Simpson's Fromus Valley and Kelsale Park

A Guide To The Earthwork Features Of The Reserve.

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Thanks are due to Dr Rosemary Hoppitt for her patience and invaluable help with the park's historical information and investigation.

Introduction

As you walk through the meadows of Simpson's Fromus Valley today, you cannot help but notice the substantial earth bank that sits at the centre of the reserve. 200 metres long, beset by tree growth, rotting stumps and old hawthorn hedging and having, intriguingly, a solitary ancient species of crab apple growing on its slopes, it is not immediately obvious just what it might be.

Figure 1: The southern half of the earthwork, viewed from the south west.

At the southern end of this earthwork, the River Fromus runs through a 5 metre deep channel, u-shape in plan view with a v-shape profile. This channel curls around it and carries on south at depth for another 150 metres, forming one of the deepest river channels in the county.

Figure 2: The u-shaped channel, showing its 'v' cross section as it runs round the southern end of the earthwork.

Even when the river is in spate, the channel dwarfs the water running through it. Close by the bank's southern end, a shallower, sloping dry channel cuts through its top. On its upstream side, a ditch leads behind the earthwork from half way along it down into the river. At the earthwork's centre, a section has been removed, although not quite to ground level.

These features are impressive and they have clearly required considerable effort to create, not least the bank itself. Just what purpose did they serve? Why is the bank there? What happened to it to give it the features we see today? What other points of interest are to be found in the reserve?

The answers to these questions are simple but explaining how they are arrived at is not quite as straightforward. This guide will help the visitor understand what the author believes the reserve's landscape features are, why they were created and what led to their present day state.

Fromus Reserve and Kelsale Park

Before going further, it is necessary to briefly describe the origins and function of Kelsale Park. The Reserve sits at the centre of a 500 acre medieval park that was created by the Bigod Earls of Norfolk, probably late in the 12th century. The park would have been enclosed by a bank with fencing and high hedging, known as the park pale. It would have had several functions but central to its purpose would have been the keeping of deer. Guests of the Bigods would have stayed within the park lodge or close by to enjoy the privilege of hunting. This would have been given either as a reward for services rendered or to encourage future services and to build political contacts. The site of the park lodge is not known for certain but is likely to have been close to the modern day building to the north of the Reserve.

At the time the park was built, Kelsale was the Bigods' principal manor and the park was part of a display of status and wealth for a family that controlled large areas of East Anglia. As the fortunes of the family grew in the 13th century, Framlingham Castle became their principal household and Kelsale lost much of its former importance. The rise and fall of the status of Kelsale, the Bigod family and the subsequent earls and dukes of Norfolk is probably behind both the creation of the main earthworks in the park and their demise.

More detailed information about the history of the park is available at suffolkflora.org

The Principal Earthwork

It is no real surprise that the high bank that stretches the length of Mere Meadow's south eastern boundary, is, or rather was, a dam. What is perhaps more surprising is how long it has taken for that to be realised. The official monument record still lists it as a section of park pale, which technically it is, as it lies on the park boundary. However, in the last 30 years, several landscape experts have independently concluded that the earthwork is likely to have been a dam to hold back a substantial pond.

The most immediate clue is the way it maintains a perfectly level top as it runs across the falling and rising valley base. A bank that was purely a boundary feature would be a constant height above ground level, rising and falling with the surface beneath it. Measurements show that for much of its length it is flat to +-20 cm, with a slight 40cm rise towards its southern end.

If it is a dam, how old is it? We know that a park map of 1616 shows the dam location as a field boundary but no trace of a pond upstream of it. There was probably one before this date, because the field behind the dam is named Mere Mede.

Figure 3: The 1616 map showing 'Meremede'. The dam location is along its south eastern end.

If the dam is pre-1616 then it might be contemporary with the medieval park. If so, then its likely use, based on similar features of the period, would have been to support a pond for the provision of freshwater fish for consumption by the park's owners and guests. This gives the lead needed to take its history back further. An all too brief cluster of references from court rolls and manorial accounts are present in the historical record of the park for a fishpond.

The first known are references from the Patent Rolls (government records of major infringements) from 1281, with two accounts of the robbing of fish there. One of these states: "*to enquire who hunted in the parks and warrens of Roger le Bygot, earl of Norfolk and marshal of England, at Lopham, Ersham, Fremlingham, Keleshale and Stouhe in the counties of Norfolk and Suffolk, and* ***fished in his stews*** *of Bungay, Framelingham,* ***Keleshale*** *and Stowe".* A stew was a pond used for the holding of fish.

Manorial and park accounts have more detailed records. In 1293 the wages of Geoffrey the Fisherman were recorded as 5/11d and Henry of Todenham took 2/7½d for coming to catch fish. In 1306, an account of the Extent of Kelsale Manor, detailing property and its value, recorded a park with a fishpond worth 2/-. The last reference of this period is from 1327 to 1329, when John Wilkin was recorded as 'Keeper of the Pond'.

The record then goes quiet for the pond until 1549 where the Patent Rolls show that Lord Grey of Wilton and John Bannaster of Spaunton, for services in battle and payment of over £1,000, were granted *"the lordship and manor of Kelsall, alias Kelshall, Suff.,…..the park of Kelsall with the lodge and pond there….."* Whether the pond there is quite the same as that referred to over two hundred years earlier is open to question, as will be seen. It does not last, though, and nearly seventy years later, no pond is shown in the park map of 1616.

The likely age of the dam is therefore at least the late 13th century. However, we shall see later that the pond it creates, and thus the dam itself, appears to be an essential element of the park design. As the park dates from at least the late 12th century, the dam could be over 800 years old.

Figure 4: The top of the dam, looking north east.

Figure 5: The dam location. **Background image © 2014 Google and Getmapping plc.**

The Pond Extent

How big was the pond that the dam held back? To the casual visitor, Mere Meadow in Figure 5 looks to be a good candidate for establishing its size. It is 200 metres long and would been a substantial body of water when flooded. It is not until you walk to the northern end of Mere Meadow and look back to the dam that you realise it still looks to be quite high, even from 200 metres away.

Mere Meadow has a very shallow gradient and rises just under a metre in its length as it goes up the valley from the dam. The dam is around 3.5 to 4 metres high today, depending on just where the base level is taken, as slumping of earth down the sides has made the base level a little irregular. The dam was probably up to half a metre higher in its heyday, without any of its subsequent weathering. With a full pond 3 metres deep or more at the dam, the northern end of Mere Meadow would have been under water that was at least 2 metres deep. This means the pond would have gone much further north, as a look today through the hedge there at the level field beyond will confirm.

Fishponds in medieval parks could be of large size. They were used to provide freshwater fish for the nobility to eat on days when consumption of meat was not permitted by the Church. Species consumed included pike, bream, roach, tench, perch and eels, with others dependent on local availability.

The poor by and large were unaffected by any religious requirement to abstain from eating meat. It would have been an intermittent staple at best when on a largely subsistence carbohydrate peasant diet.

Going up the social scale, the demand to maintain protein in the diet was more pressing. Higher status families made do with small ponds or stews where they could store and net fish brought to them live in barrels by horse and cart. Fish were also supplied salted and barrelled for long term preservation.

Wealthier families had larger ponds to breed fish and to catch them. They would be fished with seine nets, from where the fish were temporarily stored in stew ponds for later removal for cooking or salting. However, the bigger the pond, the more men and boats needed to fish it.

The largest ponds were usually the preserve of major monasteries, royalty and senior church figures such as the Bishop of Winchester, whose huge ponds would be supplying multiple establishments and hence large numbers of people with fish. Elsewhere, complexes of monastic fishponds were common in the landscape.

A pond of a size in excess of 200 metres at Kelsale, while not unheard of, would have been unusual in a medieval nobleman's park, even given the status of the Bigods. Would it have been just a fishpond?

Maps and their contour heights offer a clue to how far the Kelsale pond might have reached, possibly several hundred metres. However, the Fromus valley gradient is extremely shallow, making broad map contours insufficient to assess a detailed pond extent for the dam. As will be seen later, there is some circumstantial landscape evidence as to where the end of the pond might have been.

Nevertheless, we can now be fairly confident of the pond size. High resolution Lidar and other mapping data for Kelsale has become freely available. Using laser measurement to map every square metre of the park to an accuracy of a few centimetres, any given height in the valley can be computer modelled. The process strips away vegetation to show the land surface in great detail. A digital pond can be created and its surface area shown on a map, along with the water depth at any point.

Figure 6 shows the pond area when a water depth 0.6m lower than the current dam top is modelled. This is likely to have been around 1 metre lower than the dam top when it was built and is considered to be the minimum likely water level.

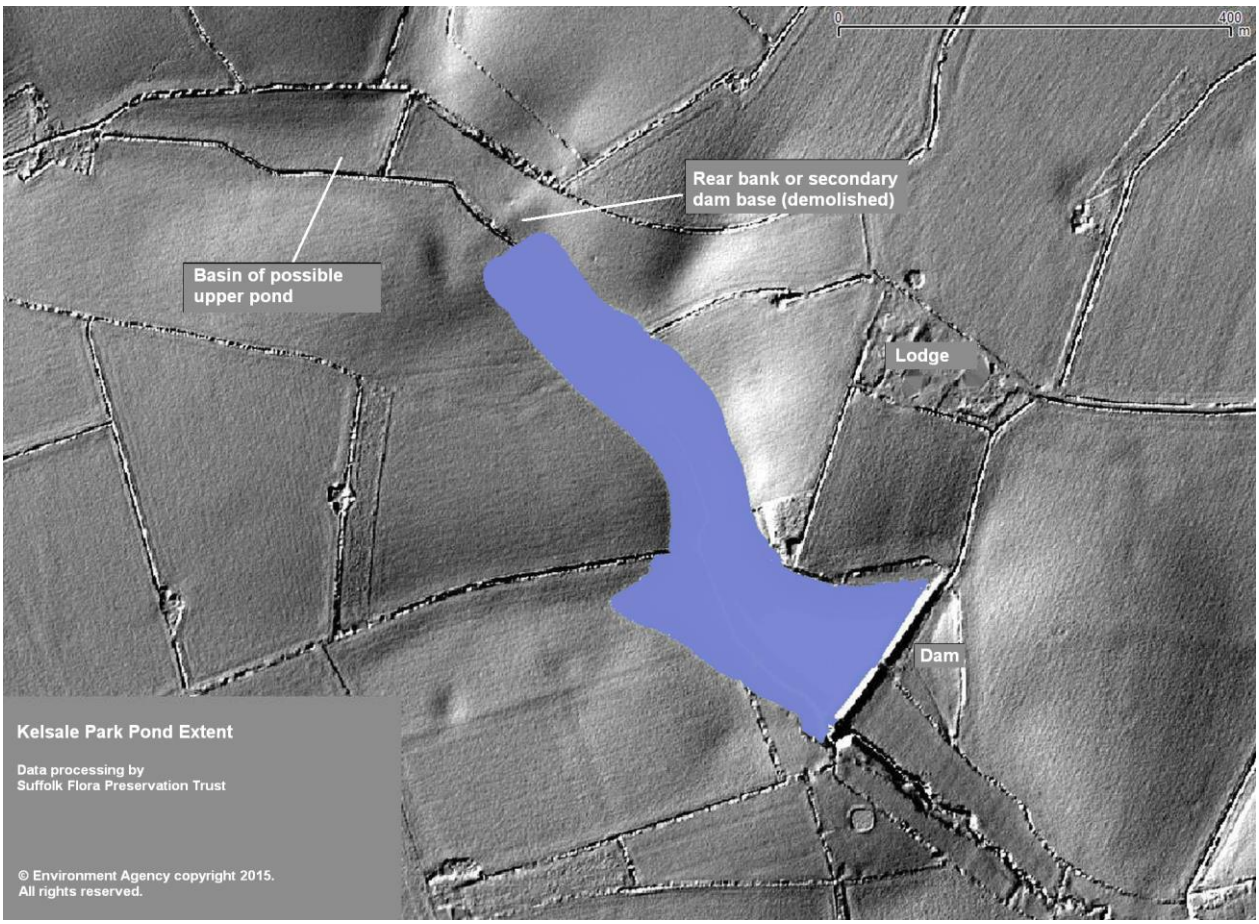

Figure 6: The pond extent based on computer modelling. Background image © 2014 Google and Getmapping plc.

Mere Meadow's 200 metre length is eclipsed. The image shows a 570 metre long pond would have been created by the dam, stretching out along the valley base in front of the likely site of the original park lodge. Very shallow at its northern end, where a second now-missing bank may have provided a means of maintaining some depth there or even supporting an upper pond, this is unlikely to be a feature solely to provide freshwater fish. From the lodge, it would have presented an extensive vista of water. A statement of power over the landscape and a feature designed to impress park guests.

The builders appear to not have been content with creating a pond a third of a mile long. The south west bank, where the hillside curves above it up the valley, looks to have been engineered to be seen as a straight line from the lodge – perhaps a visual reminder that the pond was artificial; a creation of its owners rather than a natural feature. Part of that straight bank, where it cuts through the reserve, is visible today and is shown in Figure 7 below.

Figure 7: The pond bank fragment in the meadow to the north west of the dam.

The pond is so long that it effectively cuts the park in two. This is an indication that it may have been part of the park design.

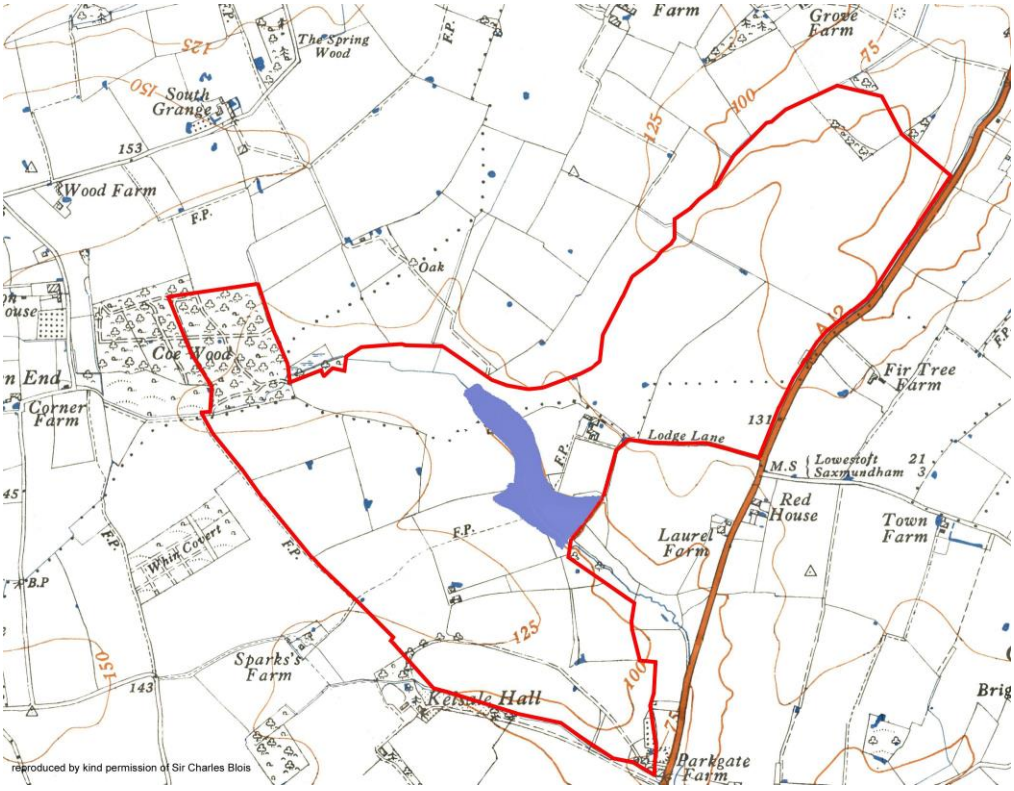

Figure 8: The pond extent in the modern landscape, with the park boundary of 1616 and 1638 delineated in red.

The 17th century park boundary, traced from the original maps, is thought to be close to that of the original design. In 1306, a reference to the park's boundary length is a good match for that shown in figure 8.

One possible outcome of the park's bisection is that the dam top may at one time have been a trackway or processional route from the lodge to the western half of the park. Ancient coppiced hawthorns and hedge maples either side of it may be descendants of bordering shrubs present from that time. Perhaps more likely, though, they are simply a result of natural wild growth or later adornments.

A visitor to the Reserve can only glimpse the fields north of Mere Meadow where the pond would have reached but here is a view of the next one there, looking back down to the northern end of Mere meadow.

Figure 9: The field north of Mere Meadow

The river course is on the right, leading down to Mere Meadow in the distance. In the centre is the flat valley floor that formed the base of the pond, for which pond silt may have helped to level. The pond banks would have been the hillsides to the right and left. The present day lodge is situated at the top of the hill to the left.

Figure 10: At the bottom of the hillside from the lodge, looking north.

As the pond heads north west up the valley towards Coe Wood (top left) its flat base is evident in the hedge line and the field beyond it to the west.

In looking at the extent of the pond to the north west, it is easy to overlook its extent in Mere Meadow, which is just as illuminating.

Figure 11: The pond extent in Mere Meadow. Background image © 2014 Google and Getmapping plc.

The north eastern boundary of Mere Meadow is clearly determined by this long-gone pond. Two small ponds in the modern landscape, left up in the hillside today and dry for much of the year, can be seen to be at the same level as the proposed pond surface. This is significant and as to why, will be discussed later. However, the entire western area, along with the present day river course, is under a considerable depth of water. Whatever Mere Meadow is and was, it was neither defining the ancient pond extent nor even a truncated version of it.

River Course Changes

The dam substantially altered the course of the river through the Fromus Valley. Prior to the dam, the river course would have looked something like this:

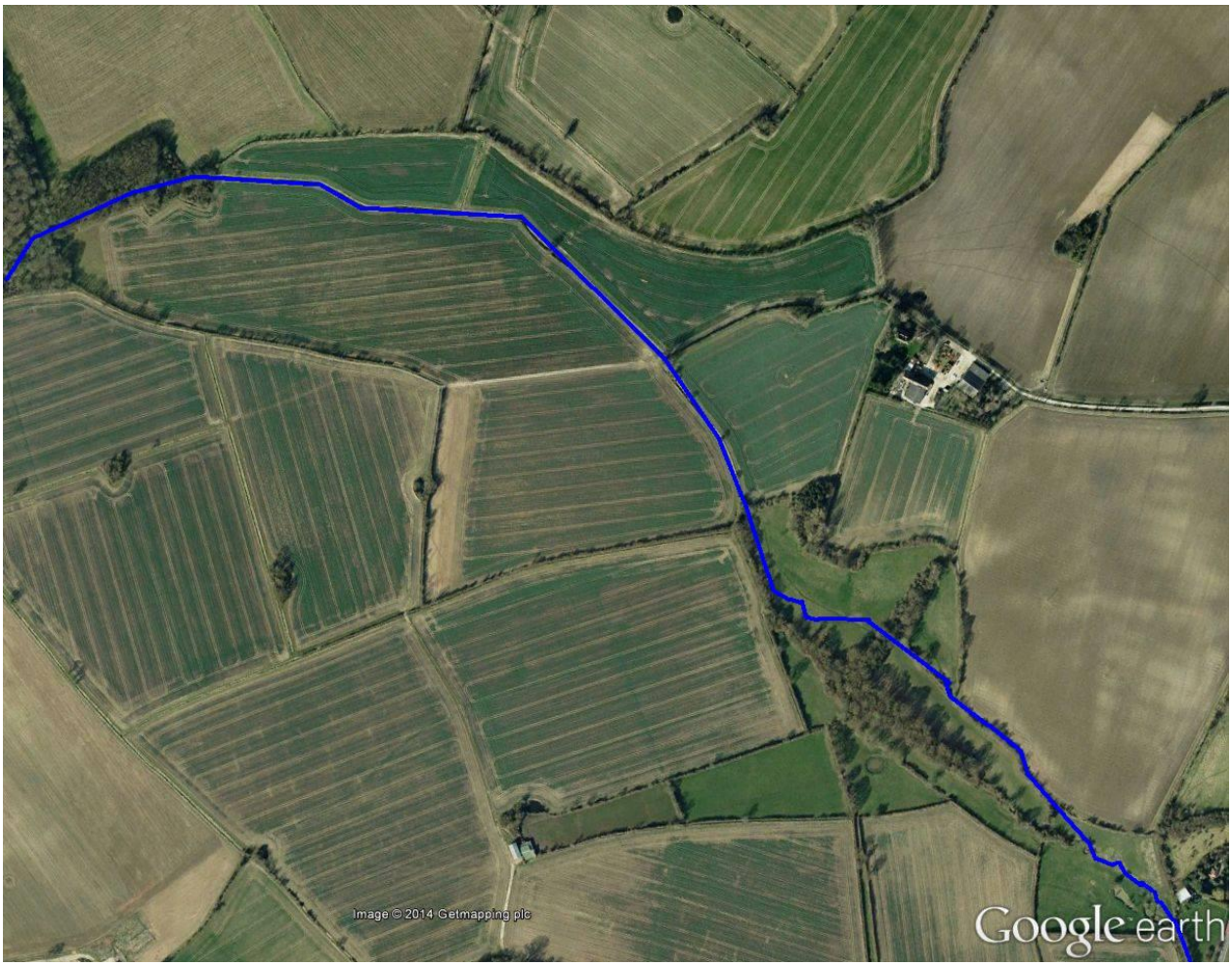

Figure 12. The likely original course of the river, following valley low points. Background image © 2014 Google and Getmapping plc.

The remains of the sinuous course of the river shown above in Mere Meadow is evident there today as a shallow depression and it is clear in aerial images as a crop mark. The wood to the far north west is Coe Wood, also known as Coo Wood and Cow Haugh in earlier years. It is a hornbeam wood today and is likely to have been a mix of oak and hornbeam in medieval times.

The river would have continued down the base of the valley towards the current day position of the A12.

With the dam in place, much of the old river course was covered by the pond it created.

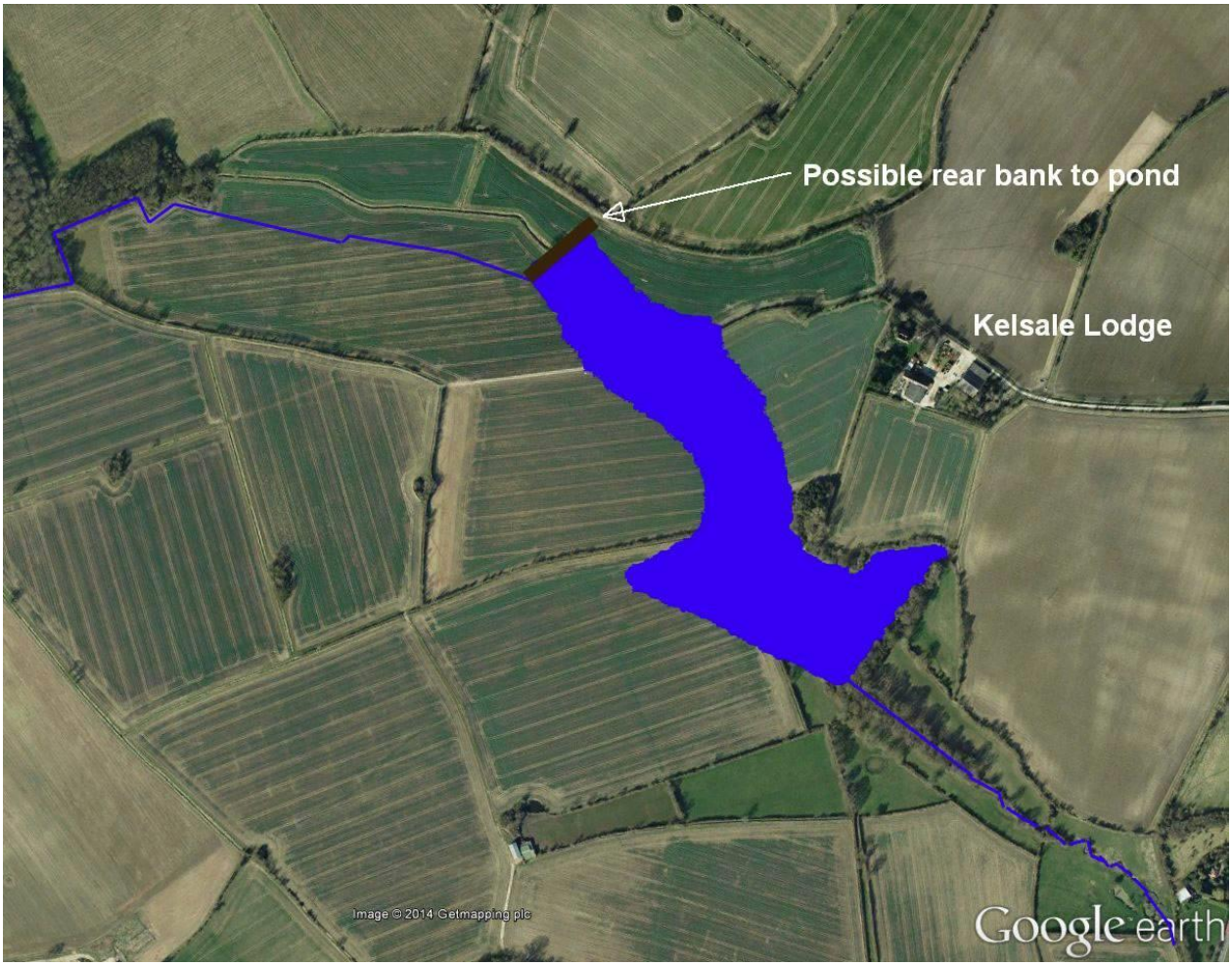

Figure 13: The pond extent and the new river course it required. Background image © 2014 Google and Getmapping plc.

The rear bank shown is not a confirmed feature but there are several indicators pointing to one being there, not least an account of it being removed in recent times. For now, perhaps the most important point is that maps up to the 1950s showed the doubled/shifted southern route of the water course depicted in Figure 13. The astute reader will have spotted a change in the river course in the wood to the far north west. This is an artificial course, still present today but now dry, which may have been in use at the time. These features are outside the Reserve and not accessible to the visitor. Details of them, plus the possible rear bank and more are given in the Appendix.

The Spillway

Below the dam when the pond was present, the river no longer flowed down the valley centre. Instead, it probably flowed over a spillway at the dam's southern end and from there into a long channel cut into the hillside, which went south to join the older river course further down. This means that the sloping feature depicted below, viewed from the east of the dam with Mere Meadow behind, is the site of the dam spillway, or pond overflow. It is directly in line with the present day river channel south of the dam.

Figure 14: The spillway site viewed from south of the dam.

If this was the spillway, it probably would have been stone or timber-lined to cope with river spate flow, with slots to hold timber boards to control both water flow and pond height. If the dam was a route from the lodge to the western side of the park, a simple bridge, perhaps of timber or arched stonework, would have crossed its top.

In the picture above, the deep u-shaped side channel is just visible on the left. This could not have been present at the time the pond was in use as it breaches the dam. Instead, the dam would have joined the hillside, which sloped upwards into the park.

The mound to the left of the spillway is likely to be the end of the dam, left exposed by the now missing hillside. In 1979 an Ordnance Survey Field Inspector visited this site and found in situ stone and strewn building materials here, which he attributed to a mill. This material is unfortunately now completely missing.

The Inspector believed the u-shaped side channel to be a mill-race but this cannot have been the case. The dam could only function as a dam in the absence of the u-shaped channel, with its 5 metre deep cut preventing any depth of water behind the earthwork. To have a mill race there would have required sluice gates of immense size and strength to ensure that water either went through the race or over the spillway position.

If a mill was at that position to utilise just the spillway flow, then that is theoretically possible. However, it could only have operated pre-1616 when the main pond was present. There is no trace of a structure shown at the spillway position on either the 1616 or the 1638 maps of the park. The author believes it more likely that masonry at this position was the remains of a stone-lined spillway and bridge.

It is interesting to compare Figure 14 above with Figure 15, an image of the spillway position at the end of a dam of comparable age at Byland Abbey in Yorkshire.

Figure 15: The spillway at the northern end of a dam at Byland Abbey, North Yorkshire.

It is evident that the spillway in the Byland Abbey dam, as it slopes through and down the earthwork, is very similar to the feature at Kelsale.

The Downstream River Channel

This is the river channel south of the spillway, with the dam end visible top right.

Figure 16: The channel immediately downstream of the dam.

The channel is deep, perhaps because it needs to match the fall of the original river course in the valley centre to the right, to join it further down. However, it is possible that this was not the primary reason for its siting and depth. After all, a shallow ditch with a weir at its end would have worked just as well, or the overflow could have cut straight down to the river course immediately behind the dam.

This channel, remarkably similar in length and profile to the dam itself, could have been the source of much of the dam's material. Above it, there are signs of additional excavation from the hillside. The void it left behind could then be used as the overflow river course. This arrangement could have been suitable for operating a mill. They were commonly found in conjunction with fishponds, as the latter provided a controlled head of water to operate a mill wheel.

The pond would have held back a huge volume of water. Removing a plank from the spillway would provide enough water flow to power any mill downstream of it for many hours without seriously troubling the pond water level. The deep v-channel would have provided a narrow and therefore high speed flow for mill wheel operation. As we shall see later, the channel's size may have been smaller when the main pond was present.

Stew Ponds

There are two more features in the reserve that may well date from the time of the main pond's construction. These are the two ponds on the northern side of Mere Meadow, that were mentioned earlier as proving to be at the same level as the original pond. They are clearly artificial, being dug into the hillside. As this requires considerably more earth removal than simply digging them on level ground, there must have been a good reason for this extra effort in siting them. They only intermittently hold water, being supplied today by modern field drains that run during periods of rainfall.

They are good candidates for stew ponds – the ponds used to hold fish netted from fishing the main pond. They are situated at the closest point to supply the lodge and, more significantly, are now known to be at precisely the right level in the hillside to be supplied with water from the main pond. They also have signs of eroded banking and cuts within that banking that would have separated them from the pond while maintaining a channel to provide a connection for water flow.

There would have been a grating or sluice gate in place in the connecting water channels to keep the fish securely held within them. Figure 17 may show one of these channels for the larger pond, although it being created for later access by cattle cannot be ruled out. There is also one into the smaller pond.

Figure 17: A channel from the main pond into the larger of the possible stew ponds.

Figure 18: The end of the stew pond and the main pond bank in Mere Meadow.

Although the main pond has long gone, the position of its edge along the north eastern side of Mere Meadow is now known. Figure 18 shows that part of the bank is still visible. The position of the stew pond by the main pond edge is clear.

Today, the ponds are left high and largely dry in the hillside, largely forgotten relics that may be 800 years old. They are clearly shown in a detailed 1638 map of the park (Figure 19). The map is a badly faded photostat, with the original lost.

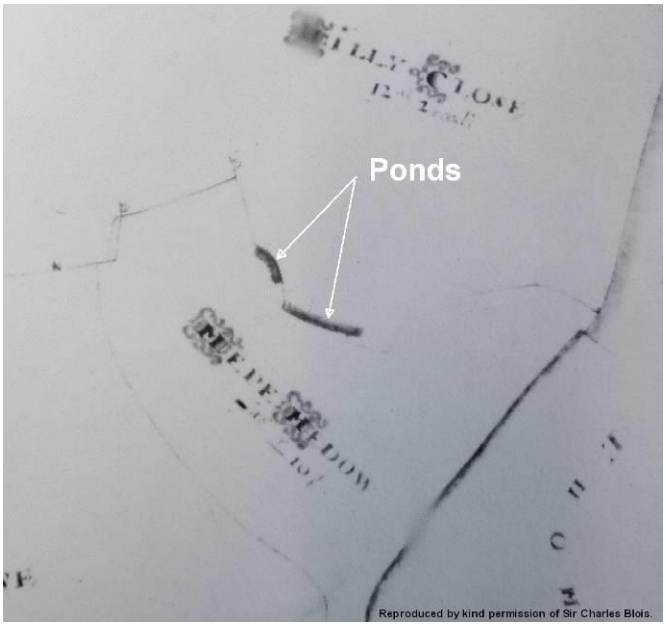

Figure 19: The 1638 map showing the hillside ponds above 'Mere Medow'.

The ponds are, though, an answer to what was a difficult question. The "stews of Keleshale" were repeatedly robbed. If there was just the main pond there, how do you break into a park and rob a 570

metre long body of water of its fish? Fishing it is a complex operation taking days with boats, nets and several men. Looting a park of its deer was done by organised gangs, often from rival families, with animal slaughter on a large scale. On occasions, deer heads were left on display as departing taunts. Whether this overt aggression would have extended to the rather more sedate use of boats and nets to steal fish is a matter of debate. However, robbing small stew ponds, designed to have fish removed to order, would have been a very different matter. Standing by them today could place you at the heart of a medieval crime scene.

The Demise Of The Pond And The Creation of Mere Meadow

We now come to the modern day river course, or at least the period since the main pond was in place.

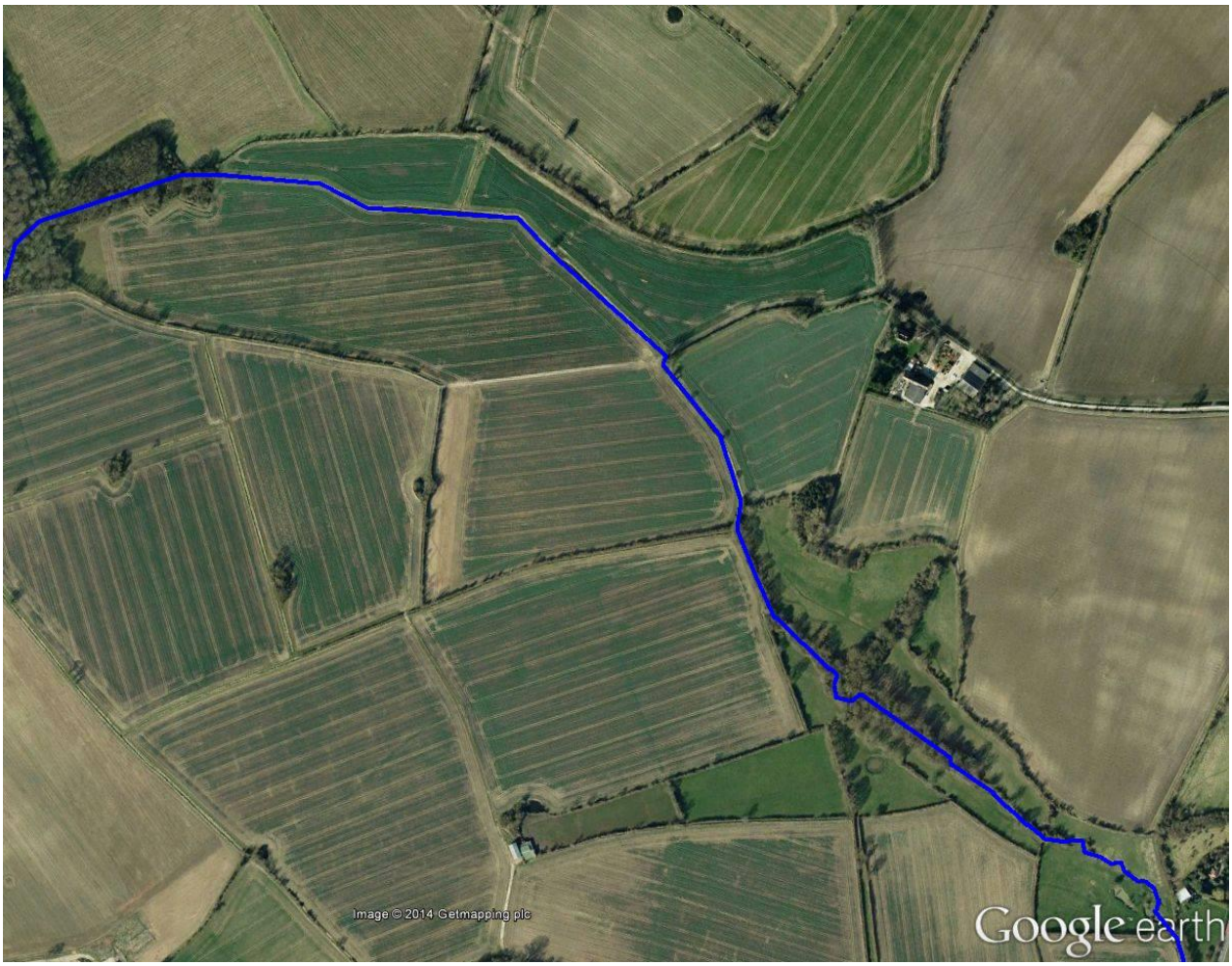

Figure 20: The modern river course. Background image © 2104 Google and Getmapping plc.

There are some notable changes here from the time of the pond's heyday. The northern extent has gone back close to its original course but, within the upper meadows, in a machine-cut channel. As the river comes down to the narrow northern end of Mere Meadow, it kinks south west a little and from this point it follows an entirely new course away from the valley base. It no longer flows over the dam's spillway but round its end in a new feature, the u-shaped end channel.

For the river not to flow down its old winding course in Mere Meadow seems odd as it is the lowest route there and therefore the natural course for water to follow. The reason for the old course not being

resumed is that after the dam fell out of use, Mere Meadow would still have been full of water, probably the mere that gave it its name. A new river channel was dug alongside the mere as part of the process of draining it away. This is described in more detail later.

What is self-evident is that the large pond has gone and there are two candidates for the feature that drained it. One is the centre cut in the dam and the other is the u-shaped end channel. Curiously, neither fully drains the pond.

The centre cut does not go deep enough to completely drain the pond, leaving a bank less than a metre high above the dam base, as can be seen in Figure 21 below.

Figure 21: The cut through the dam centre, viewed from within Mere Meadow.

The height is a little exaggerated by shooting this photo close to and at an angle to the ground but the difference in level is clear.

The centre cut has been rumoured to be a modern one for farm machinery access. It may have been enlarged in modern times and used as one since but the cut is shown in the earthwork in 1883 six inch mapping.

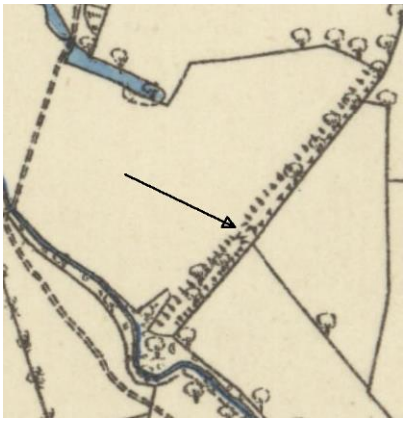

Figure 22: 1883 six inch OS mapping, showing the centre cut.

Furthermore, there is a better crossing point at the low northern end of the dam where it meets the hillside. This is in use today and has the advantage of crossing into the dry northern side of Mere Meadow rather than its marshy centre. Finally, it seems strange to go to the effort to remove all that material from the dam centre and not to remove the last half a metre or so that would have made it easier to traverse with a horse and cart. Was it instead made to drain the main pond or did it have some other function?

The u-shaped end channel is the other candidate for draining the main pond. Like the centre cut, on its own, it cannot drain it completely, despite its lowest point being half a metre below the lowest point of the pond. This is because it is situated at the end of the dam, with the pond base rising up the hillside from the dam centre by just over a metre to meet its bank. Although it would drain most of the pond, a pond depth of that amount would have been left behind.

Let's see what happens if the pond level is lowered in the computer model to give the remaining pond depth attributed to drainage solely by the u-shaped channel. This is the water depth at which the mere would overflow the channel's banktop by the dam end.

Figure 23: The pond height lowered by two metres using computer modelling.

This image clearly shows the mere that gave rise to Mere Meadow's name and which probably defined its western and narrow northern boundaries. It is the pond that was left behind after the main pond drained, almost certainly via the u-shaped end channel. What is now evident is that Mere Meadow has a boundary that is a hybrid of the original pond extent to the north east and the mere formed by the drained pond extent to the west and north.

The reasons for preferring the u-shaped end channel as the feature that drained the main pond are firstly the close boundary matches that it clearly gives for the pond it creates. If the modelled water level is lowered by a further 0.5m to match the height of the centre cut, the pond that it holds back shrinks to less than half the length of Mere Meadow and well away from the river to the west. This area has none of the obvious landscape context that the larger pond has. This change does, though, show how shallow much of the pond must have been.

Secondly, only the u-shaped channel is deep enough to fully drain the mere. It would have needed some ditching work to reach it to do so and, as we will see, there is clear evidence that this work was done. No such work was carried out at the centre cut to deepen it and drain the mere through the dam centre. Perhaps the centre cut had another function altogether.

Now let's look at the situation immediately after the main pond drained away through the u-shaped channel. The river Fromus, formerly joining the pond's northern end 570m away, is now running down the valley base. It is finding its own way along what is left of its old pre-dam course to join the northern end of the new Mere Meadow pond/mere. This new pond is then overflowing into the u-shaped end channel at the dam end.

Although still a big pond, much of it would have been extremely shallow and would have been little more than a marsh. It would not have made a good fishpond and the area that it occupied had no real agricultural use. The river topping it up ensured that it stayed constantly full. The park owners would have had three choices:

1. To reinstate the feature that drained it and to refill the main pond. We do not know when the main pond was drained but it would have been at a time when Kelsale's status was diminished with respect to Framlingham and elsewhere. Far grander and more impressive than Kelsale, Framlingham became the focus of successive owners of the park. There would have been little incentive to restore a status feature at Kelsale for a park that no longer had its earlier importance. With the park moving from exclusive use by the Bigods to a more conventionally managed farming economy, a pond that bisected the park might have been seen as an obstacle to stock and materials movement and its loss something of practical advantage.

2. To leave the Mere Meadow pond as it is. This may have been the case for many years but we simply don't know how long this situation persisted. What we do know is that it did not stay that way.

3. To drain the pond and create a grazing meadow. This definitely happened, of course, because that brings us to 1616 and to the current day but we do not know just when it took place. All we know is that by 1616, Mere Meadow was there and its pond was not.

The clues as to how Mere Meadow was drained are all still there in the landscape.

Firstly, a new river channel would have been dug as a dry ditch from the north end of Mere Meadow alongside the pond to join into the u-shaped end channel. This is why the river bank in Figure 22 is level (also confirmed by measurement in the field), aligning with the modelled pond edge, despite the valley falling by nearly a metre in the length of Mere Meadow. Fall for the river itself was provided by deepening the channel base as it headed down the valley.

The size and profile of this river cut is very different to the v-profile channel round the end and downstream of the dam, indicating that it originated at a different time.

Figure 24: The squarer profile river cut upstream of the dam.

The join point at the new river cut's southern end would have been a problem as the pond would have been continually overflowing at that position. It is also possible that the channel there would have to be made deeper within a stretch of the existing overflow area to ensure that it was lower than the pond centre.

The author believes that to cut off the pond overflow and permit the southern join to be made, a cut was made in the centre of the dam to create a temporary overflow from the pond. This is why the centre cut does not reach the pond base. It does not need to go deeper as it only has to be less than half a metre lower than the bank at the southern end of the dam to take the river flow away.

The newly dug channel for the river course could now be joined into the u-shaped channel at the end of the dam, linking it to the channel downstream of the dam that once took the spillway overflow. Once done, the northern or 'top' end of the newly dug dry channel at the end of Mere Meadow could simply be knocked out to join into the river in at that point and take it away from the pond. This could be why there is a slight kink in the course of the modern river channel there. It marks where the new channel was dug across to the river course.

This work gave a new river course that ran alongside the Mere Meadow pond. The pond was no longer filling up but it needed to be drained. This was done by digging a ditch behind the dam from its halfway point into the river. That ditch is still there and at times of heavy rain, still functioning to drain Mere Meadow.

Figure 25: The ditch behind the dam that drained the Mere Meadow pond into the river

The u-shaped channel is just visible in Figure 25 to the left. In the foreground is the ditch behind the dam and behind it is the river that it drains into.

Supporting the operation of this ditch is a shallow drainage channel running down the centre of Mere Meadow to join it.

Figure 26: The centre drainage channel and ditch in Mere Meadow. Background image © 2014 Google and Getmapping plc.

Note the curving crop mark to its south that is the likely original course of the river.

In summary, we have explanations for the functions of most of the dam and pond landscape features in the reserve and the reasons for the modern route of the river in the valley. They may not all be correct explanations but until more information comes to light, they will have to serve for now.

The U-Shaped Deep Channel

One mystery still remains and that is the origin of the u-shaped channel at the end of the dam, the feature that was responsible for the main pond's demise.

It is not known when the main pond was drained. There is a pond in the park in 1549, although it is not known if it was the main one. It is not described in the 1549 record as a fishpond and may have been the mere left behind once the main pond was gone. Although shallow, the mere was still a substantial area of water.

If the 1549 pond was the main pond, it failed between 1549 and 1616. If it was not the main pond, it is possible that the earthwork failed during the gap in records between 1329 and 1549.

Either way, there is one possible explanation for what happened that is consistent with a period of neglect.

Medieval ponds in lengthy use were subject to silting. From time to time dams were 'broken' to drain water out and allow silt to be removed, both to keep pond depth and for the water to remain in good condition. There was even a profession of 'pondcaster' for the individuals whose job this was. For dams with no sluices, cutting back an earth bank to drain their ponds required skill to prevent collapse of the dam.

For a dam like Kelsale's, the situation was rather different to breaking a more conventional shallow fishpond dam. As a very large early medieval dam, it appears to have lacked any sluices to enable its complete drainage. It would not have been alone in this respect but later dams had features built in to enable complete control of water levels. All Kelsale seems to have had is a spillway with rudimentary control of the upper water level. It is not impossible that there was a sluice at the centre cut but it seems unlikely given why the cut may have been there.

Breaking something the size of the Kelsale dam would have been a hazardous operation. With a few million gallons of water behind it, any new flow of water through the bank could result in rapid washout and collapse of the dam. There are several positions at which it could have been done in theory but we do know now, with a degree of confidence, that it was drained by the u-shaped channel, a huge 5 metre deep cut, 50 metres long, which curved around the dam end.

To dig this out would have been a big task and a rather dangerous one but it makes no real sense. To cut a more conventional, say, 3 metre-wide channel through the dam involves the removal of around 100 cubic metres of material. The u-shaped channel would have required removing around 1300 cubic metres.

The answer could well lie in the u-shaped channel not being dug out at all.

Earth bank dams are maintenance-intensive. With time, water can percolate through them, particularly at their base, washing out soil as it does so. This results in something called 'piping' where tubular voids form within the structure. At a critical point, they collapse, resulting in new fractures through which water can wash out material in rapidly increasing amounts. At the same time, their collapse lowers the dam height and water overtops the bank. At this point, the structure is doomed; failure occurs at an exponential rate. Decay that has taken many years may result in collapse that can take only minutes.

For a modern day British example, there is dramatic video online of the collapse of the canal bank at Tiverton in 2012.

https://www.youtube.com/watch?v=LlKeQqBP3xQ

https://www.youtube.com/watch?v=9ad4bl9Ejhs

https://www.youtube.com/watch?v=7nqcd9ywsIA

This next link shows an excellent computer model of the effects of piping in earth dams:

https://www.youtube.com/watch?v=PC58mGG55io

Is this what happened at Kelsale? Once the Bigod line ended, the park reverted to the Crown and had a succession of ownership changes. The park lacked the high status of its youth and there would undoubtedly have been times in the 14th century and beyond when park management was absent or reduced.

Regardless of maintenance concerns, if there was structural failure, it does not look as if it was the dam itself that failed. Considering its likely age, the remaining structure is in remarkably good condition. What is missing at the dam end appears to be a section of the hillside that the dam was joined to. It looks as if percolation and piping of dam water around the dam end and into the downstream channel could have permitted soil washout there. In addition, there are modern day signs of water draining down the valley side that are still washing soil into the river today.

When the hillside slipped, there would have been a torrent of water, as the videos above demonstrate. The downstream channel would have been scoured out to more than its original size and may owe some of its wide 'v' profile to that flood. Today, just above the dam end, the pond bank running diagonally across the western meadow abruptly ends well before the dam, perhaps a sign that the whole area there collapsed and was part washed away, along with the contents of the channel.

When did this occur? If lack of maintenance resulted in failure then there are two periods that make promising candidates.

The park suffered general decline in the 16th century, as the dukes of Norfolk fell in and out of favour with the monarch of the day, losing their lands and having them reinstated on several occasions. There was also a switch in the Howards' principal household from Framlingham to Kenninghall, with the castle at Framlingham declining during this period.

If the main pond failed between 1549, the last confirmed date for a pond in the park, and 1616 when there was none, then this is consistent with a period of decline and neglect that may have caused it. However, there seem to be no contemporary records of the flood from it failing, no description of the pond's large size and status for over two hundred years beforehand and no records of the significant maintenance that it would have required during that time. The 1616 field names show a Mere Meadow but nothing to indicate that other fields up the valley were once under water. Finally the pond is not described in 1549 as a fishpond. These arguments do not make a convincing case against failure occurring during this period but they do provide some pause for thought.

Perhaps the bank failed earlier, much earlier, at a time when written records of such an event would have been less likely to be kept or be part of community memory.

It is interesting that the last pond reference prior to 1549 dates to 1329. This was close to the start of a period of natural events that caused widespread suffering and turmoil that triggered changes in the social and political order of the country. With a succession of crop failures preceding its arrival, the Black Death in 1348 drastically reduced the population to a level where, for a few years, basic subsistence became the main priority for many more people up the social scale than it previously had been. The death rate was such that labour and skills were in short supply. Peasants found that they now could move to better areas without challenge from those they once were obliged to serve. They could also be forced to move because there was no longer a local self-sustaining settlement for them to live in.

Against this background, a high-status feature such as the pond was perhaps neither wanted by the park's owners nor was capable of being maintained by a reduced local labour force. If it fell into a state of neglect, perhaps this was the time that it met its end? Is this distance in time and the reduced local population the reason why there are no records of a flood occurring?

Analysis of pond silt depths in future years may provide an answer but until then, the date of failure is unknown.

One outcome of this analysis is that the digging out of the deep downstream channel south of the spillway provided an outlet for soil to be washed out from the hillside. If this was the case, the seeds of the dam's downfall lay in its construction. Perhaps the dam was doomed from the start.

Footnote:

You may recall that earlier it was mentioned that the dam today contains an intriguing single example of ancient crab apple. In the account rolls for 1327 to 1328, for the park there is:

"**Branches and Wood:** Item, they reply for 100/9d received from 4 oaks, 2 chestnuts 3 hornbeams 2 ashes and 1 crab tree. 17 branches and wood felled by the wind sold in the park by the parker".

Crab trees were evidently part of the park timber sales at that time. It is not too far fetched to see the example on the dam as a possible descendant of those grown then.

APPENDIX: RELATED FEATURES OUTSIDE THE RESERVE

This section has been left separate from the main guide because it relates to features not accessible to a visitor to the reserve. It also is much more speculative in nature and the reader should bear that in mind.

The Case For A Rear Bank To The Pond

The northern end of the pond would have been very shallow if it was permitted to gradually peter out along a gentle sloping valley floor. To provide some depth there, a rear bank could have been placed at a suitable point. As will be seen later, if there was one it may well have been rather more than just a small retaining bank to provide a half metre or so of water depth.

The first indicator for the existence of a rear bank is from the historian Norman Scarfe, who in his book "The Suffolk Landscape" states for the park, "One stretch of the original boundary earthwork survives about 300 yards south of Kelsale Lodge (*note: this is the dam*). A farmer here told me he removed another length of it from the north side of the little valley running from Coe Wood to the Lodge".

1945 aerial imagery shows several features in the area that would have gone during the farmer's lifetime. There is one strong candidate at the expected bank position and which satisfies the description of its location.

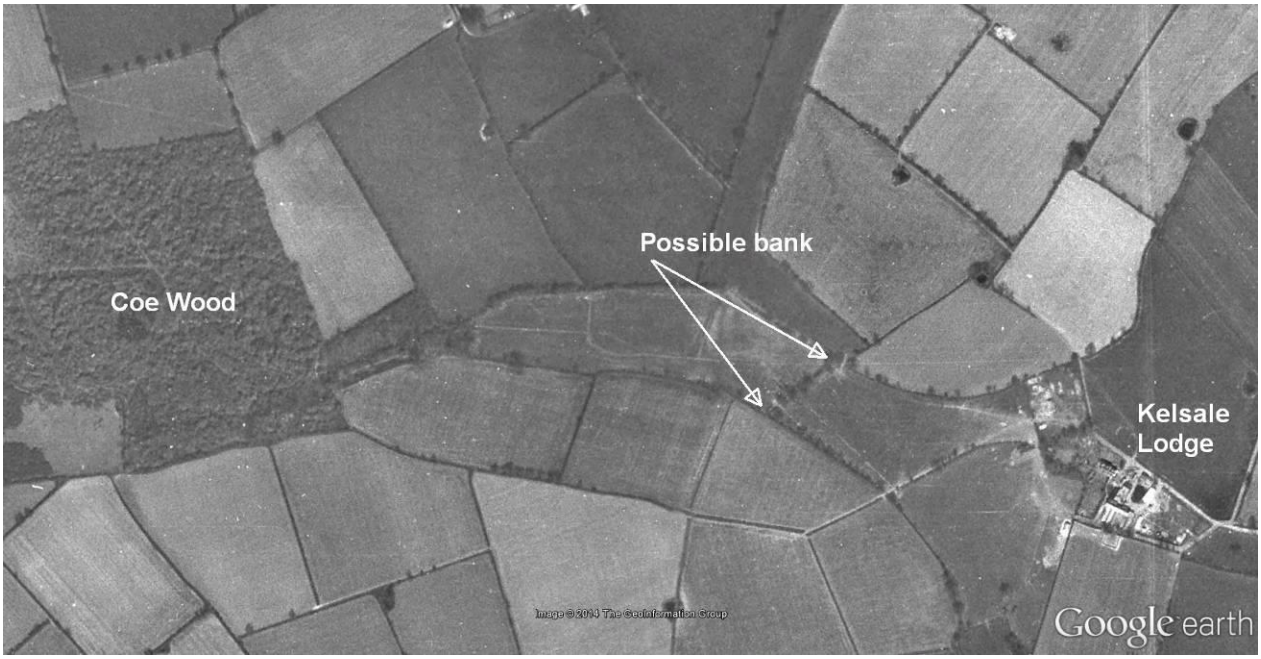

Figure 1A: The 1945 image of the valley between Coe Wood and the lodge. Background image © 2014 Google and The GeoInformation Group.

In itself, this is not conclusive. The image quality is insufficient to determine whether a bank, ditch or both are present there.

Secondly, if there was a rear bank, the river course behind it would need to have been diverted to drop into the side of the pond to fill it. There was a river course in a suitable position for this until at least the 1950s. It has since been filled in and a new one, now probably close to the original river course, has been machined out. The 1940s OS map in Figure 2A shows what was there (note the marsh in the former pond area).

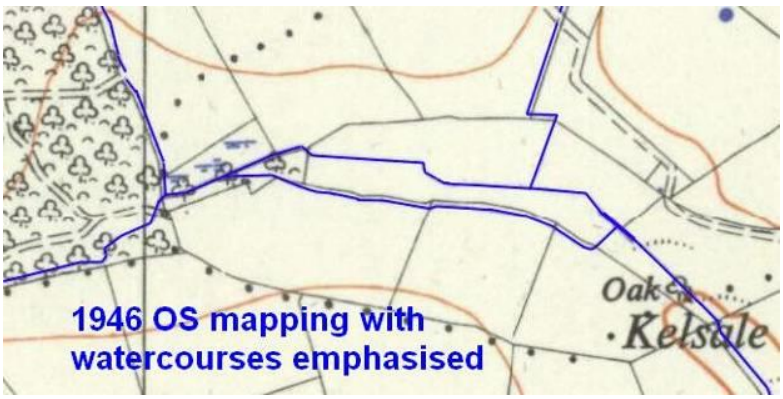

Figure 2A: The 1940s Ordnance Survey map.

The lower of the two courses is likely to have been one dug to carry the river above the valley centre and into the side of the pond.

Thirdly, a crop mark shows a feature of the expected size and at the predicted location.

Figure 3A: The crop mark at the position shown in Figure 1A. Background image © 2014 Google and Digital Globe.

This is the same position as the feature shown in the 1945 image. However, note that it is a straight line, whereas the 1945 image and, more clearly, the 1946 map (and earlier ones) show a slightly staggered one. One explanation, which fits both the farmer's description ("north side of the valley") and the map, is that only the northern section of the bank survived at that time. The southern section had gone as part of the later 'post pond' process of dropping the river course back down to its natural level at the valley base. A closer look at the 1945 image, while not clear, does support this.

Figure 4A: The possible bank position enlarged.

Finally, we have the image from current height data.

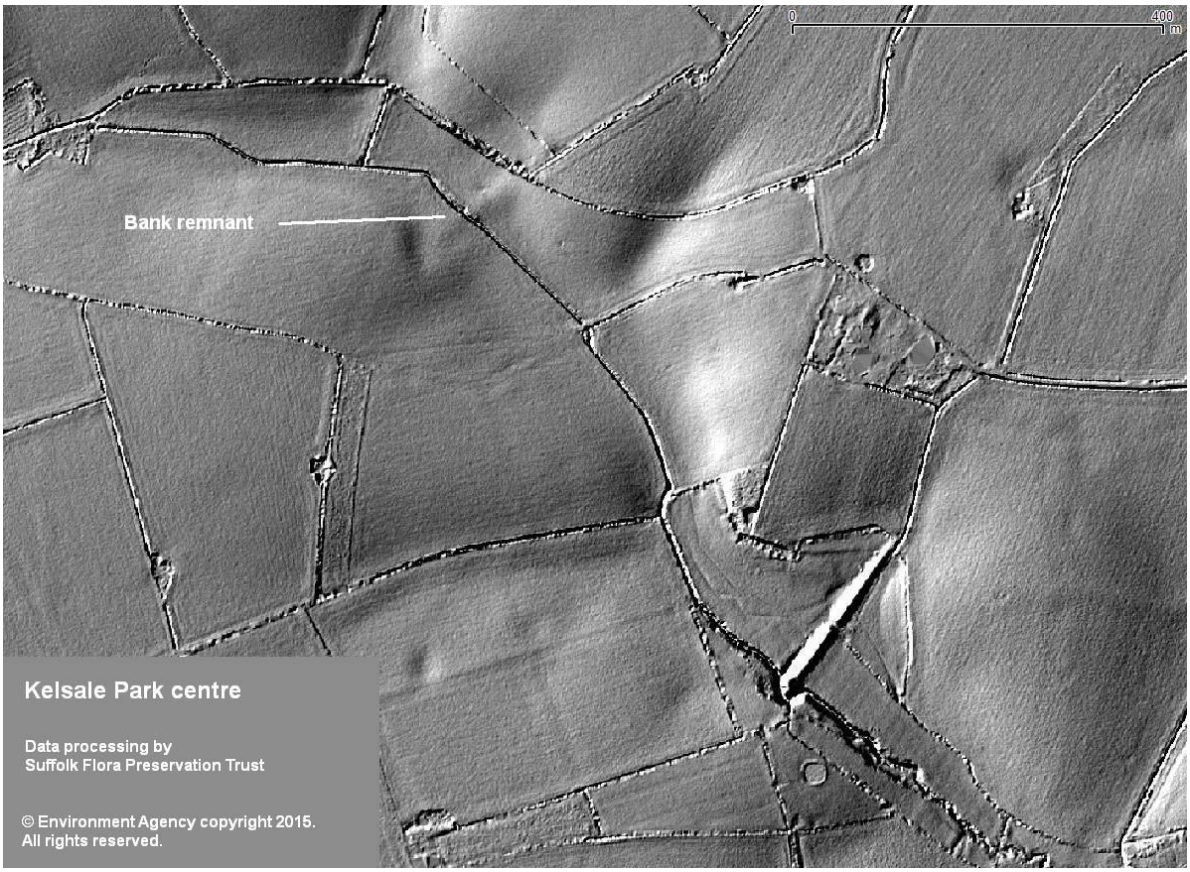

Figure 5A: Lidar imagery for the pond area

There is a distinct shelf effect at the north end of the pond where spoil from the demolished bank might be spread and beyond that a very shallow but clear bank that measures around 30cms high. Note that

the valley base by this point is quite flat. This may be a result of silting where the river flow slows on entering the pond.

It must be emphasized that none of the above is proof for the existence of a rear bank. We are looking at features in the modern landscape and extrapolating backwards in time, unable to confirm how the landscape looked before 1616 and how it has changed since. Current features that look contemporary with a particular period are undated and untested as to their earlier function.

Was there a second pond?

Although the presence of a rear bank is subject to question, if present, it might also have functioned as a dam. This would have held back a smaller pond going further up the valley. The following account is not intended to be taken as definitive, more as an avenue of approach for any future investigations. However, it does have some consistency with current day landscape features.

At the top of the valley is an unexplained saw tooth feature in the park boundary. Its age is unknown but it is present on the 1616 park map. Single 'notches' in park boundaries have been attributed to the positions of deer leaps (salters) or places for movement of cattle in and out of the park. Kelsale Park has some candidates in its boundary for these. However, the presence of the river at this position makes such a feature unlikely here.

The 'saw tooth' is shown below in both the modern landscape and the 1616 map.

Figure 6A: The saw tooth feature in the modern landscape. Background image © 2014 Google and Getmapping plc.

The current river course runs through the woodland strip about a third of the way north from its southern edge. Along the southern edge is a now dry but substantial course, cut through a ridge at Coe Wood's south eastern corner. This course is shown in more detail in Figure 9A. It is dry because the river course is obstructed in Coe Wood and now flows around the end of the ridge but it would at one time have taken the river.

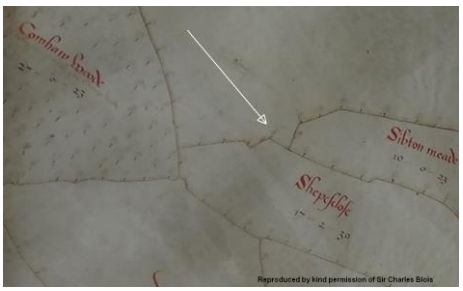

Figure 7A: The saw tooth feature in the 1616 map of the park.

Figure 8A: The river channel within the woodland strip by Coe Wood.

Figure 8A shows the river channel running from Coe Wood to the saw tooth feature, looking west. The dry channel is not visible but is running parallel to it to the left. Its bank is roughly where the small tree is on the extreme left.

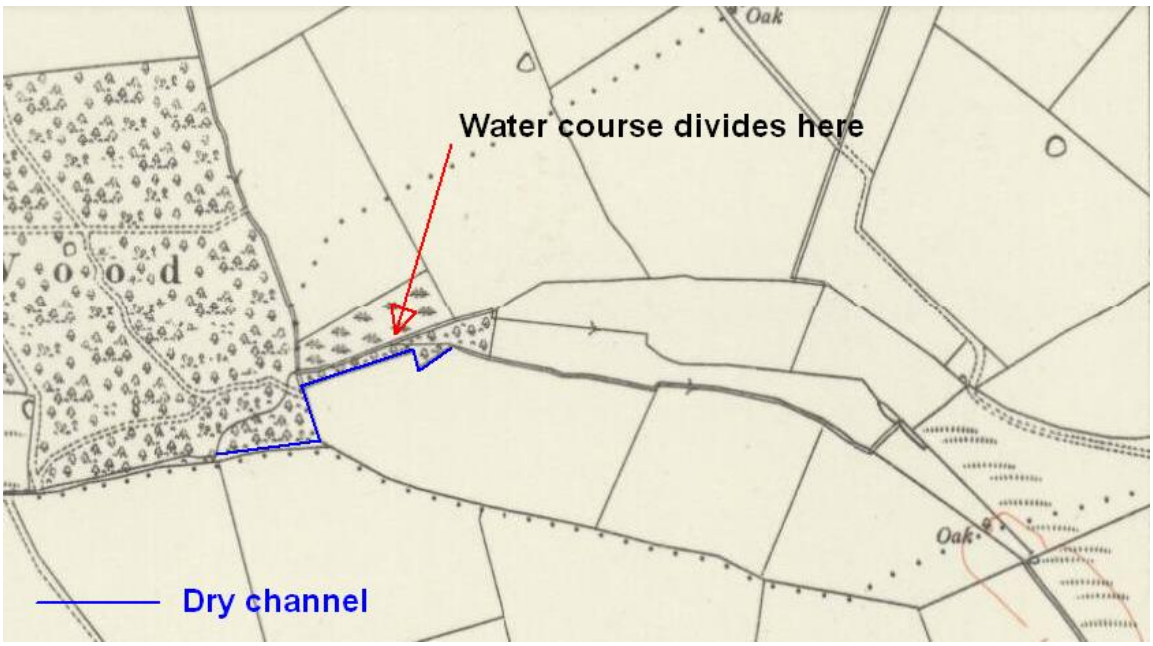

Figure 9A: The 1925 Ordnance Survey map.

This 1925 survey image shows two water courses (as arrowed lines) running east out of the saw tooth feature. Only the northern one exists today. West of their dividing point, the river course is as it is today, running through the corner of Coe Wood. The course of the dry channel where it once ran is marked in blue.

It is possible for the saw tooth feature to be interpreted simply as a landscape consequence of something there, perhaps involving the now dry channel, that may have been capable of switching the water flow from one course to another along the saw tooth edges. Unfortunately, the saw tooth centre has been dug up and refilled by the construction of a large gas main that runs through its centre and on up to the North Sea gas terminal in Norfolk. It no longer has any archaeological context.

Why would switching the river course need to be done?

There are at least three possible reasons:

1. If there was a second pond behind the hypothesized rear bank, then its level could have been controlled by such an arrangement. Peak river flows could be diverted to either pond as necessary.

2. The upper pond may not have been a pond at all. Some banks of similar date at Byland Abbey in Yorkshire have been tentatively re-attributed from being dams to being flood control earthworks. In order to prevent a pond dam from being damaged by flood surges, its water supply would be diverted into a holding area upstream of it with sufficient capacity to hold the peak flow. This earthwork would act as a dam but not hold a permanent pond.

3. A pond behind the rear bank might be a fully functional fishpond that pre-dates the much larger one below.

Any of the above reasons might account for why the farmer's account of 'removing another length of it' ('it' being the main dam earthwork) implies that something of comparable size to the main dam was

there. As a rear bank to give some depth to the shallow end of the main pond, a bank there would not have needed to be very high but as a second dam, it would have been far more substantial.

Up till now, we do not know the height of the rear bank. We cannot be sure it even existed. However, if it did exist, we have a crop mark as a candidate for indicating its likely width. The extent of water that a bank that spans the valley at that height can be modelled to fit the crop mark width. It will also show the depth of water behind the bank.

Figure 10A: The pond extent modelled on the crop mark width. Background image © 2014 Google and Digital Globe.

The result is impressive. For a depth of water that spans the crop mark, the surface would extend to the saw tooth feature and match its width there. The southern boundary is close to the line of the southern water course. The centre depth of this pond at its eastern end would have been 1.5m, so a dam there may have been 2 metres high or more. This is not as big as the main dam but is comparable to it at least.

The north east-facing pond edge abuts a straight steep bank. This is an escarpment, with the field to its north east nearly level with its top, separated by a shallow ditch. It is on the park boundary and would have been part of the park pale, although this new information suggests it also provided a pond bank. Although this may be a natural feature, its presence is quite striking and there is nothing else like it along the park perimeter. Here is the author on the bank.

Figure 11A: The escarpment along the modelled pond edge. Image © Dr Rosemary Hoppitt.

It may not be a natural feature. The height data shows that for the 200 metre length of high bank, its base is completely level. The escarpment looks to have been dug out from the hillside to produce this level base, perhaps to provide both width to the pond there and also to provide material for the earth dam. Where it bends slightly south as it goes west along the valley for another 200 metres, it loses its height but at that point a high bank would no longer be required to hold back a pond edge.

The modelled pond alignment seems too close to features in the landscape for it to be mere coincidence. However, the northern stretch of apparently isolated hillside shown in the modelled pond in Figure 10A is a concern. That may, though, just be a consequence of preventing the pond extending across the park boundary by the sawtooth feature.

Furthermore, the match of the pond edge being parallel to the southern river course could simply be that the river would be placed at that position anyway, pond or no pond, in order to provide the fall to go round the rear bank edge.

Finally, a second pond is not supported by any historical references to more than one pond there. It should be noted that this would not rule out either an upper bank being a flood defence feature, the upper pond falling out of use early in its history or it being left intact as a remaining pond after the main earthwork failed.

This illustrates the historical complications that an upper pond introduces for interpretation of records. When it comes to references to “a pond”, just which pond are the records referring to at the time they were made? In the park’s earliest phase, there may have been two ponds. The lower one then fails and drains, leaving the upper pond intact and a lower mere in its place. Was this the situation when “a pond” valued at 2/- was there in 1306? Was it instead the intact main pond, with the upper pond having gone by then or did the upper pond simply not exist? Would two stepped ponds forming one feature be regarded as “a pond”? Was the 1549 pond the mere, the upper pond or the main pond?

This confusion is down to the lack of dating evidence. There is confidence for the sequence of events because the landscape reveals what is likely to have happened but there is little to indicate the date for each step. One answer may be to take soil samples to analyse silt depths at key points along the valley. Modern ploughing may complicate this but Mere Meadow should have intact silt layers from both the life of the main pond (north eastern side) and the Mere (central and western areas).

Afterword

Not every landscape feature is immediately obvious to the investigator. Figure 12A shows the author and a colleague who, unknowingly, were standing precisely at the location of the rear bank/dam at a time before its probable existence and size was fully appreciated. It has not been completely levelled and a gentle rise can be seen along the base of the oilseed rape.

Figure 12A: The rear bank or dam position looking north. Image © Dr Rosemary Hoppitt.

References and copyright acknowledgements:

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