

Killerton Park and Marshes
Green Recovery Challenge Fund
Historic Character of Watercourses
and Floodplain

Volume 1: Narrative



12th April 2021

Antony Firth and Emma Firth

Fjordr Ref: 16620

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Cover picture: River Culm at Columbjohn (Photo: Fjordr)

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Killerton Park and Marshes Green Recovery Challenge Fund Historic Character of Watercourses and Floodplain

1. Introduction

1.1. Background

Fjordr Limited has been commissioned by the National Trust to carry out a rapid examination of the historic character of a stretch of the River Culm and its floodplain in a study area that extends from Ellerhayes Bridge upstream to Columbjohn and Paddleford bridges downstream. The study is intended to help inform the development of plans for improving habitats, resilience to flooding and greater public access as part of the National Trust's Green Recovery Challenge Fund (GRCF) project for the Killerton Estate.

This study builds on the methodology and results of a much wider examination of the entire Culm catchment, funded by Historic England and carried out in conjunction with the Connecting the Culm project. This wider project is strategic in character, being the second pilot of a method to raise awareness of the historic character of watercourses. The method comprises, in essence, mapping and recording 'Historic Watercourse Polygons' (HWPs) in a flat file GIS format that can be used by catchment managers. The HWPs present a single layer of interpretation based on otherwise disparate, mainly desk-based sources. These sources include existing archaeological datasets; various forms of historic map; and lidar data. The results of the first pilot of this methodology, focussing on the Dorset Stour (Firth and Firth, 2020), is available online¹. The main phase of mapping and recording for the wider Culm project is complete; the report is pending completion of phases of the project that are still underway.

For this study, we have revisited the HWPs previously identified for this stretch of the Culm in more detail and in the light of additional sources (notably estate maps and reports) provided by the National Trust. HWPs have been amended and additional HWPs have been identified. A longer description of each HWP – together with a consideration of significance, condition, and recommendations – have been prepared and are included in Volume 2. A gazetteer of HWPs is provided in Volume 3. This document, Volume 1, provides a narrative account of the history of the river and floodplain within the study area.

1.2. Overview of the route of the Culm

It is worth starting this description of the route of the Culm a little further upstream of the study area, as the river trends generally south west until it reaches a pinch point between Beare and Leas Hill, where the floodplain is relatively narrow – about 250m across. At this point, the Culm valley is overlooked by highest point at Killerton, which is the locally prominent hill topped by the Iron Age hillfort of Dolbury.

Due to the constriction of the valley, the Culm trends west through the former site of Silverton Mills and then north west as it enters the study area at Ellerhayes Bridge, which carries the road from Killerton (and formerly Exeter) across the Culm to Bradninch and Cullompton, and to Silverton. The river at Ellerhayes Bridge is close to the rising ground of Killerton, but once over the bridge the road is carried on causeways across the floodplain – about 450m wide at this point -- both on the Bradninch road and, after the junction, to Silverton.

From Ellerhayes Bridge (Figure 1 - A), the Culm – in a single channel – and its floodplain sweep back to the south west, around the hill of Park Wood. Near the former site of Dolbury Cottage, the

¹ http://www.fjordr.com/uploads/3/4/3/0/34300844/historic_watercourses_dorset_stour_report_280220_web.pdf.

shoulder of Killerton Hill becomes less steep and the valley broadens out. Slightly upstream, the Culm divides into two channels (B).

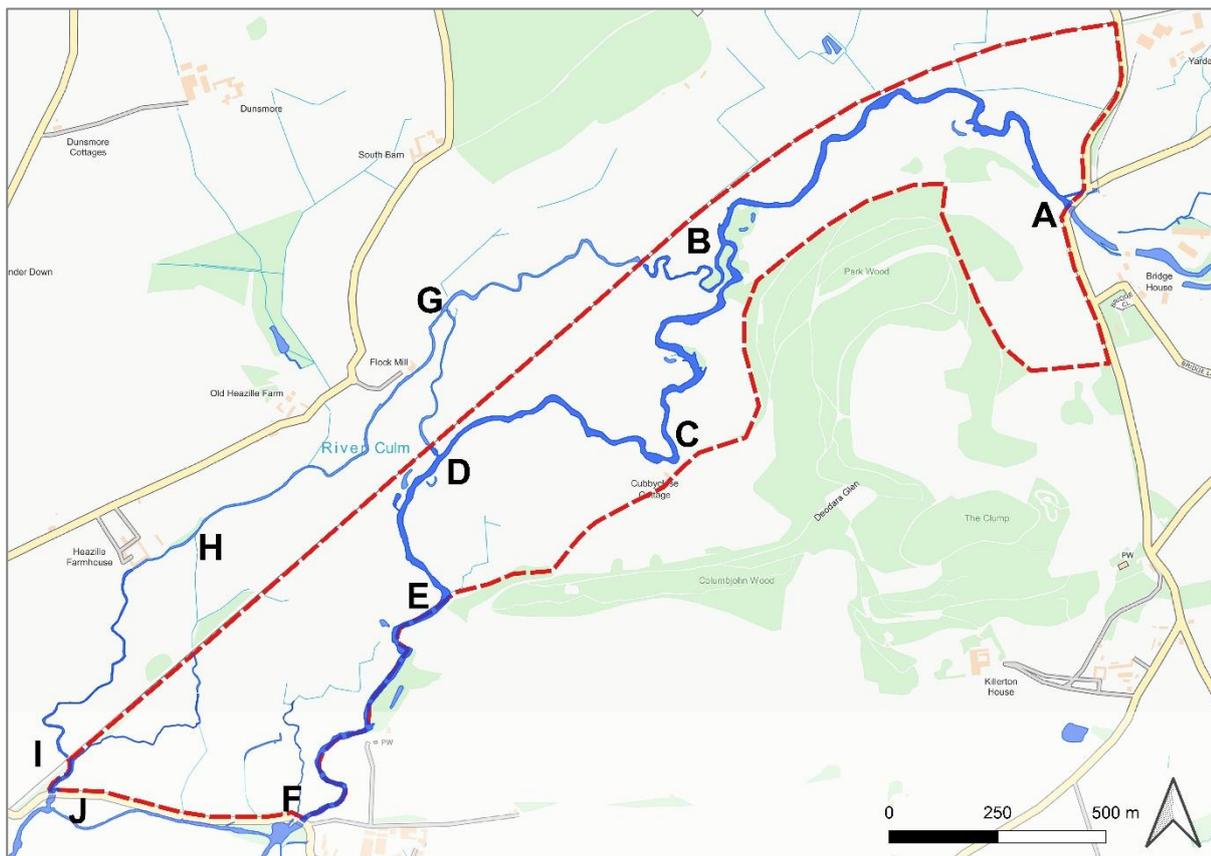


Figure 1: The route of the River Culm in the vicinity of the study area (red dashed line)

One channel crosses the floodplain from B towards Singleton Park (formerly Poundland), reaching the north west side of the valley just upstream of (Pound) Flock Mill, where the channel divides again (G). At this point, a weir takes water to a channel that crosses back across the valley to the south (D). The channel at Flock Mill, however, continues along the north west side of the valley to Heazille Barton (formerly Rewe Mill) before starting to cross the valley to Paddleford Bridge (J), where it leaves the study area. At a point (H) just upstream of Heazille Barton, another small channel leaves the north west channel and returns to it upstream (I) of Paddleford Bridge.

From just upstream of Dolbury Cottage (B), the main channel continues along the south east side of the valley to Cubbyclose Cottage (C) where it turns across the valley in a wide arc which is met at its apex (D) by the small channel from Flocks Mill and then returns to the south east side of the valley near the western tip of Columbjohn Wood on its distinct east-west ridge (E). The channel continues along the south east side of the valley – past the site of Columbjohn Mill, Columbjohn Chapel and the former mansion site – before leaving the study area under Columbjohn Bridge (F).

The multiple routes of the Culm may be natural in part but some are also likely to have been manipulated by human interventions to a degree – and perhaps created outright. These are detailed within the study area as HWP, but it is worth flagging some points relating to the river outside the study area that remain relevant to the river and floodplain within it. Notably, alterations to the watercourses were made to power water mills on the north west side of the valley at Pounds Flock Mill and Rewe Mill (Heazille Barton), as well as at Columbjohn Mill. All these mills operated on a bypass system, whereby water is taken from a main channel using a leat (head race) to power a mill, and is then returned to the main channel via another leat (tail race) (Alexander and Edgeworth, 2018, pp. 15–16). A weir is often used to maintain the head of water being diverted along the leat to the mill; this weir is overtopped into the original channel of the river by any additional flow, thereby serving as a ‘safety valve’ for any excess flow that might damage the mill. It seems characteristic of these bypass systems, however, that the leats to and from the mill often

evolve into the main channel of the river, whereas the earlier main channel, fed via a weir, dwindles in size. This can in fact be seen at both Flock Mill and Rewe Mill: it is possible that the channels that served these mills are artificial leats in both cases; and that the smaller channels which depart a little upstream (at G and H), fed by weirs, represent the earlier main channel. At Rewe Mill, this may be supported by the parish boundaries – which typically run along older channels – as they follow the apparently minor channel H-I (with a deviation caused by construction of the railway) from just upstream of the former mill. Other variations in the parish boundary on the north west side of the valley also support the interpretation that these channels – though perhaps natural in part – have been substantially altered by human intervention in the past.

This general process of altering watercourses using quite extensive leats is relevant also to Columbjohn Mill, which is discussed below.

It is also worth noting that the Culm enters the study area at Ellerhayes Bridge having just provided power to Silverton Mill. Where it leaves the study area at Columbjohn Bridge, a substantial part of the Culm's flow was carried via a now lost leat to Huxham Mill; and the channel on the north west side of the valley, leaving the study area via Paddleford Bridge, subsequently powered mills at Stoke Canon. The section of the Culm powering mills as it runs through the study area is therefore part of a much more extensive system of obtaining power from the catchment, based on major interventions in the watercourse that in many cases have become 'naturalised'.

A further major intervention in the floodplain that also affects much of the Culm catchment including the study area is the railway, which opened in 1844. As elsewhere in the catchment, the railway in the study area is on an embankment that effectively divides the floodplain along its length. The railway forms the north west boundary to the study area, hence the channels described above that cross to the north west of the valley pass out of the study area. The railway can be seen to have affected some pre-existing channels, which were modified to accommodate its construction. At some points it seems that drainage has also been impeded such that marsh areas and ponds sit immediately alongside the embankment. Moreover, the railway also cut patterns of land use that once stretched across the valley. As discussed below, floodplain meadows that were once accessed from the north west (Silverton) side of the valley were cut off from that access, as reflected by some parts of Silverton and Rewe parishes on the Broad Clyst side of the railway. As noted already, these parish boundaries can be indicators of principle channels of the river in earlier periods. Moreover, the railway appears to have cut previous estate boundaries; some significant sections of the study area were not previously within Killerton Estate, so their details are not included on estate maps.

1.3. Summary of archaeological principles

Human time-depth

The watercourses and floodplain of the River Culm at Killerton are likely to have a long history of human use and intervention. Archaeological material may be present from many different periods. Due to waterlogging, archaeological remains may include well-preserved but fragile organic materials, including deposits that have potential for palaeo-environmental analysis and scientific dating. Archaeological material may seem ephemeral, but it is likely to be very significant locally, not least in indicating how our predecessors lived and worked with the river in the past.

The action and interaction of natural and human factors

In their current form, the river and floodplain may appear 'natural' and be characterised by the presence of nature: but they are in fact the result of thousands of years of human intervention. In some cases, these human interventions may have been direct and substantial – such as the creation of mill leats and the railway line; in other cases, human interventions may have been small scale but over very long periods, such as agricultural practices that have resulted in distinct habitats. As in many other contexts, the character of the landscape of the Culm and its floodplain at Killerton 'is the result of the action and interaction of natural and human factors', consistent with the European Landscape Convention 2000. The Culm and its floodplain is best regarded as a 'GM floodplain' (Lewin, 2013) or a fluvio-cultural landscape (Brown et al., 2018).

Stability and change

The river and floodplain reflect, simultaneously, a great deal of change and a great deal of stability, in terms of both natural and cultural processes. Some aspects of the catchment adjacent to Killerton have not changed in centuries (such as the location of bridges across the river still in daily use today) or even millennia (such as some boundaries and routes). Other aspects appear to have changed over much shorter timescales: some sections of river channels have changed even in recent maps, and could have done so in quite sudden natural events (avulsions) during flooding. Human impacts can be quite sudden also, but may go on to have persistent effects. Evidence of stability and sudden change can be found in close proximity to each other.

Current perceptions of the river and floodplain may not be a good guide to perceptions and behaviour in the past

On the River Culm we can see or infer physical changes over time directly in the landscape, in archaeological sites and built heritage, or recorded in map-based sources. However, it is harder to gauge the changes that are likely to have occurred in people's perceptions of this environment over time, and even between different people or communities within the same period. In its recent history, Killerton has been a designed landscape in which ideas about the estate were cultivated and engineered, probably with considerable differences between the gentry and the people who worked there. For earlier periods we have very little idea of how people perceived the river and its floodplain, though they also would have inhabited and manipulated their environment according to those perceptions. The climate and the river's propensity to flood – and likely perceptions of risks and benefits – have changed also.

Working with the grain of the historic landscape

Hundreds if not thousands of years of human experience of working with the River Culm is embodied in the landscape we see today. For much of this long history of being together, people have lived with the River Culm in a way that has been sustainable: for flora; for fauna; and also for livelihoods. There may, therefore, be lessons in the landscape about how we build a sustainable relationship with the river and its surroundings again. Although not necessarily written in the clearest language, the landscape can be understood as a guide to what has worked previously, and what has not worked. Although we are undoubtedly equipped with a great deal of scientific knowledge not available to our predecessors – and have a significant armoury of methods for making rapid changes, there is a case for using the traditional ecological knowledge embedded in the historic environment to avoid maladaptation in the present.

No going back

Some of the language associated with green recovery, such as restoration and rewilding, might be taken to imply that historic environmental processes are reversible: that it is possible to turn back the clock to an earlier state when human impacts were less damaging, or even to a point prior to human influence. As in many other landscapes, there is no going back for the River Culm and its floodplain. The reasons why there is no going back are largely practical: some recent interventions that changed the floodplain – such as cutting it lengthwise with the railway – are not available as options to undo; some are literally fundamental to the landscape – such as the development of an alluvial floodplain from sediment mobilised by the intensification of arable farming in prehistory. However, the prospects for going forward in a better way – informed by an understanding of what has changed – are very good. Above all, the long history of human interventions in the River Culm and its floodplain is a useful reminder that the changes we choose to make now are themselves yet another human intervention.

Opportunities for primary research

There is much that is not understood about rivers, floodplains and their relationship with communities over time. Interventions in the floodplain provide, therefore, important opportunities for research not only in archaeology but in geomorphology, palaeo-environmental science and environmental history. Even relatively basic information about the risk of flooding through time,

riverine responses to climate change, patterns of human intervention and adaptation all present questions that data acquired in the course of environmental enhancement can illuminate. Relevant research need not focus only on interventions in the field: documentation such as records or diaries that set out details of weather and/or flooding on the estate could prove a valuable resource in understanding the relationship between river and estate not only in the past, but for the future (see e.g. Harvey-Fishenden and Macdonald, 2021).

FCERM Strategy²: ‘A nation ready to respond and adapt’

The evidence for people living with the River Culm in the vicinity of Killerton over the course of history, in circumstances that have changed across the centuries, provides a valuable opportunity for dialogue with communities today about how our environment is changing and how we need to adapt our behaviours accordingly. Discussing the options available to communities in the past – and how they chose to act – provides a platform for considering options for the future. Future scenarios may be quite stark, but greater awareness of our predecessor’s responses to longer term changes and short-term extremes may encourage resilience and greater preparedness.

1.4. Preliminary recommendations

Care needs to be taken with proposals in the vicinity of some potential sensitive places, and some potentially sensitive forms of feature.

Sensitive places include Columbjohn and Paddleford bridges, the site of Columbjohn Mansion, Columbjohn Mill and leat, Cubbyclose Cottage, Dolbury Cottage and Ellerhayes Bridge. This is not because of what is already known about these places, but because of what is not yet known – especially about earlier periods.

Sensitive forms of feature include palaeo-channels and former routes of the river. The potential presence of material suitable for palaeo-environmental analysis and dating should be an important consideration where they are disturbed.

The riverbed should be regarded as sensitive throughout the study area. Brief walkovers have already identified the potential presence of archaeological material surviving in riverbed contexts.

Locations where underlying gravels outcrop at the surface – especially within the floodplain and on its margins – may present opportunities for recovering worked flint that is important to understanding prehistoric inhabitation of the area.

The presence of routes in and around the study area, including onto the floodplain, might provide opportunities for increasing public access whilst also encouraging awareness of the area’s history.

The history of land use – especially of agricultural practices, the use of commons and the stewardship of other floodplain resources – may present opportunities to share with the public ideas about long-term sustainable use of riverine environments, and about the diverse ecosystems this encourages.

The initial framework of HWPs should be used to frame both improvements in understanding the study area (through subsequent investigations, for example) and opportunities for public engagement.

Potential for further enhancement of the work presented here should be explored, especially through any other documentary sources relating to the use of the river and floodplain – such as weather records and diaries for the estate.

2

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/920944/023_15482_Environment_agency_digitalAW_Strategy.pdf.

When circumstances allow, an archaeological walkover of the study area is likely to be of considerable benefit.

2. Historic land use relating to the River Culm and its floodplain

2.1. Evidence for the human history of rivers and floodplains

With a few exceptions, direct evidence for the history of the River Culm and its immediate surrounds are quite sparse in existing archaeological sources. This reflects two inter-related issues common to the archaeological understanding of rivers across England which have, in part, prompted the methodology that has been applied in this study. First, other than obvious features of the built environment such as bridges and (extant) mills, archaeological evidence within floodplains is somewhat hidden from the methods and processes that cause such evidence to be identified and mapped in other environments. Floodplains are often alluvial in character and managed as pasture with relatively little arable cultivation or development, so archaeological material is masked or does not come to light. Second, rivers and floodplains have received relatively little direct attention from archaeologists: the lack of data means that the investigations and response that might apply in other environments are not triggered. However, when investigations do take place, river and floodplain archaeology can reveal well-preserved remains and highly significant results (Firth, 2015; Firth and Firth, 2020).

Coupled to the invisibility and lack of investigation is a broader sense that rivers and floodplains are marginal areas, often useful only for grazing and subject to the calamities of flooding. Whilst this might seem reasonable from modern perspectives, it may obscure the centrality of rivers and floodplains to communities in the past. In the case of Killerton, the Culm's situation on the edge of the estate over the last 150-200 years – for which we have most historical information – may impede an appreciation of the river's importance for communities living here over several thousand years. This importance arises from the agricultural value of the floodplain, especially for hay; the role of the river as a source of energy, obtained by manipulating watercourses to power mills; and the influence of the river and floodplain on routeways through the landscape, perhaps including control over those routes. The river was undoubtedly important also as a source of various other resources of food and material, and as a source of water for drinking, washing and processing.

As already noted, much of the evidence is indirect and requires attention to context outside the study area. Evidence of environmental change is important, as is evidence of continuities in the landscape apparent in or implied by relatively recent maps indicating a deeper human structuring of the landscape. Unfortunately, secure dating evidence is generally lacking, so the following paragraphs consider human use of the landscape across multiple periods with considerable uncertainty about when they might have started and ended; and with insufficient resolution to identify much shorter though no less significant episodes. As a result, the account may give the impression of greater continuity in the landscape than might have been the case.

2.2. Grazing and hay

Human land use within the floodplain has probably been predominantly pastoral, focussing on grazing and especially hay for winter fodder. This is underlined by information recorded in the Tithe Maps and Apportionments for the study area, dating to the 1840s (Figure 2; Figure 3; Figure 4). Winter flooding is considered to be central to productivity for hay, which in turn was central to the capacity for sustaining livestock – important not only as produce (meat; dairy) but also as transport and motive power for ploughing. It is only with the widespread introduction of the internal combustion engine in the early twentieth century that hay ceases to be a commodity of primary importance. Managing the floodplain to ensure a sustainable supply of hay – benefitting from and perhaps even augmenting flooding, but also encouraging the waters to fall swiftly afterwards – is likely to have been a major driver in determining the character of the landscape that survives today. Maintaining a supply of hay would have been essential to communities on both sides of the Culm valley. There are indications of meadows that would have been accessed by one side or the

other that stretch across the valley and which the parish and estate boundaries respected until severed by the railway. Moreover, some of these meadows have a funnel-shaped form seen elsewhere on the Culm and in other parts of the country that indicates some of the meadows were managed by communities in common: tenants would have been allocated sections of the meadow (sometimes referred to as 'doles') for hay; and after it had been cut the meadow would revert to shared use for aftermath grazing. Only one of the fields in the study area (plot 11) is expressly referred to as common on the Tithe Map, but HWP's 432 and 1249 have characteristics of once being commons, even if they had been taken into single occupancy by the time of the Tithe Map. Other plots in the floodplain may have been managed for hay followed by pasture in singular occupancy – on behalf of the church or the lord of the manor – rather than in common.

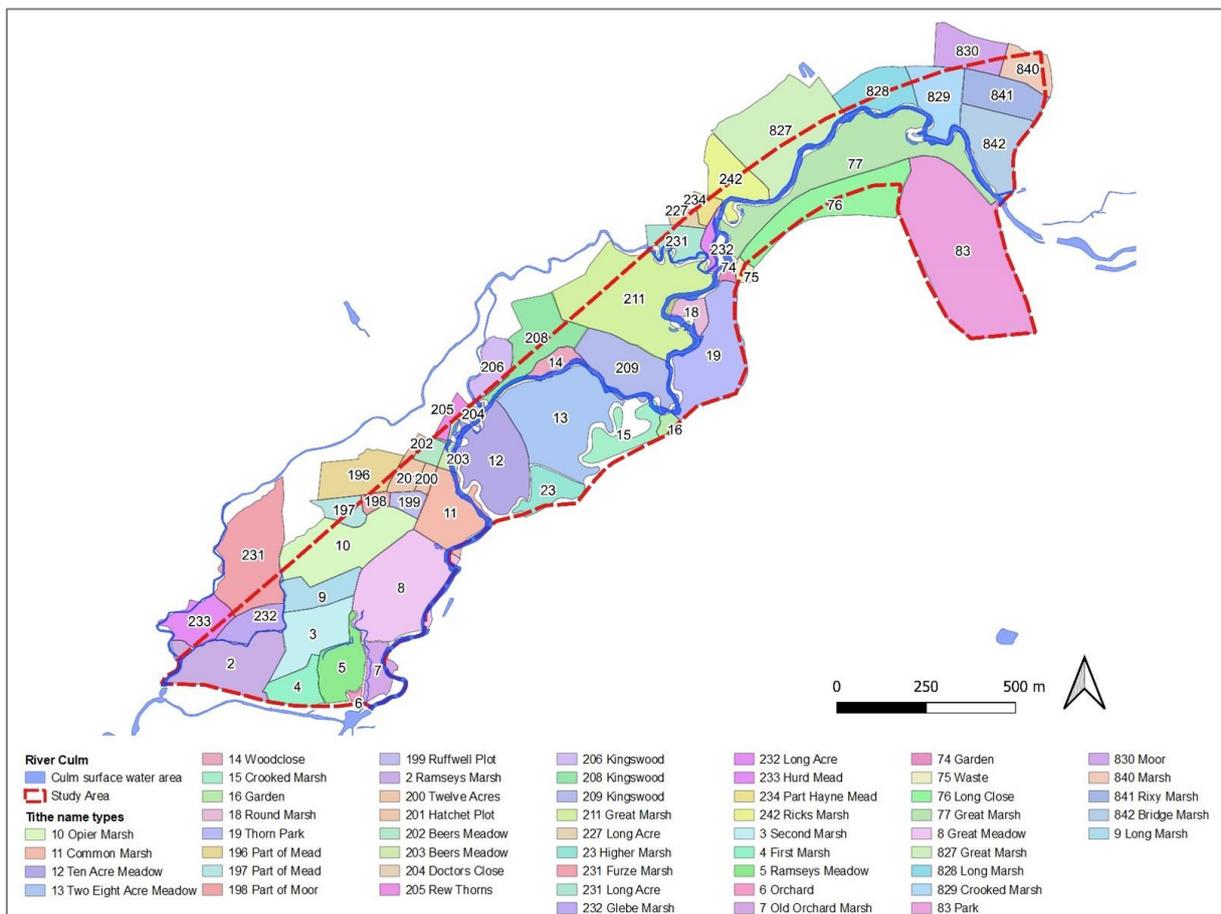


Figure 2: Tithe plots in the study area

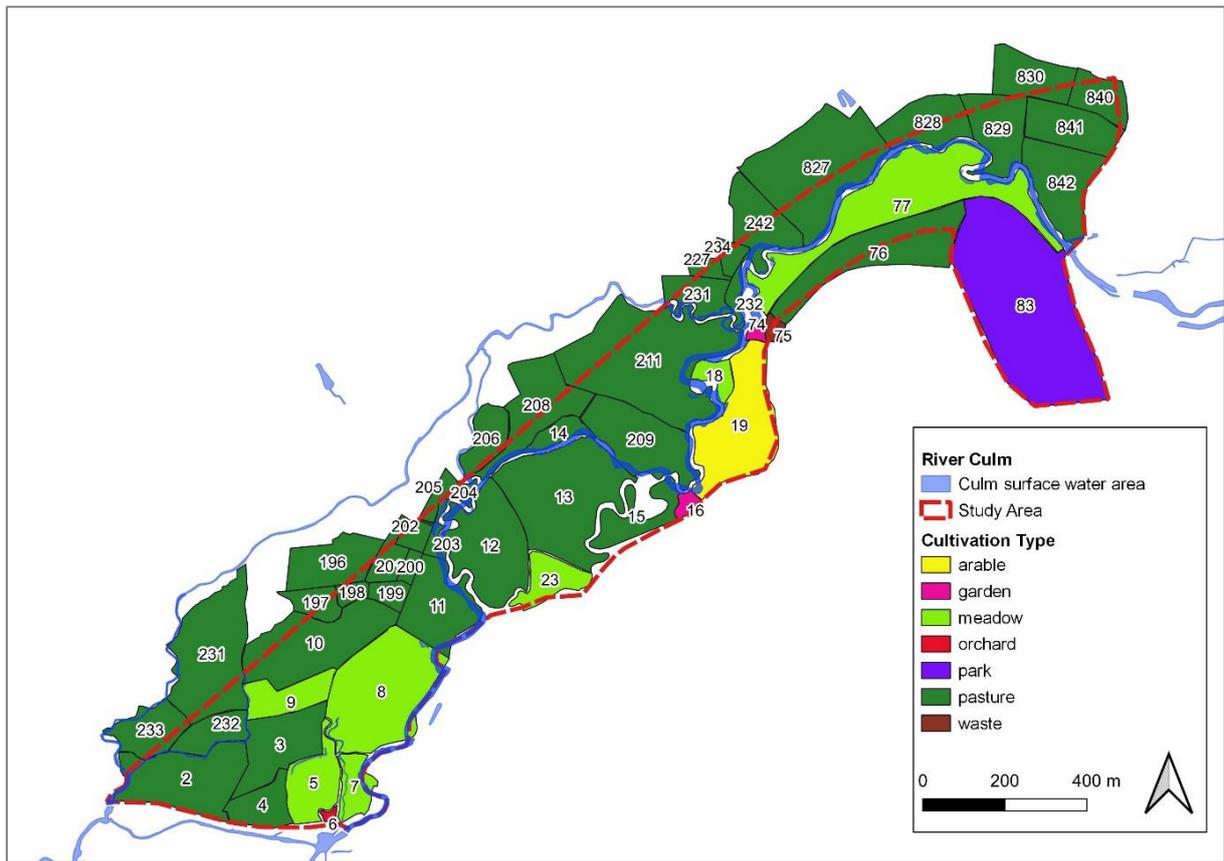


Figure 3: Cultivation type recorded in Tithe Apportionments

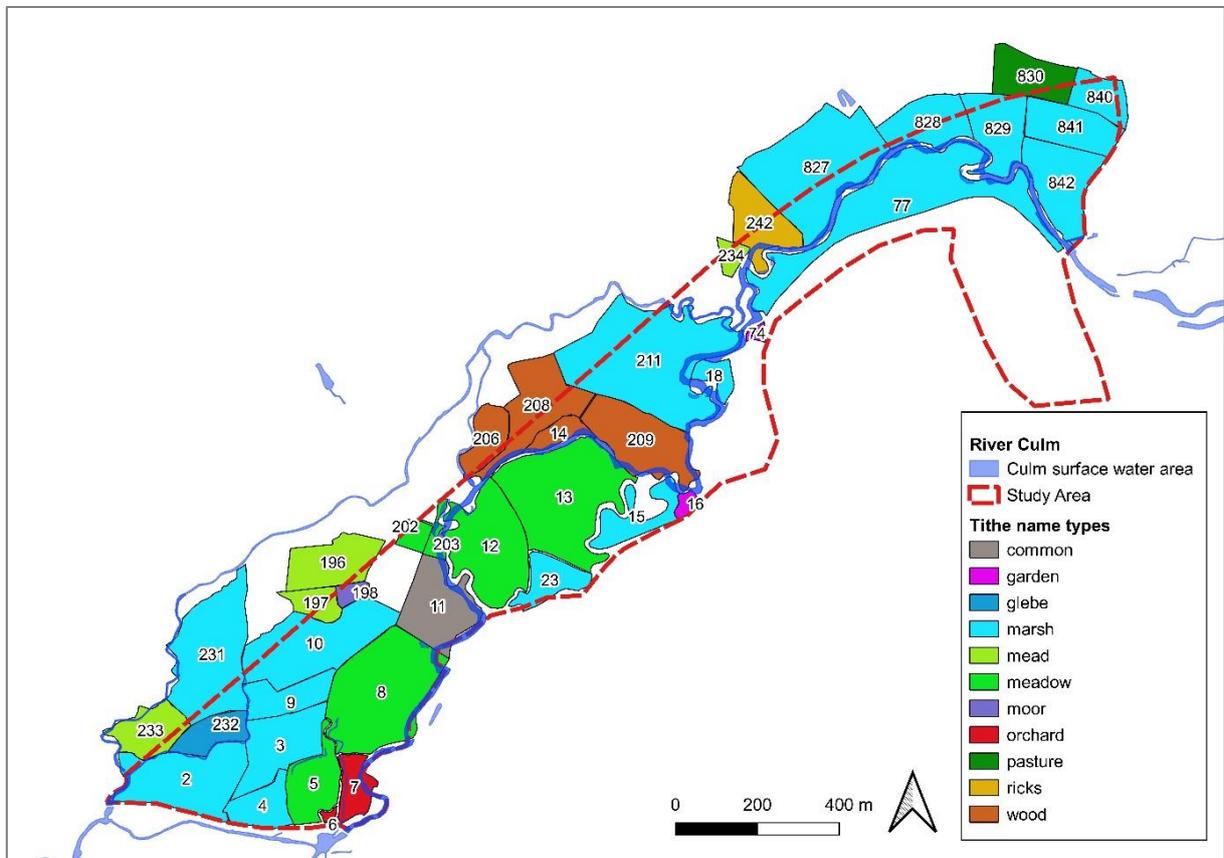


Figure 4: Name types of Tithe plots

There are indications that the system of managing meadows on the floodplain, including common meadows, persisted into at least the mid-nineteenth century: individual doles are mapped out on the Tithe Maps for HWP 432, for example. It is, however, difficult to be certain as to when meadows were first established in the floodplain, or when this form of common management originated. It is likely that it stretches back at least to the Early Medieval period. The Domesday book – which is in effect an account of the existing Early Medieval landscape shortly after the Norman Conquest – includes ‘meadow’ as one of the prime categories of land use (or value) that it records. Moreover, meadow as referred to in Domesday is understood to refer to land susceptible to flooding³. Indicating its importance, the Domesday record for Columbjohn⁴ states that the settlement had seven acres of meadow compared to three acres of ploughlands; Rewe⁵ also had seven acres of meadow for five acres of ploughlands; and [Monk] Culm⁶ in Silverton had eight acres of meadow for five of ploughlands. The parish boundaries of Rewe, Broad Clyst (including Columbjohn) and Silverton (including [Monk] Culm) all meet in the floodplain, so it is certainly possible that the study area includes meadows from these settlements dating back to 1086. Moreover, the forms of these meadows – including their boundaries and the watercourses that sometimes define them – may be of similar antiquity.

Using the floodplains for grazing and hay would have depended on the movement of animals on a seasonal and daily basis. Different environments were interlinked and independent, as John Veitch, steward of the estate, reminded Thomas Acland in December 1808 (Balmond et al., 2020, p. 186; Ravenhill and Rowe, 2006, p. 15):

Reflecting what you say about taking the Ground into the Park near to CulmJohn Chapell [sic] I think you have not considered that you will disjoint Culmjohn Barton of £300 a year & upwards, as without the Dry Ground it will not be worth Tosswill's while to rent it afterwards, as he will have no dry ground for his sheep in winter when the Marshes is [sic] covered with water or too wet for sheep – as he always lets up the Grass in the dry field for his ewes and other sheep in the winter.

The reference to sheep grazing the marshes in 1808 recalls the animals noted in the Domesday Survey in 1086: Columbjohn⁷ is recorded as having 10 cattle and 40 sheep; and [Monk] Culm⁸ as having seven cattle, 60 sheep, 15 goats and one cob.

Meadows in floodplains are often referred to as water meadows, which is the category that has been applied to much of the study area in the Historic Landscape Characterisation (HLC) of the county. The term ‘water meadow’ is, however, also used for a specific form of meadow management generally dating to the period of agricultural improvement in the eighteenth and nineteenth century. In this form of management, an intensive system of feeder channels brought water onto the meadow while an interlocking series of drainage channels took it away. The surface of the meadow had to be remodelled so that the feeders were at a higher level than the drains; as the water spilled out of the feeders and flowed down the sloping ‘pains’ to the drainage channels, the water brought nutrients and perhaps an important increase in temperature that stimulated early growth of grass. Creating these systems with their complicated earthworks and channels – known collectively as ‘bedworks’ – required heavy investment of capital to create them, and also required a lot of maintenance. Their impact on productivity could be considerable, so the construction of bedworks became very popular in some areas. They went out of use from the late nineteenth century, but their distinctive topography – and the often-complex systems of water management they required -- survives in many places, including in the Culm catchment. Land managers at Killerton were familiar with bedwork water meadows: a new cut from above Ellerhayes bridge was proposed in 1766 to ‘water ye Meadows’, which would ‘water between 58 to 70 acres and thus

³ <https://www.nationalarchives.gov.uk/domesday/world-of-domesday/landscape.htm>.

⁴ <https://opendomesday.org/place/SX9599/columbjohn/>.

⁵ <https://opendomesday.org/place/SX9499/rewe/>.

⁶ <https://opendomesday.org/place/SS9502/monk-culm/>.

⁷ <https://opendomesday.org/place/SX9599/columbjohn/>.

⁸ <https://opendomesday.org/place/SS9502/monk-culm/>.

would increase both yield and income for the estate' (Ravenhill and Rowe, 2006, p. 12). The leat was also intended to turn an engine to supply the subsequently abandoned Wyatt House with water from the river, so it does not appear to have been constructed; but the awareness is plainly present. Moreover, in 1850, the Aclands demonstrated a bedwork water meadow at Newhall Farm on the Buddlelake stream (which flows into the Clyst) to the Royal Agricultural Show Society (Balmond et al., 2020, p. 266) and there are other references to water meadows elsewhere on the Killerton Estate⁹. However, there is currently little evidence of bedwork water meadows being present in the study area: HWP 516 seems unique in this regard. The absence of bedworks may be because the meadows were sufficiently productive under their existing management – amply flooded by the Culm – without needing augmentation through such a level of capital investment.

Aside from the proposed cut of 1766, the evidence for watering meadows in the study area is ambiguous. It is possible that some manipulations of watercourses served this purpose as well as helping to supply mills; channels identified in some of the HWPs might also have had a role in irrigating / flooding the meadows. However, most of the channels in the study area probably relate to drainage, encompassing a range of forms – palaeo-channels, open dendritic channels and more obviously artificial channels – that probably represent a spectrum of natural, human and hybrid processes. Certainly, whilst flooding brought benefits to the meadows, prolonged immersion or even relatively brief flooding at the wrong point in the growing season could have been detrimental to the hay crop (Oosthuizen, 2017), so facilitating the removal of water is likely to have led to interventions such as digging small grips or more extensive works.

Arable farming – ploughing for crops – seems unlikely to have been practised within the floodplain within the study area despite its long history of agricultural use. There is no evidence for arable in the form of 'ridge and furrow' on the lidar data or references in Tithe Maps, other than plot 19 which is outside the floodplain. Within the floodplain, the soil is likely to have been heavy to plough, would clearly have been prone to flooding which would have destroyed crops, and was in any case probably too valuable as meadow. However, arable farming certainly took place in the immediate area and in the wider catchment, and has had a profound impact on the character of the river and floodplain within the study area even if it took place outside. To explore this, it is necessary to consider the human history of the floodplain over a much longer timescale.

2.3. The changing character of the floodplain

In the discussion of meadows above, it was suggested that a pattern of land use still evident in the nineteenth century probably originated in the Early Medieval period, prior to the Norman Conquest. Use of the floodplain for grazing and perhaps hay too probably stretches back much earlier, into prehistory. Geomorphological and palaeo-environmental research on the Culm – including sample sites in the floodplain towards the north of the study area – indicate that the valley probably hosted wet woodland and that its base generally comprised coarser sediments such as gravels and sands with relatively little alluvium. This landscape would have been inhabited and used by Mesolithic communities whose flint tools have been revealed by fieldwalking on arable fields at Lower Hayne, Bussell's Farm and Poundland in the vicinity of the study area (Brown et al., in press, p. 30). The presence of Mesolithic flint within the floodplain is also indicated within the floodplain at places where coarse sediments are close to the surface (Brown and Whitehouse, 2000, fig. 4).

Analysis suggests that this relatively stable situation changed about 5,300 years ago, probably due to climatic factors. The evidence for change is presented by palaeo-channels, which are former courses of the river that have been vacated as the channel has changed and then filled with silt. The alluvium in these channels can provide a detailed sequence of the environment over the period that they filled in, as well as scientific dating evidence. Because the environment is so wet, palaeo-channels can contain well-preserved organic material such as pollen and the remains of plants and beetles.

⁹ There is a reference to a water meadow being created at Columbjohn Farm (MNA104751) (Balmond et al., 2020, p. 100) but we have not yet had opportunity to consult this record.

The contents of palaeo-channels in the study area show that the influence of people on both vegetation and sedimentation transformed the base of the valley into an open environment with a floodplain of fine alluvium. The increase in sedimentation was attributable to arable cultivation which, in the Midlands and eastern and southern England, increases markedly from around four to five thousand years ago (Brown et al., in press, p. 32). In the Culm it appears to occur later, perhaps because the emphasis remains on pastoral rather than arable systems. About a thousand years' ago, pollen records from palaeo-channels in the study area characterise the vegetation as 'open grazed floodplain with some wet woodland' (Brown et al., in press, p. 21). Beetle remains indicate a similar story: open pasture, rich meadow, grazing – with some woodland (Brown et al., in press, p. 25). The broader pattern is of deforestation of wet alder-hazel woodland starting around 3000 years ago to be replaced largely by wet grazed pasture by about 1400-800 years ago (Brown et al., in press, p. 21). Nonetheless, this changing environment with strong human influences 'appears to have promoted and probably maintained high biodiversity' (Brown et al., in press, p. 33) not least because of the mix of land use and traditional agricultural practices. There are indications that sedimentation has increased in the relatively recent past, over the last 100-150 years – which might be linked to increased flooding and/or intensification of arable farming in the catchment.

This general sequence of change is common in English rivers, but an unusual characteristic of the Culm is that it has retained a system of multiple channels whereas rivers in most catchments developed into a single main channel (Brown et al., in press). This may be attributable to the timing of the change in balance between arable and pastoral farming (Brown et al., 2018), though more direct interventions may have played a part also. In particular, the use of the river for mills involved extensive modifications to the flow of water through the catchment, including in the study area. Some of the modifications were intentional, such as the excavation of leats. Other changes occurred as the water responded to being obliged to follow certain paths: some changes may have been slow and incremental, whilst others may have been sudden – perhaps as a result of flood events.

2.4. Mills and leats

The mill buildings with which we tend to be familiar today often date to the eighteenth or nineteenth century, but mills were being used extensively in the Early Medieval period. There are far more mills recorded in the Domesday Book nationally than survived into the last century or so. Also, we tend to focus on mills as buildings, where the machinery was fixed: but the flow of water that enabled the machinery to turn had to be modified and controlled over a much greater extent. Upstream of the study area at Kensham, for example, a leat to and from the mill was excavated 1.8m wide and 1.8m deep over a distance of 1.3km in the 1290s in connection with rebuilding work (Watts, 2016, p. 235). This clearly demonstrates that extensive reworking of the Culm was occurring over 700 years ago, which is well over 400 years before the earliest available maps. Over this long period, multiple changes could have occurred as a result of flooding, rebuilding and more gradual changes.

Columbjohn Mill (HWP 450) presents a good example of this capacity for change within the study area. Columbjohn is recorded as having a pre-existing mill in the Domesday Survey of 1086. It is likely that the mill remained on the same site until it burnt down in 1888 – when the mill was plainly a much more recent building (see painting on the front cover of Volume 2 of this report). As well as the buildings changing, it is possible that the purpose of the mill changed also. Although labelled as a corn mill on the OS map surveyed in 1888, the presence of 'rag' in the plot name on the Tithe Apportionment for an adjoining field (HWP 1243) might indicate that for a period it was used as a fulling or tucking mill, which would have required a tenter ground where wet cloth could be dried.

The leat that supplied the mill from the vicinity of Cubbyclose Cottage also indicates multiple phases to the history of the mill and its water supply. On maps of the eighteenth and nineteenth centuries, the leat appears to be a strange hybrid, sinuous for part of its length (HWPs 447 and 449), and then more clearly straight and artificial (HWP 450). Although only a tentative explanation, it is possible that the mill was fed by a more-or less straight leat all the way from the river by

Cubbyclose Cottage at an earlier stage, but at some point in time the river found a new path from a previous natural channel across into the leat some way along its length. Having made this jump, perhaps the simpler solution was to consolidate this combined natural and artificial combination which survived until the mill met its end in 1888. It is presumed that the upstream section of the artificial leat faded back into the landscape, though lidar data suggests that it may survive as a slight channel that forms, in part, the boundary to the garden of Cubbyclose Cottage.

It is worth noting that the river is itself convoluted around Cubbyclose Cottage, with the parish and older estate boundary indicating an earlier route to the main channel (HWP 447), and a substantial weir (HWP 1241) having been inserted probably to maintain the head of water for the mill whilst also acting as an overflow. Sluices and weirs are indicated at other points along the leat, together with overflow channels that might have served as 'safety valves' or taken off flows of water to serve other purposes.

Although not in the study area, the watercourses and bypasses used to provide and control the supply of water to Pounds Flock Mill and Rewe Mill at Heazille Barton are also clearly linked to the channels of the Culm within the study area. The degree to which they have been shaped and reshaped by both natural and human processes is not easily determined from the available evidence: but they remain central to the story of the Culm at Killerton.

2.5. Routes and the river

The Culm valley provides an important route from and to Exeter. Most recently, this is evident in the M5 which passes a little to the east of Killerton before dropping into the Culm floodplain upstream of the study area. In the nineteenth century, the railway (MDV22421) was similar in some respects, but drops into the Culm at Rewe downstream and runs all the way through the study area, slicing through the floodplain, its boundaries and routes. Earlier still, the Exeter turnpike passed right through Killerton (Balmond et al., 2020, p. 41), possibly following the route of a Roman Road between Exeter and Cullompton (MDV124645), which again dropped into the valley to cross the Culm just upstream of the study area. The presence of these routes close to Killerton underlines longevity in the human structure of the landscape – and the presence of people in the area reaching far back in time – even if direct evidence is more elusive.

The prominent hill of Killerton overlooking the Culm valley may have a relationship to these routes and could point back even further. The possible Roman Road lies almost alongside a triple ditched enclosure at Killerton (MDV29190) that may be the remains of a Roman camp and whose presence so close to the Dolbury Hillfort seems unlikely to be coincidental. There are, however, other routes potentially associated with the hillfort that more closely concern the study area and might add to the case for Dolbury having earlier phases of activity in the Neolithic and/or Bronze Age (Balmond et al., 2020, p. 84; Bayer, 2019; Wapshott and Webb, 2016, p. 27). Flint likely to be of Neolithic or Bronze Age date has also been found close to or within the study area at Yarde, near Dolbury Cottage and up the slope from Cubbyclose Cottage (Bayer, 2019).

Before it was moved to the south, away from Killerton House, the road from Killerton to Columbjohn took quite a direct route from near the hillfort to the river at Columbjohn Bridge, and equally directly to Paddleford Bridge and up the valley side to the crossroads at Rewe; thereafter it ran in a straight line along Green Lane to Fortescue Crossing – a ford across the Exe. West of the Culm, this route has been interpreted as a 'herepath' or military road referred to in early charters that might indicate an Early Medieval or Roman origin, connecting onwards to Crediton and beyond (Balmond et al., 2020, p. 85). The Culm crossing at Columbjohn / Paddleford and its eastward extension of this route to Killerton and the possible Roman camp / Dolbury might be seen in this context also.

Even greater antiquity for this route might be indicated by the probable Bronze Age barrows alongside Green Lane (MDV10269; MDV10222; MDV20093; MDV10221) and perhaps even the Neolithic/Bronze Age complex of cursus, mortuary enclosure and ring ditches a little to the north at Nether Exe (MDV57144; MDV57142; MDV57143). The fact that there is a barrow (MDV10221)

within the floodplain very close to a crossing point of the River Exe strongly echoes similar juxtapositions between barrows in the floodplain and crossing points mapped in the nineteenth century on the Dorset Stour (notably at Wick, Shapwick; Blackwater (Firth, 2020; Firth and Firth, 2020)). This might suggest an extraordinary continuity and perhaps a physical connection between the prehistoric ceremonial landscape at Nether Exe and prehistoric activity on and around Killerton Hill, which would have been prominent just 2-3 miles away (Bayer, 2011). It may be relevant that Neolithic and Bronze Age pottery has been recovered from Killerton Cricket Pavilion (MDV108115)(Balmond et al., 2020, p. 96), close to the line of the former Killerton-Columbjohn road. If there is a connection between Killerton and Green Lane/Nether Exe, then the route across the Culm at Columbjohn/Paddleford could be a key feature of this early landscape.

Other routes across the River Culm and its floodplain that are now extinguished might also have been important in the past. For example, the estate map from 1756 and from the early 1800s (Figure 5) indicate a 'Road to Silverton' crossing the floodplain from Columbjohn Mill across Common Marsh in the direction of Pounds Flock Mill, where Devon HER notes a hollow way (MDV108811) perhaps equivalent to that which serves Columbjohn Mill.

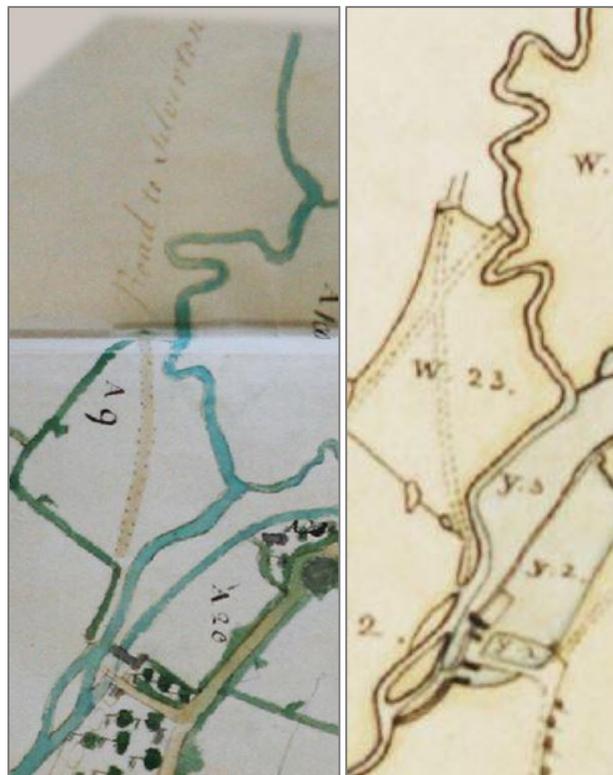


Figure 5: Clips of estate maps showing road / track across floodplain from Columbjohn Mill (1756 on left; early 1800s on right)

More enigmatic is the possibility of a route across the floodplain at Dolbury Cottage, associated with a funnel-shaped arrangement in the field boundaries that heads in the direction of the river at this point (Wapshott and Webb, 2016, p. 10). Dolbury Cottage was previously known as Dunford; the 'ford' element might be suggestive even though there is little indication of a ford other than the convolutions of the river a little upstream. Nonetheless, a crossing at this point before the river splits would have been more convenient than having to cross two channels, and at the other side of the floodplain – through what might be reasonably interpreted as a common meadow (HWP 432) – there is a clear route via Hayne Farm and Hayne Lane to Silverton. Alternatively, there is also a clear route to Poundsland and perhaps Dunsmoor – which shares its 'Dun' element with Dunford and whose 'moor' element might imply open common in a drier area above the floodplain.

The routes across the floodplain from Columbjohn Mill and Dolbury Cottage may have been largely extinguished by the railway but, reflecting earlier comments, they might have been of considerable age. Dolbury Cottage and its funnel-shaped boundaries have a very particular location where the

river meets the foot of Killerton Hill before the valley broadens again. In some respects, it reflects the location of Ellerhayes Bridge, which plainly continued as a crossing point of the River Culm through to the present. Both locations raise a question about the relationship between Dolbury Hillfort at the top of Killerton Hill and the river it dominates, and which it would have been dependent upon for water.

One form of route not so far discussed is the role that the Culm itself might have played in navigation. There is no evidence that the Culm was used by any form of vessels in recent centuries, allowing perhaps for the boathouse at Cubbyclose Cottage (HWP 444), which seems likely to have been restricted to functional uses in the immediate area, or recreation. Looking further back, the river may have formed a useful route for small craft, or even fairly sizable shallow-draft vessels that might be used to transport heavy or bulky goods. Again, the presence of Dolbury Hillfort so close to the Culm echoes the relationship of other Iron Age sites to navigable watercourses, such as the string of hillforts and settlements (Dudsbury, Spetisbury, Hod Hill, and Sturminster Newton) along the Dorset Stour connecting to the port-of-trade on the coast at Hengistbury (Cunliffe, 1990). The presence of the remains of watercraft in the river or its palaeochannels, or of other finds and structures indicating waterfront facilities – cannot be ruled out.

2.6. Living with the river

Broadly speaking, the river and floodplain would have been a rich and important source of resources for communities living in the area throughout history. Whilst settlement today might be indifferent to the river except as scenery or a source of risk from flooding, easy access to water (whilst staying just out of the range of floods) would have been valuable. As noted above, the presence of a major settlement at Dolbury in the Iron Age and earlier periods raises questions about where they obtained access to water and other floodplain resources. At the downstream end of the study area, the construction of a large mansion in the sixteenth century (MDV10176) – and the settlement at Columbjohn – point to proximity to the river being functionally useful. Indications of prehistoric settlement near Columbjohn Mill (MDV56025; MDV54053; MDV108814) suggests similar. In all these cases, evidence for inhabitation on drier ground is likely to be reflected in physical evidence of activity in the floodplain, even though that evidence may be masked by alluvium. Key to understanding the relationship between settlements and floodplain activity – as with grazing discussed above – is the likelihood that the floodplain hosted routine activity on a daily basis, including the management and husbanding of the resources it provided through countless minor actions.

To some extent, documented uses in the recent past might provide a guide to earlier uses also. For example, when John Ackeland purchased the mansion house and manor at Columbjohn in 1580-81, it included meadows, pastures, feeding woods and under woods, leats, mills, dove houses, warrens, fishing weirs and watercourses (Balmond et al., 2020, p. 223). The reference to fish weirs is especially interesting, as this confirms a likely important use of the river that may have involved altering watercourses (Haslam, 1997, fig. 10.15) and installing timber structures that would survive very well in the waterlogged deposits of the floodplain. Indeed, timber stakes have been observed in the river close to the mansion site at Columbjohn (Figure 6). Much later, in 1786, there is a reference to making a bridge over the river for fishing, though the location is not specified (Balmond et al., 2020, p. 184). It is possible that the foot bridge noted in HWP 452 may relate to fishing, as it is not on a mapped footpath.



Figure 6: Wooden stakes (ringed) in River Culm near mansion site (Photo: Fjodr)

Other interventions in watercourses in the course of works on the estate include fencing adjacent to and even in the river for the deer park in 1784-1786, including where the water 'drove it away' (Balmond et al., 2020, pp. 182–184). Bringing water within the park, presumably as drinking water for the deer, also required work: in 1784 labourers were paid for 'Passing through the inlet of water to the Park from the River by crossing it with the Park Fences'. It merited 'a gallon of beer for the Carpenters and Labourers when they were in the River putting in the posts for a park fence there' (Balmond et al., 2020, p. 183). Echoing earlier points, it is also worth bearing in mind that the deer required hay as fodder, so the floodplain would have been critical to the deer park in this respect also (Balmond et al., 2020, p. 184).

Further work is indicated by a payment in 1785 to John Levr for 'takeing the Level & dimensions of an intended cut by the River' (Balmond et al., 2020, p. 183). In 1810, Veitch made payments for sinking a pond and subsequently for levelling in Bridge Marsh and round the pond (Balmond et al., 2020, p. 188).

As mentioned previously, there was an earlier plan to provide water for the Wyatt House, which Wyatt explained to T. D. Acland in 1775 (Balmond et al., 2020, p. 134):

I have got an estimate from Chapman in St Martins Lane of the expense of erecting an Engine at the River (to work itself by the current) and raise the water to the Building it will cost abt. £300 and ... something of this nature must inevitably be done before the House can be inhabited ...

It is presumed that this proposal was not acted upon in view of the house not being completed. A comparable scheme was also proposed by Chas. Scanes, writing to TDA in 1810 about 'a Good Supply of that Essential Article Water': 'I would propose ... a good supply ... from the River Cullum That there be A sufficiently large reservoir in the Hill behind your house to serve the purposes requir'd ... by supplying the Reservoir on the Hill By a Hydraulic Engine of peculiar construction of my own inventions to be fix'd near the river' (Balmond et al., 2020, pp. 145–146). It is presumed

that his proposal was not taken up, though the remains of similar systems are present on other estates (e.g., water-powered system built in 1884 at Bryanston, Dorset¹⁰).

Another use of the floodplain implied by documentary records at Killerton is the harvesting of reed for thatching: payments for reed are noted in 1775, 1884 and 1857, for example ((Balmond et al., 2020, pp. 121, 152, 177, 190). It might be assumed that other forms of material were also obtained, such as osiers, withies and other products of floodplain trees. Although it was noted above that the floodplain was cleared of woodland over 1000 years ago, hedging and trees would remain an important element of the floodplain landscape generating valuable products. Elsewhere in the Culm catchment, there is direct evidence for the cultivation of woodland in the floodplain continuing into the nineteenth century in the form of osier/withy beds and alder beds (perhaps for dyestuffs as well as water-resistant timber). Within the study area, it is perhaps significant that there is a band of plots on the Tithe Map with 'wood' names (Kingswood (plots 206, 208, 209); Woodclose (plot 14)) even though they are cultivated as pasture; 'Opier Marsh' (plot 10) may be a misspelling of Osier Marsh. HWPs 1236 and 1242 may have been associated with osiers in the past.

One obscure reference in the documentary sources is to 'Parting the Marshes by the River' in 1785 (Balmond et al., 2020, p. 183). It is not clear what this means, but is perhaps one of the routine tasks that had to be carried out to maintain the floodplain and the resources it provided. That the river and floodplain required regular looking after as part of the estate might be one of the reasons for the cottages – Dolbury and Cubbyclose – being located close to the river, including the boat house at Cubbyclose.

Other ambiguous – and currently undatable – features in the floodplain include platforms (HWPs 534, 535, 538 and 531) and other small topographic features (HWPs 1251 and 1252), which might relate to very recent agricultural practices but could be much earlier in origin.

As noted previously, current perceptions of the floodplain as being marginal or inhospitable might obscure earlier uses – perhaps when the floodplain was drier as a consequence of climatic variations, or when communities were habituated to living with wetter surroundings. It is possible that evidence for settlement might be found within the floodplain even if it seems to us unlikely; and it is also worth keeping in mind that rivers and water have had important spiritual and ceremonial values as well as their more functional attributes, which might also result in significant archaeological material being present in a remarkable state of preservation¹¹.

3. Conclusion

This relatively brief account of the watercourses and floodplain of the River Culm within the National Trust's Killerton Estate demonstrates the historic character of the landscape, reaching back across not only centuries but millennia. The chronology through which human intervention in the landscape has developed is imprecise, so a thematic approach has been adopted that underlines continuities as well as change. This account is backed by the evidence set out in the accompanying volumes, and has also set out principles and recommendations that can inform the National Trust as it develops its own proposals for the next chapter of Killerton Park and Marshes.

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¹⁰ https://bryanstonvillage.com/uploaded_files/71.

¹¹ See, e.g., <https://www.theguardian.com/science/2018/jun/28/archaeologists-stumble-on-neolithic-ritual-site-in-suffolk>.

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