

Living With Water and Flood in Medieval and Early Modern Hull

BRIONY McDONAGH

University of Hull

Email: b.mcdonagh@hull.ac.uk

<https://orcid.org/0000-0003-3078-139X>

HANNAH WORTHEN

University of Hull

Email: Hannah.Worthen@hull.ac.uk

<https://orcid.org/0000-0002-7165-6432>

STEWART MOTTRAM

University of Hull

Email: S.Mottram@hull.ac.uk

<https://orcid.org/0000-0003-3110-3777>

STORMM BUXTON-HILL

University of Hull

Email: Stormm.Buxton-Hill@hull.ac.uk

ABSTRACT


This paper explores Hull's histories of living with water and flood in the period between the foundation of the town in the 1260s and c. 1700, examining how the inhabitants, Corporation and Commissioners of Sewers managed and governed water in order to survive and thrive in a risky yet resilient estuarine environment. It does that as part of a bigger project utilising 'learning histories' drawing on Hull's 800-year experience of living with water and flood to drive climate awareness and flood resilience in a city which has experienced major flooding in recent years and is increasingly vulnerable in the face of future climate change. Here, we use civic and other records to reconstruct a flood timeline for medieval and early modern Kingston-Upon-Hull, revealing a history of repeated flood events impacting the town and surrounding area in the centuries after its foundation in c. 1260. We explore who managed and governed water and flood risk, and how this was achieved, arguing that water management was a pervasive concern as well as a collective and shared responsibility which ultimately generated a 'living with water mentality'.

KEYWORDS

Water, flood, governance, risk, resilience

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INTRODUCTION

Today, human-induced climate change is increasing the frequency, intensity and severity of flood events, with a growing global population exposed to coastal flooding and associated adverse impacts on infrastructure and economies.¹ Addressing this challenge requires communities to learn to live better with water, building water and flood resilience at the regional, national and global scales. In this paper we argue for a green-blue humanities approach to this urgent societal challenge, thinking forward through the past in order to drive climate awareness and action. More specifically, we explore histories of water management and governance in the critical green-blue zone between land and sea, presenting a case study from Kingston-Upon-Hull on the North Sea coast of the UK as the core of a wider project to build flood resilience for today and the future.² Approximately ninety per cent of the modern city of Hull lies below the high tide mark and the city has more homes at risk of tidal flooding than any other UK city outside London.³ There have been a number of recent flood events which have adversely impacted people and businesses within the city. Severe flooding in June 2007 affected 8,600 households and 1,300 businesses, displacing 6,300 people into temporary accommodation, some for many months or years.⁴ In December 2013, a storm surge overtopped flood defences, flooding 400 homes and 115 businesses in Hull and the East Riding of Yorkshire, and the Hull Tidal Surge Barrier – which protects 19,000 properties in the city – was within 40 centimetres of overtopping.⁵ Future sea level rise – now unavoidable – combined with increased storminess and heavy rainfall will leave Hull ever more vulnerable in the future. Yet engaging diverse communities in meaningful climate action and flood resilience behaviour is a significant

1. IPCC, *Summary for Policy Makers* (Cambridge and New York: Intergovernmental Panel on Climate Change, 2022). https://www.ipcc.ch/report/ar6/wg2/downloads/report/IPCC_AR6_WGII_SummaryForPolicyMakers.pdf
2. On flood resilience and its critiques, see S. Davoudi, 'Resilience: A bridging concept or a dead end?' *Planning Theory & Practice* **13** (2) (2012): 299–307; M. Kaika, 'Don't call me resilient again!: The New Urban Agenda as immunology ... or ... what happens when communities refuse to be vaccinated with "smart cities" and indicators', *Environment and Urbanisation* **29** (1) (2017): 89–102. See also T. Soens, 'Resilient societies, vulnerable people: Coping with North Sea floods Before 1800', *Past & Present* **241** (1) (2018): 143–77, on whether concepts of resilience and vulnerability can be usefully applied to studying histories of disaster.
3. *City Water Resilience Assessment: City Characterisation Report: Hull*. Available at City Characterisation Report Hull - Arup (accessed 15 Sept. 2022).
4. T.J. Coulthard and L.E. Frostick 'The Hull floods of 2007: implications for the governance and management of urban drainage systems', *Journal of Flood Risk Management* **3** (3) (2010): 223–31.
5. Hull City Council, *Hull City Council Flood Investigation Report: December 2013 City Centre Tidal Surge Flood Event* (Feb. 2015): <https://www.hull.gov.uk/sites/hull/files/media/Editor%20-%20Planning/Tidal%20surge%20December%202013.pdf> (accessed 11 Aug. 2022).

challenge faced by regional government agencies and water sector partners. In May 2022, only 6.6 percent of Hull's population were signed up to receive Environment Agency Flood Alerts, for example, compared to more than forty per cent of the population in nearby Doncaster, Harrogate and Barnsley.⁶ This paper and the wider *Risky Cities* project address this need by using arts-led interventions drawing on Hull's histories of living with water and flood to drive flood resilience behaviours and action.

Large-scale public arts interventions and arts-led community engagement offer opportunities to raise climate change awareness and drive climate action, as an emerging body of literature demonstrates.⁷ For example, the recent *Hydrocitizenship* project used arts-based engagement to (re)weave 'local knowledges, experiences, perceptions, and values of water and place' and to build participation in 'co-visioning resilient futures', while the RisingEMOTIONS project used public art installations to capture people's emotions in relation to sea level rise and prompt awareness and action on climate change.⁸ However, although several of the projects engaged with flood memories and recent oral histories, none made explicit use of pre-twentieth century histories of living with water and flood in order to drive climate resilient actions. The UKRI-funded *Risky Cities* project recovers the histories and fictions of living with water and flood over 800 years and utilises these 'learning histories' in large-scale arts interventions and a community engagement programme. In doing so, it assesses the effectiveness of mobilising historically-informed, place-based interventions in raising climate awareness and building flood resilience actions. Thus, the *Risky Cities* project makes the case for thinking across time periods and beyond traditional historical periodisation so as to hold in dialogue the pre-modern past and as yet uncertain futures. In this paper we examine the histories that informed our arts-led engagement programme. While the bigger project

6. Hull City Council, *Residents Urged to Register for Flood Warnings as Only 6.6 per cent Signed up* (June 2022): <https://www.hullccnews.co.uk/23/06/2022/residents-urged-to-register-for-flood-warnings-as-hull-lags-behind-other-yorkshire-cities/> (accessed 11 Aug. 2022)
7. For an overview, see E. Brookes, B. McDonagh, C. Wagner, J. Ashton, A. Harvey-Fishenden, A. T. Kennedy-Asser, N. McDonald and K. Smith, 'Learning from arts and humanities approaches to building climate resilience in the UK', in S. Dessai, K. Lonsdale, J. Lowe and R. Harcourt (eds), *Quantifying Climate Risk and Building Resilience in the UK* (London: Palgrave Macmillan, 2024), pp. 75–89..
8. L. McEwen, L. Gorell Barnes, K. Phillips and I. Biggs, 'Reweaving urban water-community relations: Creative participatory river "daylighting" and local hydrocitizenship', *Transactions – Institute of British Geographers* 45 (4) (Dec. 2020): 779; C. Aragon, M. Jasim and N. Mahyar, 'RisingEMOTIONS: Bridging art and technology to visualise public's emotions about climate change', *Creativity and Cognition* 21 (2) (2021): 1–10. On using creative methods to better understand people's experiences of flooding and drive policy change in relation to this, see A.L. Williams, A. Bingley, M. Walker, M. Mort and V. Howells, "'That's where I first saw the water": Mobilising children's voices in UK Flood Risk Management', *Transfers* 7 (3) (Dec. 2017): 76–93. See also the HighWaterLine project (<https://highwater-line.org/>) which uses predicted sea levels and draws them across the city with communities to raise awareness.

addressed an 800-year period, the focus of this paper is on Hull's experiences of living with water and flood between the foundation of the town in the 1260s and c. 1700, in part because – as we note above – pre-twentieth-century histories of water have not previously been employed in driving climate and water action; in part because the participatory nature of flood risk management in the pre-modern period offers useful analogues for enhancing hydrocitizenship today; and in part because – as historians and historical geographers – we believe the distinct pre-modern conceptualisations of floods evident in our source materials are worthy of further investigation. In what follows, we examine how the inhabitants and Corporation managed and governed water in order to survive and thrive in a risky yet resilient estuarine environment.

In doing so, we address two persistent research gaps. Geographers, historians and archaeologists have long been fascinated by watery, marginal landscapes, but they have typically been concerned with histories of reclamation – the *making* of modern landscapes, particularly in rural areas – rather than water governance, flood risk management and resilience building in the period before drainage and improvement.⁹ Far less has been said about living with water and flood in the pre-modern period. More recently, Gardiner – who used maps, landscape evidence and charters to explore wetland management in the medieval Witham valley in Lincolnshire – has identified 'an emerging alternative history of wetland usage'.¹⁰ This includes scholarship by Jones and Kilby who use court records and place names to demonstrate that early medieval communities took 'proactive and practical steps' to reduce the impacts of flood hazards; by Crouch and McDonagh who shed light on an unusual system of wetland management in Wallingfen in the East Riding of Yorkshire; and by Morgan who uses the records of the Commissioners of Sewers to argue that water management was 'deeply woven into the social fabric of communities'.¹¹

9. H.C. Darby, *The Medieval Fenland* (Cambridge: Cambridge University Press, 1940); W. G. Hoskins, *The Making of the English Landscape* (London: Hodder and Stoughton, 1955), pp. 95–100; J. Purseglove, *Taming the Flood. A History and Natural History of Rivers and Wetlands* (Oxford: Oxford University Press, 1988); H. Cook and T. Williamson (eds), *Water Management in the English Landscape. Field, Marsh and Meadow* (Keele: Keele University Press, 1999); S. Rippon, *The Transformation of Coastal Wetlands: Exploitation and Management of Marshland Landscapes in Northwest Europe during the Roman and Medieval Period* (Oxford: Oxford University Press, 2000).
10. M. Gardiner, 'A landscape of medieval common peat fens: The Lower Witham Valley and Wildmoor, Lincolnshire', *Landscapes* 22 (2) (2022): 173–90.
11. R. Jones and S. Kilby, 'Mitigating riverine flood risk in Medieval England', in C.M. Gerrard, P. Forlin and P.J. Brown (eds), *Waiting for the End of the World? New Perspectives on Natural Disasters in Medieval Europe* (London: Routledge, 2020), pp. 165–82; D. Crouch and B. McDonagh, 'Turf wars: conflict and cooperation in the management of Wallingfen (East Yorkshire), 1281–1781', *The Agricultural History Review* 64 (2) (2016): 133–56; J.E. Morgan, 'The micro-politics of water management in early modern England: Regulation and Representation in Commission of Sewers', *Environment and History* 23 (2017): 409–30. See also: A.E.B. Owen, 'The custom of Romney March and the Statute of Sewers of 1427', *Archaeologia Cantiana* 116 (1996): 93–100; J.A. Galloway 'Storm flooding, coastal defence

There is also important scholarship on wetland governance and flood risk management elsewhere in the North Sea Littoral regions¹² and on flood mentalities and cultures of catastrophe in Asia, some of which specifically points to the ongoing need for more UK case studies that facilitate comparative work and allow us to better explore shared histories of risk and resilience across Northern Europe and beyond.¹³

At the same time, cultural, medical and environmental histories of urban water management have said little about flood and flood risk. Skelton and Jørgensen have conducted excellent histories of water for medieval and early modern English and Scottish towns, mapping the ways in which managing water supplies and infrastructure were crucial parts of urban society and governance.¹⁴ Yet these case studies have generally focused on the risks associated with mixing ‘fresh’ and ‘foul’ waters for the town’s good environment and the health of its inhabitants, rather than looking at how water supply issues

and land use around the Thames estuary and tidal river c.1250–1450’, *Journal of Medieval History* 32 (2) (2009): 171–88, who discusses Thames floods in the period c. 1250–1450, touching on the institutional arrangements and technology used to manage flooding as well as the impacts of flooding on land values, and including a case study of the floods at Barksore (Kent) in the 1330s; Morgan, ‘Funding and organising flood defence in eastern England, c.1570–1700’, in G. Nigro (ed.), *Gestione dell’acqua in Europa (XII–XVIII Secc.): Water Management In Europe (12th–18th Centuries)* (Firenze: Firenze University Press, 2018), pp. 413–31.

12. D. Curtis, ‘Danger and displacement in the Dollard’, *Environment and History* 22 (1) (2016): 103–35; T. Soens, ‘Explaining deficiencies of water management in the late medieval Flemish coastal plain, 13th–16th Centuries’, *Jaarboek voor Ecologische Geschiedenis* (2005/6): 35–61; T. Soens, ‘Flood security in the medieval and early modern North Sea Area: A question of entitlement?’, *Environment and History* 19 (2) (2013): 209–32; M. Van Tielhof, ‘Forced solidarity: Maintenance of coastal defences along the North Sea Coast in the early modern period’, *Environment and History* 21 (2015): 319–50.
13. O. Weintritt, ‘The floods of Baghdad: Cultural and technological responses’, in C. Mauch and C. Pfister (eds), *Natural Disasters, Cultural Responses: Case Studies Towards a Global Environmental History* (Lanham and Plymouth: Lexington Books, 2009), pp. 165–82; G. Bankoff, ‘The “English Lowlands” and the North Sea basin system: A history of shared risk’, *Environment and History* 19 (1) (2013): 3–37; G. Bankoff, ‘Malaria, water management, and identity in the English Lowlands’, *Environmental History* 23 (3) (2018): 470–94.
14. D. Jørgensen, ‘Local government responses to urban river pollution in late medieval England’, *Water History* 2 (1) (2010): 35–52; L. Skelton, *Sanitation in Urban Britain, 1560–1700* (London: Routledge, 2015). See also: W. King, ‘How high is too high? Disposing of dung in seventeenth-century Prescot’, *Sixteenth Century Journal* 23 (3) (1992): 443–57; G. King and C. Henderson, ‘Living cheek by jowl: The pathoecology of medieval York’, *Quaternary International* 341 (2014): 131–42; for wider European context, see R.C. Trexler, ‘Measures against water pollution in fifteenth-century Florence’, *Viator* 5 (1974): 455–67; M. Kucher, ‘The use of water and its regulation in medieval Sienna’, *Journal of Urban History* 31 (2005): 504–36; D. Gentilcore, ‘From “vilest beverage” to “universal medicine”: drinking water in printed regimens and health guides, 1450–1750’, *Social History of Medicine* 33 (3) (2018): 686; G. Bankoff ‘Of time and timing: Internal Drainage Boards and water level management in the River Hull Valley’, *Environmental History* 27 (1) (2022): 86–112.

intersected with flooding.¹⁵ Responding to this, our paper builds on the arguments of other urban scholars about the importance of water management in motivating and shaping governance structures in the medieval and early modern period as well as the link between these measures and mitigating flood risk.¹⁶ We use the case study of Kingston-upon-Hull to argue that the collective management of water and flood in urban areas was a familiar, necessary and all-absorbing aspect of medieval and early modern life in coastal zones prior to land drainage. Moreover, by tracing the ‘shared experience of risk and the political, social, and economic adaptations required to better be able to manage it’ that Greg Bankoff has highlighted as a feature of the pre-modern English coastal zone,¹⁷ we identify a ‘living with water mentality’ within late medieval and early modern Hull. Our examination of Hull’s experience of managing and governing water and flood therefore offers an important, transdisciplinary contribution to emerging scholarship on pre-modern watery zones across Europe.

Located at the confluence of the River Hull and the Humber Estuary, the medieval town of Hull – as it was mostly known – benefitted from a sheltered tidal haven and excellent connections by water to both the North Sea and to inland towns including York (Figure 1). It was a small town with a population of about 3,000 in 1377 that remained stable until the early sixteenth century.¹⁸ Trade boomed in the later medieval period and access to the sea via the Humber Estuary also offered opportunities to re-provision the town in times of crisis, for example during the Civil War sieges of the mid-seventeenth century. Yet its location on the banks of the Humber and the Hull brought problems as well as benefits. The area was low-lying, wet and marshy, and the town was subject to repeated floods throughout its 800-year history. Flooding was not always undesirable: indeed, annual flooding brought sediment to low-lying grazing grounds, thereby improving fertility. But storms, tidal surges and river floods that breached or overtopped defences and brought water into homes, warehouses, streets and fields endangered lives and livelihoods. This was a dynamic environment, a critical green-blue zone where the interface between land and sea was continually shifting. Living successfully with water meant that the Corporation and townspeople of Hull spent centuries negotiating and managing flood risk, and its implications for drinking water supplies, drainage and agriculture, and access to the haven (and later the port).

15. With the exception of Jørgensen, who notes that the town authorities in Coventry were aware of risk of flooding if sedimentation built up, see Jørgensen, ‘Local government responses to urban river pollution’, 46.

16. D. Jørgensen, ‘“All good rule of the citee”: Sanitation and civic government in England, 1400–1600’, *Journal of Urban History* 36 (3) (2010): 300–315; M. Jenner, ‘From conduit community to commercial Network?’

17. Bankoff, ‘Malaria, water management, and identity in the English Lowlands’, 4.

18. Jennifer Kermode, *Medieval Merchants: York, Beverley and Hull in the Later Middle Ages* (Cambridge: Cambridge University Press), p. 10.

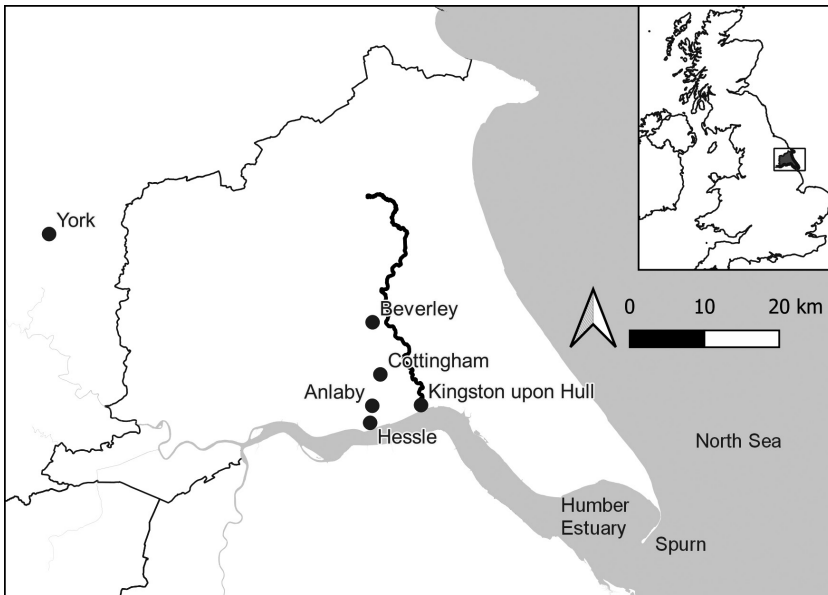


Figure 1. Map of the East Riding, showing the River Hull and places mentioned in the text (copyright the authors).

In this sense, the Corporation of Hull shared many of the concerns of other English towns and cities. What is exceptional about Hull is the quality of its surviving records, which offer near-unique insights into the history of water management and governance in an English estuarine town in the medieval and early modern period. In this paper, we draw on two principle collections: the complete run of civic Bench Books (1445–1835, with earlier material c. 1339 onwards) and the Courts of Sewers records for Hull and East Riding (1531–1930). The Bench Books – the records of the orders made by the governing body of the town, consisting of the mayor and twelve aldermen – show that the town’s corporation was regularly involved in the management of their common waterways, recording orders and expenditure in relation to flood infrastructure and flood damage, even whilst they do not offer a detailed record of individual flood events. The Commissions of Sewers were also focused on flood mitigation but their sphere of influence went beyond the town of Hull to take in the wider ‘Hull & County’ region.¹⁹ Existing from the twelfth century onwards and first given statutory power by an Act of Parliament of 1427, commissions of sewers operated in coastal and lowland areas to manage rivers and watercourses and defend coastlines from ‘the outrageous Flowing Surges, and

19. A parcel of Sessions of Sewers for the town and County of Hull, 1551–1680, The Records of the East Riding Commissioners of Sewers, Hull History Centre (hereafter HHC) CJS/1/15.

Course of the Sea'.²⁰ The emphasis was on mitigating flooding through regular maintenance of infrastructure including 'Walls, Ditches, Banks, Gutters, Sewers'.²¹ There were separate commissions for East Yorkshire and 'Hull & County', and we draw here on the archives for both.²² Commissioners appointed jurors to survey sites and report on defects, and the commissioners had power to levy taxes on the 'owners and occupiers' of land adjoining the particular water-course, bank or bridge in need of dredging or repair.²³ These archival records have been utilised here alongside George Hadley's eighteenth-century history of the town and information recorded in the Calendar of Patent Rolls for the thirteenth and early fourteenth centuries for the period before the main series of Bench Books begins. Despite the richness of Hull's surviving records of water management, the Bench Books and Courts of Sewers records have neither been published nor brought to public attention through the kind of systematic analysis we undertake here. Our extensive use of these archives therefore brings important new insights to our understanding of water management and governance, of significance for historians and historical geographers of Hull and Europe's pre-modern coastal zones more widely.

In this paper, we explore the when, how and who of pre-modern water management and governance. We reconstruct – for the first time – a flood timeline of medieval and early modern Hull ('when') and critically examine the physical infrastructure ('how') and governance arrangements ('who') by which water was managed and flood risk mitigated in the medieval and early modern period. In doing so, we explore the impacts of flooding – including various kinds of loss and damage – as well as touching briefly on examples of flood adaptations, and on the questions of flood recovery and flood equity. The remainder of the paper is divided into three sections which consider, in turn, three different aspects of living with water in medieval and early modern Hull: firstly, managing and mitigating flood risk, including reconstructing Hull's flood history; secondly, securing the provision of drinking water by creating and maintaining infrastructure; and finally, dealing with the intermingling of 'sweet' and 'corrupt' waters in their town, and the consequences of this for water quality and flood risk. All these sections will demonstrate how medieval and early modern Hull's governors and inhabitants were continually managing water in the context of living in a risky estuarine environment. The final section of the paper offers some concluding comments, returning to address the value of histories of living successfully with water and flood in building hydrocitizenship and flood resilience in the contemporary world.

20. Statutes of the realm, vol. 3 (London, reprinted 1963) [hereafter Statutes] 23 Hen. VIII c.5.

21. Statutes, 23 Hen. VIII, c.5., 368, 369.

22. These are stored in the East Yorkshire Record Office and HHC, respectively.

23. S.G.E. Lythe, 'The court of Sewers for the East Parts of the East Riding', *Yorkshire Archaeological Journal* 34 (1938): 11–24, at p. 12.

MANAGING AND MITIGATING FLOOD RISK

Hull is a town born of flood. It was founded comparatively late and the lack of Saxon, Anglo-Scandinavian and pre thirteenth-century finds in the immediate vicinity of the Old Town suggests the area was so wet as to be largely unsuitable for settlement before the mid-thirteenth century.²⁴ A flood in 1253 washed away land at Myton and resulted in the tidal waters reaching as far inland as the woods and fisheries of Cottingham, perhaps three kilometres north of the Humber.²⁵ The flood is also said to have changed the course of the River Hull. Certainly, the main flow once reached the Humber west of the current confluence through a channel labelled on later town plans as the Old River Hull. The eastern channel was known as Sayer's Creek and offered the most direct route to the Humber. It appears to have been the main course of the river by the mid thirteenth century, and the old course gradually silted up. Changes in channel morphology – whether as a result of avulsion associated with the 1253 flood or deliberate efforts to confine the river to the more easterly course by those keen to build on the surrounding land – facilitated settlement. In the 1260s, a new town was laid out by the Abbot of Meaux and swiftly acquired by King Edward I, who renamed it *Kingston Upon Hull*. It was approached from the north via a three-kilometre-long raised causeway through the wet and marshy lands surrounding the town.

The medieval Patent Rolls and other sources reveal a history of repeated flood events affecting the town and surrounding areas in the century and a half after the town was laid out. Table 1 lays out the known dates for flood events in medieval and early modern Hull, along with the geographical areas known to have been impacted by flood waters, brief details of the flood and the likely source of the flooding. This information is reconstructed from our four main documentary sources – the Bench Books, the records of the Commissions of Sewers, the Patent Rolls and the town history – and should be understood as a record of the higher magnitude, lower frequency events recorded by (near) contemporaries as problematic, undesirable and challenging, rather than a record of regular winter flooding of the grazing grounds. Many of the medieval and early modern records refer unambiguously to tidal surges and storms as the source of flood events. Inland waters were an additional source of flooding – for example in 1315 when the king's manor at Myton was 'submerged by the flow of the sea and inundations of the sweet waters'²⁶ and again in the

24. D. Evans, 'The origins and early development of Kingston Upon Hull: An archaeological perspective', in D.J. Starkey, D. Atkinson, B. McDonagh, S. McKeon and E. Salter (eds), *Hull: Culture, History, Place* (Liverpool: Liverpool University Press, 2017), pp. 15–39.

25. *The Meaux Chronicle*, cited in J.A. Sheppard, *The Draining of Hull Valley* (York: East Yorkshire Local History Society, 1958), p. 2.

26. Calendar of Patent Rolls (hereafter Cal Pat), 1313–1317, HathiTrust Digital Library, pp. 409–10 and 430. <https://babel.hathitrust.org> (accessed 9 May 2022).

Table 1. Known flood dates for medieval and early modern Hull (c. 1250–1700) with likely source of flooding and areas impacted

Date	Location	Details	Suggested source of flooding	Archival source
1253	Myton and Cottingham	Land at Myton washed away and floodwaters said to have reached the woods of Cottingham	Tidal	Chronicle of Meaux
Mid 13 th c.	Drypool	Possibly the same storm surge as above	Tidal	Chronicle of Meaux
1315	Myton	Banks broken by Useflet and others; manor and lands inundated by tides and inland waters	Compound (tidal and inland)	Patent rolls
Pre 1320	Myton	Inquisition mentions losses as a consequence of ‘the various floods of the river Humber’ – may be linked to incident above	Tidal	Bench Books
1349	Hull	Banks breached due to ‘impetuosity of the river’	Tidal	Hadley, <i>Hull</i>
1356	Anlaby, Hessle and Hull	Lands, pastures and road between Anlaby and Hull inundated	Tidal	Patent rolls
1365	Hull and Drypool	Lands, meadows and pastures flooded; hithes (flood banks) said not to have been kept in repair	Tidal	Patent rolls
1390s	Hull	The town was said to be ‘almost destroyed by flood (<i>cretinam</i>) and the excessive overflow of the Humbre’	Tidal	Patent rolls Hadley, <i>Hull</i>
1401	Drypool	Flood	?	Chronicle of Meaux
1412	Sculcoates	The fresh water dike overflowed causing flooding	Inland/ fresh water	Patent rolls Hadley, <i>Hull</i>
1527	Hull	Overtopping of the banks led to flooding in the town. The water was said to lie five feet deep	Tidal	Hadley, <i>Hull</i>
1571	Hull	Breaches in the banks led to a ‘prodigious flood’ in which lives, cattle and goods were lost	Tidal	Hadley, <i>Hull</i>
1602	Lands in the Hull valley north of Tickton	In excess of 1400 acres flooded. NB. The survey was concerned only with the North Division of Holderness (east of the Hull) and part of Harthill Wapentake (Hunsley Beacon) so does not refer to the town of Hull, except as far as the construction of a jetty at Hull and changes to channel morphology in the Humber were identified, along with dereliction of the flood banks, as causes of the flooding	Inland and tidal	Commissioners of Sewers records

LIVING WITH WATER AND FLOOD

Date	Location	Details	Suggested source of flooding	Archival source
6 July 1642	Hull	Banks breached and sluices opened on the rivers Hull and Humber, so the lands around the town flooded, in the face of a Royalist siege of the town	Deliberate	Reckitt, <i>Charles I and Hull</i> , pp. 55–57*
14 Sept 1643	Hull	Lord Fairfax ordered the sluices broken and the land around the town flooded	Deliberate	Reckitt, <i>Charles I and Hull</i> , pp. 91–95. A contemporary pamphlet <i>Hull's Pillars of Providence</i> (cited by Reckitt) also describes the siege.
Oct 1643	Hull	Spring tides flooded the land, the breaches of September not having been repaired	Tidal	Hadley, <i>Hull</i>
March 1646	Drypool	Flooding – a ‘hideous and mighty winde’ having arisen, ‘forcing up the waves and carrying away what remained’ of the wooden flood defences, so flooding the land	Tidal	Commissioners of Sewers records
Winter 1646/7	Drypool	Significant flooding in Drypool and the Holderness Level	Tidal	Commissioners of Sewers records
1669	Anlaby	‘Drowning of Anlaby how-field & the North-holmes and also the overflowing of the banks in Anlaby’ mentioned in relation to new works on the drains	Inland	Commissioners of Sewers
1706/7	Anlaby and Hessle	Flood which left the fields waterlogged and the roads unpassable	Inland	Commissioners of Sewers

* Basil Reckitt, *Charles the First and Hull 1639–1645* (London, 1952).

seventeenth century – and compound events also occurred, something which the Commissioners of Sewers themselves recognised.²⁷

Multiple flood events were recorded for Hull in the fourteenth and early fifteenth centuries. The eighteenth-century town history, for example, referred to a flood of 1349 ‘which was owing to the banks giving way to the impetuosity of the river’.²⁸ It may have been this flood that was referenced in a commission of 1350, which noted that ‘frequent storms’ had left the king’s demesnes and

27. Report on a survey of flooded ground, Sept. 1602, East Riding of Yorkshire Archives (hereafter ERYA), CSR/10/1.

28. G. Hadley, *A New and Complete History of the Town and County of the Town of Kingston-Upon-Hull* (Hull: T. Briggs, 1788), p. 72.

other lands between Ravenser Odd and Beverley ‘entirely inundated’.²⁹ There were floods recorded as affecting lands immediately west of Hull in 1315 and 1356, when a commission was ordered to look at the banks between Anlaby and Hull because ‘the waters of the Humber and Hull are now four feet higher than usual, so that the way between these two towns, and the lands and pastures between them and Hesel, are inundated’.³⁰ An Inquisition of the manor of Myton of 1320 noted that the sea banks had deteriorated through ‘lack of repair and strengthening’ and that losses had been sustained as a consequence of ‘the various floods of the river Humber’.³¹ Fields, meadows and pastures on the east bank of the River Hull flooded in the 1360s, after the sea defences were said to have fallen out of repair. In February 1365, a commission was ordered to survey the hithes of the Humber between ‘La Stelle’ in Sudcote and Hull, identify who was responsible for the defences and charge a levy for repairs, ‘sparing neither rich or poor’, a position which strived at equality but failed to deliver flood equity – given that the wealthy were doubtless in better position to pay for flood infrastructure than the poorest inhabitants of the town.³² The later town history reports this flood, noting that the banks were breached by a high tide, ‘and the water breaking in, not only swept away the cattle, but numbers of people were drowned in this great inundation, which flooded the whole country’.³³ There were floods too in the 1390s, and the town was granted £66 13s. 4d. a year by the Crown for five years from 1396 in order to repair and maintain the town in the wake of flood damage.³⁴ At least the first two instalments were paid.³⁵ A further flood was reported at Drypool on the east bank of the River Hull in 1401.³⁶ As other scholars have noted, the thirteenth and fourteenth centuries seem to have been a period of climatic deterioration and increased storminess in the Humber and beyond.³⁷ Galloway

29. Cal Pat, 1348–1350, p. 518.

30. Cal Pat, 1313–1317, pp. 409–10, 430, 595; Cal Pat, 1354–1358 p. 400. In 1353, the town’s poverty was attributed to the ‘overflow of the water of Humber’, the costs of the town walls and the impacts of the Black Death, see Cal Pat, 1350–1354, p. 417.

31. Bench Book (hereafter BB), 1320, HHC, BRE/1/1 141r; trans. R. Horrox, *Selected Rentals and Accounts of Medieval Hull, 1293–1598* (Yorkshire: Yorkshire Archaeological Society, 1983), p. 156. See also BB, 1320, HHC, BRE/1/1 135r: ‘They say that the plot was flooded by the Humber ten years ago and therefore pays nothing to the king’; trans. Horrox, *Selected Rentals*, p. 43.

32. Cal Pat, 1364–1367, p. 142.

33. Hadley, *Hull*, p. 5.

34. Cal Pat, 1396–1399, p. 6 which said that the town was ‘almost destroyed by flood (*cretinam*) and the excessive overflow of the Humber’. See also Hadley, *Hull*, p. 55 for a 1401 reference to earlier flooding, probably of Hull.

35. Victoria County History of the East Riding of Yorkshire vol. I [hereafter VCH ER I], p. 41; BB, 1396, HHC, C BRE/1/1 242r.

36. VCH ER I, p. 464, citing *Chron. de Melsa* (Rolls Ser.), iii. 285.

37. E. Gottschalk and A.M.J. De Kraker, cited in J.A. Galloway, ‘Storm flooding, coastal defence and land use around the Thames estuary and tidal river c.1250–1450’, *Journal of Medieval*

notes a number of fourteenth-century floods in Essex, Kent or the vicinity of London, including in association with storm surges of 1294, 1323, 1334, 1374, 1375 and 1404, the impact of which may have been worsened by post-Black Death labour shortages leading to a deterioration in flood defences.³⁸ There were also recorded storm surges in what later became The Netherlands and Germany in 1134, 1163, 1164, 1362 (the *Grote Mandränke*), 1394, 1396, 1398 and 1404.³⁹ More locally, June Sheppard suggests a storm surge of 1256 may have breached Spurn. There were further floods in the late fourteenth century, when the hamlet of Tharlesthorpe was washed away, Meaux Abbey withdrew from its granges in the area and Ravenser Odd became an island (and was finally abandoned by 1362).⁴⁰ The changing morphology of the lower Humber Estuary around Spurn, combined with increased storminess in the North Sea, likely impacted on tidal flood risk further upstream at Hull.

There were few floods recorded at Hull in the fifteenth century, but – as Table 1 shows – there were recorded floods in the sixteenth and seventeenth centuries.⁴¹ Floods impacted the town in 1527 and 1571, again occasioned by high tides most likely associated with North Sea storm surges.⁴² A flood affecting the river Hull north of the town was mentioned in 1602.⁴³ The lands immediately around the town were also deliberately flooded in July 1642 and September 1643 as a form of defence against Royalist sieges and, in October 1643, the springtides were said to have risen so high that ‘they flowed through the breaches, made in the banks of the Humber and Hull, laid all the country under water, and drove the Royalists, from their lower works’.⁴⁴ There was also

History 35 (2) (2012): 171–88.

38. Galloway, *ibid.* See too P. Brandon, ‘Late-medieval weather in Sussex and its agricultural significance’, *Transactions of the Institute of British Geographers* 54 (1971): 1–17; P. Brandon, ‘Agriculture and the effects of floods and weather at Barnhorne, Sussex, during the later middle ages’, *Sussex Archaeological Collections* 109 (1971): 69–93; M. Bailey, ‘Per impetum maris: natural disaster and economic decline in eastern England, 1275–1350’, in B.M.S Campbell (ed.), *Before the Black Death. Studies in the ‘Crisis’ of the Early Fourteenth Century* (Manchester: Manchester University Press, 1991), pp. 184–208.
39. G. Bankoff, ‘The ‘English Lowlands’, 3–37.
40. J.A Sheppard, *The Draining of the Marshlands of South Holderness and the Vale of York* (York: East Yorkshire Local History Society, 1966), pp. 5–6.
41. Careful scrutiny of the Bench Books reveals few references to flood events in the century after 1412, most likely as a consequence a period of decreased storminess in the North Sea rather than scribal variability in the records. The reduction in flooding in fifteenth and sixteenth-century Hull coincided with morphological changes in the lower Humber Estuary, including the emergence of Sunk Island from ~1560 onwards, likely linked to larger-scale climatic changes at the end of the Medieval Warm Period/beginning of the Little Ice Age.
42. Hadley, *Hull*, p. 94. NB.
43. ERYA, CSR/10/1.
44. Hadley, *Hull*, p. 189. Hadley’s marginal gives October 1644, but the events follow on from the Civil War siege and belong to October 1643.

a major flood in 1646–47, when the Drypool defences were breached by winter storm surges affecting thousands of acres in the Holderness level.⁴⁵

As discussion above makes clear, there were flood defences along the Humber on both sides of its confluence with the River Hull, as well as along the Hull itself, from at least the early fourteenth century.⁴⁶ Hull's defences were mentioned in the Inquisition of 1320 – when they were said to be in disrepair – and their construction, or perhaps additional heightening and strengthening, may have been part of the same broad programme of civic works that saw the town ditch and timber palisade completed by about 1330.⁴⁷ Using taxation records, Tim Soens similarly identifies the late thirteenth and fourteenth centuries as a period of investment in the creation and maintenance of flood defences along the Flemish Coast, here linked to economic growth and the expansion of agriculture rather than flood incidents – a reminder once again of how Hull's experiences reflect the wider geographies of the North Sea Littoral.⁴⁸ In Hull as elsewhere, the flood defences consisted of earthen banks as well as revetments, typically called hithes or lockerwork. Partially constructed flood defences on the Humber mentioned in 1651 consisted of wooden planks fixed to pilings, reinforced with cliff stones. Where the work was not yet completed ahead of the winter, the earthen banks were to be raised and stones or oak planks staked in front of the bank 'to defend them from the Rage of the Water of Humber'.⁴⁹ Similar wooden revetments protecting the canon placement south of the old town and at Drypool's southern extreme are also visible on a map of the town produced in c. 1537 (Figure 2).⁵⁰ The town walls running along the river Humber to the south of the town were rebuilt in brick at some point in the fourteenth century, and probably offered some protection against the tidal waters.⁵¹ There was also recognition in 1585/6 that the buildings along the Hull side of the High Street provided 'a verie good defence against the rage of

45. For a description of the winter flood and a list of townships (with acreage) 'lyyinge within the Levell subject to the over floweing of the said breaches', see Order for repair of Drypool and Southcoates Banks, 20 Apr. 1647, ERYA, CSR 14/23; and Order for sale of land in Drypool, 25 Jan. 1649, ERYA, CSR 14/34. *The Rising Tide of Humber* project at the University of Hull (risingtide.hull.ac.uk) has recreated the probable extent of the 1646–47 storm surge in virtual reality, drawing on old maps, archival and archaeological evidence combined with terrain and gauge data adjusted for seventeenth-century sea levels.

46. See, for example, Cal Pat, 1307–1313, p. 605 which refers to the banks on both rivers.

47. BB, 1320, HHC, BRE/1/1 141r; D. Evans, *Excavations at the Beverley Gate, and Other Parts of the Town Defences of Kingston-Upon-Hull* (Hull: Humber Archaeology Partnership, 2018); B. McDonagh, 'Rebellious Hull', in Starkey et al. *Hull: Culture, History, Place*, pp. 61–87.

48. T. Soens, 'Floods and money: funding drainage and flood control in coastal Flanders from the thirteenth to the sixteenth centuries', *Continuity and Change* 26 (3) (2011): 333–65; see also van Tielhof, 'Forced solidarity'.

49. BB, Nov. 1651, HHC, C BRB/4, 42(34). Note that C BRB/4 has a double page numbering system (one contemporary and one added later) and both have been noted throughout.

50. British Library, Cott Aug I.i.83.

51. McDonagh, 'Rebellious Hull', p. 65.

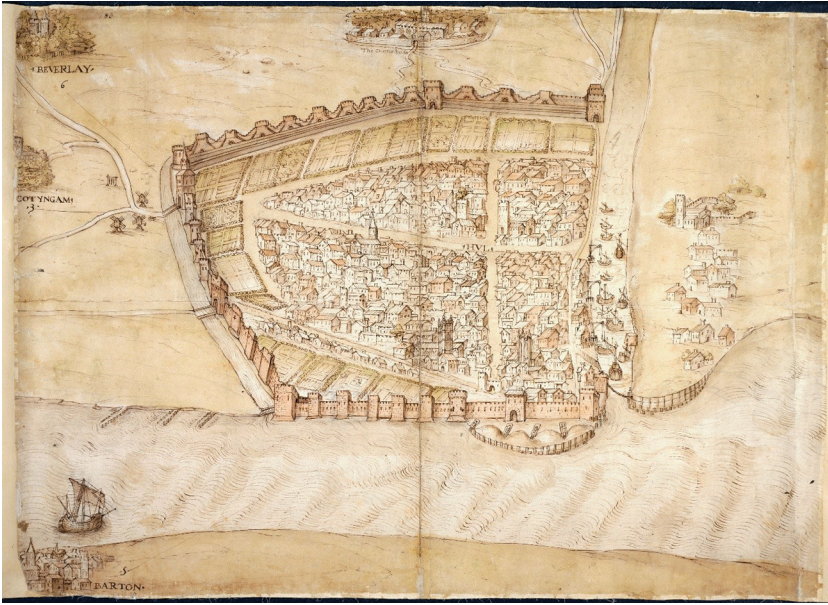


Figure 2. Plan of Kingston Upon Hull, c. 1537, British Library, Cotton MS Augustus I.i.83 (Copyright British Library Board).

the water frowinge and beatinge upon the same', and on the east bank of the Hull, the castle walls offered some protection after its construction in the early 1540s.⁵² Outside the built-up areas, the c. 1537 map depicts earthen banks to the west and east of the town as well as running northwards along the eastern side of the River Hull, the latter the responsibility of the community at Drypool rather than the Corporation of Hull.

There were also inland flood banks which stopped water falling higher up in the River Hull catchment from flooding the low-lying land in and around Hull. Effective management of this water was crucial in reducing the risks of compound flood events. Water was conveyed to the Hull and Humber via a network of drainage ditches – variously called ditches, drains, cloughs or clows, cuts and (occasionally) grafts – with sluice gates positioned on the ditches as they met the tidal Hull and Humber. These let the inland water flow out into the river and estuary but closed under the force of the high tide so as to keep tidal waters from flowing back inland. The gulleys and gutters in the town of Hull were also a form of water management in that they were intended to convey rainwater quickly and safely to the Hull and Humber, so as to minimise the risk

52. BB, 1585/6, HHC, C BRB/2, 243r.

of flooding, preserve the water supply and – as an order of 1612 identified – for the ‘avyoydeinge of infection’ by corruption of the air.⁵³

The banks, walls, revetments and sluices that made up Hull’s flood infrastructure needed to be kept in continual repair. Indeed, the references to floods in and around Hull in the fourteenth-century Patent Rolls are typically made in the context of orders for repairs and the Bench Books reveal the significant time and effort expended by the Corporation in managing and mitigating flood risk in the town, principally through the construction and maintenance of flood infrastructure. This included sums laid out for repairs to revetments, banks and sluices, but also rent rebates, as, for example, in 1356, when the Corporation chose to let plots near the Humber without charge except for the maintenance of the banks.⁵⁴ Sedimentation was also a problem about which the town authorities were concerned and in which they invested considerable sums to address. Both the ditch running round the town walls and the drainage channels running into the moat needed to be scoured and dressed – that is, cleaned out and vegetation removed – regularly in order to ensure that they did not silt up and that blockages did not back up the flow and flood surrounding lands.⁵⁵ The open sewers within the town also needed to be frequently cleansed throughout the sixteenth and seventeenth centuries, often in response to townspeople putting improper waste and soil in them as well as general environmental deterioration.⁵⁶ Protecting Hull’s water-carrying infrastructure from sedimentation and other matter ‘out of place’ was therefore about flood mitigation as well as protecting the health of its inhabitants, and the town’s governors were well aware of the dangers of allowing it to fall into disrepair.

Yet, for all the Corporation’s efforts, the sea’s erosive force continually undermined banks, walls and other flood infrastructure, and land was lost to the sea on occasion. The action of the tide on the defences on the Drypool side of the River Hull was long recognised as a potential problem for those living on both banks of the Hull. A 1604 Exchequer case about pasture lands in Drypool referred to lands ‘worne and wasted by the violence of the Humber’.⁵⁷ In 1623, the Corporation petitioned the King for support, noting that ‘whereas the said Towne standeth uppon the dangerous Ryver of Humber beinge a great and verie forcible Arme of the Sea whosse violent rage and stronge beatinge against the peers walles, bankes & haven of the said towne is w[i]th such dailie

53. BB, 1612, HHC, C BRB/3, 12v.

54. BB, 1356, HHC, C BRE/1/1 206r.

55. See for example: BB, June 1565, HHC, C BRB/2 56r; BB, Nov. 1638, HHC, C BRB/3 264v; BB, July 1642, HHC, BRB/3 277v; BB, Oct. 1651, HHC, C BRB/4, 26(34). The July 1642 reference referred to the scouring and cleansing of Bushdike in the month after deliberate flooding of the town during the Civil War siege.

56. See for example: BB, 1559, HHC, C BRB/2 28r; BB, June 1565, HHC, C BRB/2 55v; BB, Apr. 1637, HHC, C BRB/3 215v; BB, 29 March 1644, HHC, C BRB/3 304r; BB, March 1651, HHC, C BRB/4 56(48); BB, Nov. 1660, HHC, C BRB/4 334(324).

57. The National Archives (hereafter TNA), E 134/2Jas1/Mich17.

rayntinge rentinge and spoileing thereof'.⁵⁸ In an Exchequer case of 1635 brought by the Attorney General against the mayor and burgesses of Hull, deponents were asked about repairs to the Castle and blockhouse and damage occasioned by the waters of the river.⁵⁹ Deponents for both the plaintiff and defendant agreed that the castle was subject to continual damage due to the proximity of the river.⁶⁰

As well as land lost, flooding might result in other kinds of loss and damage. This included the loss of grass or arable crops growing in fields that were flooded and longer-term salt damage to the land, as well as the inconvenience caused by roads and paths becoming impassable.⁶¹ Human lives were said to have been lost in 1365, when livestock were also swept away and drowned. More typically, goods stored in both homes and riverside warehousing were spoiled by floodwaters. The later town history recorded that in 1527,

the whole country was overflowed by the Humber, which rose so high, that it came over the banks, laying the environs with water, which in the Town itself, was five feet deep. As it rose in the night time, it did considerable damage to the goods, which lay in the lower rooms, and warehouses.⁶²

Much the same was reported in relation to the later sixteenth-century flood.

A.D. 1571: This year, there was a prodigious flood, occasioned by a high tide in the night time, which broke down the banks of the Humber, and Hull. It rose with such rapidity, that people not having time to abandon their houses, were obliged to get up into their upper rooms, the whole country was laid under water, and much damage was done, by the destruction of cattle, and goods, and many lives were lost.⁶³

In both cases, Hadley's account implies that the damage caused by the floodwaters was greater than the norm because the surges hit under cover of darkness. They overtopped or breached defences at a time when people were asleep and therefore unable to quickly respond by moving goods and animals

58. BB, 1622, HHC, C BRB/3 55r.

59. The castle and blockhouses were built in the wake of the Pilgrimage of Grace of 1536 and 1537 (B. McDonagh, 'Rebellious Hull', in Starkey et al. *Hull: Culture, History, Place*, pp. 61–87).

60. TNA, E 134/11Chas1/Mich47.

61. The Commissioners of Sewers in 1646 bemoaned 'the damage susteyned by the inlet of salt waters' to the lands adjacent to the Humer: ERYA, CSR/14/21. Blashill records of the 1642 flood, that 'The roads were covered and the hay crop spoiled. The tillage lay too high for inundation, but all the grass lands would lie waste for some times after the water was drained away. The damage done was incredible, and though Parliament promised to pay compensation, little or nothing could be got from them even by their friends' (T. Blashill, *Evidences Relating to the Eastern Part of the City of Kingston-Upon-Hull* (Hull: Brown, 1903), p. 174). See Copy letter from the Rev. Timothy Raikes to the Mayor of Hull, 7 Mar. 1706–07, ERYA, DDBL/3/4, for an example of roads being impassable.

62. Hadley, *Hull*, p. 72.

63. Hadley, *Hull*, p. 94.

to safer locations. There was loss of human life in 1571, but the principle impacts appear to have been economic, specifically losses affecting furniture and household stuff, warehoused goods and livestock. The implication of Hadley's narrative is that, on other occasions when unusually high tides or storm surges arrived by day, people in the town and the surrounding areas were better able to mitigate the flood's impacts by moving goods and animals to safer locations – thus living more or less successfully with water and flood. Indeed, some inhabitants may even have made adaptations to residential buildings in order to make them more flood resilient. An entry in the Bench Books for 1662 recorded that, following complaint 'by the poore women in Mr Gees Measondiew that the floare of their house now lyeth under water', 'It is ordered that Mr Hardy doe forthwith sett workemen on worke to raise the sayd floare with sand and pave the same with bricke stones'.⁶⁴

Recovery in the wake of a flood event was likely also affected by the precise circumstances of the flood. In 1527, the defences were overtopped whereas in 1349, 1365 and 1571, the flood defences were breached. This probably explains the serious consequences – human and animal lives lost – outlined in Hadley's later account. Nineteenth and twentieth-century accounts of high tides which overtopped the town's flood defences make it clear that in these circumstances the water quickly inundated streets and buildings, but also quickly receded as the tide fell. As a result, the flood event itself typically lasted only around two hours.⁶⁵ Breaches were much more serious and were typically associated with repeated inundations so that floodwater might sit of the land for weeks or even months. This was undoubtedly the case in 1646 for example, when the water was said to have sat on the land for six months, causing disruption to travel – for example, to market – and salt damage to agricultural land.⁶⁶ The repeated inundations also proved a problem for the Commissioners of Sewers as they tried to organise for the breaches to be repaired.⁶⁷ Living with and recovering from breaches was thus costlier and more time consuming than dealing with incidents in which defences were overtopped. Yet even short-duration flooding associated with the overtopping of flood defences could imperil fresh water supplies, a subject to which we turn in the next section.

SECURING DRINKING WATER SUPPLIES

Living in the green-blue zone necessarily required the careful management of fresh water supplies. Many medieval and early modern English cities

64. BB, Nov. 1662, HHC, C BRB/4, 484(484).

65. See, for example, *Hull Advertiser and Exchange Gazette*, Friday 31 Jan. 1845.

66. 'the grounds & highwayes leading to this Towne are drowned, & overflowed with water' BB, July 1646, HHC, C BRB/3, 359v.

67. ERYA, CSR/14/20; ERYA, CSR/14/21.

developed infrastructure and governance structures to ensure that their citizens had access to clean and reliable drinking water, but this was even more pressing in a low-lying area like Hull where saline intrusion affected the availability of groundwater supplies and both overland flow and tidal floods could imperil fresh water supplies.⁶⁸ There were few wells within and close to the town and those that existed could be brackish as a result of saline intrusion into the aquifer.⁶⁹ The town's drinking water therefore had to be brought from outside the urban area, principally from townships lying to the west. As a consequence, the town authorities were under pressure initially to create the infrastructure needed to carry fresh water to its residents, and then subsequently to maintain, improve and protect that infrastructure from both environmental threats and human interference. They also needed to negotiate the tensions which inevitably arose between the town's inhabitants and Corporation on the one hand and landowners in the neighbouring communities whence the drinking water was sourced on the other. Both the Bench Books and the records of the Commissioners of Sewers for the town and county of Kingston upon Hull record the town authorities' persistent efforts to ensure both security of supply *and* water quality – and the large sums of money spent on achieving this. For the Corporation and the town's inhabitants, managing and maintaining the town's drinking water supply was a key aspect of their experiences of living with water in the medieval and early modern town.

From at least the late thirteenth century onwards – with the exception of a short period in the mid-fifteenth century when water was piped into the town – drinking water reached the town via open ditches: a dike carrying fresh water to the town from the west was mentioned in 1282 and again in 1293, when the king acquired the town from Meaux Abbey.⁷⁰ The dike or canal mentioned in the late thirteenth century seems to have replaced by a new – or perhaps an enlarged – dike in the early fifteenth century. In 1376, the king ordered an inquiry in response to the town's petition to create a new dike⁷¹ but it does not appear to have been dug, perhaps due to opposition from landowners bordering the proposed route.⁷² There was another petition and inquiry in 1401, and in 1402

68. D. Jorgensen, “‘All good rule of the cite’”; Skelton, *Sanitation in Urban Britain*.

69. For example, during the 1643 Royalist siege of the town, the attacking forces cut the town's fresh-water supply, though the VCH notes that there was still brackish water available from the wells within the walls (VCH ER I, p. 103). Wells in Humber Field – presumably outside the town walls – were mentioned in 1653, when 11s 6d was dispersed for dressing the wells and making a survey thereof: BB, December 1653, HHC, C BRB/4 119(111).

70. J. Bilson, ‘Wyke-upon-Hull in 1293’, *Transactions of the East Riding Antiquarian Society* XXVI (1928): 66. This dike is mentioned as early as 1282: *Yorks. Inq.* i. 241; cited in VCH ER I, p. 371. Having been in place only twelve years, the lead pipes were removed and sold in August 1461 and the sums raised used to alleviate the town's war debts (VCH ER I, p. 371).

71. Cal Pat 1374–1377, 324–5.

72. Hadley, *Hull*, p. 51, describes the objections, which included that, by turning the fresh water into a new channel to Hull, Hessle Haven would ‘be quickly choaked up’ by silt. This is a good example of early knowledge about the practical implications of water management.

a new watercourse twelve feet wide and five feet deep was authorised.⁷³ There was again some opposition from those in neighbouring villages – presumably because the construction of the new dike disrupted the existing system of land drainage in the area – but the works were completed soon after.⁷⁴ By the early fifteenth century, this was known as Julian Dike – though, somewhat confusingly, it also appears in the records as Derningham or Derringham Dike – and ran eastwards towards the town from its sources in Anlaby along the route of the road now called Spring Bank (West).⁷⁵ It led to Busdike at Beverley Gate and from there into the town ditch, and the water was carried into the town by bussemen (named after the Busdike or Bush Dike) until at least the second decade of the seventeenth century when Water Works were constructed on the outskirts of the town and water piped to subscribers therein (Figure 3).⁷⁶

The vulnerabilities of supplying the town with water in this manner were emphasised in the Civil Wars, when the Royalist army cut Derringham Dike in order to turn the fresh water into the Humber during the first siege of Hull, thus leaving the town without a reliable drinking water supply.⁷⁷ But it was also vulnerable to a range of more prosaic problems, including blockages, extraction and legal wrangles about ownership and access, which the Corporation actively worked to mitigate and resolve. This posed a flood risk, as previously discussed, but also led to the intermingling of waters perceived as clean and safe to drink with those that were not.⁷⁸ For example, the town's fresh-water supply was repeatedly affected by blockages – presumably of both refuse and vegetation, woody matter, earth and sediment – and the dike had to be regularly scoured and dressed at the expense of the inhabitants of the town. There were regular payments in the fifteenth- and sixteenth-century century Bench

73. TNA, C 145/279/24 (4 inquisitions and a decree); cited in VCH ER I, Public services section, fn. 6. There is a May 1669 order relating to the widening of Julian's Dike, HHC, CJS/1/15/2.

74. Sheppard, *Draining of the Hull Valley*, p. 6; on the opposition, see the Roman *curia* of 1412 (Hull Corp. Rec., D. 216A; cited in VCH ER I, p. 371) and Hadley, *Hull*, p. 57. Interestingly, the later town chronicler noted that in the petition of 1401 – which eventually led to the construction of the new dike – the inhabitants argued that the lack of drinking water combined with the expense of repairing the flood banks together threatened the depopulation and destruction of the town.

75. According to a 1906 map, Julian's Well lay in the field west of the church in Anlaby while Derringham Springs lay close to the modern Springhead Pumping Station. The 1880 1:5,000 OS map seems to mix up Julian's Well and Derringham Springs, labelling the latter as the former. See Plan of Julian [Julian] Well and Watercourses, Jun. 1906, ERYA, DDX39/6.

76. Water Works were constructed on the outskirts of the town in 1613, in part because the drinking water was 'often found polluted, so as to render it useless'. The works took two years to complete and townspeople had to maintain the pipes and pay annual rent in compensation for receiving the water (Hadley, *Hull*, p. 111). The works were built 'at great cost & charges to the inhabitantes' and so in 1626 it was ordered that there should be a fine for anybody who was not a tenant of the waterworks who attempted to remove any of the water from the works (BB, 1626, HHC, C BRB/3, 25v.).

77. Hadley, *Hull*, p. 167.

78. Gentilcore, 'From "vilest beverage" to "universal medicine": 684–87.



79. BB, 1452, HHC, C BRE/1/2 27r.
80. BB, 1493, HHC, C BRE/1/2 148v.

sprryng head to the Bush dyke' because of 'stoppage of the dyke being neare growne upp in many place'.⁸¹

The dikes and water courses were also occasionally interfered with by local residents: one nuisance was when local people attempted to divert the water by means of 'cutting' the banks. Wrongful extraction was thus a persistent issue that the Corporation worked to address. In 1652, for example, they granted Robert Newby a fee of 20 shillings a year to go 'twice or thrice euery weeke to see if there bee noe Cutts in the bancke and to take a spade with him and if he find any Cutts in the bancke to make up the same & stopp the water'.⁸² Again, in 1654 it was ordered that 'the passage of the water oute of the spring ditch into sculcoates Lordshipp be stopped up & care be taken that none doe for the future Cutt the bankes thereby the water may be taken from the ditch and that awatch be kept for that end'.⁸³ And, presumably for a similar purpose, George Covell was appointed 'viewer of Darringham Dyke' in 1655.⁸⁴ However, it was difficult to totally prevent extraction and, in 1659, a warrant was issued for the apprehending of James Robinson to the next quarter sessions for cutting the banks lying upon Derringham Dike and laying a trough from there 'into his close'.⁸⁵

The importance, and the precarity, of Hull's access to palatable drinking water is underlined in the Corporation's relationship with Sir John Barrington, an Essex gentleman, lawyer and Member of Parliament who had inherited from his father the land on which Derringham Well stood.⁸⁶ In 1571 the well – a crucial source of fresh water as it fed into Derringham Dike and thence into the town – was acquired for the town for an annual fee which, in 1641, amounted to a 'tunne of wine'.⁸⁷ Yet the records of the Bench Books suggest that, despite this being a vital asset for the town, the rent often fell into arrears. By 1654 the annual rent was 20li, but the Corporation agreed to pay back their debt and to a future annual rent increase to £26 6s and 8d.⁸⁸ Despite this, in 1656 the arrears were still unpaid and so Barrington presented a bill in the Court of Exchequer for the monies owed.⁸⁹ The Corporation found the original deeds and engaged a lawyer to advise them and answer the Bill.⁹⁰ Hull eventually agreed to pay eleven years of unpaid rent, and in return Barrington granted the spring to the town in fee simple, thus securing the supply of drinking

81. BB, 1624, HHC, C BRB/3, 62r.

82. BB, Oct. 1652, HHC, C BRB/4 71(63).

83. BB, July 1654, HHC, C BRB/4 133(125).

84. BB, Aug. 1655, HHC, C BRB/4 162(154).

85. BB, June 1659, HHC, C BRB/4 285(275).

86. <http://www.historyofparliamentonline.org/volume/1660-1690/member/barrington-sir-john-1615-83>

87. BB, 10 Mar. 1641, HHC, C BRB/3, 273v.

88. BB, Apr. 1654, HHC, C BRB/4, 120(128).

89. BB, Sep. 1656, HHC, C BRB/4, 196(188).

90. BB, May 1656, HHC, C BRB/4, 188(180); BB, Jun. 1656, HHC, C BRB/4, 190(182).

water.⁹¹ The Corporation's willingness to use litigation to retain Derringham Well, and thereby protect, manage and ultimately govern the town's water supply, demonstrates just how crucial this source of water was. The case also underlines that human, as well as environmental, factors shaped the efforts to secure drinking water for the town. Both these elements also came to bear on the final aspect of Hull's water governance discussed in this paper: protecting their water supplies from the risk posed by flood.

SWEET WATERS VERSUS CORRUPT WATERS

Ensuring drinking water quality in the face of persistent flood risk was an ongoing problem for the Corporation. Efforts were made at the construction of the freshwater dike in the early-fifteenth century to protect it from salt water intrusion – by blocking ditches connecting it with the Humber – and to allow ditches from other springs to run into it.⁹² Sluices generally stopped salt water from flowing back into both the network of drainage ditches and the freshwater dike, but this could still be a problem on occasion, especially during flood events. The other persistent problem throughout the medieval and early modern centuries was management of so-called 'land water', specifically the need to keep it separate from the drinking water supplies. Distinguished by contemporaries from the spring water carried by the dike, 'land water' was fresh but not, by preference, drinkable. It resulted from precipitation that fell both in the immediate locale *and* elsewhere in the catchment and was carried through the low-lying lands west of Hull in ditches and streams to the Humber. Groundwater flows no doubt also contributed to the problem at times. Drinking water was typically referred to in the Bench Books and Commission of Sewers records as 'sweet' or 'fresh'; while the 'land water' was also known as 'field water' and was described as 'fowl' [sic] and 'nautious muddy and corrupt'.⁹³

Three key problems emerged in relation to the management of land and sweet water, all of which contributed to tensions between different stakeholders in local water management. Firstly, land water could contaminate drinking water supplies. As Hadley put in in the late eighteenth century, the passage of the water along the dike and through the town moat was said to have so 'polluted' the freshwater 'as to render it useless'.⁹⁴ Secondly, failing effectively to manage land water increased flood risk in the parishes and in the town, both from pluvial and fluvial sources and in compound events involving tidal

91. BB, Sep. 1656, HHC, C BRB/4, 196(188); VCH Hull, ER I, p. 372.

92. VCH Hull, ER I, p. 371.

93. See, for example, Order of the Court of Sewers, Dec. 1679–Jan. 1679–80, documents relating to Julian Dike, ERYA, DDBL/10/13; Order of Commissioners of Sewers, 1680, ERYA, DDBL/10/17; BB, June 1662, HHC, C BRB/4 440(430).

94. Hadley, *Hull*, p. 111.

surges. Land water needed to be conveyed away in order to avoid the fields around the town becoming waterlogged and the roads unpassable, as happened for example in Anlaby and Hessle in 1706/7, but the Corporation's insistence that the land water should not enter the dike, made it harder to effectively convey it away. Thirdly, failure to manage drinking water supplies could directly contribute to flood risk, specifically when the dike carrying water to Hull backed up and overflowed into lands in Anlaby and Sculcoates. For example, a presentment in King's Bench in 1411/12 referred to a stoppage in the dike at Beverley Gate which caused the dike to overflow onto the lands of Gerard de Useflet. This was probably one incident within the larger dispute between the townspeople and neighbouring landowners about the construction of new dike, about which the Corporation eventually complained to the Pope, saying that the men of the neighbouring towns had both filled in the dike and, when it was reopened, turned salt water into it – and so poisoned the town.⁹⁵ Useflet, moreover, was almost certainly a relative of the man of the same name who had sabotaged the flood banks west of Hull a century earlier, in what seems to have been a dispute between the king as the lord of Myton and other local landowners about the construction of new flood banks which protected the king's manor but, by interfering with the passage of the inland waters south to the estuary, contributed to flood risk on neighbouring properties.⁹⁶ The key point here is that failure to manage drinking water supplies could contribute to flood risk, just as failure to manage flood risk imperilled the provision of safe drinking water.

This inevitably led to tensions between different landowners who found that building flood defences in one location might contribute to flood risk in another. There were also significant disagreements between the Corporation (on the one hand) who wished to keep the land water out of the freshwater dike in order to ensure water quality for Hull residents, and the landowners and inhabitants of Anlaby and Hessle (on the other) who wanted to see the land water effectively conveyed away in order to avoid their fields and commons becoming waterlogged with knock on effects for agricultural productivity as well as all the disruptions that a big flood event might bring to people's lives. These concerns stretched back at least as far as the early fourteenth century, as we have seen, and continued to emerge periodically throughout the late medieval and early modern periods.⁹⁷ In what follows, we draw on the Bench Books and Commissioners' records from the second half of the seventeenth century to offer us insights into the different types of participation in water

95. Ibid., p. 57.

96. Ibid., p. 5; for 1315, Cal Pat, 1313–1317, 409–10 and 430. Cal Pat 1313–1317, 595 added Loretta, late the wife of John de Useflet, to the list of offenders and noted that the banks were broken 'by night'.

97. See, for example, BB, May 1575, HHC, C BRB/2 129r; BB, 1578, HHC, C BRB/2 200v; BB, April 1632, HHC, C BRB/3 140v.

governance carried out by the Corporation and local landowners, how this led to wider tensions between the town and county, and the new works intended to resolve these issues.

Contamination of the fresh water dike continued to be a problem in the 1660s, when tensions between the Corporation and the neighbouring landowners again flared up, a situation that Hadley suggests resulted from neglect of the fresh water infrastructure during the Civil Wars.⁹⁸ New works on the dike and the drainage network were mentioned in both the Bench Books and the Commissioners of Sewers records in this period. It was noted by the Commissioners in April 1662 that ‘for the preventing of unwholsom water comeing into the towne of Kingston Upon Hull’, the mayor and burgesses had made a new stop or stops – read: sluice gate – in Derringham Dike, as it was lawful for them to do.⁹⁹ This appears to have been located at the head of the dike close to Derringham Springs. The old stone stop or dam had apparently fallen into disrepair and was said to both let the land water into the dike and so foul and spoil the drinking water, and ‘also stopp & keepe out the sweete water coming from Anlaby well’.¹⁰⁰ It was to be replaced by new clough with a sluice made of wood which was intended to ‘hinder the corrupt and noisome water from mixing with the said sweet spring water’.¹⁰¹ The sluice was to be shut ‘when the fowle water cometh downe’ and to be kept open at other times ‘to let the sweete water in’.¹⁰² Evidently, contamination principally occurred at times of heavy precipitation, a strong indication that the problem was primarily about overland flows not salt water intrusion.

Works on the new sluice gates appear in the Bench Books for early June 1662, when the Corporation ordered labourers to be set to work. The neighbouring landowners, however, considered the new sluice ‘a great grievance’ because they believed it was the cause of flooding in the fields around Anlaby and in the North Holmes.¹⁰³ The Commissioners of Sewers – principally acting on behalf of the landowners – ordered that an additional sluice was to be made ‘at or neare the east end of new darringham or Julian dike’ – that is, much nearer the town.¹⁰⁴ They ordered that the drain between Anlaby fields and the

98. Hadley, *Hull*, p. 236. At least some work had been done on Derringham Dike in 1651 (C BRB/4, 26(34)), but less work may have taken place on the network of drainage ditches.

99. Presentments to the Court of Sewers by the Jury of Enquiry, April – June 1662, ERYA, DDBL/10/9; BB, April 1662, HHC, C BRB/4, 429(419).

100. BB, June 1662, HHC, C BRB/4, 430(440); ERYA, DDBL/10/13. This presumably refers to Julian’s Well, which lay to the west of Anlaby. A dam at the head of Derringham Dike (near the modern pumping station) would have stopped drinking water from further west in Anlaby running into the dike, and hence onwards to Hull.

101. ERYA, DDBL/10/13.

102. BB, June 1662, HHC, C BRB/4, 440(430).

103. Hadley, *Hull*, p. 237–38.

104. ERYA, DDBL/10/9; BB, April 1662, HHC, C BRB/4, 429(419) suggests this was at Wilfe Stocke, which was mentioned too in 1644, see BB, Jan. 1644, HHC, C BRB/3, 325r.

North Holmes be 'kept dressed and made sufficient to carry away the land water running from the said dike' and that on old drain in the North Holmes in Anlaby be reopened, specifying the size of the channel and the route by which the land water would be conveyed into the River Humber at Hesse Clough.¹⁰⁵ This was probably the drain later known as Mr Legard's new cut. It was to be 'be dressed bottom scoured and the bankes on both sides made sufficient to contain convey and passe away the water without over flowing the banks'.¹⁰⁶ The new ditch was to be dug with the consent of the landowners *but at the expense of the Corporation*, a reminder once again of the considerable costs to the town of supplying fresh water to its inhabitants in a manner that did not contribute to flood risk, and thus maintaining good relations with the neighbouring freeholders.¹⁰⁷

All this is indicative of the existence of complex water management infrastructure and the significant investment, and necessary cooperation, by the Corporation and landowners in the parishes west of Hull in the mid-seventeenth century. Sluices were used to allow spring water from Julian Well to pass into the aqueduct at Springhead and to keep out overland flows that would spoil the drinking water. At least one bridge seems to have carried one of the drainage ditches running from Julian's Dike over other field drains and sewers.¹⁰⁸ There was also a watch house in Derringham Close near the springhead.¹⁰⁹ It was occupied by Richard Rodwell in 1663, whose duties were:

to watch and take care of the stopp that is made at the head of Julian dike that the water doe not cum over or through the same and to take care of the whole bancke upon Julian Dyke that it be not cutt or broken whereby any fowle water may cum into the sayd dyke and he is also to take care that noe carryon or filth be cast into or suffered to lye in the same dyke.¹¹⁰

Rodwell presumably also operated the sluice gate at the head of the dike, opening and shutting it as required, a good example of how urban corporations managed water both by financing physical infrastructure projects, such as sluices and dams, as well as by encouraging what Jorgensen calls the 'specialization' of citizen roles who could help to manage them.¹¹¹ Moreover, the link between water supply issues and flood risk was clearly understood by both the Commissioners and the Corporation, the latter referring to the new works in an April 1669 inquisition as specifically intended 'for preventing the drowning of

105. ERYA, DDBL/10/9.

106. Ibid.

107. See BB, Apr. 1662, HHC, C BRB/4, 77(419).

108. HHC, CJS 1/15/3.

109. BB, June 1663, HHC, C BRB/4, 519(519).

110. BB, September 1663, HHC, C BRB/4, 536(536). The house may have been occupied in the 1650s by Robert Newby and George Covell, who served in a similar role.

111. Jorgensen, "'All good rule of the Citie"; Skelton, *Sanitation in Urban Britain*.

Anlaby low-field & the North-holmes and also the over flowing of the banks into Anlaby Carr'.¹¹²

Yet the works at the west end of Julian's Dike continued to be a controversial intervention in the landscape across the subsequent decades. In 1680, the commissioners referenced actions brought by Robert Legard of Anlaby against the mayor and burgesses of Hull for the removal of the stop or clough which diverted the waters from running down the dike and turned them another way through Anlaby. It was decreed that the stop could remain 'for the protection of the land waters mixing with the spring waters running to Hull' but that the drains leading south to the Humber must be cleansed and scoured at the costs of the mayor and burgesses.¹¹³ This was much the same as had been ordered in 1662, but the orders needed to be reissued – presumably because regular maintenance had not been undertaken by the Corporation. A letter of 1706/7 addressed to the magistrates of Hull referred to a flood in Anlaby and Hessle of the previous year and demanded that works be undertaken to ensure the water flowed into Mr Legard's new cut rather than along the road.¹¹⁴ A decade later, the inhabitants of Hull petitioned the commissioners that the new cut be abandoned as a sewer and filled in. They said that they had:

by ten or twelve years experience found that the new cut in Hessle carr is insufficient for carrying the water out of the highway at the stoops, but since it was made the water hath been as deep in winter as before and that it carries of no more than the Fence Ditch (which is also a sewer) when well dressed will doe, and that the new cutt running thro' the midst of the said Carr hath been very prejudicial in drowning of sheep etc to the great loss of ye inhabitants abovesaid.¹¹⁵

In the same year, the inhabitants of Anlaby and Hessle were subject to a fine of 6s 8d per rood for 'not dressing the sewer commonly called esquire Legards new cut'.¹¹⁶ Petitions and complaints made by inhabitants over the next century indicate that non-payment of levies for the maintenance and improvements of Hull's water management system was a recurring issue for the Commissioners. John Legard – continuing his father's battles over Legard's cut – refused to accept that he and the other inhabitants of Anlaby should bear responsibility for sections of the sewer that he alleged passed through the grounds of another landowner.¹¹⁷ A range of local stakeholders had ideas on what should be done: those with landholdings of sufficient size could exert influence by becoming commissioners, whilst the less wealthy could submit petitions and pursue legal

112. HHC, CJS 1/15/3.

113. ERYA, DDBL/10/17 (Order of Commissioners of Sewers, 1680).

114. ERYA, DDBL/3/4.

115. Petition of the inhabitants of Hessle to the Commissioners, 9 Sept. 1714, ERYA, DDBL/3/6.

116. Pains Laid by the Jury of Commissioners, 1714, ERYA, DDBL/3/5.

117. Case and opinion of Thomas Pengelly, Jan. 1719–20, ERYA, DDBL/3/7.

challenges.¹¹⁸ Competing interests, changing requirements and different types of participation in water management meant that the physical infrastructure and governance arrangements which supported water and flood risk management were subject to continual review, discussion, and maintenance. It is as a result of this administration and management that we know so much about the practicalities and experiences of living with water and flood in medieval and early modern Hull.

CONCLUSIONS

This paper has, for the first time, presented a reconstructed flood timeline for medieval and early modern Kingston-Upon-Hull, revealing a history of repeated flood events impacting the town and surrounding area in the centuries after its foundation in c. 1260. Hull's uniquely detailed archival records mean that we know more about these flood events, and about who managed water and flood risk and how, than for many other English and Scottish towns located in similarly risky estuarine zones. This was achieved first and foremost by the creation and ongoing maintenance of a complex system of water infrastructure consisting of flood banks, walls and revetments, and a network of drainage ditches, stops and sluices. This system was subject to centuries of careful governance by the town's Corporation and the Commissioners of Sewers, as well as by the inhabitants and landowners who were financially responsible for its upkeep and repair. In medieval and early modern Hull, as in other contemporaneous European towns, water management was a pervasive concern as well as a collective and shared responsibility – everyone played a part in managing the movement of water in the town and surrounding areas and mitigating the risks posed by both tidal and inland flooding.¹¹⁹ Notably, it was when this system was compromised or under threat, either by human or environmental agency, that we generally find references to water and flood in the archival records. Thus, it is in the relatively mundane orders of daily government that we learn about the people of Hull's relationship with their watery landscape.

The story that emerges from the archives is predominately one of surviving and thriving in a risky estuarine environment, rather than of flood-related disaster and cataclysm. We see examples of premodern flood adaptations and

118. Residents' petitions could be very specific such as when inhabitants requested a new bank at Foord Dike that 'was 8 foot high and 20 foot broad at the bottom and 6 feet at the top': see Petition of inhabitants of Sutton and Swine, late seventeenth-century (ERYA, CSR/12/9).

119. M. Jenner, 'From conduit community to commercial Network? Water in London, 1500–1725' in P. Griffiths and M. Jenner (eds), *Londinopolis: Essays in the Cultural and Social History of Early Modern London* (Manchester: Manchester University Press, 2000), pp. 250–72; Trexler, 'Measures against water pollution in fifteenth-century Florence', 455–467; Kucher, 'The use of water and its regulation in medieval Sienna', 504–36; Gentilcore, 'From "vilest beverage" to "universal medicine"', 686.

flood recovery, even while there were also significant tensions stemming from competing water management interests, which sometimes resulted in legal challenges or even direct action to break banks or stop drains (perhaps by those least able to mitigate the impacts of flooding on themselves and their livelihoods). In all the material produced by the Corporation and Commissioners of Sewers, there is remarkably little about the disruptions flooding brings; instead, the records focus on managing flood risk and ensuring drinking water supply, with occasional reference to the ways flooding impacted agriculture or disrupted travel. This contrasts strongly in tone with the eighteenth-century town history in whose pages the occasional incidents of flooding that appear are more dramatic, with reference made to lives lost and goods damaged. Yet, despite the conflicts between the different parties involved in managing and governing water in Hull, and the ever-present risk of a major incursion of water into homes and businesses, the overall story is one in which Hull communities seem to have lived – more or less – successfully with water and flood for more than 500 years. This is not to suggest, however, that water management infrastructure and flood governance in Hull and the surrounding areas was unchanged for half a millennium. Rather, we see the Corporation and Commissioners of Sewers implementing technological innovations as well as failed schemes in water infrastructure and management over the course of our period, just as we also know that exogenous factors – including climatic variations and considerable socio-political change across the long medieval and early modern period – necessarily shaped experiences and decision-making in Hull. Nor is it a story of flood equity: there were doubtless winners and losers during flood events, the cost of maintaining flood defences and water infrastructure was probably least affordable to the poor, and the communities within some Humber townships felt they bore disproportionate responsibility for maintaining flood banks and walls that protected wider regions. These are themes that might usefully be explored further elsewhere, just as there is also work to do to investigate community responses and recovery at those times when floodwaters breached the defences and caused major flood incidents, as happened in the winter of 1646–47.

As our detailed examination of the archival sources has revealed, there existed in Hull and the Humber region what we might usefully call a ‘living with water mentality’ – that is, living with water and flood was an integral, entirely commonplace and very normal part of dwelling in the medieval and early modern town. Moreover, for the inhabitants of Hull and the surrounding areas, the ongoing need to manage water infrastructure and mitigate flood risk actively instilled in them a material connection with their green-blue home and created with it a sense of responsibility and stewardship. By sharing premodern Hull’s watery histories, this paper makes an important contribution to current scholarship around hydrocitizenship, river daylighting and climate arts, opening up new possibilities to use medieval and early modern stories of stewardship and

connection to drive water, flood and climate action and so empower people to live better with water in the present. As we have argued elsewhere, utilising ‘learning histories’ as the foundation of place-based, historically-informed community engagement also offers us opportunities to make big global narratives about climate change tangible and relatable at the local level – and so drive anticipatory action.¹²⁰ In doing so, our work holds in dialogue the premodern past and as yet uncertain futures, thinking forward through the past to build flood resilience and climate action, with the ambition of shaping new, more inclusive ‘water cultures’ today and for the future.

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120. Brookes et al., ‘Learning from arts and humanities’; B. McDonagh, E. Brookes, K. Smith, H. Worthen, T. J. Coulthard, G. Hughes, S. Mottram, A. Skinner and J. Chamberlain, ‘Learning histories, participatory methods and creative engagement for climate resilience’, *Journal of Historical Geography* **82** (2023): 91–97