.

Chronology According to Greci 2016, 239, the canal was built in 109 BC. **Reliability of dating and chronology** high.

Description According to Strabo, M. Aemilius Scaurus built navigable canals south of the Po during drainage work in the plain between Modena and Parma (Smith 1977, 77). According to Campbell 2012, 221, the construction »may have been part of a plan to assist the shipment of military supplies«.

Description of the written record The canal is mentioned by Strabo (Strabo V.l.5), see Smith 1977, 77: »But Scaurus drained the plains by running navigable canals from the Padus [Po] as far as Parma; for near Placentia the Padus is joined by the Trebia, as also before that by several other rivers, and is thus made excessively full.«

Canal type indeterminate. **Initiators and responsible agents** military(?).

References Greci 2016, 239. – Smith 1977, 77. – Patitucci Uggeri 2005, 276. – Campopiano 2018, 33. – Felici 2016, 207. – Campbell 2012, 221.

167 Piacenza

Latitude 45,0544, **Longitude** 9,6986. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Po.

Written sources yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes, **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.

Chronology According to Piacenza Romana 2013, the canal was built in the Augustan period in the late 1st century BC and remained operational through the medieval period at least until the 16th century (see also Pagliani 1991, 78; Greci 2016, 239). **Reliability of dating and chronology** high.

Description The canal is connected to the Po. According to Piacenza Romana 2013, the canal called *Fossa Augusta* connected the river with the northern city walls of Piacenza. In the medieval period, the canal which then was called *Fodesta*, was fed by the River Trebbia (Pagliani 1991, 78). According to Piacenza Romana 2013, the canal was used as a canal harbour until the 16th century. The entire harbour area as well as parts of the city were called after the church of S. Agnese, the patroness saint of the boatmen (»patrona dei barcaioli«) .

Description of the written record The name *Fossa Augusta* changed to *Foxusta* and later on to *Fodesta* in the 13th to 15th centuries (Greci 2016, 239; Piacenza Romana 2013; Pagliani 1991, 78). The first mention of the canal under its modified name dates to 1209 (Pagliani 1991, 78).

Canal type indeterminate. **Bank revetments and other infrastructure** harbour installations. **Initiators and responsible agents** indeterminate.

References Piacenza Romana 2013. – Greci 2016, 239. – Bissi/Boiardi 2013. – Pagliani 1991, 78. – Wawrzinek 2014, 428.

168 Pisa *Fossa Papirianae*

Latitude 43,8359, **Longitude** 10,3310. **Reliability/precision of geographic location** very low.

Connected to lake; sea, **Adjacent waterways** Lago di Massaciuccoli; Mediterranean Sea.

Written sources yes.

Construction/planning Roman. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes.

Chronology The sources point to a construction of the canal(s) no later than the 3rd century AD. **Reliability of dating and chronology** high.

Description The canal is documented in the Antonine Itinerary as »*Papiriana*« and in the *Tabula Peutingeriana* as »*fossae papirianae*«, thus pointing to a navigable canal or canal system in the marshy areas near Lago di Massaciuccoli (Felici 2016, 216–217).

Description of the written record *Tabula Peutingeriana*; Antonine Itinerary (see Felici 2016, 216–217 for details).

Canal type indeterminate. **Initiators and responsible agents** indeterminate.

References Felici 2016, 216–217. – *Tabula Peutingeriana*. www.cambridge.org/us/talbert/talbertdatabase/TPPlace1088.html (26.2.2019).

169 Pomptinian Marshes *Forum Appii*-Terracina [*Decemnovium*]

Latitude 41,4665, **Longitude** 12,9977. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** indeterminate.

Written sources yes.
Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** assumed, **8th cent. AD** assumed, **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed, **13th cent. AD** assumed.
Chronology The canal was in use from the 1st century BC to at least the 6th century AD (Smith 1977, 76; Esch 2011, 15). **Reliability of dating and chronology** high.
Description The so-called »*Decemnovium*«-canal crossed the Pomptinian marshes parallel to the Via Appia. Strabo and Horace furnish detailed descriptions of the traffic on the canal, mentioning a towpath, professional boatmen, pulling mules, and a canal harbour in *Forum Appii*.
Description of the written record Strabo V.3.6; Horace's Satires 1.5.12 (see Smith 1977, 76; Felici 2016, 217–231).
Canal type parallel. **Dimensions** Length c. 26 km. **Bank revetments and other infrastructure** towpath; harbour installations. **Initiators and responsible agents** royal initiative; military(?).
References Smith 1977, 76. – Esch 2011, 15. – Haas u. a. 2014. – Felici 2016, 217–231. – Bockius 2014b, 89. – Aguilera Martin 2012, 109. – Hadfield 1986, 20.

170 Portus Canale di Fiumencino [*Fossa Traiana*]

Latitude 41,7699, **Longitude** 12,2446. **Reliability/precision of geographic location** high.
Connected to river; sea, **Adjacent waterways** Tiber; Mediterranean Sea.
Written sources yes, **Archaeological sources** yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes, **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Rice 2017, 212, the canal »was built under Claudius«. According to http://moocs.southampton.ac.uk/portus/glossary/fiumicino-canal/, it was »originally established as part of the Claudian harbour«. **Reliability of dating and chronology** high.
Description The *Fossa Traiana* or Canale di Fiumicino connected the Tiber with the sea. According to Keay 2012, 48, the canal was crucial for the entire harbour network and hence connected to other canals. It was crossed by bridges and equipped with quay walls. According to Salomon u. a. 2014a, 32, the canal »is still used for river and maritime traffic«. According to Salomon u. a. 2016a, 296, the banks were consolidated with brick walls and the fairway was dredged regularly.
Description of the written record inscription.
Canal type parallel. **Dimensions** Width c. 50 m. **Bank revetments and other infrastructure** brick walls; bridge; quay. **Initiators and responsible agents** royal initiative; military(?).
References Keay 2012. – Keay u. a. 2014. – http://moocs.southampton.ac.uk/portus/glossary/fiumicino-canal/ (17.11.2016). – www.ostia-antica.org/portus/t057.htm (3.2.2019). – Goiran u. a. 2010; 2017. – Smith 1977, 79. – Felici 2016, 217–223. – Salomon u. a. 2012, 84; 2014a, 32; 2016a, 296. – Rice 2017, 212.

171 Portus Canale Romano

Latitude 41,7815, **Longitude** 12,2751. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Tiber.
Written sources yes, **Archaeological sources** yes.
Construction/planning 2nd cent. AD. **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** assumed.
Chronology According to Salomon u. a. 2014a, 33. 46, the canal was in use from the early 2nd century and »in the late 5. century AD [...] the Canale Romano had already been cut-off upstream«. **Reliability of dating and chronology** high.
Description The canal was part of the harbour system of Portus and offered a bypass from the *Fossa Traiana* to the Tiber along the Trajanic harbour basin. It was »clearly used as a waterway [...] probably had a quay side« and »ran alongside the ancient warehouses of Portus« (Salomon u. a. 2014a, 43). The canal has been the object of intense geoarchaeological study.
Description of the written record For all canals in Ostia/Portus: Suetonius Nero, 16; Pliny the Younger Letters, VIII, 17; Cassius Dio; Strabo; Horace; Procopius (see Smith 1977, 79; Felici 2016, 217–223).
Canal type parallel. **Dimensions** Length c. 2 km, width 35 m, depth 4.4–7.4 m. **Bank revetments and other infrastructure** quay(?); store houses. **Initiators and responsible agents** indeterminate.

References Salomon u. a. 2014a. – Keay 2012. – http://moocs.southampton.ac.uk/portus/glossary/canale-romano/ (17.11.2016). – Smith 1977, 79. – Keay u. a. 2014. – Goiran u. a. 2017. – Felici 2016, 217–223.

172 Portus Canale Traverso

Latitude 41,7760, **Longitude** 12,2654. **Reliability/precision of geographic location** high.
Connected to river; sea, **Adjacent waterways** Tiber; Mediterranean Sea.
Archaeological sources yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes.
Chronology According to Salomon u. a. 2016c, 15, »Canale Trasverso and Claudian basin at Portus begin to be used in the early 1. c AD«. According to Salomon u. a. 2016c, 15, »the absence of organic material made it impossible to date the final closure of the pool of the harbour, and it can only be suggested that the water column of the Canale Traverso in the 6.–7. c. AD lay at c. 1 m below the sea-level of that period«. According to Gelichi 2008, 293, there is excavated evidence for repairs and maintenance at the quay and the canal itself between the 6th and the 9th century.
Reliability of dating and chronology high.
Description The short canal gave direct access to the Trajanic harbour basin in Portus from the *Fossa Traiana*/Fiumicino (Salomon u. a. 2012; 2016c; Keay 2012, 51). The fairway had brick wall revetments (Salomon u. a. 2012, 84).
Canal type parallel. **Dimensions** Length less than 0.5 km, width c. 25 m, depth 5.5 m. **Bank revetments and other infrastructure** brick walls; quay. **Initiators and responsible agents** indeterminate.
References Salomon u. a. 2012, 84. 86; 2016a, 296; 2016c, 15. – Gelichi 2008, 293. – Smith 1977, 79. – Keay u. a. 2014. – Goiran u. a. 2017. – Keay 2012, 51. – Hadfield 1986, 19–20. – Felici 2016, 217–223. – Lisé-Pronovost u. a. 2019.

173 Portus Northern Canal

Latitude 41,7881, **Longitude** 12,2749. **Reliability/precision of geographic location** high.
Connected to river; sea, **Adjacent waterways** Tiber; Mediterranean Sea.
Archaeological sources yes.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed.
Chronology The canal is most likely Roman, but there are no absolute dates as yet (Salomon u. a. 2016a, 296; Keay u. a. 2014, 19–22). **Reliability of dating and chronology** low.
Description The canal is located north of the Trajanic harbour basin in Portus. It was identified in aerial images and in magnetometer surveys. It connects »the Tiber with the northern entrance of the Claudian harbour basin and the sea beyond« (Salomon u. a. 2016a, 296).
Canal type parallel. **Dimensions** Length c. 2.5–3 km. **Initiators and responsible agents** indeterminate.
References Salomon u. a. 2016a, 296. – Keay u. a. 2014, 19–22.

174 Portus-Ostia Canal

Latitude 41,7714, **Longitude** 12,2728. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Tiber.
Archaeological sources yes.
Construction/planning Roman. **1st cent. AD** assumed **2nd cent. AD** yes, **3rd cent. AD** assumed.
Chronology The canal is Roman, but its absolute chronology was still under investigation during finishing stages of this book. According to the latest analysis by Salomon et al 2020, 139, it »was built between the end of the first century AD and the beginning of the second century AD and was abandoned between the late second and early third centuries AD«. **Reliability of dating and chronology** low
Description The canal, which was identified through a magnetic survey in 2009, runs from the *Fossa Traiana*/Fiumicino opposite the mouth of the Canale Romano to the Tiber in Ostia. It follows a coast-parallel course and also runs parallel to the Via Flavia (Salomon u. a. 2016a; Keay u. a. 2014, 19–27). It »formed part of a complex network of canals« and »created a more efficient navigable link between the both ports by cutting out the eastern meander

of Ostia« (Salomon u. a. 2016a, 296. 301). The canal has been the object of intensive geoarchaeological fieldwork and geophysical prospection. According to Salomon u. a. 2016a, 299, »it had uneven edges with no evidence for a built revetment on both sides«, and Salomon 2020, 138 refers to »loose riverbanks that led to the lateral mobility of the canal«. Salomon u. a. 2020 mention piers and even a bridge. According to Salomon u. a. 2020, 139, it »could have been used for navigation by small to medium size boats and ships with water depths of between 2 m and 5 m, and perhaps also as a flood-relief canal«. It is possible that the two ship wrecks Isola Sacra 1 and 2, which have a terminus ante quem for the wreckage in the early 3rd century AD, sank within the southernmost part of the canal (Salomon 2020, 145).

Canal type parallel. **Dimensions** Length 3–4 km, width c. 90 m (North) and c. 40 m (Sputh); depth 2 m (cut 1) resp. 3.5 m (cut 2). **Bank revetments and other infrastructure** Bridge, Piers. **Initiators and responsible agents** indeterminate.

References Salomon u. a. 2016a; 2020. – Keay u. a. 2014, 19–27. – Goiran u. a. 2017.

175 Ravenna *Fossa Asconis*

Latitude 44,4278, **Longitude** 12,2059. **Reliability/precision of geographic location** low.

Connected to river, **Adjacent waterways** Po/Padenna and Lamone.

Written sources yes.

Construction/planning 5th cent. AD. **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes.

Chronology According to Mauskopf Deliyannis 2010, 54–55, »it is reasonable to assume that this [the digging of new canals] happened at the same time as the walls were built«, in other words, in the early 5th century AD. According to Mauskopf Deliyannis 2010, 288, »sometimes before the late ninth century the old *fossa Asconis* was extended to carry water from the Lamone to the Badarenus«. **Reliability of dating and chronology** high.

Description The canal was connected to a southern branch of the Po, the Padenna/*Fossa Augusta*. It is located outside the late antique city wall (see Mauskopf Deliyannis 2010, 54 fig. 28). According to Cirelli 2014, 16–17, the canal connected Ravenna and the Lamone (a southern tributary of the Po in this period) with the River Badareno, a branch of the Po. Following the course proposed by Mauskopf Deliyannis 2010, fig. 100, the canal was 500–750 m long. According to Cirelli 2014, 17, there is no firm evidence tracing the canal's exact route. According to Mauskopf Deliyannis 2010, 55, its construction was most likely connected to that of the city wall in order to »provide additional defences«. It is unclear if it also was navigated, but according to Cirelli 2014, 16–17, it offered access to the Badareno, which indirectly leads to suggest fluvial traffic.

Description of the written record According to Cirelli 2014, 16, the canal is mentioned as *Fossa vocatur Asconis* by Jordanes in the 6th century. Mauskopf Deliyannis 2010, 55 connects the later 5th century description by Sidonius that »the two-fold branches of the Po [...] led away from its main bed by public dykes [...] so that part surrounds the walls providing protection« with the construction of a canal which was »later known as the fossa Asconis«.

Canal type parallel. **Initiators and responsible agents** indeterminate.

References Cirelli 2014, 16–17. – Mauskopf Deliyannis 2010, 54–55. 288. – Christie 2006, 333. – Felici 2016, 207.

176 Ravenna *Fossa Augusta*

Latitude 44,4315, **Longitude** 12,1956. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Po, *Fossa Flavia*, *Fossa Clodia/Claudia*.

Written sources yes, **Archaeological sources** yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes, **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** assumed.

Chronology The canal was built at the end of the 1st century BC to improve navigability and to channel the waters of a branch of the Po into the harbour basin (Cirelli 2014, 19). Given the canal was identical with the course of the river Padenna, as proposed by Cirelli 2014, 19–20, the silting of the river would also be identical with that of the canal. Consequently, the final abandonment of the river (Cirelli 2014, 21) in the 15th century would mark a *terminus ante quem* for the canal's use. According to Patitucci Uggeri

2005, 342–343, a section of the *Fossa Augusta* north of Ravenna was referred to as *Fossa Butratica* in the 8th century and thus seems to have been operational in this period. Patitucci Uggeri 2005, 280 affirms that the canal was still in use in the early Middle Ages. On the other hand, Patitucci Uggeri 2005, 346 also assumes that the Padareno Canal was cut in late antiquity to replace the obsolete *Fossa Augusta*. It is apparent that there is some ambiguity concerning the abandonment of the *Fossa Augusta* as also the relation to possible replacements. Patitucci Uggeri 2002, 34–35 points to the fact that the canals between Ravenna and Venice – among them the *Fossa Augusta*, the *Fossa Claudia,* and the *Fossa Flavia* – were still functioning in the 10th century when bishop Liutprand of Cremona travelled the Po and the canals from Ravenna to Venice. Archaeological evidence pointing to restorations of the bank revetments of the Padenna or its canal in Ravenna most likely in the 13th century point to a sustained continuity in the maintenance of at least some of its parts (Cirelli 2014, 22. 210). Nevertheless, the canal/Padenna was most likely already very narrow in this period (Cirelli 2014, 210). According to Cirelli 2014, 22–23, the canal »certainly did exist until the twelfth century« and had completely lost its importance by the 15th century. **Reliability of dating and chronology** low.

Description The canal was connected to a branch of the Po and ran parallel to the coastline. Mauskopf Deliyannis 2010, 27 as well as Cirelli 2014, 19–20 point to the fact that the canal course inside the town of Ravenna is indistinct. The initiative to build the canal was connected to Emperor Augustus and »probably conceived for the supply of the navy« (Malmberg 2016, 328). According to Malmberg 2016, 28, »The Fossa safely connected Ravenna with the Po, and made it possible for relatively large vessels to go from the large harbour as far inland as Turin without transshipment«. The *Fossa Augusta* was »only the first in a series of canals which were built in the 1. century in order to connect several lagoons along the coast into a coherent system. They formed an alternative transport system from Ravenna to Aquileia and Grado« (Malmberg 2016, 331). According to Cirelli 2014, 20–22. 261, possible parts of the canal revetments were excavated along the Via S. Alberto north of the city walls and at several other locations inside the city, but this interpretation is not always reliable. In the 5th century, the 9.5 m wide arcade through the city wall gives a precise idea of the minimum dimension of the canal inside the urban area. It most likely was significantly wider to the north of the city (Cirelli 2014, 21; see also Malmberg 2016, 328–329). According to Cirelli 2014, 20–21. 261, the banks of the canal were consolidated with massive masonry and additional wooden structures. The stone walls inside Ravenna served as quays, which were supported by wooden walkways and mooring posts for boats (Cirelli 2014, 22). From the 5th century onwards, the canal/Padenna entered the city through an arcade of 9.5 m width (Cirelli 2014, 21). Bridges allowed to cross the canal soon after the construction was finished (Cirelli 2014, 21; Malmberg 2016, 329). Several early medieval bridges from the 6th century and later are recorded in written sources, as also verified by the archaeological evidence (Cirelli 2014, 22–23). According to Mauskopf Deliyannis 2010, 28, a 9 m wide paved road »ran along the western bank of this canal to the north of the city«. According to Patitucci Uggeri 2005, 281, a lighthouse helped to navigate the canal coming from the Po. It was located »near Comacchio (Baro Zavelea, Valle del Mezzano, where the Fossa Augusta flowed into the main branch of the Po)« (D'Agostino/Medas 2010, 290). There is also proof for a lighthouse in Ravenna that operated between the 1st century AD and the early medieval period and thus gave its name to S. Maria ad Farum (Mauskopf Deliyannis 2010, 28; Cirelli 2014, 28). In 1253, the castle Marcamò was erected by the city of Venice at the canal's entry into the Po in order to control and block navigation (Israel 2017, 114).

Description of the written record According to Mauskopf Deliyannis 2010, 27, Pliny the Elder describes the *Fossa Augusta* which connected the Po with the harbour in the 1st century AD: »[…] a portion of its stream is drawn off by rivers and canals between Ravenna and Altinum, for a space of 120 miles, still at the spot where it discharges the vast body of waters, it is said to form seven seas. By the Augustan Canal [*Augusta fossa*] the Po is carried to Ravenna, at which place it is called the Padusa […] The nearest mouth to this spot forms the extensive port known as that of *Vatrenus* where Claudius Caesar […] entered the Adriatic in a vessel[…]«. Sidonius Appolonaris describes Ravenna in the later 5th century as »a city of hydraulic instability« (Mauskopf Deliyannis 2010, 55). Sidonius further describes »the twofold branches of the Po wash around and through the town [oppidum]; led away from its main bed by public dykes, through them by diverted channels it

divides, diminished, with divided flow, so that part surrounds the walls providing protection, part flows within and provides trade, as convenient an arrangement for commerce as especially for bringing provisions[…]« (Mauskopf Deliyannis 2010, 55). This text clearly describes the canal/river's navigation function for the city's supply. Mauskopf Deliyannis 2010, 314 quotes Cassiodorus who in the 6th century wrote that ships were always able to sail between Ravenna and Istria »for when the sea is closed by raging of the winds, a path through pleasant river country is open to you[…]From a distance, when their channel cannot be seen, it looks as if they [he ships] are moving through the fields. They were kept still by ropers, but they moved drawn by cables«. According to Cirelli 2014, 20, Jordanes described the canal in the 5th century AD. During the 6th century the harbour of Augustus was largely silted up: »This, which was once a harbour, now displays itself like a spacious garden full of trees; but from them hang not sails but fruit« (Cirelli 2014, 28; Malmberg 2016, 338). Patitucci Uggeri 2005, 287 draws attention to the 6th century work *Vita S. Martini* by Venantius Fortunatus, stating that ship traffic between Ravenna and Aquileia preferred the canals. According to Patitucci Uggeri 2005, 342–343, 8th century written sources mention »*Fossa Butratica*« in reference to a section of the *Fossa Augusta* c. 6 miles north of Ravenna and close to an antique settlement called Butrium.

Canal type parallel/connection. **Dimensions** Length min. 25 km, width max. 9.5 m inside Ravenna. **Bank revetments and other infrastructure** bridge, road, towpath, lighthouse, castle. **Initiators and responsible agents** royal initiative; military(?).

References Mauskopf Deliyannis 2010. – Cirelli 2010 ; 2014. – Chenault 2010. – Stillwell 1976, 751. – Malmberg 2016, 328–329. – Smith 1977, 77. – Patitucci Uggeri 2005, 280–281. 342–346. – D'Agostino/Medas 2010. – Uggeri 1997. – Israel 2017, 114. – Campbell 2012, 221.

177 Ravenna *Fossa Lamisa/Fossa Amnis*

Latitude 44,4198, **Longitude** 12,2077. **Reliability/precision of geographic location** low.

Connected to river, **Adjacent waterways** Po/Padenna and Lamone.

Written sources yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes.

Chronology According to Mauskopf Deliyannis 2010, 25, the canal was built »by the first century BC«. According to Deliyannis 2004, 119 fn. 6, the description in the *Liber Pontificalis Ecclesiae Ravennatis* may suggest that the canal was »no longer in use« in the 830s/840s. However, owing to the contentious nature of this assumption, it can be affirmed only that water was still flowing in the canal in the 9th century.

Reliability of dating and chronology high.

Description The canal is connected to the river Padenna, a branch of the Po, as well as to the Lamone/*flumisellum Padennae* (Mauskopf Deliyannis 2010, fig. 3; Cirelli 2013, 118; 2014, 22; Augenti/Cirelli 2017, 298). The canal crossed the city already at the time of the Roman Republic, dividing it in a north-eastern and a south-western part, although the exact course yet remains indistinct (Cirelli 2013, fig. 8; 2014, 24–25). There seems nonetheless to be a consensus that the canal entered the town area from the west, near the Posterula Latronum/*ad suum vicum,* and that it joined the main course of the Padenna at the Piazza Caduti, east of the later Ursiana cathedral (Cirelli 2014, 25; Deliyannis 2004, map overview; Mauskopf Deliyannis 2010, fig. 100). Drill probes carried out at several locations tend to corroborate with this view (Cirelli 2014, 24–25). According to the 9th century *Liber Pontificalis Ecclesiae Ravennatis*, the »bridge of the millers« close to the episcopal residence crossed the canal. A place referred to as *organaria* »a thing wonderful in size and completely constructed of a built device [*mira magnitudine et tota aedificali machina constructa*]« was located below/at this bridge (Agnellus, *Liber pontificalis ecclesiae Ravennatis*, ed. Deliyannis, 119. – ed. Holder-Egger, 289). Deliyannis 2004, 119 fn. 6 interprets the structure as »probably some sort of lock or waterwheel used in regulating water levels and providing power to the mills near the bridge, probably blocking off the waterway with some constructions«. Nevertheless, she also mentions that the »Latin here is corrupt« and that the translation of the passage is somewhat problematic (Deliyannis 2004, 119 fn. 6). Squatriti 2000, 222 also mentions »sluices […] to regulate water levels in urban canals at times of exceptionally high flow« in early medieval Ravenna.

Description of the written record The *Fossa Amnis* is first mentioned in the earlier 9th century *Liber Pontificalis Ecclesiae Ravennatis* (Agnellus, *Liber pontificalis ecclesiae Ravennatis*, ed. Deliyannis, 119; Cirelli 2014, 25). Several bridges crossing the canal at different locations are furthermore mentioned in the 9th and 10th centuries (Cirelli 2014, 35).
Canal type parallel. **Bank revetments and other infrastructure** sluice(?). **Initiators and responsible agents** indeterminate.
References Agnellus, *Liber pontificalis ecclesiae Ravennatis*, ed. Deliyannis, 119; ed. Holder-Egger 289. – Mauskopf Deliyannis 2010, 25. 55. 101. 256 fig. 3. – Cirelli 2013, 118; 2014, 24–25. – Augenti/Cirelli 2017, 298. – Squatriti 2000, 222.

178 Ravenna Naviglio

Latitude 44,5411, **Longitude** 12,1560. **Reliability/precision of geographic location** low.
Connected to river; sea, **Adjacent waterways** Po; Mediterranean Sea.
Written sources yes.
Construction/planning High Middle Ages. **11th cent. AD** assumed, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology Since the canal was first mentioned in 1107, its date of construction was probably earlier (Patitucci Uggeri 2005, 345). The canal was still navigated in the early 16th century (Patitucci Uggeri 2005, 346). **Reliability of dating and chronology** low.
Description The canal is connected to the Po di Primaro (Patitucci Uggeri 2005, 345), and according to Luciano 2017, 196–197, the medieval harbour of Ravenna was located at the mouth of the canal. According to Patitucci Uggeri 2005, 345, the canal joined the southern side of the Po di Primaro vis-à-vis of S. Alberto. The course further south is not clear, but the Via Canalazzo seems to be connected to the canal course (Patitucci Uggeri 2005, 345). From S. Alberto to the via Canalazzo the distance is c. 12 km (see Patitucci Uggeri 2005, 345). According to a 14th century chronicle and other contemporaneous written sources, the length of the canal was 12 miles, which corresponds to c. 19 km (Patitucci Uggeri 2005, 345 fn. 408). According to Luciano 2017, 197, the continuation of the canal between the harbour and the coast was flanked with timber piers, although the chronology of this feature still needs to be resolved. A castle protected the canal's confluence with the Po in the later Middle Ages (Patitucci Uggeri 2005, 345).
Description of the written record The canal is first mentioned in 1107 as *Nauigium*. In the 13th and 14th century it is referred to regularly under several names such as *Codarundini*, *Nauilium Comunis,* and *Cavodorzo* (Patitucci Uggeri 2005, 345). In the early 16th century written sources file problems with navigation (Patitucci Uggeri 2005, 346).
Canal type connection. **Dimensions** Length c. 19 km. **Bank revetments and other infrastructure** quays; wooden piers; lighthouse. **Initiators and responsible agents** indeterminate.
References Patitucci Uggeri 2005, 345–346. – Luciano 2017, 196–197. – Felici 2016, 213–214.

179 Ravenna Padareno

Latitude 44,5419, **Longitude** 12,2055. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Po.
Written sources yes.
Construction/planning early medieval. **5th cent. AD** assumed, **6th cent. AD** assumed, **7th cent. AD** assumed, **8th cent. AD** yes, **9th cent. AD** yes, **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Patitucci Uggeri 2005, 343 the canal was built in late antiquity. Written evidence dates to the 8th–10th centuries. The canal was still in use in the later Middle Ages, but partially replaced by the Naviglio/Cavodorzo. Nevertheless, according to the itinerary of Albert of Stade attributed to the year 1236, the canal was still a navigable alternative to travel from Ravenna to Ferrara: »*Infra Fossam Pudollam navigando per Padum XI millia passuum laeva ripa peruenitur ad vicum et monasterium Sancti Alberti*« (Patitucci Uggeri 2005, 344). **Reliability of dating and chronology** low.
Description The canal is connected to the Po north of Ravenna (Patitucci Uggeri 2005, 343). According to the map in Mauskopf Deliyannis 2010, fig. 6, the canal was connected to the sea at its south-eastern end. According to Patitucci Uggeri 2005, 343, the canal's south-eastern extremity may have been located in the area of the mausoleum of Theodoric; it runs and was formerly connected to the channel of the Po at Paisolo/San Nicolo c. 4 km east of S. Alberto. The purpose was to create a navigable waterway from Ravenna to the main branch of the Po north of the

city in order to replace the »obsoleta Fossa Augusta« (Patitucci Uggeri 2005, 346). According to the description by Albert of Stade, the canal was XI miles (c. 17 km) long (Patitucci Uggeri 2005, 344).

Description of the written record According to Patitucci Uggeri 2005, 343, the canal is referred to in written sources of the 8th and 9th centuries as *Patareno* and later *Padareno*. Fishing in the canal is documented in texts from 10th century.

Canal type connection. **Dimensions** Length c. 17 km. **Initiators and responsible agents** indeterminate.

References Patitucci Uggeri 2005, 342–344 fig. 41. – Felici 2016, 213–214.

180 Ravenna/Classe Harbour Canal

Latitude 44,4687, **Longitude** 12,2693. **Reliability/precision of geographic location** low.

Connected to sea, **Adjacent waterways** Mediterranean Sea.

Archaeological sources yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes.

Chronology The canal was probably built in the late 1st century BC, together with the harbour of Augustus and the *Fossa Augusta*. Parts of it were navigable at least until the 7th century (Cirelli 2013, 115). According to Cirelli/Augenti 2012, 208, the canal harbour in Classe was used at least until the 9th century, but only on a reduced scale after the 7th century. Nevertheless, this would mean that the canal was still navigable in the 9th century. **Reliability of dating and chronology** high.

Description The canal connects with both the Adriatic coast and the Ravenna harbour basin, which at the same time is the mouth of a Po branch (Cirelli 2013, 111). According to Malmberg 2016, 326, the large lagoon provided a natural harbour »which could be reached from the sea through a man-made channel«. According to Mauskopf Deliyannis 2010, 28, the canal »led from the Adriatic into the harbor [...] where the *fossa Augusta* [and the mouth of the Padenna] entered from the North«. The canal was built concurrently with the harbour of Augustus. In the 5th to 7th centuries, the canal silted and became narrower, whilst there is mention of an island used for commercial activities (Baldassari/Cirelli 2009, 923; Augenti/Cirelli 2017, 298). In the Augustan period, the banks of the canal were »strengthened with quays and with piles of building rubble. The mouth leading to the sea was fortified with very strong moles, made of cement« (Mauskopf Deliyannis 2010, 28). According to Cirelli 2013, 115, the banks of the canal were protected with rows of wooden piles in the 5th to 7th centuries, whereas stone steps allowed direct access to the canal to facilitate loading and unloading of cargo. Excavations at the bank of the canal revealed a pier with a wooden substructure and a high-quality stone pavement. An inverted, reused marble capital was found on a brick pillar at the far end of the pier, which served as a bollard for anchoring the boats (Cirelli 2013, 115–116). A »series of warehouses«, some of them more than 400 m^2 in size, »faced the canal« (Cirelli/Augenti 2012, 207). They were found to contain enormous amounts of amphorae, mainly from the Eastern Mediterranean. In the 5th to 7th centuries, there is also proof for several craft activities in the harbour area close to the canal (Cirelli/Augenti 2012, 208). The port's original urban infrastructure began to decline in the second quarter of the 7th century, with especially small warehouses of wood and clay now replacing earlier ones of stone (Cirelli/Augenti 2012, 208–209).

Canal type dead-end; parallel. **Dimensions** According to Mauskopf Deliyannis 2010, 28, the canal was »80 m long, and it widened on the interior, flowing around at least two small islands«. Malmberg 2016, 328 describes the canal as »narrow«. **Bank revetments and other infrastructure** wooden revetments; quay walls; mole; store houses. **Initiators and responsible agents** military(?).

References Cirelli 2010. – Augenti 2011. – Deliyannis 2004, 289. – Luciano 2017, 193. – Mauskopf Deliyannis 2010.

181 Rome Augustus-Mausoleum

Latitude 41,9060, **Longitude** 12,4755. **Reliability/precision of geographic location** high.

Connected to river, **Adjacent waterways** Tiber.

Archaeological sources yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes.

Chronology The canal was most likely built in 10 BC, according to Buchner 1996, 166–168. **Reliability of dating and chronology** high.

Description The dead-end canal leading from the Tiber to the Mausoleum of Augustus is thought to have been intended to transport heavy obelisks by boat. Traces of the supposed canal have been documented in drill probes. Buchner 1996, 166–168 claims that the canal was flanked by moles/quay walls on both sides. Nevertheless, the height differential between the river and the canal head was 8–10 m, so that the confirmation of its navigability yet hinges on evidence from conceivable equipment such as locks (Wawrzinek 2014, 35. 347; Felici 2016, 224; Buchner 1996).
Critical remarks it is uncertain whether it was really navigable/navigated.
Canal type dead-end. **Dimensions** Length c. 50 m, width c. 14 m. **Bank revetments and other infrastructure** moles/quay walls(?). **Initiators and responsible agents** royal initiative.
References Wawrzinek 2014, 35. 347. – Felici 2016, 224. – Buchner 1996.

182 Rome *Naumachia Augusti*

Latitude 41,8828, **Longitude** 12,4682. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Tiber.
Written sources yes.
Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes.
Chronology The canal was built together with the *naumachia* during the rule of Augustus, and it still was in use in AD 59 (Rabun 1997). **Reliability of dating and chronology** high.
Description The water basin of the *naumachia* of Augustus in Rome was connected to the Tiber by means of a navigable canal (Felici 2016, 224; Rabun 1997). According to Rabun 1997, 474–475, it is likely that there was a weir/sluice to control the flow of water in the canal.
Description of the written record According to Cassius Dio, Nero travelled by ship from the *naumachia* via the canal to the Tiber (Felici 2016, 224; Rabun 1997, 467.)
Canal type dead-end. **Bank revetments and other infrastructure** sluice/weir; basin. **Initiators and responsible agents** royal initiative.
References Felici 2016, 224. – Rabun 1997.

183 Rome Tiber Canalisation

Latitude 41,8906, **Longitude** 12,4777. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Tiber.
Written sources yes.
Construction/planning Roman. **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed.
Chronology According to Felici 2016, 223, plans to canalise the Tiber under Caesar failed to materialise, but other canalisation schemes were carried out in the Augustan age, e. g. under Agrippa. **Reliability of dating and chronology** low.
Description According to Felici 2016, 223, different written sources point to a major canalisation and redirection of the Tiber in Rome in antiquity. A main purpose was flood control, but the new canals were also to be made navigable. According to Campbell 2012, 220, attempts to improve navigation and to regulate the water flow in the lower Tiber were made as early as the 3rd century BC, which also included the construction of canals.
Description of the written record Horace; Cic., Att. XIII, 35, 4; Plut., Caes. 58, 10 (after Felici 2016, 223).
Canal type parallel. **Initiators and responsible agents** royal initiative; military(?).
References Felici 2016, 223. – Campbell 2012, 220–221.

184 Salapia near Trinitapoli

Latitude 41,4127, **Longitude** 16,0381. **Reliability/precision of geographic location** high.
Connected to lake; sea, **Adjacent waterways** Laguna di Salapia; Mediterranean Sea.
Written sources yes, **Archaeological sources** yes.
Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** assumed.
Chronology According to Felici 2016, 243–245, the canals existed in the 1st century BC. **Reliability of dating and chronology** high.
Description According to Felici 2016, 243–245, navigable canals between Salapia and the sea are described by Vitruvius and Strabo.
Description of the written record Vitruvius I, 4, 12; Strabo VI, 3, 9 (after Felici 2016, 243–245).
Canal type dead-end(?). **Initiators and responsible agents** indeterminate.
References Felici 2016, 243–245.

185 Secchia-Canal

Latitude 44,7277, **Longitude** 10,6528. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Po.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Schumann 1977, 59, the canal was used in the 13th century. **Reliability of dating and chronology** high.
Description The canal ran from Reggio in the south to the Tagliata/Taleata canal. According to Schumann 1977, 59, it was supplied by the River Tassone.
Description of the written record not specified.
Canal type parallel. **Dimensions** Length c. 30 km. **Initiators and responsible agents** indeterminate.
References Schumann 1977.

186 Spina Harbour Canal

Latitude 44,7070, **Longitude** 12,1030. **Reliability/precision of geographic location** low.
Connected to sea, **Adjacent waterways** Mediterranean sea.
Archaeological sources yes.
Construction/planning pre-1st cent. BC. **pre-1st cent. BC** yes, **1st cent. BC** assumed, **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed, **6th cent. AD** assumed.
Chronology According to Felici 2016, 212, the absolute dating is indeterminate, but a construction as early as the 3rd century BC is possible. The canal existed for sure in the 1st century BC. **Reliability of dating and chronology** low.
Description The Etruscan city of Spina thrived along a fluctuating coastline. Its direct connection to the sea, however, was assured by a canal which had to be extended due to sedimentation and a shifting coastline (Felici 2016, 212). Several aerial anomalies and archaeological features may belong to this canal, but the evidence is ambiguous (see also no. 152 Comacchio Canale Pallotta/Girata). If the identification is correct, the canal would be c. 20 m wide, 1.5 m deep, and equipped with wooden revetments (Felici 2016, 212).
Canal type parallel. **Dimensions** Width c. 20 m, depth c. 1.5 m(?). **Initiators and responsible agents** indeterminate.
References Felici 2016, 212. – Stillwell 1976, 857.

187 Venice and Torcello

Latitude 45,4735, **Longitude** 12,2643. **Reliability/precision of geographic location** very low.
Connected to sea; river; lake, **Adjacent waterways** Lagoon of Venice; Mediterranean Sea.
Written sources yes, **Archaeological sources** yes.
Construction/planning pre-1st cent. BC. **pre-1st cent. BC** yes, **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** yes, **4th cent. AD** yes, **5th cent. AD** yes, **6th cent. AD** yes, **7th cent. AD** yes, **8th cent. AD** yes, **9th cent. AD** yes, **10th cent. AD** yes, **11th cent. AD** yes, **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The canals date from the Roman period to the modern era (see Felici 2016, 209–212). **Reliability of dating and chronology** high.
Description There is an enormous number of canals and multiple archaeological proof for canal construction and maintenance in the Venice Lagoon (see Felici 2016, 209–212; Calaon 2013, 56; Calaon u. a. 2014, 57–58. 214–215; Gelichi 2007, 94–96). **Written sources** from 1224 give testimony for officials responsible for the »*viis de canali*« (Savoy 2012, 1).
Description of the written record Not specified.
Canal type heterogenous. **Dimensions** variable. **Bank revetments and other infrastructure** storehouse; lighthouse; bridge; quay walls. **Initiators and responsible agents** civic authorities; indeterminate.
References Calaon u. a. 2014. – Felici 2016, 209–212. – Savoy 2012, 1. – Calaon 2013, 56. – Negrelli 2012, 409–410. – Gelichi 2007, 94–96. – Gelichi u. a. 2012, 195. – D'Agostino/Medas 2010. – Guillerme 2013, 73–74. – Heher 2009, 27. 19. 88. 97.

The Netherlands

188 Alphen-Gouda Gouwe Canal

Latitude 52,0188, **Longitude** 4,7208. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Rhine; Ijssel.
Written sources yes.
Construction/planning 13th cent. AD. **13th cent. AD** yes.
Chronology According to Fockema 1960, 175 »it appears that Count William I succeeded soon after 1200 in opening up the Gouwe canal«. According to Bond 2007, 174, the canal was opened »soon after 1203«.
Reliability of dating and chronology high.
Description The canal was connected to the Old Rhine »and the southern river system [with the Ijssel] well to the west of Utrecht« (Fockema 1960, 175–176). The construction was initiated by Count William I (Fockema 1960, 175). Between c. 1220 and 1250, locks were constructed to prevent flooding (Fockema 1960, 175). According to Bond 2007, 171, the canal is c. 20 km long. The lock near Haarlem was 24 ft wide in 1253 (Fockema 1960, 175), so ships up to c. 6–7 m wide could have navigated the canal. According to Fockema 1960, 175, the canal was constructed as a rival to the »Utrecht route«. By means of the canal, »the Holland route was established all the way from the Ij north of Haarlem through Alphen and Gouda to the Rhine mouth and so to Flanders« (Fockema 1960, 175).
Description of the written record Not specified.
Canal type connection(?). **Dimensions** Length c. 20 km, fairway width 24 ft (c. 7 m). **Initiators and responsible agents** nobility.
References Bond 2007, 171. 174. – Fockema 1960, 175–176. – Hadfield 1986, 28. – TeBrake 2000, 121. – Skempton 1957, 442.

189 Amstel-Canal

Latitude 52,3448, **Longitude** 4,8736. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Amstel.
Written sources assumed, **Archaeological sources** yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to Abrahamse u. a. 2013, the canal was cut after 1165. According to Bont 2015, 357, the earliest archaeological traces date »from the beginning of the 13th century«, but »earlier dating of this site is still possible«. According to Bont 2015, 359 »The Amstel canal was dug somewhere between 1063 and 1275, but it is perhaps more realistic to date its construction ›between the second part of the 11th century and halfway through the 13th century‹.«
Reliability of dating and chronology high.
Description According to Abrahamse u. a. 2013, the canal »connected two natural meandering watercourses« in the Rhine estuary. The initial purpose was drainage, but it was also navigable and part of a waterborne »network of infrastructure that later enabled the rise of cities in Holland« (see also van de Ven 2004, 66–67). According to Bont 2015, 357–358, the canal was dug in three phases. Phase 1 »was started from a curve in the southern Amstel and followed a straight line towards the Old Church of Amsterdam, stopping at the supposed watershed«; phase 2 »was carried out from north to south, also stopping at the former watershed«; phase 3 »connected both canal parts by cutting through the former watershed«.
Canal type indeterminate. **Initiators and responsible agents** civic authorities(?).
References Bont 2015. – Abrahamse u. a. 2013. – van de Ven 2004, 66–67.

190 *Fossa Corbulonis*

Latitude 52,0973, **Longitude** 4,4191. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Maas/Waal.
Written sources yes, **Archaeological sources** yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes, **3rd cent. AD** assumed, **4th cent. AD** no.
Chronology The canal is dated by dendrochronology to AD 37–41 and AD 50. In the 2nd century parts of the canal became derelict, whereas other parts may have been navigated until the 3rd century (Kort/Raczynski-Henk 2014, 60–61; Jansma u. a. 2014, 493; 2017, 37). **Reliability of dating and chronology** high.
Description The *Fossa Corbulonis* is »a canal connecting the Meuse and Rhine directly behind the

North-Sea beach barrier« (Jansma u. a. 2017, 37). Tacitus gives a detailed description of the construction and the purpose to avoid the »*incerta oceani*« on the open sea and to avoid idleness among the soldiers (Smith 1977, 78. 80; Tacitus, Annalen, ed. Heller 11,20). Archaeological excavations and dendrochronological dating have verified its course, chronology, and construction. The banks were consolidated with wooden revetments (Kort/Raczynski-Henk 2014).

Description of the written record Tacitus, Annalen, ed. Heller 11,20: »[...] *ne tamen segnem militem attinerent, ille inchoatum ante tres et sexaginta annos a Druso aggerem coercendo Rheno absolvit, Vetus Mosellam atque [Ararim] facta inter utrumque fossa conectere parabat, ut copiae per mare, dein Rhodano et Arare subvectae per eam fossam, mox fluvio Mosella in Rhenum, exim Oceanum decurrerent, sublatisque itineris difficultatibus navigabilia inter se Occidentis Septentrionisque litora fierent* [...]«.

Canal type parallel; connection. **Dimensions** Length c. 35 km, width on average 12–15 m, but several segments only 4.5–6 m; depth c. 1.4 m. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** military.

References Kort/Raczynski-Henk 2014. – Campbell 2012, 223. – Coulon/Golvin 2018, 21–22. – Bechert 2007, 26. – Jansma u. a. 2014, 493; 2017, 37–38. – Kort 2013. – Smith 1977, 78. 80. – Hadfield 1986, 20. – Felici 2016, 177–178. – Muntenau 2011, 159. – Hanel 1995, 107. – Rippon 2000, 88. – Fockema 1960, 174. – Tacitus, Annalen, ed. Heller 11,20. – Werther u. a. 2018a, 358–361.

191 *Fossa Drusiana*

Latitude 52,0133, **Longitude** 6,1385. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Rhine; Ijssel.

Written sources yes.

Construction/planning 1st cent. BC. **1st cent. BC** yes, **1st cent. AD** yes, **2nd cent. AD** assumed, **3rd cent. AD** assumed.

Chronology The canal was built in 12 BC and intensively used in the 1st century AD (Smith 1977, 78). Bachrach 2001, 137 postulates that »The early Carolingians kept the Vecht canal (successor of the *fossa Drusiana* that connected the Rhine with what is now called the Ijselmer) in operating condition«, but this seems highly hypothetical. **Reliability of dating and chronology** high.

Description The *Fossa Drusiana*, which is mentioned by different ancient authors, was cut under the command of Drusus between Rhine and Ijssel, but the exact location is unknown (Kort/Raczynski-Henk 2014, 52; Bockius 2014b, 89–90; Smith 1977, 78; Rogers 2013, 109). Navigation on the canal was mentioned repeatedly in the 1st century AD (Smith 1977, 78). According to Bockius 2014b, 89–90, dams along the Rhine cited by Tacitus may have been part of the construction scheme. According to Smith 1977, 78, the canal »provided a short cut from the Rhine to the Ijssel so speeding the passage of troops and equipment from Roman territory into Germania or, via the Zuider Zee, along the Frisian coast to the mouths of the Ems and Weser.« According to Smith 1977, 78 the length was about 9 miles, but this could not be verified. According to Campbell 2012, 223 »the original purpose was primarily military«.

Description of the written record Suetonius Claudius, 1.2; Tacitus Annals, 1.60; Tacitus Annals, 11, 8; Tacitus Annals, sXI.18; Tacitus Annals, XIII, 53; Tacitus Histories, V.19 (after Felici 2016, 175–177; Smith 1977, 78).

Canal type parallel. **Dimensions** indeterminate. **Bank revetments and other infrastructure** dams(?). **Initiators and responsible agents** military.

References Rippon 2000, 88. – Rogers 2013, 109. – Bachrach 2001, 137. – Smith 1977, 78. – Felici 2016, 175–177. – Hanel 1995, 107. – Bockius 2014b, 89–90. – Kort/Raczynski-Henk 2014, 52. – Hadfield 1986, 20. – Muntenau 2011, 158–159. – Campbell 2012, 223.

192 Groningen

Latitude 53,2151, **Longitude** 6,5628. **Reliability/precision of geographic location** very low.

Connected to river, **Adjacent waterways** Hunze/A.

Written sources yes.

Construction/planning 13th cent. AD. **13th cent. AD** yes.

Chronology According to Reinders 1999, 131, canals near Groningen were cut around 1275. **Reliability of dating and chronology** low.

Description According to Reinders 1999, 131, »the maritime aspirations of Groningen are reflected in the city's efforts to improve its connection with the open sea«, among them the construction of nav-

igable canals and the canalisation of existing river courses. The town had an important harbour in the later Middle Ages (Reinders 1999, 130–131). **Description of the written record** not specified.
Canal type indeterminate. **Initiators and responsible agents** civic authorities (?).
References Reinders 1999, 131.

193 Leiderdorp

Latitude 52,1511, **Longitude** 4,5285. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Rhine; Leitha.
Archaeological sources yes.
Construction/planning 8th cent. AD. **8th cent. AD** yes, **9th cent. AD** yes.
Chronology According to Dijkstra/Verhoeven 2019 and Dijkstra 2016, the existing meandering channel was canalised and equipped with strong revetments around AD 750/780. This canal and the entire occupation »came to an abrupt end c. 840 when a new channel was cut into the landscape, filling up the old crevasse channel and covering the entire area with a thick layer of clay« (Dijkstra/Verhoeven 2019, 67). **Reliability of dating and chronology** high.
Description The canal is connected to the early medieval main course of the Rhine. According to Dijkstra/Verhoeven 2019, 70, in the Carolingian phase the »coherence in construction, dating, and length of the revetments suggests that they were assembled as part of a planned operation, either as a joint initiative between neighbours or as a project that had been instigated and supervised by a central authority«. According to Dijkstra/Verhoeven 2019, 67, the canalised section is c. 650 m long and the fairway of c. 750/780–840 AD was 6.5–8 m wide. The »narrow revetted channel was not wide enough to be navigable for larger ships. Mooring facilities were also lacking. It is possible that jetties existed on the natural levee of the Rhine, some 500 m to the west, where the main part of the settlement must have been situated« (Dijkstra/Verhoeven 2019, 75). According to Dijkstra 2021, 140, »the straight course of the channel between the two excavated parts also suggests that the channel was straightened and dug out to improve drainage of the hinterland and access for (small) boats.« »The main type of wood used in the revetments was alder (c. 40–80 %), followed by oak, ash and some elm« and »some wood from the revetment of Phase 3 (c. 811–816) came from dismantled buildings« (Dijkstra/Verhoeven 2019, 70). In the earlier phase (c. 750–800) »horizontal posts or beams were placed behind [...] vertical posts. [...] The vertical posts were placed next to each other, with 3 to 4 horizontal posts behind them. [...]. The revetment of Phase 3 [...] built c. 811–816 was the sturdiest. Somewhat thicker and longer vertical posts where placed every c. 1–1.5 m, with a line of 5 to 6 horizontal beams behind them. Parts of a board-walk were found on the south bank [...] This most likely functioned as a temporary walkway during the construction and levelling activities« (Dijkstra/Verhoeven 2019, 70). According to Dijkstra/Verhoeven 2019, 73, small wooden pieces of boats were found. According to Brouwers u. a. 2015, 18 a fragment of a flat-bottomed boat dated around AD 809 was found »in de restgeul« (in the residual channel).
Critical remarks natural channel, but massively canalised and provided with revetments.
Canal type dead-end. **Dimensions** Length c. 0.65 km, fairway width 6.5–8 m. **Bank revetments and other infrastructure** wooden revetments. **Initiators and responsible agents** indeterminate.
References Dijkstra/Verhoeven 2019. – Dijkstra 2016; 2021.

194 Scheldt - Maas Canal

Latitude 51,8190, **Longitude** 3,9790. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Scheldt/Maas.
Archaeological sources yes.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed.
Chronology A Roman date is assumed (Jansma u. a. 2014, 493). **Reliability of dating and chronology** low.
Description According to Jansma u. a. 2014, 493, »Recent archaeological evidence shows that the Scheldt may have been connected to the Meuse through a combination of natural inlets and a dug canal [which would] explain the presence of a Roman harbour in the centre of this coastal range at Goedereede-Oude Oostdijk.«
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Jansma u. a. 2014, 493.

195 Thiel

Latitude 51,8898, **Longitude** 5,4343. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Linge/Waal.
Archaeological sources yes.
Construction/planning medieval. **9th cent. AD** assumed, **10th cent. AD** assumed, **11th cent. AD** assumed, **12th cent. AD** assumed.
Chronology According to Oudhof u. a. 2013, 26, the canal is dated between the Carolingian period and the 13th century, based on archaeological finds and the stratigraphy. **Reliability of dating and chronology** low.
Description Remains of a canal connected to the Linge and/or Waal have been excavated in Tiel. The canal overlies Carolingian layers and is filled with sediments containing 13th century finds (Oudhof u. a. 2013, 26). There is no clear proof for navigation, but it was filled with water, and its width of 30 m may support this.
Canal type indeterminate. **Dimensions** Width 30 m.
Initiators and responsible agents indeterminate.
References Oudhof u. a. 2013, 26.

196 Utrecht Nieuwe Vaart/Vaartse Rijn

Latitude 52, 0799, **Longitude** 5,1232. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Lek.
Written sources yes.
Construction/planning 13th cent. AD. **12th cent. AD** assumed, **13th cent. AD** yes.
Chronology The canal was built either in the 12th or in the 13th century (Reinders 1999, 126; van Dinter u. a. 2017, 232 Appendix A6). **Reliability of dating and chronology** low.
Description According to Reinders 1999, 126, »in 1288–1289 a new canal, now known as the Nieuwe Vaart, was dug to connect Utrecht to the Lek again« and later called »the Vaartse Rijn«. Nevertheless, according to van Dinter u. a. 2017, 232, the Vaartse Rijn canal was dug soon after the construction of the Oude Gracht. In van Dinter u. a. 2017, appendix A6 it is furthermore dated to 1122. Therefore, it is not entirely clear whether the canal already existed in the 12th century or whether it was built in the 13th century. According to van Dinter u. a. 2017, 232, it was c. 8 km long. »In 1373 two sluices were constructed in the dike near Vreeswijk, to connect the Vaartse Rijn and the Lek« (Reinders 1999, 126), which opened three times every week (Lohrmann 2000, 14).
Description of the written record not specified.
Canal type parallel/bypass canal. **Dimensions** Length c. 8 km. **Bank revetments and other infrastructure** sluices. **Initiators and responsible agents** civic authorities.
References Ijsselstijn 2021. – van Dinter u. a. 2017, 232. – Reinders 1999, 126. – Lohrmann 2000, 14–15. – Hadfield 1986, 28. – Skempton 1957, 442.

197 Utrecht Oude Gracht

Latitude 52,0896, **Longitude** 5,1208. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Rhine.
Written sources yes.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology According to van Dinter u. a. 2017, 232, the city was granted the right to build canals in 1122 and the Oude Gracht was cut in 1122–1127. The canal still exists (Fockema 1960, 175). However, according to Ijsselstijn 2021, 166, a predecessor of the northern part of the Oude Gracht was probably already dug around AD 975. This latest information arrived only after the final editing of the maps for the present volume, so that they are accounted for only in the text. **Reliability of dating and chronology** high.
Description According to Ijsselstijn 2021, 166, »it is […] assumed that a first canal was constructed, to cut off a meander of the Vecht« as early as AD 975 and »extensive evidence for harbour infrastructure has been found: revettments, jetties and vessels, dating from 975 onwards« has been found. Utrecht »lost its riverine supply route« after the »damming of the river Kromme Rijn at Wijk bij Duurstede in AD 1122«, »which was solved by digging a canal« (van Dinter u. a. 2017, 232). The right to build canals was granted in 1122 and the intra-urban Oude Gracht/*novum fossatum* was finished in 1127 (van Dinter u. a. 2017, 232). According to Hourihane 2012, 208, cellars were built in the 13th and 14th centuries »between the houses alongside the canal and its waterfront [and] an open space called ›wharf‹ lay between the cellars and the water« (see also Reinders 1999, 126; Ijsselstijn 2021, 167–169). After 1300, a »large three-door lock was built at Vreeswijk on the Lek [which] had

to withstand the full force of the annual flood on the river, and it must have been a remarkable engineering work for its date. But the vertical movement of the lock gates, together with the low-arched bridges in the city itself, prevented vessels with fixed masts from using this route« (Fockema 1960, 175).

Description of the written record According to van Dinter u. a. 2017, 232 bishop Godelbald granted the right to build canals in 1122 and the canal is mentioned as »*novum fossatum*« in 1127.

Canal type parallel/bypass canal. **Dimensions** Length c. 1.5 km. **Bank revetments and other infrastructure** quay/wharf; store houses. **Initiators and responsible agents** civic authorities.

References Ijsselstijn 2021. – van Dinter u. a. 2017, 232. – Fockema 1960, 174–175. – Bond 2007, 173. – Reinders 1999, 124–127. – Hadfield 1986, 29. – van de Ven 2004, 63. – de Groot 2000, 56. – Escher/Hirschmann 2005, 79. – Hourihane 2012, 208. – Ellmers 1972, 163.

Norway

198 Spangereid

Latitude 58,0458, **Longitude** 7,1438. **Reliability/precision of geographic location** high.

Connected to sea, **Adjacent waterways** North Sea.

Archaeological sources yes.

Construction/planning Roman/Migration Period. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed.

Chronology According to Grimm 2011, 25 »efforts to radiocarbon date ›Groben‹ failed since they related to organic materials which were stratigrafically younger, but it may be possible to establish a dating based on the southern Norwegian land rising. C. 2000 years ago, there was a sheltered bay to the south of Spangereid, and the canal had a quite suitable position in relation to that bay«. According to Stylegar 2006, 220, »for topographical reasons (the bottom level of the canal relative to the land rising over the previous 2000 years) it was probably established in the late Roman and Migration period or somewhat later« (see also Stylegar/Grimm 2003b). According to Grimm 2011, 31, the canal was probably »in use in the first half of the first millennium AD«. According to Stylegar 2017 it »is known to date back to the Iron Age«. In the 11th/12th century, the canal was probably already partially filled (Stylegar/Grimm 2003a, 98; Stylegar 2006, 220). Other sections were not backfilled before c. 1900 (Stylegar 2017). **Reliability of dating and chronology** very low.

Description The canal cuts a narrow isthmus between the North Sea (south) and the Lenefjord (north). It has a straight course from southwest to northeast (see Stylegar 2006, 221; Grimm 2011, 24). According to Grimm 2011, 24, the main purpose was »an alternative seafaring route« to avoid a »dangerous passage around Lindesnes«. According to Stylegar/Grimm 2003a, 86, the canal is to be seen as a »proto-royal« project. The canal was excavated in 2001 and 2005 (Stylegar 2005; 2017; Stylegar/Grimm 2003b). It is c. 250 m long, 6–7 m wide at the base, 8–12 m wide at the top of the ditch, and c. 1.5 m deep (Grimm 2011, 24; Stylegar 2006, 220; 2005; 2017; Stylegar/Grimm 2003b). Considering the land uplift and the higher water level compared to the surface when the canal was constructed, Stylegar 2005 postulates a water level of c. 1 m in the canal. The canal was cut in sandy marine sediments (Stylegar 2005). After the abandonment, a peat layer formed »in a freshwater environment« (Stylegar 2006, 220; Stylegar/Grimm 2003b). According to Grimm 2011, 25, the »sloping sides […] might have been stabilised by some sort of a wooden construction«. Stylegar 2017 mentions that »a row of flagstones was uncovered that appeared to have been placed at an angle up against the sides of the canal. These flagstones possibly served to support a wooden structure«. Several large, most likely contemporaneous boathouses have been recorded in the surrounding area, (Stylegar/Grimm 2003a, 86–87. 93–95; Grimm 2011, 25; Stylegar 2017).

Description of the written record **Written sources** and maps/drawings give proof for the canal's existence from the 16th century onwards (Stylegar/Grimm 2003a, 97–98; Stylegar/Grimm 2003b).

Canal type parallel. **Dimensions** Length c. 0.25 km, width base c. 6–7 m, top 8–10 m, depth 1.5 m. **Bank revetments and other infrastructure** revetments made

of stone and perhaps wood; boathouses/ship sheds. **Initiators and responsible agents** indeterminate.

References Grimm 2011, 24–25. 31. – Stylegar 2005; 2006; 2017. – Stylegar/Grimm 2003a; 2003b.

Poland

199 Gdansk/Danzig

Latitude 54,3553, **Longitude** 18,6677. **Reliability/precision of geographic location** low.
Connected to river, **Adjacent waterways** Motlawa; Siedlica.
Archaeological sources assumed.
Construction/planning 12th cent. AD. **12th cent. AD** yes, **13th cent. AD** yes.
Chronology The canal was probably built before the first half of the 13th century (Paner 1999, 47). **Reliability of dating and chronology** low.
Description According to Paner 1999, 47: »By the first half of the 13th century [...] the old port canal at the mouth of the River Siedlica gradually began to silt up thus considerably restricting manoeuvrability for ships«. Shipwrecks have been found in the harbour (Ossowski 2004).
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Paner 1999, 47. – Ossowski 2004.

Serbia

200 Galovica Bezanija Canal

Latitude 44,8322, **Longitude** 20,1062. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Sava/Save.
Archaeological sources assumed.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed.
Chronology The canal is Roman, but the absolute chronology has not yet been fixed. **Reliability of dating and chronology** very low.
Description Remains of a Roman canal connected to the Sava »upstream from the *statio Ad Confluentes*« have been identified at Galovica (Wilkes 1998, 643; Muntenau 2011, 164). According to Muntenau 2011, 164, it is likely that small boats navigated the canal. Together with several other canals (**Nr. 202. 204**) and natural waterways, the canal forms an interconnected regional »system of navigation« (Wilkes 1998, 643).
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type indeterminate. **Dimensions** indeterminate. **Initiators and responsible agents** indeterminate.
References Muntenau 2011, 164. – Wilkes 1998, 643.

201 Iron Gate Canal

Latitude 44,6659, **Longitude** 22,5234. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Danube.
Written sources yes, **Archaeological sources** yes.
Construction/planning 1st cent. AD. **1st cent. AD** yes, **2nd cent. AD** yes.
Chronology The canal was built between AD 98 and 101 (Schwarz 2006, 57; Šašel 1977). **Reliability of dating and chronology** high.
Description To bypass the dangerous rapids at the Iron Gate, a bypass canal was cut during a military campaign under Trajan. The construction is mentioned in an inscription discovered at the site, and there is also archaeological proof for its existence (Campbell 2012, 225–226; Serban 2009, 33; Šašel 1977, 81; Felici 2016, 202). According to Serban 2009, 33, vestiges of the canal were observed in the 19th century and also in 1969, before they were flooded. According to these observations, the fairway of the canal was c. 10 m wide and flanked by earth banks up to 14 m high. According to Campbell 2012, 225–226, the name of the adjacent auxiliary fort »*Caput Bovis*« is »indicating the place where harnessed oxen began to tow the boats«.

Description of the written record The canal construction is mentioned in an inscription dated to AD 101 (Šašel 1977, 81): »*ob periculum cataractarum derivato flumine tutam Danuvi navigationem fecit*« (see also Serban 2009, 33). According to Šašel 1977, 84, »*nova flumina, novos pontes fluminibus iniectos*« in this area are also mentioned in a poem reproduced by Pliny.
Canal type parallel. **Dimensions** Length min. 3 km, fairway width perhaps c. 10 m. **Bank revetments and other infrastructure** towpath. **Initiators and responsible agents** military.
References Felici 2016, 202. – Schwarz 2006, 57. – Šašel 1977, 80–81. – Campbell 2012, 225. – Timoc 1996. – Muntenau 2011, 164–168. – Wawrzinek 2014, 36. – Serban 2009, 33. – Mirkovič 1996, 38–39. – Hadfield 1986, 20. – Pop-Lazic u. a. 2014, 74. – Timoc 2001. – Wilkes 2005, 151.

202 Progar Jarčina Canal

Latitude 44,7148, **Longitude** 20,1610. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Sava/Save.
Archaeological sources assumed.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed.
Chronology The canal is Roman, but the absolute chronology has not yet been fixed. **Reliability of dating and chronology** very low.
Description Remains of a Roman canal have been identified near Progar/Jarčina, which connects the River Sava with Progar (Wilkes 1998, 643; Muntenau 2011, 164). According to Muntenau 2012, 207–208, a fleet base of the *Classis Flavia Pannonica* was located at the mouth of the canal near *Singidunum*. Muntenau 2011, 164 suggests that the canal may have been navigable for small boats. Together with several other canals (**Nr. 200. 204**) and natural waterways the canal formed an interconnected regional »system of navigation« (Wilkes 1998, 643).
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type indeterminate. **Bank revetments and other infrastructure** fleet base. **Initiators and responsible agents** military(?).
References Muntenau 2011, 164; 2012, 207–208.

203 Trajan's Bridge Canal Iron Gate

Latitude 44,6104, **Longitude** 22,6483. **Reliability/precision of geographic location** high.
Connected to river, **Adjacent waterways** Danube.
Written sources yes.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed, **5th cent. AD** assumed, **6th cent. AD** assumed.
Chronology The date of construction is unclear as the source is from the 6th century. According to Šašel 1977, 81, the canal may have existed already when the bridge was under construction around 100, but this is not very convincing. **Reliability of dating and chronology** low.
Description According to Procopius, the canal is a navigable bypass around the impassable obstacle of the ruins of the Danube bridge built by Trajan and destroyed by later floods.
Description of the written record The canal is mentioned by Procopius, *De Aedificiis*, ed. Loeb/Thayer, book 4 chapter 6, 16. It reads: »when boats reached that point, the river was no longer navigable, since the ruins and the foundations of the bridge lay in the way; and it is for this reason that they compel the river to change its course and to go about in a detour, so that they may keep it navigable even beyond that point«. According to Šašel 1977, 84, a poem reproduced by Pliny also mentions »*nova flumina, novos pontes fluminibus iniectos*« in this area.
Canal type parallel/bypass canal. **Bank revetments and other infrastructure** bridge. **Initiators and responsible agents** military(?).
References Šašel 1977, 81–84. – Campbell 2012, 226. – Serban 2009, 33. – Mirkovič 1996, 38. – Procopius, *De Aedificiis*, ed. Loeb/Thayer, book 4 chapter 6, 16.

204 Veliki Begej Vojka Canal

Latitude 44,9350, **Longitude** 20,1514. **Reliability/precision of geographic location** very low.
Connected to river, **Adjacent waterways** Sava/Save.
Archaeological sources assumed.
Construction/planning Roman. **1st cent. AD** assumed, **2nd cent. AD** assumed, **3rd cent. AD** assumed, **4th cent. AD** assumed.

Chronology The canal is Roman, but the absolute chronology has not yet been fixed. **Reliability of dating and chronology** very low.
Description Remains of a Roman canal have been identified near Veliki Begej »which flows past the village of Vojka and links the canals of Progar/Jarčina and Galovica/Bezanija« (Wilkes 1998, 643; Muntenau 2011, 164). According to Muntenau 2011, 164, small boats may have navigated the canal. Together with the other canals (**Nr. 200. 202**) and natural waterways, it formed an interconnected regional »system of navigation« (Wilkes 1998, 643).
Critical remarks it is uncertain whether it was navigable/navigated.
Canal type indeterminate. **Initiators and responsible agents** indeterminate.
References Muntenau 2011, 164. – Wilkes 1998, 643.

Switzerland

205 Avenches

Latitude 46,9015, **Longitude** 7,0516. **Reliability/precision of geographic location** high.
Connected to lake, **Adjacent waterways** Lake Morat/Murtensee.
Archaeological sources yes.
Construction/planning 2nd cent. AD. **2nd cent. AD** yes, **3rd cent. AD** no.
Chronology The canal's construction is dated by dendrochronology to AD 125, whilst repairs are reported until 170 (Bonnet 1982, 24–26; Castella 2013, 52). **Reliability of dating and chronology** high.
Description The canal is connected to Lake Morat/Murtensee. It is a dead-end harbour canal ending close to a large *villa suburbana* outside the Roman town of Avenches/*Aventicum*. According to Arnold 2009, 168, »it seems likely that [a small natural] watercourse was diverted into the canal to keep it clean and prevent it from silting up«. Wooden revetments made of oak piles and horizontal planks as well as a towpath have been excavated and the canal may have served as a shipyard (Arnold 2009; Castella 2013, fig. 7; Bonnet 1982). According to Bonnet 1982, 20, the maximum water depth was 0.7 m. According to Castella 2013, 53, the canal was 870 m long and its water c. 0.8 m deep. The maximum excavation depth is c. 4 m. According to Wenzel 2014, 230, it is very likely that the canal was used to ship bricks from a large industrial-scale brick manufacture as well as stones for construction works. According to Pury-Gysel 2015, 144. 177, the canal was most likely built by the owner of the *villa suburbana*, C. Camillius Paternus, as named by an inscription on a large monument near the canal and dedicated to Silvanus and Neptun.
Canal type dead-end. **Dimensions** Length c. 0.9 km, width c. 7 m, water depth 0.8 m, canal depth c. 2 m.
Bank revetments and other infrastructure wooden revetments, harbour at the canal head, towpath. **Initiators and responsible agents** civic authorities/nobility(?).
References Castella 2013, 52–55. – Bonnet 1982. – Arnold 2009. – Pury-Gysel 2011, 21. 37. 42; 2015, 177. – SGUF 2002, 82–98. – Castella 2001. – Arnold 2013. – Eschenbach u. a. 1995. – Furger u. a. 2001, 145–151. – Schwarz 2006, 58–59. – Wawrzinek 2014, 228–230. – Felici 2016, 181. – Wenzel 2014, 230.

Tabellarische Übersicht aller katalogisierten Kanalbauten

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
1	Bruges Damme Canal / Damse vaart	Belgium	12th cent. AD														yes	yes
2	Bruges Old Zwin	Belgium	Early Middle Age											assumed	assumed	yes	yes	yes
3	Canal du Bergues / Bergenvaart	Belgium	13th cent. AD															yes
4	Gent Ketelvest Canal	Belgium	12th cent. AD													assumed	yes	yes
5	Gent Lieve	Belgium	13th cent. AD															yes
6	Lovaart / Canal de Lo	Belgium	12th cent. AD														yes	yes
7	Scheldt Canalisation	Belgium	10th cent. AD												yes	yes	assumed	assumed
8	Danube-Save Canal [*mutatio fossis*]	Croatia	3rd cent. AD					yes	assumed									
9	Kopilice	Croatia	Roman			assumed	assumed	assumed	assumed									
10	Osor Kavanela Canal	Croatia	Roman		assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed
11	Kanhave Canal	Denmark	8th cent. AD										yes	no				
12	Ribe	Denmark	High Middle Ages														assumed	yes
13	Abingdon Swift Ditch	England	11th cent. AD													yes	yes	yes
14	Aylmer Hall	England	Roman				assumed	assumed	assumed									
15	Bampton Canal	England	Early Middle Ages												assumed	yes	yes	yes
16	Bardney Abbey	England	High Middle Ages													assumed	assumed	
17	Barlings Abbey Canal	England	High Middle Ages														assumed	assumed
18	Bishop Dyke York	England	High Middle Ages													assumed	assumed	
19	Bottisham Lode	England	Middle Ages													assumed	yes	yes
20	Bourne Morton Car Dyke	England	Roman				assumed	assumed										
21	Bristol St. Augustine's Marsh	England	13th cent. AD															yes
22	Bullington Priory Canal	England	12th cent. AD														yes	yes
23	Butley Priory Canal	England	13th cent. AD															yes

Tab. 16 Gesamtübersicht aller Kanäle im Katalog von der Antike bis zum 13. Jh. mit chronologischen Informationen (Bauzeit/Planungszeitraum und jahrhundertweise Belege für Bauarbeiten, Instandhaltung und Nutzung). | Overview of all canals from antiquity to the 13th cent. AD as listed in the catalogue, together with their chronological data (construction/planning periods and evidence for work, maintenance, sorted according to century).

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
24	Bykers Dyke	England	Middle Ages													yes	assumed	
25	Cambridge	England	High Middle Ages														assumed	yes
26	Car Dyke Lincolnshire	England	Roman				assumed	assumed								yes	yes	yes
27	Cheddar Yeo Canal	England	High Middle Ages														assumed	yes
28	Cirencester	England	2nd cent. AD			assumed	yes	yes	assumed									
29	Cnut's Dyke [*magna lada?*]	England	Middle Ages												assumed	assumed	yes	
30	Colne Ditch	England	Roman				assumed	assumed										
31	Crowland Cut South Eau	England	Middle Ages													assumed	yes	yes
32	Darcey Lode Oxlode	England	Middle Ages															yes
33	Deeping Car Dyke	England	Roman				assumed	assumed										
34	Ebbsfleet	England	11th cent. AD													yes	no	
35	Ely Cut	England	High Middle Ages														assumed	assumed
36	Fen Causeway Canal	England	2nd cent. AD				yes	yes	no									
37	Fens Flaggrass Stonea Canal	England	Roman				yes	assumed										
38	Foss Dyke Lincoln-Torksey	England	12th cent. AD			assumed	assumed						assumed	assumed	assumed	assumed	yes	yes
39	Glastonbury Anglo-Saxon Canal	England	Early Middle Ages												assumed	assumed		
40	Glastonbury Mill Stream	England	Middle Ages													yes	yes	yes
41	Glastonbury New Brue	England	Middle Ages														yes	yes
42	Glastonbury Pilrow Cut	England	13th cent. AD															yes
43	Glen Car Dyke	England	Roman				assumed	assumed										
44	Itchen Canalisation	England	11th cent. AD												assumed	yes	yes	assumed
45	Kings Dyke [*magna lada?*]	England	Middle Ages												assumed	assumed	yes	yes
46	Kings Lynn Nar	England	High Middle Ages													assumed	assumed	assumed
47	London Bridge	England	11th cent. AD													yes		
48	Meaux Abbey Eschedike	England	12th cent. AD														yes	yes
49	Meaux Abbey Forth Dyke	England	13th cent. AD															yes
50	Meaux Abbey Monk Dyke	England	13th cent. AD															yes

Tab. 16 Fortsetzung. | Continued.

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
51	Meaux Abbey Skerndike	England	13th cent. AD															yes
52	Nene Diversion	England	Middle Ages												assumed	assumed	assumed	yes
53	Norwich Cathedral Canal	England	High Middle Ages														assumed	assumed
54	Old Tillage Canal	England	2nd cent. AD				yes	yes	assumed	no								
55	Ramsey Abbey Lode	England	12th cent. AD														yes	yes
56	Reach Lode	England	Middle Ages													yes	yes	yes
57	Reading	England	13th cent. AD														assumed	yes
58	Rhee Wall	England	13th cent. AD															yes
59	Rhuddlan Clwyd Canal	England	13th cent. AD															yes
60	Rippingale Car Dyke	England	Roman				assumed	assumed										
61	Sandwich Scipryne	England	Early Middle Ages													yes		
62	Sawtry Abbey Monks Lode	England	12th cent. AD														yes	assumed
63	Selby Abbey Monk Fryston Canal of Abbot Hugh	England	12th cent. AD														assumed	yes
64	Slade Lode Leam	England	Middle Ages															assumed
65	Swaffham Lode	England	Middle Ages													assumed	assumed	yes
66	Swavesey Lodes	England	High Middle Ages														assumed	assumed
67	Tupholme Abbey	England	12th cent. AD														yes	
68	Ubbemaerelade/Merelade	England	Early Middle Ages												yes	assumed		
69	Waltham Abbey Canal of Abbot Walter	England	12th cent. AD														yes	yes
70	Well Creek	England	13th cent. AD															yes
71	West Water	England	Middle Ages													yes	yes	yes
72	Wimblington	England	Roman				assumed	assumed										
73	Yaxley Lode	England	Early Middle Ages												yes	yes	yes	yes
74	Amiens	France	Early Middle Ages												assumed	yes	yes	yes
75	Anchin Monastery	France	12th cent. AD														yes	assumed
76	Autun Le Canal du Touron	France	Roman		assumed	assumed	assumed	assumed	assumed	assumed								
77	Bar-le-Duc	France	Roman		assumed	assumed	assumed	assumed	assumed	assumed								

Tab. 16 Fortsetzung. | Continued.

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
78	Beauvais Gonard Canal	France	Roman					assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed
79	Boigny-sur-Bionne Le Grand Bouland	France	12th cent. AD														yes	yes
80	Bonnefamille	France	Middle Ages								assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed
81	Bouxwiller	France	Middle Ages								assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed
82	Caen Nouvelle Odon	France	11th cent. AD													yes	assumed	assumed
83	Caen Robert Canal	France	11th cent. AD													yes	yes	yes
84	Calais	France	12th cent. AD														yes	yes
85	Canal de la Colme	France	13th cent. AD															yes
86	Canal Poitou	France	12th cent. AD														yes	
87	Châlons-en-Champagne/ Marne	France	11th cent. AD												assumed	yes	yes	yes
88	Château-Thierry	France	13th cent. AD															yes
89	Colmar Place du 2 février	France	Middle Ages								assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed
90	Conteville *Fossa Herluini*	France	11th cent. AD													yes	assumed	
91	Corneillan near Lunel	France	11th cent. AD													yes		
92	Dassargues near Lunel	France	10th cent. AD												yes	yes		
93	Doaui Scarpe Vitry	France	10th cent. AD												assumed	yes	yes	yes
94	Douai Scarpe Arleux	France	11th cent. AD													yes	yes	yes
95	*Fossa Augusta* Orange	France	Roman		assumed	assumed												
96	*Fossa Mariana* Rhône Delta	France	pre 1st cent. BC	yes	yes	assumed	no											
97	Fréjus	France	Roman			assumed	assumed	assumed										
98	La Celle-en-Morvan Polroy	France	Roman		assumed	assumed	assumed	assumed	assumed	assumed								
99	Lattes	France	13th cent. AD															yes
100	Lattes la Cereirede	France	pre 1st BC	yes	yes	yes	yes											
101	Lyon	France	1st cent. AD			yes	no											
102	Metz Place Mazelle	France	13th cent. AD														assumed	yes
103	Montrelais/ Varades Le Canal Torse	France	High Middle Ages													assumed	yes	yes
104	Nantes	France	6th cent. AD								yes							

Tab. 16 Fortsetzung. | Continued.

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
105	Narbonne Lagoon	France	1st cent. AD			yes	yes	yes	yes	yes								
106	Narbonne Saint-Loup	France	1st cent. BC		yes	yes	yes	yes	no									
107	Oedenburg Biesheim Riedgraben	France	1st cent. AD			yes	yes											
108	Orange	France	Roman		assumed	assumed	assumed	assumed	assumed	assumed								
109	Pontorson Couesnon	France	12th cent. AD														yes	
110	Rosières-aux-Salines	France	unclear							assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed
111	Saint-Lyphard Rue des Gros Fosses	France	Middle Ages								assumed	assumed	assumed	assumed	assumed	assumed	assumed	assumed
112	Saint-Omer	France	10th cent. AD												yes	yes	yes	yes
113	Saint-Omer Nouvelle Aa	France	12th cent. AD														yes	yes
114	Saône-Mosel-Canal	France	1st cent. AD			yes	no											
115	Senlis Nouvelle Rivière	France	High Middle Ages											assumed	assumed	assumed	yes	assumed
116	Tendu	France	1st cent. AD			yes												
117	Troyes	France	1st cent. AD			yes	yes	yes										
118	Troyes Canal de Jaillard	France	Middle Ages														assumed	assumed
119	Vienne Rue Victor Faugier	France	Roman		assumed	assumed	assumed	assumed	assumed	assumed								
120	Calbe Stift Gottesgnaden	Germany	12th cent. AD														yes	
121	Karlsgraben / *Fossa Carolina*	Germany	8th cent. AD										yes					
122	Landgraben Hessisches Ried	Germany	Roman			assumed	assumed	assumed										
123	Müritz Canal	Germany	High Middle Ages															assumed
124	Passau	Germany	13th cent. AD possible															assumed
125	Recknitz-Trebel Canal	Germany	High Middle Ages															assumed
126	Regensburg Donaumarkt [most likely no canal]	Germany	10th cent. AD possible											assumed	assumed	assumed		
127	Regensburg Steinerne Brücke [most likely no canal]	Germany	High Middle Ages													assumed	assumed	assumed
128	Altino	Italy	1st cent. BC		yes	yes	yes	yes	yes	assumed								
129	Aquileia Canale Anfora	Italy	1st cent. AD			yes	yes	yes	no									
130	Ariano nel Polesine	Italy	Roman		assumed	yes												
131	Bologna - Argenta Canal	Italy	Middle Ages														assumed	yes

Tab. 16 Fortsetzung. | Continued.

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
132	Brescia	Italy	Early Middle Ages							assumed	assumed	assumed	assumed					
133	Brescia Naviglio Civico	Italy	13th cent. AD															yes
134	Canale delle Bebbe	Italy	Early Middle Ages												yes	yes		
135	Circeo Lago di Sabaudia / Paola	Italy	Roman		assumed	yes												
136	Comacchio	Italy	8th cent. AD									assumed	yes	yes				
137	Comacchio Canale Pallotta/ Girata	Italy	unclear									assumed	assumed	assumed	assumed			
138	Corte Cavanella [*Mansio Fossis*]	Italy	1st cent. AD		assumed	yes	yes	yes	yes	yes								
139	Cremona Cremonella	Italy	13th cent. AD															yes
140	Cremona Taleata/ Tagliata Canal	Italy	13th cent. AD															yes
141	Este Canale Bisatto	Italy	12th cent. AD														yes	
142	Este Canale Sirone	Italy	Middle Ages									assumed	assumed	assumed	assumed	assumed		
143	Etsch / Adige Canal Augustus	Italy	1st cent. BC		yes													
144	Ferrara - Bologna Naviglia Canal	Italy	High Middle Ages														assumed	yes
145	*Fossa Clodia / Claudia*	Italy	1st cent. AD			yes	yes	yes	yes	yes	yes	yes	yes	yes	yes			
146	*Fossa Flavia*	Italy	1st cent. AD	assumed	assumed	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes			
147	Heracleia Cittanovia	Italy	unclear					assumed	assumed	assumed	assumed	yes	yes					
148	Imola Conselice	Italy	11th cent. AD													yes		
149	Iulia Concordia / Concordia Sagittaria	Italy	1st cent. BC		yes	assumed	assumed	assumed	assumed	assumed								
150	Iuvenalta / Genivolta	Italy	Early Middle Ages											yes				
151	Lago di Fogliano	Italy	Roman			yes												
152	Lago d'Averno Canal of Agrippa	Italy	1st cent. BC		yes													
153	Milano / Mailand	Italy	1st cent. AD			yes	yes	yes	yes	assumed								
154	Milano / Mailand Naviglio Grande	Italy	12th cent. AD														yes	yes
155	Milano / Mailand Piazza Resistenza Vettabbia / Vepra canal	Italy	Roman			assumed	assumed	assumed	assumed	assumed	assumed	assumed				assumed	assumed	

Tab. 16 Fortsetzung. | Continued.

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
156	Milano / Mailand Porta Tosa Canal	Italy	12th cent. AD														yes	
157	Mantua	Italy	Roman			assumed	assumed	assumed										
158	Mantua Canal Mincio - Adige	Italy	12th cent. AD														yes	assumed
159	Modena Po Canal	Italy	11th cent. AD													yes	yes	yes
160	Modena	Italy	Roman		assumed	yes	yes	yes	yes	assumed	assumed	assumed	assumed	assumed	assumed			
161	Muzza-Canal near Cassano	Italy	13th cent. AD															yes
162	Nonantola	Italy	unclear											assumed				
163	Oderzo	Italy	Roman		assumed	yes	yes	assumed	assumed									
164	Ostia-Puteoli *Fossa Neronis*	Italy	1st cent. AD			yes	no											
165	Padua-Monselice Canale di Battaglia	Italy	12th cent. AD														yes	yes
166	Parma Po Canal	Italy	pre 1st cent. BC	yes	yes	assumed	assumed	assumed	assumed									
167	Piacenza	Italy	1st cent. BC		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
168	Pisa *Fossa Papirianae*	Italy	Roman			yes	yes	yes										
169	Pomptinian Marshes Forum Appii-Terracina [*Decemnovium*]	Italy	1st cent. BC		yes	yes	yes	yes	yes	yes	yes	assumed	assumed	assumed	assumed	assumed	assumed	assumed
170	Portus Canale di Fiumencino [*Fossa Traiana*]	Italy	1st cent. AD			yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
171	Portus Canale Romano	Italy	2nd cent. AD				yes	yes	assumed									
172	Portus Canale Traverso	Italy	1st cent. AD			yes	yes	yes	yes	yes	yes	yes	yes	yes				
173	Portus Northern Canal	Italy	Roman			assumed	assumed											
174	Portus-Ostia Canal	Italy	Roman			assumed	yes	assumed										
175	Ravenna *Fossa Asconis*	Italy	5th cent. AD							yes	yes	yes	yes	yes				
176	Ravenna *Fossa Augusta*	Italy	1st cent. BC		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	assumed
177	Ravenna *Fossa Lamisa* / *Fossa Amnis*	Italy	1st cent. BC		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				
178	Ravenna Naviglio	Italy	High Middle Ages													assumed	yes	yes
179	Ravenna Padareno	Italy	Early Middle Ages							assumed	assumed	assumed	yes	yes	yes	yes	yes	yes
180	Ravenna / Classe Harbour Canal	Italy	1st cent. BC		yes	yes	yes	yes	yes	yes	yes	yes	yes	yes				

Tab. 16 Fortsetzung. | Continued.

Cat. no.	Name	Country	Construction / planning	pre-1st cent. BC	1st cent. BC	1st cent. AD	2nd cent. AD	3rd cent. AD	4th cent. AD	5th cent. AD	6th cent. AD	7th cent. AD	8th cent. AD	9th cent. AD	10th cent. AD	11th cent. AD	12th cent. AD	13th cent. AD
181	Rome Augustus-Mausoleum	Italy	1st cent. BC		yes													
182	Rome *Naumachia Augusti*	Italy	1st cent. BC		yes	yes												
183	Rome Tiber Canalisation	Italy	Roman		assumed	assumed	assumed											
184	Salapia near Trinitapoli	Italy	1st cent. BC		yes	assumed												
185	Secchia-Canal	Italy	13th cent. AD															yes
186	Spina Harbour Canal	Italy	pre 1st cent. BC	yes	assumed	assumed	assumed	assumed	assumed	assumed	assumed							
187	Venice and Torcello	Italy	pre 1st cent. BC	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
188	Alphen-Gouda Gouwe Canal	Netherlands	13th cent. AD															yes
189	Amstel-Canal	Netherlands	12th cent. AD														yes	yes
190	*Fossa Corbulonis*	Netherlands	1st cent. AD			yes	yes	assumed	no									
191	*Fossa Drusiana*	Netherlands	1st cent. BC		yes	yes	assumed	assumed										
192	Groningen	Netherlands	13th cent. AD															yes
193	Leiderdorp	Netherlands	8th cent. AD										yes	yes				
194	Scheldt-Maas Canal	Netherlands	Roman			assumed	assumed											
195	Thiel	Netherlands	Middle Ages											assumed	assumed	assumed	assumed	
196	Utrecht Nieuwe Vaart / Vaartse Rijn	Netherlands	High Middle Ages														assumed	yes
197	Utrecht Oude Gracht	Netherlands	12th cent. AD														yes	yes
198	Spangereid	Norway	Roman			assumed	assumed	assumed	assumed	assumed								
199	Gdansk / Danzig	Poland	12th cent. AD														yes	yes
200	Galovica Bezanija Canal	Serbia	Roman			assumed	assumed	assumed	assumed									
201	Iron Gate Canal	Serbia	1st cent. AD			yes	yes											
202	Progar Jarčina Canal	Serbia	Roman			assumed	assumed	assumed	assumed									
203	Trajan's Bridge Canal Iron Gate	Serbia	Roman			assumed	assumed	assumed	assumed	assumed	assumed							
204	Veliki Begej Vojka Canal	Serbia	Roman			assumed	assumed	assumed	assumed									
205	Avenches	Switzerland	2nd cent. AD				yes	no										

Tab. 16 Fortsetzung. | Continued.