

A history of the drainage of
The Gwent Levels

Tony Pickup



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**THE HISTORY AND LEGACY OF THE
CALDICOT AND WENTLOOGE LEVELS
INTERNAL DRAINAGE BOARD**

TONY PICKUP

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Figure 1. The Gwent Levels, looking west across Goldcliff and Newport Wetlands.





CONTENTS

| | |
|---|----|
| List of illustrations | 5 |
| Foreword | 6 |
| Prehistory and Roman times | 9 |
| The Normans, the Marcher Lords and the religious houses | 17 |
| The time of Henry VIII | 22 |
| The Monmouthshire Court of Sewers | 25 |
| The history of farming on the Levels | 40 |
| Change is in the air - The 19 th Century | 51 |
| The Twentieth Century | 61 |
| Drainage management | 68 |
| And finally... | 73 |
| Acknowledgements | 78 |
| References | 79 |

ILLUSTRATIONS

| | |
|--|----|
| Figure 1. The Gwent Levels. | 2 |
| Figure 2. Board and staff of the CWLIDB. March 2015. | 8 |
| Figure 3. Life on the Levels, circa 5000BC. | 10 |
| Figure 4. Contemporary woodcut showing 1607 flood. | 35 |
| Figure 5. A stormy high tide at Goldcliff, March 2007. | 36 |
| Figure 6. Sea wall re-alignment at Goldcliff. | 37 |
| Figure 7. Damage to the sea wall facing, Dec 1981. | 38 |
| Figure 8. Looking from inland towards the coast. | 41 |
| Figure 9. Looking inland from coastal belt. | 42 |
| Figure 10. Flooded farmland, March 1981. | 43 |
| Figure 11. The Undy Commons in 1830. | 49 |
| Figure 12. The Redwick, Broadmead strip commons in 1830. | 50 |
| Figure 13. 1830 Survey of Wentlooge Level. | 53 |
| Figure 14. 1830 Court of Sewers map of part of Newport. | 54 |
| Figure 15. Detail from 1794 map of Newport. | 55 |
| Figure 16. 1830 map showing proposed line of railway. | 57 |
| Figure 17. St. Woolos parish map, 1830. | 59 |
| Figure 18. Sketch map showing urban expansion. | 60 |
| Figure 19. Industrial development on the wet, back fen. | 65 |
| Figure 20. Herons and egrets. | 67 |
| Figure 21. Bank reaping using a scythe. | 70 |
| Figure 22. Controlling water levels. | 72 |

FOREWORD

The Gwent Levels are a unique part of the Welsh landscape. Over a period of two thousand years, a succession of landowners, farmers, engineers and official bodies - such as the Commissioners of Sewers and Internal Drainage Boards - have reclaimed and maintained land, recognising its value, initially for agriculture, and more recently for housing, transport and commerce. Draining this low-lying area of land, which stretches for about twenty miles along the northern shore of the Severn Estuary, involved enormous human effort: constructing a sea wall and digging the intricate network of drainage ditches (or reens) to allow the land to be used productively, particularly for grazing cattle, horses and sheep. More recently, over the last 200 years of industrialisation, this fertile belt of land has also protected crucial development around Newport and Cardiff. Many interesting individuals and institutions have held a vested interest in the successful management of the Levels' drainage, as you will discover in this short book by Tony Pickup. Roman colonists, Norman barons, Franciscan and Cistercian monasteries, large landowners such as the Tredegars and Beauforts, and the Monmouthshire Court of Sewers established by Charles II all played their part in the Levels' rich history. Each dynasty has depended on the successful management of the Levels' drainage system; a responsibility which has been held by the CWLIDB since 1942, when we took over from the Commissioners of Sewers.

Whilst we have naturally seen changes to our drainage governance on the Levels in the past, a common element has always been that such a distinctive and complex flood defence system required its own locally managed body. The Board, with its combination of representatives from farming communities and local authorities, has maintained an enviable record in "keeping our feet dry" over the last seventy years. Since the 1980s we have also adapted our work to recognise the ecological value of the land we manage. Seventy two per cent of the Levels is now classified as SSSI, largely because of the number of interesting and rare plant and animal species which rely on the Board's reen management programme for their survival. The balance between producing food on the Levels and protecting the wildlife is very delicate but can be achieved through communication and negotiation if approached in the right manner. We must not underestimate the importance of keeping a harmonious relationship between all landowners and ratepayers in order that this continues.

Over the last three years, we have upgraded our administration and begun a major programme of capital investment in sophisticated new steel weirs and are proud to have been awarded ISO qualification (14001) for water level and flood risk management. We were ready to take the next step in streamlining our membership and creating a wider consultative body in the Levels.

In response to recent Welsh Government consultations about the future of the IDB, I was pleased to learn that our restructuring efforts and future role were recognised by a large majority of informed respondents, both local and national, who asked the Government to retain the Board. Our members were extremely disappointed that Welsh Government Ministers decided to overlook the response and plough on with a pre-determined policy of abolishing the IDB and transferring its executive functions to a central government agency,

Natural Resources Wales. As we approach the date of the transfer, on 1 April 2015, I feel a profound sense of personal sadness at the termination of centuries of local control of our critical drainage and flood defence system in the Levels.

My regret about the decision to merge the Board with NRW is combined with determination that we should still seek to maintain as much local influence and advice as possible under the new arrangements. Through the Board's efforts we have been able to secure the creation of a new body to advise NRW on its drainage and flood prevention work in the Levels, comprising local farming and council representatives, with co-opted experts. I am pleased to have been nominated by NRW as the first Chairman of the group, and that several active members of the former Board will join me in our new remit. We will do "our level best" to make sure that the unique work of our predecessors and a two thousand year heritage is not lost in an era where we face new threats to the Levels, including the effects of climate change. Our farms, our industry, our transport, our homes will be ever dependent on sound drainage and sea defences.

All that we have so far achieved in the Levels, and will achieve here in future, depends on human effort and knowledge. This includes the dedicated and hard-working staff of the Drainage Board who will now join NRW. Their expertise will need to be nurtured and deployed effectively. My thoughts are with them, and also with the thousands of people over two millennia who have created and maintained this delicate and beautiful environment - those who built the sea wall, those who dug the ditches, and those who maintained them century after century. Many of their names are no longer known, but we owe it to them and their descendants to make sure that we create institutions that safeguard our heritage of the Levels, celebrated in this book.

I am sad that the final chapter in the history of the Caldicot and Wentlooge Levels Internal Drainage Board has been written during my watch as Chairman. My thoughts at this time are with past chairmen as well as past and present Board members; all of whom have freely given their time, experience and detailed local knowledge. I am sure that all of those people who live, work and travel through and around the Caldicot and Wentlooge Levels would want to join me in acknowledging the great debt of gratitude we owe them.

Derek David
Chairman, Caldicot & Wentlooge Levels Internal Drainage Board
March 2015



Figure 2. Most of the last Board and staff of the CWLIDB. March 2015.

PREHISTORY AND ROMAN TIMES

...and in the beginning

It was hot, so hot; the sun beating down from a cloudless sky. The sun, which was at its highest during these months, was burning her bare shoulders. She walked with the child on her hip, having carried him through the tall marsh grasses. And now she was on the shore. Flat, open for miles, the sea barely visible in the haze on the horizon. There had been a big storm yesterday, but now the sky had settled into a flat, blazing, cloudless sheet. The sun passed so slowly across it, and by this time in the day was throwing out such heat as you only got if you went too close to where the men were making metal. The heat had even made the mud on which she walked thicker than usual. Her footprints remained behind her, leaving a long trail from the island out onto the sands. She put her baby down. He was too heavy to carry anyway. The two walked side by side across the open mud, out towards the distant water, she carrying her stick in case there was a flatfish coming in with the tide, her son walking beside and a little behind. She thought of the coolness that the water would bring her. Tonight they would all be leaving the island. The heat of the last months had made the water taste bad and some of the children had become ill. The elders said they should go inland again. "The water there will be good". So this walk out into the river would be the last for a while.

Later that day, the shore was bare. There was no sign of the girl and her child. The sun was lower and the sand and mud was being slowly, oh so slowly, covered by a burnished sea. Not a breath stirred the air, not a ripple stirred the tide's surface. It was a hard mirror, reflecting the day's heat back to the sky. As the tide came in, the water, laden with silt from the previous day's storm, gently covered the beach. The silt slowly settled out, filling her footprints and those of her son, and the mud's surface was covered with a thick slurry. The tide rose and fell, and rose and fell another fourteen times. The still, windless, summer heat continued, and at each high tide the slurry layer deepened and at each low tide the sun baked it hard. Below the surface her footprints and those of her son remained; a tiny record of her life.

Two thousand years later her footprints, just off Goldcliff, re-appeared, and starts our story. For this is an attempt to tell the story is of how man has used, changed, and controlled the landscape of the Gwent Levels throughout recorded history.

We can start about 5,000 years ago, when the landscape was primitive and virtually unaffected by man, and our young mother went out to seek food and cool in the waters of the Severn. Travelling down through the aeons, we can watch mankind develop on The Levels, and see him try to put a harness on the land on which he made his living. We see him gradually getting it under control, although occasionally finding the wild animal that he thought he had tamed kicking down the stable door and having its wild way.

We will see some of the characters, and a lot of the politics, which have affected the history of this land. But at the story's heart are the people who live or have lived on the Monmouthshire





Figure 3. Life on the Levels, circa 5000BC
(Alexander Maleev/National Geographic Creative)

Moors, now more widely known as the Gwent Levels. People whose whole lives were often totally consumed by their existence on the land, the survival of which has always been balanced on a knife edge, and people for whom such existence had become quite normal. Families, like our hunting mother, for whom the Gwent Levels was not just a home, but a means of survival.

The origins and structure of the Gwent Levels

The original Gwent Levels Landscape, and by original we are only thinking of relatively recent geological times - a few thousand years, not millions - was formed out of the latest major geological incident to affect our land - the last Ice Age. During that time, most of Britain, roughly down to a line from the Severn to the Wash, was covered by a huge ice sheet. Glaciers creaked and groaned and life-shortening winds knifed across the landscape. Few living things, except perhaps a lost bird, would be seen. South of the permanent ice, the country was a bit like present-day northern Finland and Russia: snow-covered in winter and exposed, short, arctic vegetation in summer.

Then, about 15,000 years ago, as the climate became warmer, the ice sheet began to retreat northwards. The thawing ice produced vast quantities of melt-water, making fast-flowing rivers that eroded the land over which they flowed. Torrent-carried rocks shattered the river bed and banks, each rock constantly breaking off smaller rocks and all the time smashing bits off themselves. The smaller pieces themselves were ground to gravel in the water, and the gravel to sand and the sand to silt and the silt to tiny, microscopic particles of clay. All this was eventually carried in a muddy, brown soup down to the sea.

While the rivers flow quickly, they carry all the rocks and sediment along with them, but as the current slows their water is unable to keep all the stones moving. So, progressively the water drops, first the boulders, then cobbles, then the gravel, and once the river reaches sea level and barely manages to keep moving, its grits and coarse sands settle out. Finally, once the river meets the sea and its current almost ceases, then even the smallest particles begin to fall out of suspension. They settled out as enormous sand and mud banks under the high tide. At low tide the rivers meander seaward following whatever channels they can keep open between the sandbanks they have created. In this way the Severn and the Wye, the two huge rivers draining the melt-water from the retreating Welsh ice sheet, began to fill in the wide, flooded valley where they reach the sea – The Severn Estuary.

During the Ice Age so much sea water had been locked up in ice that the world's sea level was more than 100 feet lower than it is today. After the thaw set in, not only were the Severn and Wye dropping huge quantities of sand into the mouth of the Severn, but sea levels were also rising. Originally the Wye and Severn were flowing down relatively narrow valleys which opened out to the prehistoric coast. As the sea level rose the rivers flooded and over-topped these valleys and the waters spread out to create a wide estuary; dropping their sediments across many miles of flat floodplain. Close to the centre of the estuary where the river flow was at its strongest, only the largest particles, the sands, settled out. But as the waters spread

out over the flat, wide flood lands at the estuary's side, the water moved so slowly, that even the microscopic clay particles settled out.

After the last Ice Age, a depth of around ten metres of sand, silt and clay was laid down by the two rivers over hundreds of square miles, creating what we now know of as the Gwent and Somerset Levels.

Over a period of maybe four or five thousand years following the ice's retreat, the bare landscape of Britain, (including our Gwent Levels), was gradually covered by natural vegetation. People lived in small, isolated groups in "openings" in the natural cover, which had matured to become a thick forest of oak, with many other species.

So, at the time of our mother and child, what would the Gwent Levels have looked like? Overall it was probably a huge reed swamp; but that was if you looked from the inland edge, for that was where the marsh was deepest and trees wouldn't grow. As you went out through the reed towards the coast, trees started to appear, willows first, growing in the reed, then more alders and fewer reeds, and finally, as you neared the coast, a solid oak and elm forest. To see this as a panorama you would have needed to stand on one of the few high points around the northern edge of The Levels and peer through a gap in the forest which covered them; in the trees on the hill above Bishton, or the forested hill on which St. Woolos now stands, for example.

Goldcliff, where our mother and child left her footprints, was a small island surrounded by the sea at high tide, but accessible over marshy vegetation at low. Goldcliff Island itself was clothed in oak and elm, though the trees were probably being cleared little by little by our girl's tribe at this time.

It is impossible to know how much of the actual Levels were used by peoples during this Mesolithic period. Presumably they caught fish and wildfowl in the reeds and pools, and hunted animals in the woodland. It is interesting to ponder how they were able to find their way out from the dry hinterland to the north, across the featureless reed swamp at the inland edge. Maybe they followed creeks out to the coast, but we know they built brushwood walkways and used crude boats. The tribes inhabiting Britain at these times were becoming more fixed in their abodes and, rather than wandering from one natural glade to the next to make new shelters and to feed their animals, were starting to make changes to their immediate surroundings to help better support themselves.

However, whatever these Stone Age peoples might have done to create new, usable land out of the marsh around them, it was doomed to failure - sea levels on the Gwent Levels were now inexorably rising. There is no evidence that global sea levels were actually increasing at this time, but there is a lot of evidence to suggest that land levels were altering in relation to sea level. In some areas of Britain this was due to the removal of the great weight of the ice sheets, which allowed the land to spring back up to give the impression of a drop in sea level. However, on the Gwent Levels, recent research suggests that perhaps the sediments laid down after the melt of the ice sheets were compacting under their own weight, causing the land to sink in relation to the surrounding sea level.

Whatever reason, about 2000 years ago, the Gwent Levels lost its freshwater marsh and woodland, and began to disappear under the sea again. Any inhabitants would have been confined to the few high points, like Goldcliff, only able to walk off to the uplands to the north at low tide.

The Romans

Some four to five thousand years after we left our mother and child at Goldcliff, The Gwent Levels had reappeared from under the sea. Land had built up through sedimentation from the tide and from peat establishment following the creation of large bogs during the last inundation.

The Roman General, Sextus Julius Frontinus, had made inroads into South Wales, defeating the native Silurians in AD 75. The fortress created by the Romans at Caerleon to defend their new territory remained in use for the next 350 years, and the Roman presence left echoes that have resounded down the ages. Some of the changes they made to the Gwent Levels still exist, both in solid structure and in idea. As far as we know, they were the first to try to protect the Levels from the sea by building embankments along the shore line. They also developed a network of man-made ditches to protect the land from river and rainwater.

One might wonder why people would feel it necessary to undertake something as stupendous as trying to keep the sea off the land. The answer is probably not all that difficult to fathom. The Romans' use of horses as draft animals is well known. Most might think of Ben Hur and chariots, but the Romans had more prosaic uses for them. They had to move huge quantities of material to supply their ever extending empire with its long chain of fortresses and camps. Pasture for these horses was, of course, essential.

At this time, much of Wales, indeed much of Britain, was covered in dense, ancient forest and grazing land would have been a scarce habitat in these isles. The forests had been in existence since not long after the retreat of the ice, and at low altitude in Wales the woodland were mostly oak and elm interspersed with other species such as lime and ash. The woodland was thick and heavy and openings in them were probably few and hard won. Imagine the effort required to fell an oak with a girth of ten feet using just hand tools, and then dealing with the stump to make a pasture. Then multiply this up to create open land in which sufficient grass would grow to support a large herd of horses... While this was perhaps not quite as difficult as you might think, (the Romans had developed saws with offset teeth and indeed mechanical saws, as well as very efficient axes and mattocks), the prospect of creating grazing out of woodland, and then keeping the forest at bay was doubtless a huge undertaking. So, when an open, short pasture was visible covering the salt marshes at the edges of this forested land, it is not surprising that reclaiming land from the sea to feed horses appeared an attractive proposition.

On the flat saltmarshes below the forests and adjoining the Severn, ideal grazing pasture already existed – acres and acres of it. Because the sea submerged the saltmarshes completely a number of times a year, salt prevented the growth of trees or shrubs, and only salt tolerant plants survived to create a short pasture. Even before reclamation, the saltmarshes were

probably the first land on which the Romans grazed the large number of animals they kept. It was a simple matter to move their livestock to places of safety at the highest tides. It was then no great leap to consider keeping the sea permanently off this grazing land by building walls to keep it back. The Romans had enough hands to do the work (in the form of Silurian slaves), and permanent, productive grassland was available from the moment they were able to keep the sea at bay.

Creating pasture from reclaimed woodland on the other hand, not only necessitated the onerous task of removing the trees, but the Romans would then have had to wait at least a year before the resulting grassland was fit to graze.

So it becomes quite clear why reclamation from the sea was so attractive and how the Romans undertook so much reclamation work during the 350 years that they occupied South Wales. They were great engineers and surveyors, and a few miles of bank of an appropriate height would pose no problems. Archaeological evidence shows that they built sea walls at intervals from the Rumney to beyond Redwick, a distance of more than ten miles. Maybe the walls were continuous over that length, but with coastal erosion having removed any evidence we may never know.

Once the sea had been held back it would have been a simple step, indeed it may have been essential, to cut drainage channels in the soft ground behind the sea wall, both to drain excessive freshwater, and to contain the stock and keep out predators. The drains would also have permitted the establishment of fields that could be kept free of grazing stock and so planted with crops.

Whilst it is clear where the Romans erected the sea walls, it is not as easy to determine where they dug drainage channels and made fields on the reclaimed land. They certainly created fields on Wentlooge Level, but any evidence for their having created fields on the Caldicot Level has yet to be found. Roman remains have been discovered at a number of places along the sea wall on the Caldicot Level, and at places along the inland edge of the Levels, but not much has (yet) been found in the middle of the Caldicot Level. The archaeological finds on the inland edge suggest that, at least on the Caldicot Level, there was perhaps quite a large area of marshy fen here, with channels directly connecting it to the sea. A Roman boat was found against a wharf, uncovered during the excavations of the Europark Industrial development near Magor in 1993, suggesting direct contact with the Severn through the Caldicot Level.

The Dark Ages

The Dark Ages, roughly between when the Romans left Britain and the arrival of the Normans, is a period which, seemingly, saw the reversal of some, if not all of the Roman land reclamation on the Gwent Levels. Sadly, the Dark Ages is so named for good reason and there is very little evidence from which to determine how the Levels were actually managed during this time. This is the period where imagination, legend and traditional tales, like those of King Arthur, are all we have to judge what the land was like, and unfortunately many of these are the product of very active Victorian imaginations!

The reality is that with the departure of the Romans, who had suppressed tribal conflict during their occupation, there would have been considerable competition for the land in the power-vacuum they left behind. This was also the time when European invaders were pushing eastwards through England, and the few records that exist of that time suggest that there was much inter-tribal warfare, with excursions into eastern Wales by the Anglo Saxons. The un-wooded, though marshy Levels land would have proved attractive prospect to invaders, much more so than the forests, in which the defending British princes and their followers were supreme. Land ownerships on the Gwent Levels may not have been particularly stable during this tense and violent time; land ownerships and occupation changing with each battle.

The absence of solid evidence means that we can't say with any certainty what the Levels were like during the 700 years or so after the Romans left. It seems, though, that there was no expansion to the area of reclaimed land left behind by the Romans. In fact, the opposite seems to be true, that there was probably a cessation of management to the sea walls which ultimately led to their failure. We know that the sea walls were not totally obliterated, but breaches occurred in them, (presumably caused by the storms and not marauders), and inundation of the Levels began to occur. Sea walls are at their most vulnerable when storms coincide with high tides. Failure to repair damage before the next storm would allow the sea to exploit an earlier weakness, and once the sea had broken through, the gaps would be quickly widened until they became too big to repair, particularly given the limited resources available to the warring factions.

Tidal inundations after storms would have flooded the land for short periods of time, but the sea would then have drained back again over succeeding low tides. So it wasn't a case of the whole of the Levels becoming submerged, but of the land returning to "natural saltmarsh" conditions of periodic immersion. This is borne out by the archaeological evidence which shows that the whole of the Caldicot Level and part of the Wentlooge Level returned to saltmarsh for some time between the departure of the Romans and the arrival of the Normans in 1066.

While vast areas of the Levels returned to saltmarsh during the Dark Ages, much of the sea wall remained, albeit in poor condition. Indeed, the Roman sea wall is present along a lot of its length today, and the Roman field system at Wentlooge still exists.

THE NORMANS, THE MARCHER LORDS AND THE RELIGIOUS HOUSES

The Norman times

A hundred years or so after the Norman Conquest, in 1188, Giraldus Cambrensis (Gerald of Wales) travelled the length and breadth of Wales, recording his travels in his *“Itinerarium Cambriae”*ⁱⁱ. His journey started in Hereford and ran down to Newport, then westwards to Pembroke, before swinging north. While his early travels brought him to Newport, he had little to say about the place except:

“At Newport, where the River Usk runs down from its source in Cantref Bychan and flows into the sea, many people were persuaded to The Cross”.

However, he did find that:

“High above the water, and not far from Caerleon, there stands a rocky eminence which dominates the River Severn. In the English language it is called Goldcliff, the Golden Rock. When the sun’s rays strike it, the stone shines very bright and takes on a golden sheen”.

Gerald’s description perhaps contains some poetic licence!

However, he did record, perhaps more accurately:

“A small stream known as Nant Pencarn winds through the district called Wentloog in the Newport area. It is passable only at certain places and by certain fords, more because of the way it has hollowed out its bed in the muddiness of the marshland which surrounds it, than the depth of its waters.”

Sadly all that Gerald’s brief association with the Gwent Levels confirms is that the area was still very wet. His brilliantly detailed record that illuminates much of the Norman countryside elsewhere in Wales, seemingly passed us by.

After the Norman Invasion in 1066, William the Conqueror created three new earldoms: Chester, Shrewsbury and Hereford, to help maintain his border against the Welsh Princes. The land between the Dee in the north and the Wye in the south was known as The Welsh “Marches”. As well as these Earldoms, the Crown also encouraged the establishment of smaller lordships along its border with Wales, not only to defend the border itself, but to try to extend into valuable Welsh lands where possible. The “Marcher Lordships”, while owing allegiance to the crown, were not subject to English Law, but instead were able to govern under their own laws.

At this time, Wales was heavily wooded and, of course, mountainous, and therefore the land most attractive to colonisation was the coastal belt. Not surprisingly the Normans encroached on the kingdom of Gwent on the north shore of the Severn and it seems that

within about 75 years of the Conquest they were well established there. And this connects directly with our own drainage board history.

In about 1133, the Norman Lord of Caerleon, Robert de Ghandos (or Gandos), founded the Priory of Goldcliff as a dependency of the Norman Abbey of Bec-Hellouin. Sponsoring religious houses by the rich was a common occurrence - seen as some sort of insurance, either in the after-life or in the here and now.

However, the Normans' hold over the March Lands was constantly being tested by the usurped Welsh Princes. In 1172, Henry II had arranged to meet in Newport, Owain, the son of one of the rebellious local leaders, to discuss a peace. However, Owain was murdered on his way to the meeting, supposedly by one of Henry's nobles, and his brother Hywel and father Iowerth, in revenge laid waste to much of the land between Cardiff and Chepstow (Striguill). Caerleon and its lands were taken back from the Normans. A deed in the Eton College Archive, thought to have been written between 1174 and 1211, reflects this. It is confirmation of gift to the Goldcliff Priory - in return for prayers to be said in perpetuity for the donors - of church and land to the monks by Hywel of Caerleon (Hywel ap Iowerth).

Many of the names in this document are recognisable today in this translation from the original Latin text, courtesy of Eton College Archives.

Confirmation by Hoel' de Carliun [Hywel of Caerleon] to the monks serving the church of St. Mary Magdalene [priory of Goldcliff] of all gifts of churches, lands and alms which he and his predecessors and men made to them, to hold in frankalmoign for ever, namely:

(i) of his gift, the church of Whdi [Undy], a mill and 1 acre of land and 2 burgages at Caerleon;

(ii) of the gift of Morgan [ab Owain] the mill next to langestan [Langstone];

(iii) of the gift of Morgan the younger 10s worth of land at fraxinum [Nash];

(iv) of the gift of Morgan and I[orwerth ab Owain] 2 fisheries in the Usk, one called fifwere and the other opposite, and 200 acres in the moor;

(v) from Wronu [Grono] the son of Nicholas 5s worth of land in the moor in exchange;

(vi) of the gift of William the chamberlain 5s worth of land at Nash;

(vii) of the gift of Caradoc the land of bule moor [Bulmore in Christchurch];

(viii) of the gift of W[ronu] son of Nicholas and Cadug' [Cadwgan] his brother 1 fishery at colemannes pulle [?pill].ⁱⁱⁱ

The monastic years

That the Levels were damp during this period, we already know from Giraldus, but the following summary translation of a document from the Eton College Archive, dated around 1248, shows that it was not only in the names that the Normans had cemented their hold on the Levels land. It gives an indication that for the first time since Roman occupation, sophisticated drainage system had again been established on the Gwent Levels. It's even a drainage system that we can (partly) recognise today!

Grant by Henry¹ prior of Goldcliff and the convent there to William Blewett, lord of Langstane [Langstone] and his heirs of a gout across dubeleis² [Dulais] stream through the middle of the monks' land as far as the great gout which falls into pullard [?the pill] to drain William's meadow which lies between the land of Andrew the chaplain of K[ar]liun [Caerleon] and the pasture of lanwarne [Llanwern] on the one side, and the meadow of lord Nicholas de Mora and the monks' embankment (fossata) next to dubeleis on the other, to hold the said gout in perpetuity, rendering annually 10s sterling at Easter; on condition that the prior and monks have a sluice running in their embankment whenever need arises. If the meadow should flood so that damage is done to the monks' land, the gout is to be stopped up until the flood has subsided; when it subsides the gout may again be opened.

William and his heirs are bound to make and maintain a wall on the east side of their meadow from the wall belonging to Andrew the chaplain up to the alder grove of Llanwern, and another wall on the north from Nicholas' meadow aforesaid to the monks' wall next to dubeleis. William and his heirs are bound to make and maintain these walls so that no fresh water passes them, nor may they allow any water to enter the gout except water from their meadow. The prior and monks and their successors are bound to embank (fossare) and maintain the wall which lies between dubeleis and the aforesaid meadow, from Andrew's land as far as the land of Llanwern to the same height as their wall called Monekewall (Monkwall), except for 20 feet in length in the same wall to the north of the aforesaid meadow which the monks have granted to William and his heirs in perpetuity for them to have free ingress and egress for carrying on their business. William and his heirs shall maintain the said 20 feet in length to the same height. If a breach occurs in the wall which the monks do not mend, William and his heirs may repair the breaches from their land and up to the same height. William and his heirs are bound to make and maintain the said gout at their costs, and to find timber to make the sluice whenever need arises; and the monks and their successors are to make the sluice at their costs whenever need arises, and the sluice is to be closed whenever need arises. For this grant William paid 40s sterling. If the 10s annual rent is not fully paid by the term when it is due, the monks and their successors may force William and his heirs by seizing the

¹ Henry was prior of Goldcliff c. 1248-9 (see David H. Williams, 'Goldcliff Priory', *The Monmouthshire Antiquary*, Vol. 3 (1970-1), p.51 and David Knowles and others, *Heads of Religious Houses England & Wales 940-1216* (Cambridge, 1972), p.103).

² Identified for Eton Archives by Mr W.H. Baker as Dulais stream. It appears elsewhere as Develes or Monk ditch, into which it emptied.

said gout or any oxen which are found on their land until the 10s has been fully paid.

Witnesses: Lord William de Sancto Muro [de Saint Maur], Robert de Mora, Nicholas de Wideston [Whitson], knights, Roger de Wilecke, Richard de Portere., Bartholomew his brother, Gilbert Ospec and others.

It is difficult to identify the land to which the document relates. Much of it possibly now lies under Llanwern Steel Works and the urban development around Lliswerry and Langstone. But the document does confirm the existence of a sophisticated drainage system in the mid-13th century, apparently associated with the present day Monks' Ditch. Water was controlled by sluices, and could be let onto fields as well as being kept off them, and banks were built and maintained to control flood water.

Quite what the engineering is, that is described in this document, is not too clear. The word Gout usually refers to an outfall or sluice, though it talks of a gout "From across the Dubelais", "*Ex traverso dubeleis currentem*". Possibly gout meant something different in the 13th century, perhaps a main drain? The original wording at first sight seems to suggest a means of getting water across a ditch, so does this signify in an aqueduct or siphon? Both the Clift Reen and the Monks Croft Reen flow UNDER the Monks' Ditch. Does this document refer to one of these? However, it was perhaps just a request to connect a ditch to the Monks' Ditch. It seems that it had to be fitted with a sluice (gout) to allow the monks to limit abstraction or drainage, and to have banks to confine flood water to the ditch and not let it onto the Monks' land. Sadly we cannot know for sure what meanings these words had 800 years ago; it's even possible that the person dictating the deed did not know exactly what he was talking about, but they surely illustrate a drainage system recognisable today.

The Benedictine monks at Goldcliff were not the only religious house with an interest in the Gwent Levels. The Benedictines depended on alms and gifts to support their religious life. The Eton College documents show clearly that land was given to the Priory so that the Priory could keep the tithes from the estate to support themselves. The Cistercians, on the other hand, had a slightly different approach to monastic life from the Benedictines. They sought a more self-reliant existence, less dependent on alms. Instead, they acquired land, usually within a day's travel of the monastery, on which they could provide for their earthly needs. Lay brothers, who lived at the monasteries, would travel out to manage the land and provide for the Abbot and their religious betters back at the monastery. This was the Grange system. Tintern had two Granges on the Levels: Lower Grange between Magor and Redwick, and Grangefield, between Magor and Whitson, both still in existence today.

An interesting aside to the Cistercian story is their connection to wet ground! The Cistercian Order was started, as an off-shoot of the Benedictines, by a monk with a more ascetic philosophy on life, who wanted to live closer to God and to the founder Benedictine's original teachings. The first monastery he founded was in a wet and wooded area south of Dijon and the name Cistercian came from the name of that marshy land!

The Cistercians at Tintern developed an interesting association with another marsh land in England, Romney Marsh, when in 1326 they acquired the tithes of Lydd Church on Romney Marsh, (known as the cathedral of the marsh). Romney Marsh had similarly been reclaimed from the sea and, no doubt, valuable experience was exchanged between the two places.

The Benedictines were known as the Black Monks and the Cistercians, the White Monks, after the colours of their habits. Quite a few of the drainage features on the Levels bear the words white or black in their names. Whitewall and Blackwall in Magor/Redwick, Blackwall now under Llanwern, as well as a number of Whitehalls. It is interesting to ponder whether the names have any connection with the two priories. Could the Magor Whitewall and Blackwall be old boundaries between their estates? Could the eastern Blackwall at the northern end of the Monks Ditch be the eastern boundary of Goldcliff Priory lands. The black in Blackwall could, of course, simply relate to the fact that the soil was black (peat) where it was built, (which it was) and the Whitewall was so named because it was not on peat soil. But the three walls do fall near to where the boundaries of the monastic estates might have been, so...?

The monks' prayerful and monastic life did not prevent them from being some of the most adventurous "improvers". They performed, or had performed for them, some prodigious feats of land reclamation. In a way, this is not surprising, given that by the time monasteries were expanding in the early 11th century, all the "good" land had already been claimed by the nobility, and what was left for the monks was land that no-one else wanted; the so called "waste". Land that flooded easily would have fitted this description, but the monks' experience of working marsh lands enabled them to realise its potential. Thus it was that the monks were the ones who put in place much of the drainage system we see today. The land was still prone to flood but, with their experience, the water could be drained off again pretty quickly and its farming value exploited.

A third religious interest on the Gwent Levels was that of the Diocese of Llandaf. The Bishops of Llandaf had at least 2 other palaces as well as the main one in Cardiff: at Mathern and Bishton, both on the Levels. The Palace Mead Reen, sadly now lost under a steel rolling mill, served the Palace's meadow land in Bishton. The nearby hamlet of Llandavenny, on the edge of the Levels, might also be connected with the Bishton estate; the first part of its name possibly deriving from Llandaf.

There can be little doubt that these religious houses became established here, not because the area was remote and suitable for communing with God, but because of the good agricultural value of the land, and their unrivalled understanding of its drainage management. By the early 1300s drainage was obviously quite sophisticated and effective, and from the recorded history, the richness of the land was exploited to the full.

In 1440 it appears that the Prior of Goldcliff was removed for not paying his dues to the mother Priory, and somehow, the running of Goldcliff was taken over by Tewksbury Abbey. There was then considerable argument over the ownership of Goldcliff, and for the next 20 years or so both Rome and the English monarchs contended for this valuable estate. Eventually Tewksbury Abbey seems to have won, and with royal assent was given the tenure. In the meantime Henry VI had made over to Eton College an annual "pension" from Goldcliff. Eventually, in 1467, Edward IV fully made over Goldcliff Priory, its lands, plus the Manor of Coldra, or Coldrey as it was called then, to Eton. It is through Eton's estate archives that we have so much valuable recorded history containing gems of information on the Levels and how it was managed during this period.

THE TIME OF HENRY VIII

The next significant events of our story, and there were three of them, occurred between 1531 and 1541, in the reign of Henry VIII. In 1531 Henry recognised the importance of floodplain farmland to the wealth of his realm and made a statute for the Commissions of Sewers. This gave power to appointed commissioners to enforce the maintenance of walls and ditches to defend certain areas from risk of flooding by the sea or fresh water.

The second event was that in 1536 he ordered that Wales be governed under English law in the “Laws in Wales Act”. This removed the independent laws of the Marchers Lords and also saw the crown take over a good number of the Marcher Lordships, or dispose of them as royal patronage. While this might be perceived as the end to the Welsh hopes of retaining interest in the land, in fact some of the great families to receive royal patronage as a result of these changes were of Welsh origin. Henry Tudor was of course Welsh!

Finally, in 1541, Henry’s dissolution of the monasteries ended the great age of monastic influence on the Levels. The Goldcliff Priory had already been bequeathed to Eton and the Tintern lands were re-assigned to non-religious landowners.

Early control of the management of sea defences and drainage

We have already established the high farming value of flood-prone lands of the Gwent Levels. This is clearly illustrated by the regal and papal interest in Goldcliff Priory Estate; an estate sufficiently productive to support charitable establishments elsewhere in the realm. The land was very attractive to wealthy landowners and the nobility and, after the turmoil of immediate post-Norman settlement died down, the land on the Levels eventually came under the control of a few major families. It was usually occupied by tenants but much would also have had common rights associated with it. This was the start of the major landowning interests of the Duke of Beaufort, The Earl of Pembroke, the Morgans of Tredegar, (thought to have been the Lords of Caerleon in Norman times and therefore descended from the earlier Welsh Princes) and the Kemeys family.

As yet, prior to the Court of Sewers, we have no recorded evidence of any formal or informal arrangement between landowners on the Gwent Levels to ensure a common standard of drainage or sea defence. However, these nobles were obviously in close contact and even related by marriage, so it seems inconceivable that they did not have some sort of agreement, informal at least, to safeguard their holdings. There may even have been local “policing” of the occupiers by their landlords.

On Romney Marsh, for example, in a 13th century document reference was made to “ancient and approved customs”, hinting that a control of the system for the general good had already been in existence there for so long that it had passed into accepted practice.

This large tract of marsh-land was perhaps fenced in from the overflowings of the sea, as early as any in these parts of England, for the laws, statutes, and ordinances, for the conservation of it, are, like our common laws, without any known original, and as early as the 35th year of King Henry III. (1242) they are called antient and approved customs. ^v

The informality of these arrangements would obviously have had limitations requiring a degree of trust-worthiness that might have been missing in some individuals in a community. As a result there was some form of oversight.

There were twenty-four jurors, or jurats, as they are now called, who were time out of mind elected by-the commonaltie, and sworn to do the best they could for the preservation of the Marsh from such overflowings, and they had, by custom and prescription, power to raise a tax for that purpose;

Once the disparate kingdoms of England and Wales were brought under one law, the ability to “enforce” such cooperation became possible. Henry III created the first formal control of drainage – again on Romney Marsh - when he commissioned certain men who were:

“sworn to do the best they could for the preservation of the Marsh from such overflowings, and they had, by custom and prescription, power to raise a tax for that purpose; which was confirmed by the same king’s letters patent at Romney, in his 36th year (1243).

So fundamental were these principles, that even up to the 18th century, documents relating to “Courts” for controlling drainage and sea defence would include the words: “*after the laws and customs of Romney Marsh.*” ^{vi}

The informal Romney Marsh system that Henry III modified and confirmed, was a Court system established by the local occupiers, designed to ensure that everyone fulfilled his communal responsibility. Henry’s modification to the system was to do away with the “elected by the commonaltie” element and replace it with jurors whom he selected from the Marshes’ landowners.

In 1531, Henry VIII took this a step further and gave the whole marshland court system a legal footing by passing “The Act of Sewers”. This gave Royal approval to the powers of Commissioners and Courts of Sewers, detailed their responsibilities and defined the limits of their powers. It confirmed their ability both to raise taxes to pay for sea defence and drainage work, and to issue summons against defaulters and fine them or charge them for reparations. The Act required Commissioners and Jurors to be appointed for a fixed term, to oversee the management of the drainage and sea defence systems and carry out regular inspections of it. The result of these inspections, either by appointed surveyors or as formal meetings of the Commissioners in “Courts of View”, then formed the basis of “presentments” to the Court, where short-comings or deficiencies could be dealt with. The Courts had the power to order landlords to carry out repairs to sea walls and the drainage system where deficiencies were found, and if these were not repaired, to authorise them to be done by others and reclaim the costs from the defaulting landowner.

At this time, and in fact right up until the Monmouthshire Commissioners successfully promoted an Act of Parliament in 1884, management of the sea defences and drains was “ratione tenurae”, which means that each land owner was responsible for carrying out his share of the work. Each land holder worked on those bits of the sea defence or drainage system that were on his land. This obviously was not very fair. For example, those with lengths of sea wall on their land were benefitting pretty well the whole population of the Levels, while someone with a length of ditch might only benefit a few upstream neighbours. It was not until the late 1800s that this inequity was resolved.

Landlords held ultimate responsibility for the work on their land, but covered this with in conditions written into tenancies. In default landlords could be fined as much as the tenant.

From a Lease dated 16 September 1521 to John ap Morgan of Caerleon of 631/2 acres of meadowland in the Parish of Nash from Eton College.

“John and his assigns are to pay all charges issuing out of the property, and the cost of all repairs next to the sea, whether to sea walls, ditches, dikes or fences ... If the rent is unpaid for 3 months, or if there is any defect in repairs to the sea walls, the Provost and College have the right to re-enter.”^{vii}

The earliest surviving documents in the UK relating to the Commissioners of Sewers mostly refer to Romney Marsh in the 13th century and the East Anglian Fens in the 16th century. However, in the National Library of Wales, there is a Letter Patent dated “the sixteenth year of Our Reign”. The monarch in question was Charles II, and the year 1660. The Letter Patent confirms the names of the Commissioners to serve on the Monmouthshire Court of Sewers and precisely describes their responsibilities and how they should and could go about their duties. Thus begins the next chapter in our story.

THE MONMOUTHSHIRE COURT OF SEWERS

This point represents the recorded start of the system of control of the Gwent Levels drainage – essentially the same system that runs to this day. In the 16th and 17th centuries Commissioners and Courts of Sewers were being established on a number of areas of rich, but flood-prone agricultural land in England. Many of these used the format set out in Romney Marsh and virtually all survived for the next 500 years or so when, in 1930, the Acts deriving from Henry VIII's original statute were repealed, and replaced by "The Land Drainage Act". In this the Commissioners and Courts of Sewers were replaced by Internal Drainage Boards.

The establishment of the earliest Commissioners of the Gwent Levels, or as it was then known, The Monmouthshire Moors, Court of Sewers is found in the mid-17th century, and appears in a document in the Tredegar Archives in the National Library of Wales. The appointment of Commissioners was done through "Letters Patent", which are documents of standardised wording issued by the ruling monarch when making appointments and the like. This Letters Patent established the Monmouthshire Commissioners of Sewers in 1660. But elsewhere in the Tredegar Archives there are presentments made to the Court of Sewers in 1641^{viii} which suggests that the first Monmouthshire Commissions may have been established in 1640 or perhaps earlier. Commissioners were appointed for 10 year periods and the same text reappears, sometimes slightly modified, in all subsequent Commissions; right up until the process was changed in Victorian times.

Because of its importance in our history, the transcription of this first Letters Patent has been given in full, but to help understand it, the text has been broken up by explanations. The original document is hand written on vellum and the spelling in the transcription is more or less as it was written. There is a problem with transcribing these documents in that scribes frequently used shorthand symbols to speed up the writing process. These can't be transcribed in typed words, so sometimes, what appears as a misspelling, are exactly the letters appearing in the document.

If you get lost in the full text, don't worry. I did and I spent hours trying to read it! If you read the summary paragraphs they'll tell you what you need to know.

Charles the Second By the Grace of God King of England, Scotland, France and Ireland, Defender of the Faith, To our right Trustie and right noble Lord Edward Marquis of Worcester, Philipp Earl of Pembroke and Montgomery and to our right and noble Lord Henry, Lord Herbert of Raglan, Lord Herbert of Cardiff, Edward Lord Chirberry, William Herbert Esq., Sir "Trebtor" Williams baronet, Sir Edward Morgan baronet, Sir George Probert Knight,

These are the major landowners of the Gwent Levels. The Marquis of Worcester became the Duke of Beaufort and had holdings on the Levels from Norman times. A few of the titles, for example Earl of Pembroke and Lord Herbert of Cardiff, became part of the same estate in later times. One of the Pembroke Estate's minor Lordships was Striguil, which was Chepstow, and this estate dates from Norman times. Sir Edward Morgan was ancestor of

Lord Tredegar whose family interest in the Levels probably dates back Norman times as well. There then follows a list of other local landowners and worthies, including The Kemeys, whose family presence on the Levels dates back to Norman times. They were all appointed as commissioners as were the following extensive list of minor landowners and local dignitaries.

Thomas Morgan of Mathin, William Morgan of the same, Walter "Pembrey" the Elder, Charles & Roger Herbert, Henry Probert of Pantglas, Francis "Anderton, William Jones of Tre Owen, Edmond Morgan, Thomas Lewis of Saint Heews, William Morgan of Penfreeze, George Gwyn Edward Kemes of Kemes, Henry Milbourne, Thomas Loughes, Twrbervil Morgan, Lewis Morgan, Thomas Morgan of Hencross, William Herbert, John Walter, Henry Morgan, Walter Twm the younger, Thomas Williams, Nicholas Moore, Herbert Evans, Walter Prichard, Roger Oateshythe Lewis, Roger Williams, John Waltour of Norton, Thomas Pritchard, Walter James, Henry Bassett, Richard Baker, Charles Herbert, Charles Milboume, Nicholas Kemes, Barry Morgan Esq, John Lewis of Penhill, John Rwmsey, Rowland Morgan of Riska Rous, Paul Morgan of Wolus Newton, Christopher Perkins, William Button, Roger Alde, George Morgan of Pwllreadd?, Henry Edward & Edward Morgan of Caerlion, Wiliam Williams, Thomas Young & John Bird, Walter Nicholas and 'Porolan' Morgan of "Frosway" gent.

The document goes on to describe the drainage system in terms of where it was and what elements needed to be controlled. Some of these elements we wouldn't recognise today, while others we can only guess at. Calcis or calcies for example are perhaps culverts? Gotes are presumably gouts, which are sluices. Fishgarths were enclosures on a river or sea shore for preserving fish or allowing them to be caught easily (Henry VIII's 'Act of Sewers' mentions them also as "certaine engines for taking of fish known as fish garths"). Ballengers were small, light seagoing ships common in the 15th and 16th century. Hebbing wears (weirs) were probably tidal outfalls. Hebbing is an old English version of ebbing.

Know thee that for as much as the walls, ditches, banks, gutters & sewers, gotes, calcies, bridges, streams, and other defennces by the coasts of the Sea and Marsh grounds being and lying within any the Lymitts of the County of Monmouth from Sheap Toll to Rummy Bridge Or in the Borders or confines of the same by rage of the Sea flowing and reflowing and by means of the Trenches of freshwaters descending and having course by Diverse ways to the Sea be so disrupt, lacerate and broken, and also the common passages of shippes, ballengers and boats in the rivers streams and other fludds within the said lymytts or the Borders or _____ the said? by means of setting up erecting, and making of Streams, Mills, Bridges, ponds, ffishgarths, Mill dams, locks, hebbing wears, ffludgates, and other like letts, impediments or annoyances be letted and interrupted so that great and inestimable damage for default of reparation of the said walls, ditches, banks, gotes, calcies, gutters, bridges and streams. AND also by means of setting upp, erecting, making, and inlarging of the said ffishgarths, Milldams, locks, Hebbing wears, hecks?, ffludgates and other like annoyances in tymes past have happened And yet is to be Feared that farr greater hurt loss and damage is like to insue that speedy remedy be provided in that behalf.

The next part of the document tells the Commissioners, (after re-naming them!) that they have a responsibility to keep an eye on the drainage system and its components, and anything that could affect its efficiency.

This includes the important bit: the detailing of the Commissioners' duties and the extent of their powers. The Letters Patent stipulates how many Commissioners are expected as a minimum at meetings, and how many are needed to make decisions - the "quore". They can raise taxes, make statutes, force people to do work, hold courts and order people to carry out repairs or maintenance. They can fine miscreants, and commandeer men and equipment to carry out repairs, as well as charge defaulters for the work done. They can also appoint surveyors and bailiffs and anyone else they see fit. Their legal backing came from the law of the country as meted out by the County Sherriff and their considerable powers clearly reflect the importance of the flood land of the Levels to the country's wealth.

WEE THEREFORE for that by reason of our dignitie and Prerogative Royall wee be bound to provide for the safety and pers??bation? of our Realm of England willing that speedy remedy be had in the ?owtmisses have assigned you and anie five or more of you Whereof yee The said Marquess of Worcester, Earl of Pembrokehire and Montgomery, Henry Lord Herbert of Ragland & Lord Herbert of Cardiff, Lord Chirberry, William Lord, Sir Trebor Williams, Sir George Probert, Thomas Morgan of Machen. William Morgan of the same, Charles Probert , Herbert Henry Probert of Pantglas, William Jones of Twr Onen, Thomas Lloyd of Saint Heews, William Morgan of Penfreeze, Edward Kemes of Kemes, Henry Miilbourne, Twrbervile Morgan, Lewis Morgan, Walter James, and Charles Herbert halve? of the Quore of the witness, will that three of you of the Quore shall always be there our Justices to survey the said walls, ditches, banks, gutters, sewers, gotes, calcis, bridges, trenches, mills, milldams, ffludgates, ponds, locks, hebbing wears, and other impediments, letts and annoyances aforesaid and the same to be made, corrected, repaired, amended, putt down, or reformed as the case (shall) require after your wisdoms and discretions.

AND therein aswell to ordain, and do after the form tend and effect of all and singular the Statutes and Ordinances made before the first day of March in the three and twentieth year of the reign of King Henry the Eighth touching? the premisses? or any of them. As also to inquire by the oaths of the honest and lawfull men of this said county, place, or places where such Defaults or annoyances be, aswell within libties? as without by whom the truth may the rather be known through whose default the (said) hurts and damages have happened. AND who hath or holdeth any land or tenement or common of pasture, profit of fishing or hath or may have any hurts, loss, or disadvantage by any manner of means in the said places as well near to the said dangers, letts, and impediments as inhabiting or dwelling thereabout by the said walls, ditches, banks, gutters, gotes, sewers, trenches and other the said impediments and annoyances, and all those persons and every of them to tax, assess, charge, distrain and punish aswell within the meets, lymitts and bounds of old tyme authorised or otherwise on its wheres? within our Realm of England after the quantities of their lands tenen[cies] and rents by the number of acres and pearches after the rate of every person, porrowfarmers? or profits or after the quantities of their comon of pasture or profits of ffishing or other comodities there by furtherways and means and in such manner and form? as to you or five of you, whereof

wee will that three? of you of the Quore shall always be there shall seem most convenient to be obtained and done for redress? and reformation? to be had in the Premisses also to reform?, repair, and amend the said walls, ditches, banks, gutters, sewers, gotes, calcies, bridges, streams and other the premisses in all places needful, and the same as often and where need shall be to make new, and to clense and purge the trenches sewers and ditches in all places necessary and to reform, amend, prostrate and overthrow all such mills, streams, ponds, locks, ffishgarths, hebbling wears, and other impediments and annoyances aforesaid as shall be found by inquisition or by your surveying and discretions to be excessive or hurtful,

AND also to depute and assign diligent faithfull and true Keepers, Bailiffs , Surveyors, Collectors, Expenditors and other Ministers and Officers for the safety, conservation, reparation and making of the premisses and every of them, AND to hear the accounts of the collectors and other ministers and for the receipt and paying out of the money that shall be levied and paid in and about the making, repairing, reforming and amending of the said walls, ditches, banks, gutters, gotes, sewers, calcies, bridges, streams, trenches, mills, ponds, locks, ffishgarths, ffludgates and other impediments and annoyances aforesaid. AND to distrain for the arrearages of money such collection tax or assess as often as shall be expedient for otherwise to punish the debtors & delay not of the same by fynes, amoriaments, pains or other like means after your good discreions, AND also to arrest and take as many carts, horses, oxen, beasts and other instruments necessary, and as many workmen and labourers as for the said works and reparations shall suffice, paying for the same competent wages, salaries and stipends in that behalf. AND also to take further and as many trees, wood, underwood and timber and other necessaries as for the same works and reparations shall be sufficient at reasonable price by you or five of you whom of wee will that three of you of you shall always be shewn to be assessed on lymittes as well within the Lymitts and bounds aforesaid, as in any other place within the said County neer unto the said places. AND to make and ordain statutes, ordinances and provisions from tyme to tyme as the case shall require for the safeguard conservation?, redress, correction and reformation of the premises and every of them and the parte lying to the same necessario? and be heedfull? after the laws and customs of Romney Marsh in the County of Kent or other wise by any wais or means as after your own wisdom and discretions. AND to hear and determine all and singular the premise as well as our suits as at the suits of any other whatsoever complaining before you or five of you whereof wee will that three of you of the Quore shall always be there after the laws and conforms (insertion afore said) by any ways or means after your discretions. AND also to make and direct all writs, precepts, warrants and other commissions by virtue of these present to all Sheriffs, Bailiffs, and all other ministers, officers and other Jurors? aswell within libties? as without before you or five of you whereof wee will that three of you of the quore shall always be there at certain days, houres? and places to be to prefixed and be returned and further to confirm the process of the same.

AND FINALLIE to do all and every thing and things as shall be requisite for due execution of the premises by all wais & means after yr resons and discretions. AND thereof? and remaind? you that at certain days and places when? and where? you or five off you of them wee will that three of you of the quote shall always be there shall think

so expedient yee do survey the said walls, ditches, banks, gutters, gotes, sewers, calcis, ponds, bridges, rivers, streams, watercourses, mills, trenches, ffishgarths, fluddgates and other the letts, impediments and annoyances aforesaid And to accomplish, fufill, heare and determyn all & singular the premises in due form and so aforesaid after your good discreions AND all such as you shall find negligent gainsaying or rebelling in the said works reparations or reformation of the premisses, or negligent in the due executions of this our Commission that you do compell them by distress, fynes or amorriam or by other punishments wais or means worth to you or five of you of them wee will that three of you of the Quore shall always be there, shall seem most expedient for the speedy remedy, redress and reformation of the premises and due execution of the same And all such things as by you shall be made bond or ordained in this behalf as well within libities as without that yee do cause the same firmly to be observed doing therein as to enquire? appertaineth after the land? and statutes of this our Realm, and according to your informed discretions. Saved always to no such Fynes and amorriam be as to ?? thereof shall belong And we also command our Sheriff of our said County of Monmouth that he shall to come before you or five of you, whereof wee will that three of you the Quore shall always be there at such day and places as yee shall appoint to him such and as many noblemen of his Bailywick as well within libties as without by whom the truth may be best known to inquire of the premisses, commanding alsoe all other ministers and officers, aswell within libties as without that they and every of them shall be attendant to you in and about the due execution of this our comission. In Witness whereof we have raised these our letters to be made patents, Given at ?????? under the Seal of our Duchy of Lancaster the ffirst day of September.

Edward

The working of the Court of Sewers

There were two Courts, one for the “Hundred of Wentlooge” and one for the “Hundred of Caldicot” and they sat at regular intervals; bi-monthly in many instances but sometimes more frequently. Between six and eight Commissioners sat on them (the minimum stipulated in the Commission was five). The Courts usually sat in the same place, which was normally someone’s residence, though later they tended to go to hostelries. On 26th April 1692, the Court for the Hundred of Wentloog was:

“Held at the home of Thomas Bassett of the town of Newport”.

And on next day the Court for the Hundred of Caldicot was:

“Held at the dwelling house of “Proth Stedder””. (The writing here is difficult to read!).

By the 1860s the Courts were held at The King’s Head in Newport.

At any time Commissioners would inspect sites on the Levels and hear report of where problems had occurred and these would then be brought before the Court as “Presentments”.

At this time, work on sea walls and the drainage system was the responsibility of the occupiers of the land. Landowners made their tenants and occupiers responsible for carrying out the work, though the landowner would be held ultimately responsible. The amount of work required of an owner depended primarily on the size of his holding, not necessarily on the length of seawall or “communal” drain on his land, and each holding was assessed and apportioned a management “quota”. These quotas first appear in map books of 1868, but were long-standing apportionments based on the productivity of the land.

If the Commissioners found a problem due to inadequate maintenance then the relevant owner or occupant would be arraigned to appear before the Court to answer for his failure and a decision made as to the solution. Usually this meant that the defaulter was ordered to carry out the work before the next Court. If he then failed, the Court could commission it to be done by others and charged the work to the defaulter and even add a fine.

The following are all “presentments” from the 1690-1710 Court Minutes, unless mentioned.

We find faulty and do order Ellen Reen to be reaped and scowred beginning at Blackmoor Gout containing 495 perches done by John Grosham Howe Esq., worth the doing one pound 4 pence.

Anne Edwards for not mending 7 perches of Lake 2 foot high worth 2 pence per perch.

Sir Charles Kemeys Bart. and ??? Edmonds for not repairing end of Law Ferry 2p.

Sir Edmund Thomas or his tenant for not reaping and scowering 100 perches of reen worth 2d per perch.

Reaping and scowring (also written elsewhere as scouring) was bank cutting and de-weeding, which in these days was done twice a summer, by July and again by October.

On other occasions, problems in the drainage system were found to be so severe that they required new work to solve them. This was from a Wentlooge Court Minutes in 1695:

Whereas six of the said commissioners having viewed Key Gout do find that the same is so filled with slime and mud that it cannot without extraordinary charge be made fit and capable to discharge the water to the sea as it has formerly done and that the country is in great danger to be drowned for want of a free passage to the said water and that great damage has already accrued to the country therefrom. It is therefore concluded agreed and ordered by these councillors that the new reen, channel or canal of four foot broad in the bottom and eight foot broad at the top and of such a depth as is necessary to discharge is put through the lands of Sir Edmund Thomas Knight and from (something) athwart a lane here called the Middle Lane with a Key and Gout to be made below where it shall be most convenient to discharge the water best and it is ordered that the said canal or (something illegible) be accordingly cut by the next year...

On yet others, land owners would ask for permission to make drainage improvements. This from 1833:

Ordered that a view be had on Ellen reen in the parish of Christchurch for the purpose

of making a new cut or reen across the lands of Capel Hanbury Leigh Esq, beginning at a spot called the Dry Arch in the Parish of Christchurch and ending near the new decoy pool in the same parish.

There are many similarities between present day management and that of four hundred years ago.

... we present Whitewall Reen defective and ought to be cast from Whitewall to Abbots Gout and to Barecroft 10 foot in breadth and cast to the clay by those persons viz Thomas Bassett and his tenant and Harries 18 perches (99 yards)...

But there are differences too.....

...a stank of 4 perches at the end of Hay Street leading to Porton to be raised 3 foot high and 12 foot broad worth 4 ??? by the Parishes of the estate of Llantarnam and Eliza ???...

Margaret Whitehall and Henry John Morgan for not mending a stank to keep the water in its course, worth the doing 1d.

Stanks nowadays usually just refer to clay dams used to put a temporary block in a reen. In the first presentment above, the length of the stank was that of a cricket pitch, (a perch is 51/2 yards) and there are quite a few presentments to the Court in the 17th and 18th centuries relating to inadequacies of stanks or their maintenance. In those times stanks may have been required much more commonly due to the inability of the ditch system to carry flood water away fast enough. Low-lying land may have had to have been protected from the highest ditch water levels by raising the bank to a degree with stanks. Such work is almost unheard of these days, perhaps because all the necessary ground raising has been done, but perhaps also because the drainage system is now that much more efficient and rarely in danger of over-flowing.

The maintenance of banks was as important then as now. Presumably the freeboard mentioned below relates to the face of the bank, (perhaps damaged by stock) and not raising the bank above ground level, as that would be raising a stank as above.

Robert Morgan for not making up six perches of freeboard to the said Duke's freeboard leading towards Redwick 2 foot high and 4 foot broad at 1d per perch.

Another interesting feature of these early presentments, which are no longer relevant to modern day drainage management, is the "hollow tree".

The hollow tree presented to be on the 4 acres in that parish and there to be ??? is to be repayred placed and made sufficiently passable by the persons only who are to receive the greatest benefit therefrom.

Item Wee present Ezekiall Kamer for not placing a hollow tree and a gate with all things necessary at the end of the Middle Way with....

Mr Edward Morgan to place a hollow tree before the 4 acres neer the place where the gate was worth 10d.

...the said Mr Milbourne and James Morgan for 7 perches of the like, Mr Milbourne for 20 perches more of the like, who is to set a hollow tree there.

Almost all references to “hollow trees” appear in connection with gates or tracks. If hollow trees were literally that, and the phrase was not in common usage as meaning something else, then perhaps hollow trees were used as culverts, or maybe footbridges. In the first of the presentments above, the hollow tree is to be made “sufficiently passable”, suggesting that its function was to allow people and/or animals to cross a watercourse.

We do know that hollow trees were used as pipe culverts, as recorded in an order from the Court in Oct 1746:

...stank on Broadspool Common to be done by the Provost and Fellowes of the College of Eton worth the doing of 5d a perch and that a gout there made by them... and that the hollow tree lately put in the old stank ought to be maintained by the Provost and Fellowes of the College of Eton.

The hollow tree here, presumably acted as a water-level-control, rather like a modern day overflow pipe, to avoid the risk of water over-topping the stank and starting to erode it.

Other interesting indications of a now long-lost life on the Levels can be found in the Court Minutes. The Letters Patent mention Milldams, and it is clear from the Courts’ Minutes that there were water-powered mills on the Levels. Goldcliff Priory had at least two mills on the Levels and possibly a third. On the 15th Nov 1692:

It is ordered that John Edward the Miller of Goldcliff take care so to pound the water for the future that it may not overflow the top of the stake that is placed and sett for a mark to the annoyance of the Levell Lands in that neighbourhood and in case he should be negligent here in that he forget that he forfeit the sum of xxd (20d) for every tyme that he shall impound the water to the...

The Court did not just rely on its own observations or reports from land holders, it appointed local people to act as their eyes. Surveyors were critical and, if not impartial, knew the standards that had to be maintained. They were appointed in each parish to inspect the reens and seawalls and report deficiencies to the Court. They would also report on execution or otherwise of the Court’s orders. From the Minutes of 11th Nov 1692:

Thomas Smythe is appointed surveyor of said parish (Ifton) instead of James Davydes.

Richard Kenton is appointed Surveyor of the said Parish instead of Richard Rawlings.

The Court was empowered to raise money for maintenance and costs, though at this time, there is no indication of how monies raised by the Court were handled or accounted for. The following item from the Court of 16th Nov 1692 orders:

...that a warrant be directed to the Chief Constables to direct the petty constables in all the several parishes within the Levells of the said Hundred to assess and collect a penny rate on every acre of the Levells land within their respective parishes (except the parish of Caldicot) for and towards the reparation of the Cevills wall and that the same be also

payed into the hands of the said Mr Harrys before the next Court.

The above rates were raised to carry out work on part of the seawall, and demonstrate that - while responsibility for maintaining the seawall lay with the adjoining landowners - it was perhaps recognised that it was unjust to expect them to bear the full cost for something which benefitted all land owners. If the seawall was damaged by a storm, for example, despite being maintained by the landowners to the Court's satisfaction, the restoration of the wall might then be paid for by money raised from levies such as the penny rate. The same would apply to cases where the seawall was deemed to need raising.

It might come as a surprise to discover that the Commissioners of Sewers also owned land on the Levels, not as individuals, but as the Commission. This could come about when a landowner could not, would not, or maybe did not want to carry out some maintenance work demanded of him. The following appears in the Court minutes of 23rd May 1693:

It is ordered that Henry Morgan Esq., brother of Sir James Morgan Bart have tyme to the next Crt of Sewers to consider whether hee will accept the Levell lands of the said James Morgan in portion by Grant and Decree from this Court paying the whole charge for the sea wall charged upon the said lands being £114 2s 0d and that he give his final answer at the next Crt. And in case the said Henry Morgan shall refuse to accept thereof that then the said lands be seized by order of the Crt by the High Sheriff of this County into the hands of the Commissioners of Sewers to the use of the Country and that the said lands (with all rents issues and profits thereof) do remain and continue in their hands until all the charge layd out upon the said sea (wall? – word missing, frayed edge) subject to the said lands be wholoy (sic) payed and reimbursed.

Subsequently this land passed to the Commissioners.

So those then are the general principles on which the Court of Sewers operated from its establishment in the mid-1600s. Its powers remained largely unchanged for the next 200 years, and though its modes of operation changed slightly to make it more efficient to run, its composition was remarkably little changed from that of today's IDBs. The Commissioners were voluntary laymen, but they appointed a paid "clerk" and "expenditors". The clerk was arguably the most important person in the Court of Sewers. His knowledge and experience of the drainage system enabled him to act as the "professional" advisor to the Court in "engineering" matters. The expenditors, supervised the execution of the work and acted a bit like present day project managers.

Sea defences

Maintenance of the seawall was, of course, of paramount importance to the whole of the Levels, as with all coastal flood lands and there are numerous historical records of catastrophic flooding in the area of the Levels. In 1097

“The Sea overflowed its banks to a very great extent in Monmouthshire and Glamorganshire and many men and beasts were drowned on the bankes of the Uske near Newport.”^x

The same source records:

“In 1116 at Christmas, there were great floods in Monmouthshire which destroyed the cattle and caused great scarcity of provisions.”

Again, on Jan 20th 1606, the whole of the Somerset and Gwent Levels were hit by a flood of biblical proportions. The seawalls were totally overwhelmed and hundreds of people lost their lives when the Levels on both sides of the Severn were inundated. The floodwater reached depths of more than ten feet in places, while the waters spread up to 14 miles inland^{xi}.

There has been some debate over whether such a catastrophic event was the result of a storm flood or a tsunami. A tidal storm surge now seems most likely, but whatever its cause, the floods emphasised the vital importance of the sea walls to the local community.

The memory of the 20th January 1606³ must have been relatively fresh in the minds of the Monmouthshire Commissioners of Sewers in 1691. Protecting the land from the sea was one of the Court’s primary concerns, and it took its duties very seriously. A landowner’s failure to maintain his portion of seawall was dealt with severely.

Rock 24th Feby 1691

Ordered that Mr Francis Lewis and William Ford by the next Crt repayre Thomas Dapwell’s sea wall. The reparations of each of them to be as follows viz: Mr Lewis at the rate and value of 20 acres of land purchased from the said Dapwell and the said William after the rate of 50 acres. And it is further ordered that they shall have immediate possession of (...missing text) Eleven acres of the land and a half that is at present in the tenure of the said Thomas Dapwell and shall receive the rents (word missing) profits thereof for their own use without rendering any accounts of the same unto the said Thomas Dapwell until they shall be fully reimbursed all the costs and charges they shall bee at and shall bee by them expended and layd out in the reparation and amendment of the said sea wall which is by them to be made up with good and efficient service.

³ In contemporary accounts and memorials the year is given as 1606. But in 1752 the UK changed from the Julian calendar to the Gregorian, which means that in the present day calendar the year was 1607.



Figure 4. Contemporary woodcut showing 1607 flood.

In this ruling, it appears that Dapwell, for failing to maintain his length of wall, was forced to sell some of his land to his neighbours as well as lose the income on an additional 11 acres until the costs of the repair work had been covered. Pretty draconian measures, but then the consequences could have been quite serious too!

The importance of the sea defences has been recognised right up to the present day, with improvements still being made to it in the early years of this century. We now know from tidal records quite how important the sea defences are. The mean high water spring tide level at Newport Dock is 20.55 metres above the ordnance datum, while the highest ever recorded level at the same place is 26.20 metres. That is higher than roof level on many houses!

Seawall realignment

The sea defences had been a source of constant concern from the earliest days of the Commissioners. Not only were occasional breaches a constant threat, there were times when whole lengths of seawall became untenable. From the proceedings of the Court of Augmentations in 1590-91^{xii}:

“Note that the manor of Rumpney (Rumney) lies adjoin the sea. There is a wall between the sea and the lordship for the defence of the same, which wall being about two years past in great decay, was by commission new made and placed more in to the land than before it was, by reason whereof there was cut out and left betwixt the sea and the wall, 28 acres most part meadow and pasture of parcel of the said desmesnes of the manor...”

Seawall re-alignment has had to be undertaken in a number of places for as long as there has been a seawall, and since the Middle Ages, it has almost always been a retreat. The evidence of the retreat is clear to see in some fields along the coast that have seemingly been “sliced off by the seawall” along a line that bears no relationship to the local field layout^{xiii}.

The reason for the seawall’s gradual retreat may in part be due to its actual existence. One of the problems with any attempt to keep the sea at bay, is that natural oceanographic processes are extremely strong and attempts to control them often do not eliminate them but rather re-direct them elsewhere. Therefore, erecting a seawall in one place can lead to an increase of tidal forces elsewhere, often nearby.

Under many “natural” coastal conditions, silt accretes on the shore and salt-tolerant plants colonise it. The plants themselves then trap silt enabling more and different plants to grow, extending the muds both upwards and outwards into the sea. As the marsh grows, more and more plants can colonise, creating a wide and very resilient absorber of the energy of storm waves. The broader the saltmarsh the greater its ability to absorb storm and tidal erosion. Thus, saltmarsh can be a key sea protection for seawalls themselves, reducing the strength of storm waves before they reach the wall. During very violent storms, more especially those coinciding with the highest spring tides of the year, (so they are pretty rare occurrences), salt marshes may be eaten into at the seaward face, but they are very rarely totally removed and repair themselves during the following periods of relative calm.

On the Gwent Levels the original saltmarsh was what had been enclosed by the first sea walls and it was this that was converted to agricultural land. What little saltmarsh remained outside the sea walls was mostly the bit that would normally have been washed away during storms and repaired by outgrowth of the inland marsh vegetation. But now the sea wall had

Figure 5. A stormy high tide at Goldcliff, March 2007.





Figure 6. Sea wall re-alignment at Goldcliff. Note how the sea wall has been moved inland leaving a small, triangular remnant of the field in the middle distance.

cut the erosion face off from its parent marsh and so the relict saltmarsh areas were liable to total, irreparable annihilation during big storms.

The seawalls themselves may well have even attacked what was left of any nearby areas of natural saltmarsh by altering and concentrating tidal currents into an eroding force.

Once the saltmarsh is gone, sea defences are totally dependent on the protective powers of a seawall. While King Knut (Canute) was doomed to failure by using will power alone to keep the tide back, even modern man with sophisticated engineering is still frequently overwhelmed by the forces of nature.

The protective influence of the salt marshes was well appreciated by the Commissioners of Sewers, but the saltmarshes, or wharfs, were also valuable grazing land. Unfortunately, over-grazing could reduce the saltmarshes' power of recovery after storm damage and over-stocking would lead to erosion and eventual loss of the salt marsh vegetation. This, in turn, would lead to direct exposure of a seawall to the risk of damage from storm waves.

The following order from the minutes of the Court of Sewers of 3rd March 1745 clearly illustrates this concern.

Whereas the most noble his grace the Duke of Beaufort as Lord of the Manor of Redwick the right honourable the Lord Charlesworth and John Blewet and Thomas Bushele Esquire in sight of the Ladys are seized of certain wharfs in the parish of Redwick in the County of Monmouthshire wherein the tenants and occupiers of lands and the tenements of the several parishes of Redwick and Magor right of common in the said wharfs from the 29th Sept to Lady Day for their commonable cattle and whereas the said wharfs

adjoin the sea wall and also to the river and it has been found by experience that the grazing of the said wharfs by the said Lords and their tenents and also by tenents and occupiers of land over the tenements of the parishes of Redwick and Magor having the right of common there is very (defensible?) and great damage done thereby to the sea walls and to the in and goings of the sea and whereas the said remedying of the said evil the lords have proposed that the said wharf shall not be occupied by them or any person or persons for the space of three years from the day of the date here of this (forms?) by this court and that the several tenants in the said parishes of Redwick and Magor having right of common there shall also forbear to claim their rights of common there for the said three years or (linn?) any cattle to the said wharfs for the said three years provided the said lords shall forbear to exercise their rights during that time and it is also ordered that of several occupiers of lands and tenements fronting the said wharfs shall fence in frontages to prevent their cattle for going over the said sea walls to trample down the sea walls thereon or grazing the said wharfs to the intent that the said wharfs may have quiet to grow for saving and preserving the said seawalls and better the preservation of the county.

At the expiry of the original three years the Court then asked for an extension of a further three years of non-grazing, but with the added concession:

....save only that the inhabitants of the said parish on the customary day to turn their cattle for half an hour for the preserving of their right wherein they think fit.

This might have preserved the commoners' rights, but the feasibility of turning out cattle onto fresh, ungrazed wharf for just half an hour may have been a bit of wishful thinking!

The loss of salt marsh and its implications for sea defence has remained a problem right through to the present day, even with the engineering powers available to us now.

Figure 7. Damage to the sea wall facing, Dec 1981.



In the report on the condition of the Levels made to the government of the day in 1954, "... our engineer stresses the importance of the saltings in sea defence and there is evidence that erosion is a major problem."^{xiv} One of the recommendations in the report was for the salt marsh to be reinforced by planting with *Spartina*, and references made to the system used by the Dutch for salt marsh creation^{xv}.

The most recent significant breaches in the sea wall came in 1936 and 1940. In 1936 floods over three feet deep occurred as a result of failure of the sea defences. The fear of sea breaches is still present and a recent IDB chairman remembers the 1936 event. A child at Common Farm, near the present IDB offices, had for safety been taken upstairs, but subsequently had to be handed out of an upstairs window onto a farm cart below, to escape the rising water.

Sea wall construction

The most readily available material for making seawalls is the clay and soil on the coastal belt, and indeed much of the core of the present seawall is probably made of this. However, a more solid facing has often been applied to the wall to withstand the force the waves. In 1745 the Court minutes mention pitching work to be done on the seawall in Nash, pitching being a stone facing.

Different methods of constructing and repairing the seawalls were employed. This is clearly illustrated in one the Court of Sewers Survey of Sea Walls in 1868 where adjacent sections of wall were made from: "Bank; Stakes & Stones; Stakes and bank; and concrete! From the map there seems to be a degree of haphazardousness to the distribution of the various constructions; while some may have reflected erosion points that required special facings, others may indicate hasty or sub-standard remedial works. Indeed the 1868 survey was carried out because of concerns over the variable state of the seawalls.

The Court's minute books of the 18th and early 19th century are full of presentments of seawall defects and orders for their repair, and showed obvious concern at the vagaries of seawall management. The ability to be able to apply a common standard to all works by undertaking the repair work themselves had clear advantages.

One very interesting adjunct to the proper maintenance of seawalls appears in a minute of the Court of 30th April 1760.

Whereas the securing of the Foundations of the Sea Wall from the Force and Violence of the tides hath hitherto been by driving Stakes with Beetle by Force of Hand only, a method not found to answer effectually the Intention, as it would were they to have a deeper hold, for which purpose its prep'd that Orders be given and Money issued not exceeding Five Pounds out of the Level Land Tax for making a Portable Engine which may be lodged in a convenient place for the Use of the Levels for repairing the walls belonging to forfeited lands.

This is probably reference to the Commissioners/IDB's first ever machine – a post-driver!

THE HISTORY OF FARMING ON THE LEVELS

Topography and its relation to farming.

At this point it is appropriate to digress from the management and control of the sea and flood defences and look at the reasons why this was necessary. From prehistoric days the Gwent Levels had been exploited for producing food. Neolithic man caught wildfowl and fish in its marshes and channels, Romans grazed their ponies, and over the last thousand years its land was farmed to feed the country.

There is a commonly held belief that, because land has a history of flooding, it is only suitable for pastoral farming; that is for grazing stock. In 1955^{xvi} the comment was made about the Gwent Levels that: *“the physical controls”* (i.e. the Levels geographical situation and condition), *“have ensured the continued operation of certain inescapable factors such as the unsuitability of the Levels or coastal fen for the plough”*. This is not quite true.

The topography of the Gwent Levels is perhaps not what one might expect. The land next to the shore is actually higher than the land furthest from the sea. This comes about quite simply and is best explained by thinking about a river bursting its banks. Water's ability to carry sediment is dependent on its speed; the faster the current the more sediment it can carry. So the converse must apply, the slower the current the quicker the sediment falls out of suspension. Imagine a river in flood with its water about to overtop its banks. The silt laden flood water is flowing at pretty much the same speed right across the width of its channel. Then the water starts to overtop the banks. It now has a much larger area across which to flow because instead of just flowing in one direction, downstream, it can now flow in all directions. Because of this, its flow slows as the water spreads out. Some of the particles of sand and grit which were only just being kept aloft in the fast main current, now quickly start to fall out of suspension in the slower water. This deposits layers of silt onto the top of the land immediately adjacent to the river and forms what geographers call a levee, a rise in the land level immediately next to a river that regularly bursts its banks.

Exactly the same process applied to the Severn Estuary and the Gwent Levels before sea walls were built. Each time the Severn overtopped the shore at peak tides, it dropped silt on the land next to the river and built up the land level there. Other factors have come into play to exacerbate the difference in levels between the coastal belt and the inland edge. For example the coastal “ridge” or levee caused flood water to be held inland of it, creating lakes and marshes. This fen turned into peat. Since peat is more compressible than alluvium it sinks under its own weight. It also shrinks when it dries, so the inland “back fen”, tended to sink of its own accord as it dried under drainage and then became even lower in relation to the alluvium of the coastal levee.

This variation in land level from “front to back” of the Levels is up to two metres in some places, particularly on the Caldicot Level, but usually is much less. A clear indication of this drop in land level was illustrated by the old Blackwall track that used to run from Whitson Arch (near to where the Llanwern electricity sub-station is now), northwards, into land now



Figure 8. Looking from inland towards the coastal belt, with arable fields in distance.

occupied by the steel works. This track followed the line of three reens running closely in parallel. Blackwall to the west, and Barn Reen to the east drained the fields. The Monks Ditch, ran between these two, taking water from inland and passing it straight over the levels to the sea between raised banks. As the track passed northwards alongside Barn Reen its level followed the land surface but as the surface dipped, in order to keep it free of the water being carried in the Monks Ditch, the track had to be protected by raised banks alongside the Monks'. Eventually one was walking along a track at ground level, with water at head height in the adjacent ditch!

This negative gradient obviously has major significance for the drainage of the area since water trying to drain from the back fen has to pass through higher land on its way out to the sea. This manifests itself as an increase in the “freeboard” in the ditches, (distance from land surface to water level), as you approach the sea, and obviously this gives rise to differences in flood risk.

Thus the coastal lands with their greater freeboard had slightly greater resilience to flooding, and were therefore more suitable for mixed farming as long as the drainage was maintained. The lower lying inland areas, where the water was closer to the surface, were much less suitable for the plough. In monastic times, the Priory at Goldcliff had three mills on the coastal strip: at Goldcliff; Whitson and Redwick^{xvii}. These clearly indicate that corn was grown on the coastal strip. However, it only needed small differences in land level to make ploughing impossible, and less than a mile away the land was only ploughed under exceptional conditions and was generally kept as grassland. Within the general depression of the land's surface as you progress inland, there is wide, minor topographical variation which means that some farms can plough some of their land and others not far away cannot plough any.



Figure 9. Looking inland from coastal belt over typical Gwent Levels grazing land.

Parish agricultural returns between 1866 and 1951 show that an average of 12% of the Gwent Levels was ploughed^{xviii} during this time, with a minimum of a minimum of 6% and a maximum of 30% tilled.

The back fen areas were generally too low to be used as anything but pasture, where grazing stock could be easily removed in the event of flooding. Even here, though, drainage improvements made in the 18th and 19th centuries made it easier to protect these lands from flooding and allow some fields to be used for hay as well as grazing.

While there has always been an element of arable cropping at places on the Levels, it is as pasture farming that it has always been most productive. There has been a long history of using the rich grasslands of the levels for fattening “store” cattle; cattle that have been bred on less productive, often upland farms, and then sent down to the rich, flood-plain grasslands to be fattened. This trade was of major economic importance to the lands on either side of the Severn. Store cattle from Wales were even swum across the Severn between Beachley and Aust to be fattened on the Somerset Levels^{xix}.

Farmland from flood land

Flood plains like the Gwent Levels are such productive farmland because their high, controlled water-tables can ensure good growing conditions during the summer months. The drainage ditches needed for flood control also have an economic value in that they avoid the need for expensive fencing to control stock, and thus provide a very cheap and efficient means of controlling the grass-use. Occasional winter floods add nutrients to the soil in



Figure 10. Flooded farmland, March 1981.

the silts they leave behind, and as long as the duration of floods is short enough, they won't adversely affect the sward, or the soil organisms.

Animal-life in soils is crucial to keeping the soils resistant to the effects of flooding. Worms, for example, make burrows that help water and air to move through the soil. They also ingest and then excrete the soil, covering the mineral particles with an organic "film" which helps the particles to stay apart and not slump into a solid mass. Again this helps drainage allowing excess water to drain away as well as letting air to get down to roots. Many species of earthworms don't like being submerged and drown quickly in flooded soils, but some species can survive immersion for some days. Populations of these species are common in the most highly productive grasslands that are subjected to regular flooding, but even they can't hold their breaths for ever. After two or three weeks of sustained flooding even they succumb. Once the worms die, the open and free-draining soil "collapses", and the good pasture which is dependent on good drainage with free-access for air to its roots, dies and its grasses are replaced with unpalatable species like rushes. These can tolerate such poor, anoxic, soil conditions but are of little agricultural value. So, not only do floods destroy arable crops, if prolonged, they will destroy grassland too. However, if managed correctly, floodplain farmland is some of the richest on the planet, and is self-sustaining.

The distinction between pasture and meadow is important to make in relation to floodplain grassland. Pasture is simply grass for grazing whenever conditions permit, while meadow is for producing hay to keep the animals alive over winter when they cannot graze outside. Meadow land was crucial to peasant farmers and could determine survival or death. In medieval days a peasant, if lucky, might have a cow. Its offspring would provide food or could be traded, and, of course, it could provide milk. It might also be used to pull a plough. It was a buffer to keep a family above the breadline. But with just one animal it was essential that it

survived the winter. If it died through lack of winter fodder, while this might provide a short-term glut of food, since peasants by definition live “hand to mouth”, there would be no means to buy a replacement animal the next spring. So land for hay production was as important as grazing land to them. Mead (meadow) land is almost as sensitive to flooding as arable and is thus almost as valuable as arable.

The remaining agricultural land on the Gwent Levels is that outside the seawall - the saltmarsh, or wharf, as it is locally called. This land is to some degree is covered by the Severn, particularly at spring tides, but despite the regular inundation can be valuable grazing. By the Middle Ages and into the 17th century it was used extensively along the Gwent Levels coast, but erosion, meant that it was always a very vulnerable source of pasture. Its value to sea defence was also long recognised and grazing was controlled where possible, to preserve its sea defence capabilities.

The big estates and farming

It is no surprise then that once the means of controlling floods had been developed, the land, particularly on the coastal fringe, attracted landowners as valuable investments to be acquired and held. To the Crown, the land raised taxes to feed armies and helped to restore depleted treasuries. The land also provided direct income to landowners from rents and tithes. And, of course, valuable land was a good resource for anyone seeking power or influence.

We have already seen how the religious houses took land on the Levels from early medieval times. By then the nobility were already established as major land owners. In the early days their land “acquisition” may have come from force of arms, as happened in the Lords of Caerleon, but subsequently it would be purchased, inherited or even acquired through “strategic” inter-marriage. Some of the major landowning families on the Levels in the 19th and 20th centuries first acquired their interests nearly a thousand years earlier. Gwent Levels land truly was a valuable asset.

While the coastal belt yielded highly productive mixed farming land, there was always the risk that short-term exploitation of the land would be to its long-term disadvantage. So landowners were careful to prevent tenants from damaging their land by over-working it. They often imposed stringent conditions over the amount of land that a tenant could put under crops, which would reduce a soil’s fertility quickest. This extract from the transcript of a tenancy document for Hill Farm at Goldcliff of 1745^{xx} clearly illustrates this.

Abstract of conditions contained in an agreement made between Westcot Littleton [agent for Eton College] and Charles Tamplin for the Hill and Murbourn Farms [Hill Farm, Goldcliff and Moor Barn Farm (variously spelt), Nash], at a rent of £115, 21 January 1745:

(i) Tamplin may enter the fishery granted with the farms at Candlemas next to hold for 1 years;

(ii) no maiden or meadow land may be ploughed except the banks on the sides of the

ditches; he is not to plough more than 20 acres of land in any one year, and not more than 10 acres the last 2 years of the lease, nor to raise more than 3 crops of grain on any land;

(iii) all the ways to and from the lime kiln are reserved for the use of Eton College;

(iv) all sea stakes are to be collected by Tamplin for the College's use;

(v) he is not to dispose of or make use of stones in the Cliff or the old buildings on penalty of paying £5 or every ton of stones;

(vi) if any sea wall or cross hays should be made before the Cliff, the College is to raise and carry stone from the Cliff, allowing reasonable amends for damage to the tenant;

(vii) if the lime kiln is destroyed, another should be made;

(viii) no part of the 34 acres is to be ploughed except the barley stubble for 1 or 2 years and the banks on the sides of the ditches;

(ix) no land is to be ploughed without leave on the Hill Farm that has not been ploughed within 20 years;

(x) no dung is to be carried from the premises;

(xi) houses and outhouses are to be put in repair;

(xii) a stable, calves' house and waggon house and Mow Barton are to be built at the Hill

(xiii) £5 a year is to be spent in casting ditches till they have all been cast;

(xiv) a lease is to be signed and sealed as soon as offered.

Draining the back fen and improving drainage in the 18th century

The middle belt of land, between the coastal clays and the back fen was primarily pastoral with occasional arable cropping where slight rises in land level gave sufficient freeboard to allow the soil to be occasionally cultivated. While the arable element was much less certain than on the coastal lands, the rich grassland made for highly productive farming.

The same could not be said for the lowest land. As one went further "back" towards the inland edge of The Levels, the land surface came closer to the water table and, though this was of positive benefit to grass growth during the season, it prevented ploughing and made the ground susceptible to flooding at the slightest rise in water levels. On the Wentlooge Level this pastoral grassland, with high water levels in the ditches is still very obvious and covers a sizeable proportion of the land. But this land was not as low as the "difficult" back-fen on the Caldicot Level. Some of its names give testament to its value: "Rotten Lands, Bareland Reen, Barecroft.

Much of this land has now disappeared under post 1850's development around Lliswerry, Langstone and, of course, under the 1960's Llanwern steel works. It was hardly surprising that the landowners were happy to see some return on it, even if it was to lose its agricultural status for ever. However, prior to this, during the 17th and 18th centuries, the more advanced farmers were throwing large amounts of energy, (and doubtless, large sums of money) into improving land.

The Kemeys family had always held land on the Caldicot Level, with manors at Caldicot, Magor and Redwick. The Magor estate included The Green Moor, the low-lying area of back fen now covered by the remains of the Llanwern steel works. In 1693 a presentment at the Court of Sewers mentions "The Lords of Green Moor" and names them as Edward Kemeys, Charles Jones and George Jones. The term moor refers to marsh, not upland, to which it now commonly refers. (The moorhen, is not an upland bird but a bird of marshy waters). At the time of this presentment, we don't know how much of the land was drained and it seems to have little recorded history. It may be that the history is hidden in the estate records of the men who owned the land, The Lords of the Green Moor. Though it was more prone to flooding than the coastal lands, it was doubtless valuable pasture, and in good years, probably valuable for hay. Green Moor was "Enclosed" under Parliamentary Act in the 1850s, so held common rights as well as private.

Exactly when the main drainage of Green Moor took place is unknown. It appears with a comprehensive ditch system on the 1830 maps, so much drainage certainly predates then and the ditch layout on the 1830 maps suggests something later than medieval. Sadly, we have few direct records to say when the drainage was carried out, and the best we can do is make inferences from other recorded work. In the mid-1700s there are a number of references to improvements ordered on watercourses which ran from the Green Moor. In June 1745, following a "view" by the commissioners they:

Ordered on the said view that the Gout in North Row leading to Green Moor be pulled down and rebuilt and to be made 6 foot in the clear.

And that they ordered:

...that a Gout be made at the east end of Rush Wall near Green Moor to be done by the proprietors of the lands between Rush Wall and Stutt Wall and the Gout to be five foot clear and made with lime and stone.

In May 1763 there is an order in the Court for:

...a new bank to be made towards the north west corner of Green Moor, then to Bishton...., then to the stone bridge that separates Green Moor from Wilcrick Moor... It is also ordered that a (?) or Timber Gout with a door measuring twenty inches thereon... be made at the west end of Grange Lake in the said Bank to be done by the said inhabitants of the parishes of Magor, Redwick, Whitson, Goldcliff, Bishton, Llandevenny and Wilcrick.

This last order clearly suggests that the management of Green Moor's water was of relevance to all the surrounding parishes, and it may be at this time that the Moor's drains were properly laid out.

Around the same time other improvements were being made to the system on Caldicot Level. In July 1758 the Court ordered:

...that a New Cut be made from the end of Cockshoot Lane through Grangefield along the ditch belonging to His Grace the Duke of Beaufort to Elver Reen ten foot wide at the top and six foot wide at the bottom in order to carry water from Windmill Reen to Elver Reen.

In the April 1759 minutes this new reen was, confusingly, to be named Windmill Reen and the old Windmill Reen called Old Windmill Reen! The description of the new cut is quite clear though. It was:

...from Kimney Pool north of Broadmead into Elver Reen in the west, 87 perches of 20 feet each perch.

Unfortunately when you look at the present reens in this area there is no sign of this "new" Windmill Reen. The length described, 535 metres, does not fit with any reen presently running from Kimney Pool to Elver Reen, so what happened to this new reen is anyone's guess. A hundred years later, Broadmead Common was enclosed and the existing reen around its northern edge, Meares Reen, may have been improved making the New Windmill Reen redundant. So perhaps it is now part of the private ditch system that between Elver Pill and Kimney Pool

Drainage work continued in the back fen areas into the 19th century. The following extract from the 1833 minutes records the summoning of the Commissioners to "view" just such a proposed improvement.

Ordered that a view be had on Ellen reen in the parish of Christchurch for the purpose of making a new cut or reen across the lands of Capel Hanbury Leigh Esq, beginning at a spot called the dry arch in the Parish of Christchurch and ending near the new decoy pool in the same parish.

Of interest here is the mention of a new decoy pool. The construction of decoy pools, for trapping of wildfowl for food, was quite common on very wet areas of floodplain farmland in the early 19th century. In 1823, The Marquis of Bath constructed three decoys on his land in the Somerset Levels, where there were probably 14 in total. Only three decoys are known of on the Gwent Levels, all now lost under Llanwern steel works. The construction of decoys has been suggested as a way of retaining some of the traditional activities on wetlands that were increasingly being drained for more intensive agricultural production, but in this case they may have been a means for improving the "returns" from farmland incapable of being drained any better.

There are relatively few references to new works taking place during this era on the Wentlooge Level. This fits in with the archaeological evidence that a lot of the present drainage system

may be pretty much as the Romans left it -and it obviously worked well. Most of the entries in the Wentlooge Court minute books relate to maintenance and repair of defects. However, the absence of records of new works should not be construed as meaning there were none. It may simply reflect the fact that, until the mid-1800s Commissioners of Sewers were only really empowered to maintain the existing structure, not to create additional drainage systems.

However, one entry in the Wentlooge minute book is of April 1759 makes a surprising revelation about the materials sometimes used!

Ordered the brass door be taken from the new Key Gout in Peterstone and sold to the best advantage and that ... be expeditious in stopping up the said Gout with earth and lime.

Ownership and commons

If proof were needed of the value of the land on the Gwent Levels one needs only to look at the spread of large ownerships across the area. In 1830^{xxiii}, The Duke of Beaufort had holdings in ten parishes; The Bishop of Llandaff in six and Sir Charles Morgan (Lord Tredegar), in 15. Other major landowners included The Kemeys with holdings in four parishes, Sir Thomas Salisbury in three; Sir Mark Wood, in two parishes and Sir Digby Mackworth with big holdings in St Mellons. And of course Eton College with holdings in Nash, Goldcliff and Christchurch parishes.

However, all over Britain, from time immemorial, communities had evolved “rights” to feed themselves from the land around where they lived. Even when their villages had been taken over as spoils of war, these rights persisted in common law, and of course the rights were included in transfer of ownership of land, whether by sale, dowry or any other disposal. Though landlords took every opportunity to put common land under their own control, until the mid-19th century “privately owned” land with common rights was not at all unusual. The Levels was no different from any other part of Britain in this way, and until the mid-1800s there were large areas of “common”.

The present day concept of a common is usually of un-fenced, and often unmanaged, land. However, this was far from true, at least until the 19th century. Commons provided land vital to the day to day survival of the poor villager. There were essentially two types of farmed (as opposed to wooded) common: those used for grazing and those used for cropping. Areas of common grazing were rarely, if ever, subdivided. Instead commoners had rights to graze a certain number of animals on the land. The cultivated commons, on the other hand, were usually divided, often into blocks, for each rights holder. Sometimes these were strips were around 220 yards long (a furlong) - this being the distance that it was generally believed an oxen could plough before needing a rest.

Figure 11 is a section of the 1830 Commissioners of Sewers Map of the parish of Undy showing two large areas of common grazing, Undy & Bridewell, with the small strips and patches of cultivable common land around the edges of the grazing commons.

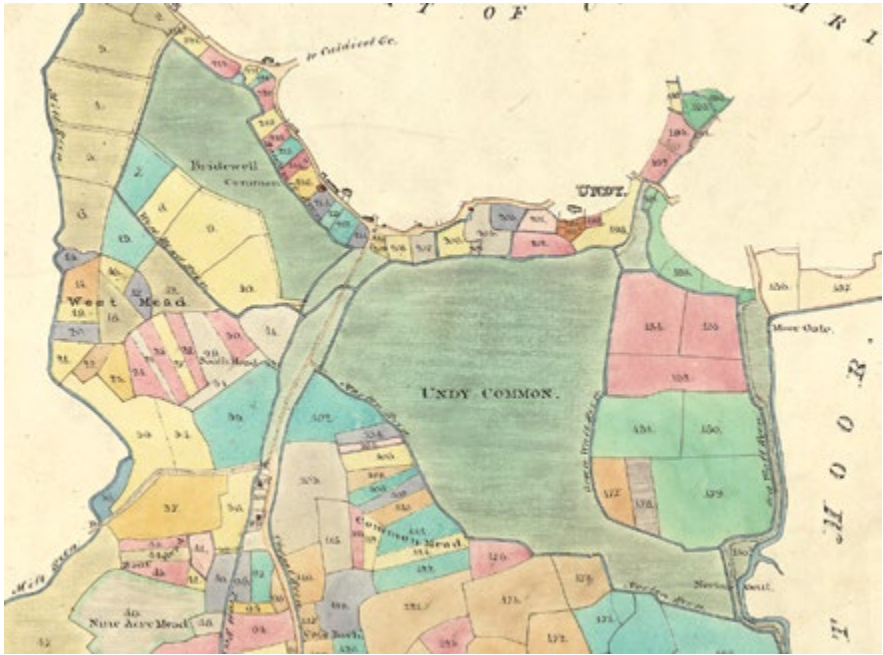


Figure 11. The Undy Commons in 1830.

The Undy commons do not include furlong or strip commons, perhaps this was because the land was too wet to plough and so may have had to be cultivated by hand instead.

By contrast, the Broadmead commons in Redwick on the map are archetypal strip commons, tying in with the fact that the land had a greater freeboard and thus was likely to be drier and more suitable for the plough than Undy’s wetter land.

The significance of these commons to the drainage of the land relates to the way in which ditches were maintained, “each according to his own share” i.e. you maintained a length of ditch proportionate to the amount of your land served by that ditch. Since ditches alongside commons had a multitude of occupiers, the responsibilities to manage them, particularly in relation to open pasture commons, was impossible to ascribe to individuals, so had to be handled by a committee of commoners.

Redwick’s Broad Mead common strips were set out in such a way that failure of the commoners to carry out adequate ditch management on their land could directly affect the effectiveness of Windmill Reen to the east and Elver Pill Reen to the West. These were two main discharges for water from the Green Moor and Wilcrick back fen and their maintenance was essential to the successful drainage of that land and all the land inland of the Common. This may be why the Commissioners cut a “New Windmill Reen” in the mid-1700s across to the north of Broadmead, to allow water to bypass the Common and, thus, avoid management problems.

The Commissioners of Sewers had to deal with the Commoners Committees and the relationships between these representatives of the “common man” and the “landlord” were

doubtless difficult. These conflicts were one of the reasons why parliamentary processes were established to enable the enclosure of Commons and cessation of common rights on valuable farmland.

However, the Court of Sewers obviously had some authority over the commoners' activities. As has been mentioned earlier in the case of the wharf at Redwick, they were able to restrict the commoners grazing rights in order to protect the sea defences.

Figure 12. The Redwick, Broadmead strip commons in 1830.



CHANGE IS IN THE AIR - THE 19TH CENTURY

Social change and land enclosure

Landowners had long considered the commoners' system as an inefficient and unproductive use of land and had sought every opportunity to bring common land under their own control. Much of the pre-industrial age class warfare was based on these fights. After much lobbying in the middle 18th century Parliament passed "The Inclosure Act" in 1773, and by this means landowners were able to take common land under their own control.

Commons could be enclosed by two means. Firstly, if the land no longer had any exercising rights-holders the rights could be deemed to be lapsed. This could happen on the most remote or difficult to manage commons where it just was not worth the rights holder's effort to put his stock on the land or try to cultivate it. More frequently, though, common land was enclosed through a parliamentary process. Each enclosure required an act to be passed to remove the common rights. Theoretically, commoners were consulted in the parliamentary process and had to agree to the outcome and were compensated for the loss of their rights. However, there were many cases where commons were taken over the heads of the commoners and this was one of many stimuli to great social unrest in the 19th century.

Leaving discussion of the social injustices aside, the effect on the Gwent Levels was that virtually all the Levels' commons were enclosed in the 1850s by Parliamentary Acts: Caldicot Moor in 1850, Magor and Undy Commons in 1850 & 52, Broadmead and more of Caldicot Moor in 1858. The availability of employment to displaced commoners in burgeoning Newport may have helped offset the price exacted on them, but it probably also helped to feed the fires of social unrest for which Newport subsequently became famed.

The Commissioners of Sewers were very much involved in the work arising from the Enclosure of commons. Indeed, some Commissioners themselves were direct beneficiaries of enclosure, being landowners of commons. The common land itself, which until then had been in large single blocks, or divided into strips by little more than small banks, had to be re-arranged into a system of fields, which required the digging of new ditches to act as both boundaries of the fields and to provide drainage. It also provided opportunity to re-align sea walls; in Undy and Rogiet, for example.

Tragically, the one source of information that may have revealed some of the changes wrought by and on the Commissioners at this time, the Minute Book covering the period of Commons Enclosure, went missing in 1903 following a court case.

The emergence of professionalism in the work of the Commissioners of Sewers

The system of Commissioners of Sewers and their Courts had been established in the 1400s and changed little over the next 400 years. However, the land that they served did change;

often dramatically. More land had been reclaimed with new owners appearing, and “old” land changed hands in its usual random fashion. By the mid-1700s the old system of drainage management of “each to his share” was getting increasingly complicated. A watercourse may have had a number of land owners, and each owner may have been responsible for managing numerous, disconnected lengths of that ditch. The situation frequently occurred where long sections under the same ownership were broken by short sections in another ownership, and people were working odd patches all over the Levels. In June 1745 we see the first attempt to “rationalise” the management responsibilities on such sections. The Court ordered:

... that Chapel Pill be measured by Charles Van Esquire and William Phillips Gent and that the proprietors who have now their share in several places shall have their several shares consolidated that they may for future have their work entirely together and not in parcells for the future.

Not only did this ease matters for the landowners, it made defaulting less likely and the drainage more assured.

On the 27th June 1827 a “view” was made by the Commissioners of the sea walls between Magor Pill and Goldcliff. The summary in the Court Minute Book deplored the state of the wall and took 14 sides of foolscap to list the 90 separate lengths of defect! Each of the defects listed represented a different occupier, each of whom had to be dealt with separately. At the Court sitting on the 13th November that year, the Commissioners’ frustration was revealed in the entry:

Ordered that the Clerk to the Commissioners enquires and reports to the next meeting whether an Act of Parliament could be obtained regulating the practice of the Court of Sewers for the Hundreds of Caldicot and Wentlooge and the probable expense of such an Act.

This was the beginning of the Commissioners efforts to take onto themselves the direct responsibility for managing the key elements of the drainage and sea defence system and bring it all under a coherent management system. It took another 57 years –a life-time - before this state was fully realised. The measure of control needed would require legal grounding, and therefore an Act of Parliament, to provide the statutory powers. The first Act was taken before parliament in 1832 but failed through lack of time. It was immediately taken back to parliament for further consultation, but the Commissioners’ own case seems to have been overtaken by a perceived more widespread need to control drainage and flood management in Britain. This resulted in the Land Drainage Act of 1861, which didn’t seem to do much for the Gwent Levels problems, but allowed the creation of Drainage Boards in places where there weren’t already Commissioners of Sewers. It wasn’t until 1883 that the major legislative change took place to benefit the Levels. The Commissioners asked for powers to take over all the landowners’ responsibilities for managing the key elements of the drainage and sea defence system, in return for which the landowners would be charged according to the value of their land. The 1884 Act of Commutation was the result and was the start of a system that essentially prevails today.

Mapping the Gwent Levels

The drainage system had grown almost organically from its beginnings; as new drains were dug, so new land became suitable for reclamation. Seawalls were built, then re-located as they were over-topped or eroded by tides and storms. One of the major tasks tackled by the Commissioners in the first part of the 19th century was to find out exactly what the sea defence and drainage system consisted of. They needed this information, not only because they were taking their work more and more seriously, but also because they were becoming more involved in matters relating to the industrial development burgeoning in Newport. As the land the Commissioners were responsible for became more valuable, so the need to know exactly what they were responsible for, became more acute.

On the 13th November 1827 the Commissioners ordered:

...that an agreement be entered into with Mr Thomas Morris to surveance and map the whole of the Level Lands at four pence per acre – that the parish of Goldcliff be first assessed and mapped as a specimen and to be produced to the Commissioners or any three on or before the 10th of Nov next, who are authorised to approve or reject...

And so came the two beautiful books of superbly accurate maps of the Gwent Levels, which now reside in the Gwent Archives. These maps preceded the Ordnance Survey of the area by 3 years and also preceded the Commons registration maps, (indeed they were used for common registration at the time of enclosures twenty years later). So accurately are they surveyed that they can be laid over modern day maps with remarkable conformity.

Figure 13. A page from the 1830 Commissioners of Sewers' Survey of Wentlooge Level.





Figure 14. 1830 Court of Sewers map of part of Newport. Note Corporation Road running through fields.

The surveying skills are obvious in these maps, but the cartography is superb. The compass arrows are works of art in themselves, and each map is drawn with painstaking care and attention to detail. When closely scrutinised it is difficult to find errors, although one amusing inaccuracy can be found in the book of Wentlooge maps. On the two adjoining pages of Rumney and Peterstone Parishes, the reen now known as Rhosog Fawr, is labelled as Great Hassock reen, (a mangled English translation and Anglicisation?) on the Peterstone page, but as the Great Haddock Reen on the Rumney page. Something was obviously lost in the translation across the drawing office!

The Caldicot and Wentlooge Levels each have their own book, in which every field, track, building and reen is mapped and labelled, one parish to each page. Each field is numbered and coloured, the field numbers relating to a separate book, which gives the owner's name and the area of the holding.

The Court Minutes state that the cartographer, Morris, was to be paid at the rate of 4d per acre for the whole job. This works out to be around £440, which in today's value is about £27,500.

The survey was repeated in 1868, but this time the maps were produced on tracing paper and each map was of just one reen. Each map accurately showed the line of the reen and was labelled with the lengths of reen for which each adjacent occupier was responsible and identified the relevant occupiers.

The arrival of the Industrial Revolution

A number of changes started to appear during the latter part of the 1700s which had an impact on the Gwent Levels and its drainage. Some of them were just a continuation of farmland improvement, while others were nothing to do with food production or farming, but were manifestations of the dramatic changes wrought in Britain by the Industrial Revolution. In the space of less than one hundred years, the major influence on the Gwent Levels would change from agrarian to urban, yet ironically be brought about by some of the same land-owning families who had been farming the Levels since Norman times.

Late 18th century maps show Newport as a small market town clustered around the castle, hardly different from its 14th century boundaries. However the beginnings of development around the wharfs downstream on the River Usk were already starting. The Court of Sewers survey of 1830 shows Newport as largely a landscape still typical of the Gwent Levels; a complex system of drainage ditches and reens, but now there were tracks linking groups of buildings on the river front.

The 1830 map clearly shows the start of urban development, with tramways and the Monmouthshire canal cutting through the farming landscape to linking the wharfs at Pillgwenlly to Newport and Cardiff. On the opposite side of the river all was still farmland, right up to the bridge over the river by the castle.

Newport, since its incorporation as a borough in the 14th century, had always been a small group of dwellings and shops serving the castle that protected the wharf on the Usk and the river crossing. Shipping was both for local movement across to the important English ports of Bristol and Gloucester, as well as national and international trade. The Portuguese

Figure 15. Detail from 1794 map of Newport.



“Newport Ship” found in the mud alongside the old town wharf gives clear evidence of the trading connections to Europe. However, with the valleys above Newport being exploited as a vast repository of raw materials to power the Industrial Revolution, Newport developed an importance which the Gwent Levels drainage and sea defence system had to support for a completely different reason than before. Keeping land free of water was not for farming use but for industrial development.

The first section of the Monmouthshire Canal arrived at Newport Castle in 1794 and, by 1800, had extended to beyond where the River Front Theatre now stands. By the time of the 1830 Commissioners of Sewers survey it had reached Pillgwenlly. This really marked the start of Newport’s growing importance and its increasing separation from the Gwent Levels farming community. The page from the 1830 Court of Sewers map of the area of Newport between the Ebbw and the Usk shows a snap-shot almost at the point of change. Apart from a cluster of buildings in the wharf area at Pillgwenlly, all else was fields and ditches, but carefully scrutiny reveals The Monmouthshire Canal and the Cardiff tramway already cutting through fields on their way to the wharfs lower down the Usk. Within 60 years buildings and roads will cover all the ground between the original town around the castle, and the confluence of the Usk and Ebbw, with many fields excavated to make two large, locked, docks. By then these, the Town and Alexandra Docks, handled more iron and coal than almost any other port in the UK.

From the early 1800s the Commissioners were becoming increasingly involved in decisions relating to Newport’s commercial development. Many enterprises were backed by Acts of Parliament and the Commissioners were constantly fighting to ensure that sea and flood protection and the work of the Commissioners was considered in the developments. As the old farmland drainage system was built over, the need to deal with the ever-present flood risk had to be considered.

And while Newport’s urban boundaries were set to expand, another development was underway that presaged an even more significant social change. While coal could be moved by sea, the needs of industrialised England required a faster and more reliable conveyance for it. By 1844 a prospectus had been produced by South Wales Railway Company for the establishment of a rail link between South Wales and England. The 1830 Court of Sewers map shows the line of a “South Wales Railway” marked on them, so one can only assume that discussions about the railway were going on long before the scheme really took to life.

By 1850 a railway had been opened between Swansea and Chepstow, with a station at Newport, and 2 years later the line had reached Gloucester and there connected to London. It was another 30 years before the problem of the River Severn crossing was solved when in 1886 Thomas Walker’s Severn Tunnel was opened and a direct link between London and Ireland, via South Wales was completed.

Because of the rapidly rising land to the north the route of the railway was laid along the flat, inland edge of the Gwent Levels knifing straight across the Levels, dividing the Wentlooge Level in particular, into northern and southern areas. The impact on the Levels drainage of the railway line was perhaps not as great as it might have been but the railways certainly could not have existed were it not for the sea and flood defences managed and paid for



Figure 16. 1830 map showing proposed line of the South Wales railway.

by the occupants of the Levels. In 1862, the Commissioners' levied a charge on the South Wales railway of £1740 in respect of the provision and maintenance of the sea and flood defence, but small print in the Railway Company's Act exempted them from any special rating, which up till now had been based on the acreage and productivity of farmland. As a result, the railway company were able to reduce their bill from £1740 to £7 1s 2½d; a derisory figure considering the importance of the defences to the profitability of the railway. This was perhaps the first record of the change in emphasis of the work of Commissioners and Sewers, (and their successor body), from protecting the livelihoods of the Levels' inhabitants to protecting commercial and political interests outside the Levels.

An interesting parallel to this occurred 100 years later, when Richard, Thomas & Baldwin, the original steel works on the Llanwern development on Green Moor, contested the drainage rate levied on them by the, then, IDB. They maintained that they should only pay an agricultural drainage rate based on the acreage of land used. This completely ignored the fact that the value of the drainage works to them was astronomically higher than that for a farmer. In contrast to the Railways, the steel works lost the case and had to pay a rate proportionate to the benefit the drainage provided them. For of course, were it not for the sea defences and drainage system their steel works would have been under 6 feet of water most of the time!

The Commissioners Minutes during the 19th century clearly show the increase in commercial pressures on their work. Much time was spent in negotiations over the parliamentary bills establishing developments such as the Alexandra Dock, The Western Valleys Sewerage Company, the East Usk Railway Company, and of course, ultimately the Corporation of Newport.

The Commissioners paid the clerk for his time spent representing them in negotiations and he was supported by paid, part-time surveyors and an expeditor. Expenditors were originally local people appointed by the Commissioners to arrange and oversee local contractors to carry out particular jobs. They were reimbursed with a small percentage of the total cost of the works. By the 19th century, the number of expenditors had been reduced to just one, who was effectively the Commissioners' drainage engineer. With his knowledge and experience of the Levels and its sea and flood defence mechanisms he supervised and acted as project manager for all the works carried out by the Commissioners.

At the same time the Commissioners' work was becoming even more commercially critical, for without the successful management of the sea defences and the drainage system the economic consequences of flooding could be disastrous. The financial risks associated with failures of the Commissioners and their system was now vastly greater than when they were just protecting farmland.

The Commissioners were also facing political pressures. Increasing town populations in Cardiff & Newport meant increasingly powerful local governments. In 1890 Monmouthshire County Council sought to take over the whole responsibility held by the Court of Sewers. The reason behind this attempt is unclear, but the Commissioners were able to satisfy parliament's Local Government Board that their skills and experience in managing the Gwent Levels could not be replaced by an inexperienced body of local politicians. One of the Commissioners main supports in this was their ground-breaking, long, and eventually successful struggle to get some of the first laws made for the sensible management of sea and flood defence.

The ability of the Commissioners to take over full responsibility for critical maintenance was an essential adjunct the earlier Land Drainage Act of 1833, which had replaced the old Statute of Sewers Commissions from the time of Henry VIII. The 1833 Act enabled Commissioners of Sewers, for the first time, to propose and carry out improvements to the drainage system, where previously their powers had been limited to the protection of the existing drainage system. What was still missing was the ability to ensure that work was done, and done adequately, as it still depended on individual land owners "doing their share".

Leaving the actual maintenance work of the system to individual landowners had been a struggle for generations, and now, with the commercial pressures on the Commissioners, was increasingly unsatisfactory. In 1884 the Monmouthshire Commissioners successfully promoted a parliamentary bill that allowed them to take over from individual landowners the responsibility for all essential flood and sea defence work. It was a landmark in law. Now, the Commissioners could ensure that work was done to a set standard and by a set time. If there were floods it would not be because, as in the past, someone hadn't done his share of the work, or had done it poorly. This "commutation" bill was one of the first in the UK and the Monmouthshire Commissioners were in the forefront of establishing the legal framework for the effective management of sea and flood defence in the UK. While promoting their Bill they had tried to enlist the support of other Courts of Sewers, but the minutes show that getting any response, far less support, from others seemed to have been very difficult. It clearly illustrated the difference between the Monmouthshire Court, which had become, of necessity, forward thinking and commercially aware, while most of the others in the UK



Figure 17. St. Woolos parish map in 1830 Commissioners' survey.

were still largely agrarian bodies with a less critical function. Indeed, some still seemed to be stuck in the Middle-Ages, with Court sittings ending with a good meal and a sing song^{xxiv}.

The expansion of Newport

The town of Newport rapidly grew in the 19th century, and so its influence increased. While some of the Commissioners of Sewers were intimately involved in Newport's industrial development, (Lord Tredegar and The Kemeys family), many were not. But the agricultural influence on the operation of the Commission was progressively overtaken by urban and industrial interests. Large areas of farmland were built upon, and roads spread out across the fields of Christchurch and Mendalgief parishes. Industries and wharf facilities expanded, fields were pushed further and further back and railways were extended down the eastern bank of the Usk on Caldicot Level.

The sketch map below shows the present day outline of Newport's urban development, (in lighter grey). The boundary of Newport, as shown on an earlier (1817) map is shown by two small areas of dark grey. Almost all the pale grey area was farmland. The line of the M4 has been shown for reference.

Increasingly, division came between the Commissioners of Sewers and Newport's councillors, which was not surprising considering their different responsibilities. It was inevitable that eventually Newport would want total control over all its own operations and with the Newport

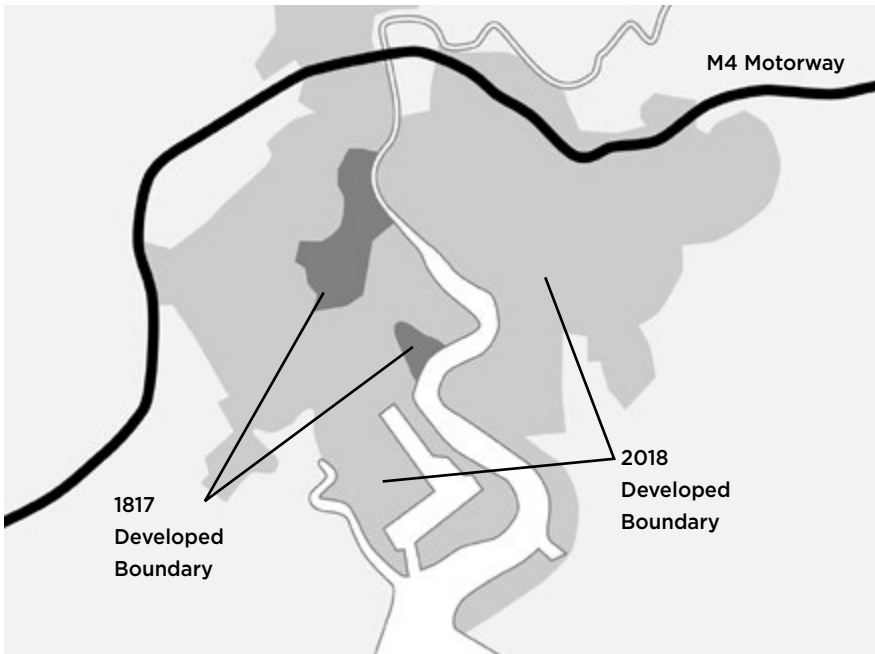


Figure 18. Sketch map showing urban expansion of Newport over the Levels farmland.

Corporation Act of 1900, responsibility for drainage of the land within the corporation's boundary was ceded to them. This meant that the Commissioners lost the rateable income from the two parishes of Christchurch and Mendalgief, but not the sea and flood defence works that still had to be carried out to protect them. The commissioners mounted a claim against the Corporation for this loss of income and a long legal battle ensued. Eventually the case was found in the Commissioners' favour and Newport had to pay the Commissioners £11,000 in compensation. But, as Newport expanded across the Levels, particularly across more flood-prone inland areas, the potential for conflict with the Commissioners grew.

THE TWENTIETH CENTURY

We have seen that one of the biggest concerns of the Commissioners had always been management of the sea defences. From the Industrial Revolution onwards their failure would now not only affect farmland, but also hugely valuable commercial and residential developments in Newport. Maintaining the sea walls in good condition had always been a problem and in December 1865, following a Court of View of sea walls, the Commissioners:

“...were of the opinion that if the whole of the sea walls and works were placed in the hands of their officers for repair and maintenance at the cost of the parties liable it would be highly desirable and in time lead to a uniform construction of the sea walls.

To this end it was suggested that a local Act of Parliament would be necessary and the clerk was directed to call the attention of the Court to it at the next meeting.”

This decision followed a protracted legal wrangle over the failure of a landowner to adequately maintain a section of sea wall in Undy. It ultimately led to the Commissioners successfully attaining their Act of Parliament in 1884, giving them the responsibility to manage seawalls and replace the landowners' management apportionment with a levy.

By 1894, ten years after they received their powers to manage the seawalls, a “Court of View” reported that the seawalls on Caldicot Level, the more vulnerable of the two levels, were generally in a good state of repair. However, the Commissioners were, as ever, fighting the forces of nature, and two large storms, on 10th September 1903 and the 16th December 1910, breached the walls in a number of places.

We have seen earlier how the destruction of the wharfs, or salt marshes, was of major significance in allowing storms to damage the sea walls and, as mentioned earlier, their protection against over-grazing had been carrying on since the mid-1700s. However, the wharfs obviously continued to be eroded. The Commissioners' legal battle mentioned above had started with a Court of View in June 1862,

“...to view the Sea Bank in Undy belonging to Mr Daniel Baker when they found that the Sea was washing away the Salt Marsh in front thereof very rapidly that it had reached the eastern end of the Bank and that it was approaching close to the Bank in others”.

While the seawall was eventually repaired, no attempt could be made to reverse the loss of saltmarsh that could have helped to protect the wall. Knowledge of how to do this just didn't exist. However, the changes to the saltmarsh may have been inevitable anyway, due to the very existence of the seawalls elsewhere. Attempts to try to protect the saltmarsh at Nash by using groyne in the late 1800s had had no success.

The problem of eroding salt marsh was a national one and a Royal Commission on Coastal Erosion was set in 1906 to look at the problem. It visited the Gwent Levels to see the problems here and gather information for the investigation. It finally appeared that the protection of

salt marshes was beyond human endeavour and so, instead, increasing reliance had to be placed on the walls themselves.

The sea walls and their management would ultimately be one of the factors that would lead to the demise of the thousand year old system of control of sea and flood defence on the Gwent Levels, but a number of other changes occurred before that which eroded the power of the Commissioners.

The emergence of national controls

By the start of the twentieth century the Court of Sewers has already lost some of its power and responsibility to the town of Newport. This reflected the change in the 19th century from government dominated by large, rural landowners to one dominated by Britain's increasing urban population. In the past, areas of Britain operated fairly autonomously, but there was now an increasing desire, and even need, to centralise control. The advent of the First World War emphasised this as the government struggled to supply the voracious needs of the military campaigns in France and Belgium, as well as supply the population back home who were supporting the effort.

After the war, there was a great need to improve agricultural production and particularly to take advantage of the known fertility of land that was subject to regular flooding. On a number of floodplains, work was deliberately created - both to help solve the post-war unemployment problem and to improve agricultural production - by providing a workforce to dig ditches to drain farmland. The Lugg floodplain in Hereford was one such example of an area drained in such a manner.

At the same time, the various bodies charged with managing flood lands had combined to petition the Government for improvements to drainage law to make land reclamation and flood management more efficient, again, for purely agricultural purposes. The aim now was to bring everything under the same laws, instead of the hotchpotch of local acts and the archaic system of Henry VIII's Act of Sewers and its amendments. In 1927 the government established a Royal Commission to investigate, and in 1930 passed The Land Drainage Act. This Act straightened out the convoluted laws surrounding land drainage in Britain by repealing sixteen Acts dating as far back as 1531 and amending three others!

The Act had a number of important elements to it, but the major one was one first put before parliament in 1878. This was a recognition that flood management had to be dealt with on a catchment level. Managing the sources of the water that caused floods was as important as managing the land that could suffer the floods. As a result "Catchment Boards" were created to deal with the main rivers, while land that was particularly threatened with flooding was to be managed by Internal Drainage Boards (IDBs). Areas which were already served by Courts of Sewers would be directly replaced by the new IDBs, with the essential difference being that the new boards were filled by elected members and not appointees.

The Act also recognised that the cost of flood defence and management in flood-prone lands should not just be borne by those who lived on the flood plains, but also by people

whose “water” might be posing the threats to those on the floodplains. So, funding for flood management and drainage could now be generated from rates levied on a population living outside the land that actually flooded, but whose “water” might help to cause the flooding.

As a result of this new Land Drainage Act, the Monmouthshire Court of Sewers was replaced in 1942 - after about 300 years, by the Caldicot and Wentlooge Levels Internal Drainage Board. The new IDB did what the Commissioners of the Court of Sewers did, but had clearer powers, as well as new access to national funds. As with the Courts of Sewers, they were still able set local drainage taxes, but the area to be taxed was widened beyond just those who “benefitted” from the work; a recognition that people living away from flood-prone lands should pay their share where someone else had to deal with their water.

Though the new IDBs were to consist of elected members, in the event many of the old Commissioners continued to sit on the new Boards – after all, their Court of Sewers work meant that they probably knew more about the drainage systems than anyone else, so they were the right people to serve. The critical point was that they were all occupiers of the drainage district.

While the IDBs’ operations and responsibilities have remained pretty much unchanged since the 1930 Act, the other element to the 1930 Act, that is, the Catchment Boards, underwent a number of changes. These came about in recognition of the fact that managing water involved a lot more than just flood control. The same water that flooded land increasingly provided water for drinking, for irrigation, for industry, and for fisheries, and all these were not just affected by availability but by such things as pollution.

This recognition did not come in one stage. In 1948, the Catchment Boards were then renamed River Boards, reflecting the fact that they were now, not only responsible for land drainage, but also for fisheries and pollution. At the same time there was a fundamental change in the responsibilities for managing the sea and flood defence systems. Some responsibilities were taken from IDBs and passed to the River Boards. Main watercourses on the Gwent Levels became classified as “main rivers” and the responsibility for their management taken over by The Usk River Board. At the same time, the responsibility for sea defences was also believed to have been taken over from IDBs by the River Boards. There is more on this in the last chapter!

Next, fifteen years later, in 1963, the River Boards were replaced, this time by River Authorities, whose added responsibility it was to monitor water quality and manage water resources (e.g. abstraction).

This arrangement continued for over 25 years, until, in 1989, the supply of water and management of sewage was privatised. These responsibilities were, of course, removed from the River Authorities’ remit but resulted in the creation of yet another body, the National Rivers Authority, which merged all the individual River Authorities into one nationalised, umbrella group. Unsurprisingly, this created some problems. For example, all the Rivers Authority reservoirs were transferred to the private companies, but this meant that the new NRA then had to pay the private companies to use the water in them in their rivers, and the NRA sometimes ended up paying more for the water, than the private companies had paid in licencing fees to the Authority!

In 1995, the situation changed yet again, when the National Rivers Authority was subsumed into a new Environment Agency. This new body had added 'non-aquatic pollution control and monitoring functions' to the NRA remit, along with all the old water management and drainage roles.

Under the 1930 Land Drainage Act, the IDBs' and the Catchment Boards' operations were closely related and well integrated; indeed representatives of both boards often served on both bodies. However, over the years, with the progressive absorption of many other functions into the national organisations, there was an inevitable distancing of working relations. Though attempts were constantly made locally to keep the two elements in close contact, the main rivers bodies were more and more constrained by decisions made at a national, not local, level and were also sometimes constrained by conflicts within their own organisations.

All these changes to the bodies responsible for flood and sea defence inevitably gave rise to some confusion over responsibilities, one of which was only clarified in a court case in Cardiff in 2012. It appeared that the EA had historically inherited only permissive powers to maintain and improve sea walls, while the IDB still had the liability to maintain them. One wonders whether this is what the Government had in mind in 1952 when they gave the River Boards the responsibility for sea defence – if, indeed, they ever did!

The emergence of the conservation lobby

The IDBs and the Courts of Sewers had been created to protect land reclaimed for agricultural purposes from flood risk. This had been their "raison d'etre" since time immemorial. But as the twentieth century entered its third quarter there began to appear an increasing resistance to this principle. After the Second World War some grave misgivings had begun to emerge over "industrial-scale" farming, particularly in the US, where pesticides like DDT were being shown to have terrible long-term effects on humans as well as wildlife. The Californian Dust Bowl of the 1930s had clearly demonstrated that man was capable of causing catastrophic damage to vast areas of farmland by intemperate management. At the same time, there had been an increased interest in wildlife for its own sake. Before the Second World War, interest in wildlife was not a common pastime, but after the war, burgeoning membership of wildlife charities illustrated that wildlife was no longer an eccentric interest of a tiny proportion of the population. This perhaps reflected the desire of an increasingly urban population (with increasing leisure time and increasingly tedious employment) to want to "re-connect" with their (idealised), rural past.

The crunch probably came in 1973. Until then, generally there had been little public resistance to providing financial help to farmers to increase food production. Subsidy was given when food production needed to be increased and, of course, the tax-payers would benefit. However, when Britain joined the European Economic Community in 1973, tax-payers' money was producing "butter-mountains" and "wine-lakes"; agricultural over-production that no one wanted, or could, use. Some tax-payers began to resent that their money was being used, not just for something that provided them with no benefits at all, but was actually damaging their "interests". Stories of "Barley Barons" in the late 1970s with huge annual incomes from



Figure 19. Industrial development on the wet, back fen.

subsidy, and of farms being bought by finance companies to exploit the grant system for economic gain, supported their case and a major rift began to develop between farmers and “conservationists”. In time the conservation interest became a conservation “business”, and the two sides of the argument: farming and conservation, became increasingly polarised. Opposing views from both sides led to uncomfortable working relationships between IDBs, who, not surprisingly given their origins and remits, were seen to represent farmers, and the conservation lobby. Sadly there was ignorance on both sides which masked the true facts.

On some flood plains in Britain, cessation of drainage might have increased wildlife value by allowing floods to return, though it would, of necessity, reduce agricultural productivity. On the Gwent Levels, ironically, the areas that might have benefitted from such a return to “natural” conditions, had already been built over by the urban spread of Newport and Cardiff. Most of the wettest areas of the Levels had disappeared under bricks and concrete during Newport’s industrial expansion of the 19th century, and Cardiff’s development of the Wentlooge Level in the middle 20th century. The land that was left was the driest coastal belt that could not be “re-wetted” without putting the lower, inland areas, now covered in houses and factories, at higher risk of flooding.

Despite this, the drainage system of the Gwent Levels was found to possess a nationally important wildlife value of its own: the plants and animals of the ditches themselves. It was quickly realised that, as long as the ditches were maintained regularly, as they had been for hundreds of years, this important conservation value could be maintained. The Gwent Levels comprise the largest area of reclaimed wet pasture in Wales and one of the most

extensive in Great Britain, bearing comparison with the Somerset Levels, Romney Marsh and the Pevensey Levels^{xxv}. Extensive surveys between in 1981 and 1985 established that the invertebrate interest was of national (UK) value. However, the key to the survival of this interest was the continuation of maintenance of the drainage system. So valuable were the managed ditches of the Gwent Levels that, in 1993 more than half of the Gwent Levels was declared a Site of Special Scientific Interest.

The process by which the establishment of the SSSIs was accomplished clearly demonstrated the good working relationships between the communities living on the Levels, the IDB and the government's conservation agency, the Nature Conservancy Council (NCC). This was in marked contrast to some other wetland areas of Britain where farmers burnt effigies of conservationists! Packed public meetings on the Levels demonstrated an interest in the idea of the SSSIs, and the establishment of an easy-working committee of farmers, land advisors, the NCC and the IDB saw through the process in a way which was an example of harmonious co-operation between the supposedly opposing factions of "farmers and conservationists". The then chairman of the IDB, Neville Waters, a farmer with family associations with the IDB and the Court of Sewers going back nearly 200 years, was in no small way responsible for building the bridges between the potentially opposing factions. The notification of the SSSIs, was also ground-breaking in another sense. It recognised the fact that the management of conditions needed to maintain the SSSI interest could not be achieved by individual land owners, but only by the management of the system as a whole, primarily through the IDB's control. The SSSI notifications that resulted were possibly the only ones of their kind in the UK, in that they did not put the responsibility onto individual landowners, but recognised that the long-standing drainage management of the whole system, so long as it persisted (and it was likely to do so long as people lived and worked on the Levels) was probably all that was required to keep the ecological interest high. It just required the moderating effect of the IDB to ensure that drainage was not significantly altered or intensified.

Ironically, the importance of the persistence of ditch management regimes was, initially much better appreciated by the conservation bodies than by the farmers and Drainage Board! In the late 1970s, the Nature Conservancy Council became concerned by the lack of management on some of the IDB's ditches, which was potentially threatening to the wildlife interest. When NCC asked the IDB why they had stopped management and were told that the Board thought this would be better for wildlife. NCC asked for urgent restoration of the long-standing ditch maintenance regimes!

There may have been areas of the Gwent Levels where impeding drainage efficiency and raising water levels in ditches could have produced a conservation gain, but, due to development on the lowest-lying areas, these areas were probably far less extensive than commonly believed; perhaps less extensive in proportion to many other flood plain, grassland sites in the UK.



Figure 20. Herons and egrets are a common sight along reens and ditches.

DRAINAGE MANAGEMENT

Over the hundreds of years of its existence, the management of the Gwent Levels' drainage system has followed remarkably similar routines and there has always been a hierarchy in the management practices. These are reflected in the layout of the drains. The main drains take water out to sea, both from the inland watershed and within the levels proper and they generally run north to south. Slightly smaller drains form a network between the main channels and their purpose is to take water from the land and discharge it into the main drains. Finally there are small ditches that surround individual fields which are designed simply to drain that particular area of land.

The difference in the importance of these three types of drains was recognised back in 1248, and remains true today. The first two levels are crucial to the whole system, while the final field-drain system is important to just that particular parcel of land. This difference has been recognised in the way in which, first the monks, later the Court of Sewers, and finally the IDB, treated their management. These bodies concerned themselves primarily with the main and secondary ditches. If an individual landowner failed to manage his private ditches, he generally only affected his own land. There were instances where the Court of Sewers was called upon to adjudicate in a dispute between neighbours over mismanagement of a ditch, but generally the Commissioners only concerned themselves with the ditches of the primary and secondary system: the main rivers and the reens "adopted" by the Commissioners and later the IDB.

Within the field drainage system, or the third tier of drainage, there is another "hierarchy" of drains. Fields traditionally had a ridge and furrow, or as it is termed on the Levels, "ridge and vurrow", landform. Ridges were often five or seven yards from crest to crest, though there was considerable variation. During heavy rain, water flowed into the furrows, which were connected to the ditches around the field. In grassland there were also grips, which were shallow trenches, sometimes dug at the bottom of the vurrow, sometimes at right angles to them. These were designed to get water off the field surface and into the ditches around the field as quickly as possible. Ridge and vurrow required very little maintenance, but grips needed frequent cleaning to maintain their function. The management of these, and most of the ditches around field perimeters were, as they continue to be today, are the responsibility of the land's occupier.

In the main channels to which the field drain system is connected, the tradition has always been for them to be de-weeded and their bank vegetation cut every year. In the 17th and 18th century the management practices were called reaping, scouring and casting. Reaping referred to bank cutting and the removal of the vegetation that emerged from the water in the ditch, scouring was the process of silt removal, which probably also included removal of floating and submerged plants, while casting was, as now, the process of re-cutting the profile of a ditch down to the underlying clay.

In the Court records of the 17th and 18th centuries it is clear that reaping and scouring were expected to be done twice a year: once by July and again by October. There are relatively few

recorded instances of people being brought before the Court of Sewers for failing to do this, so one might assume that most complied. Given the fact that this was done entirely by hand and that there were over 80 miles of ditches, this represented an enormous expenditure of effort. The economic value is difficult to estimate easily but, in 1695 this work was rated by the Court at 2d per perch. In present day terms this approximates to a present day labour cost of roughly^{xxvi} £3 per metre, translating (perhaps fatuously) to a cost of £420,000 per annum! Whatever the real cost, the economic value of the drained Levels' land was obviously considered very high to be worth this expenditure of effort.

Before the advent of machines all this work was done by hand. Bank reaping was done with conventional scythes and reaping hooks, (sickles), while channel vegetation was cut and removed with special, long-handled reaping hooks. Long-handled muck rakes; four or five pronged rakes with long tines bent at right angles to the haft, would have been used to pull material from the water. De-silting a deep channel in days before machinery, was extremely laborious. In some instances the channel bottom was so far below ground level that, during the de-silting process, platforms had to be built within the ditch so that material could be thrown onto them and from them up onto the bank. Once that section of ditch had been cleared, the platform would then be moved on. Hand clearance of reens continued well into the 20th century, until finally in 1953, the Government's Monmouthshire Moors Investigation recorded that "The excavation or "casting" of channels by hand, as now practised by the Drainage Board, is likely to cease and the work will be done by mechanical excavation...!"

At the end of our chapter on seawalls, mention was made of a machine for driving in stakes, but we have no evidence of any equipment other than hand-tools being used for drainage work until the 20th century. The first machines used were steam-powered, and only used for very large tasks. Contractor James Lowther was employed to use two steam traction-engines to haul a custom-made scraper for the purpose of de-silting Goldcliff Pill and the Peterstone Gout. This operation, which was derived from the steam ploughing system of 1860, carried on well into the middle of the 20th century. The scraper had solid sides and its "back" was a one-way flap door. When pulled in one direction across the channel by a traction engine's winch, the scraper's door would stay open allowing it to be pulled empty across the pill. When it was pulled back by the engine on the other side, the scraper's door would be forced shut, and the collected silt dragged up to the machine and onto the bank. The process would be repeated in slow and laborious succession; after each section of pill had been cleaned, the traction-engines would advance along the channel and the process start all over again.

This operation was of little use for cleaning smaller ditches, however. This had to await the invention of more mobile machines. The first of these were draglines, essentially mobile cranes with a bucket on the end of a cable. The bucket was dropped from the end of the crane's jib, then pulled back to the crane with a retrieving cable, scooping up mud as it went. The crane was mounted on a powered crawler-chassis and progress was considerably quicker than that which used traction engines. On these machines the bucket could be thrown out some distance by swinging the crane round on its base and releasing the brake on the bucket's cable half way round. A skilled operator could "throw" a bucket many metres from the crane with remarkable accuracy, and for large channels a dragline could be used to great effect. The IDB's first dragline, a Priestman, had been bought before the Second World War. Unfortunately, normal ditch cleaning was not easy with this machine. It took great skill to

avoid the bucket digging into the clay profile of a ditch when trying to de-silt it and operators were highly skilled but necessarily slow. This machine was later replaced with one that had been fitted with a side-arm which stuck out at right angles to the crane. The side-arm overhung the ditch and had the bucket's retrieval cable routed to its end. This meant that the bucket could be dropped into the ditch with the crane's jib, then dragged along the line of the ditch to the end of the side-arm. A trapezoid shaped bucket, suited to the profile of the ditch, made de-silting and casting a much quicker and more efficient process. Eventually, in the early 1960s, hydraulic machines began to appear and replaced cable operated machines. These could progress relatively quickly along the channel bank and controlling the depth and angle of the bucket depth became much easier, greatly simplifying and speeding up the operation. Hydraulic diggers also enabled the spoil to be spread thinly out on the bank, where the dragline tended to leave the arisings in rough heaps that often had to be harrowed flat later. The development of hydraulics and hydraulic motors also meant that machines eventually could be equipped with a variety of powered "heads", in place of the "bucket". "Bradshaw" buckets appeared in the 1970s. These had baskets instead of solid buckets and had a reciprocating blade across the mouth of the basket to cut underwater weed. This allowed the very quick de-weeding of channels of both floating and emergent vegetation. The Bradshaw bucket also had an unexpected advantage in that it also took out a very small amount of silt from the ditch along with the weed. This meant that channels which had been de-weeded were then slower to silt-up, extending the period between which the much slower operation of casting needed to be done. As well as weed buckets, today's hydraulic machines can now operate a variety of hydraulic-powered "heads", which enable them to undertake jobs like cutting bankside trees and then lifting them bodily up the bank for disposal.

Figure 21. Mr Rees of Ty Gwyn, Peterstone, scything the ree opposite his home.



Carole Newton

Originally, using hand power, but very many hands (i.e. all the occupants of the Levels) it is possible that most of the ditches on the Levels that needed de-weeding and de-silting each year were treated. However, after 1884 when the Commissioners took over much of the drainage maintenance, it must have been very difficult to complete the annual programme. Despite this, hand-working carried on until the 1960s. However, once hydraulic power came along, hand-working became much rarer. But in the mid-1970s mechanical control was supplemented with chemical control and from 1977 until 1993 reed in ditches was routinely controlled with the chemical Dalapon, reducing the need for mechanical methods. In the late 1980s environmental legislation began to appear which started to restrict herbicide uses near water and by 1993 general herbicide use in ditch management had virtually ceased. Spraying then, as now, was limited to sites where mechanical or hand control methods were impossible for one reason or another.

Water level control

We have very little information as to what sort of water level management was undertaken before the 19th century. However, we definitely know from the records that sluices were in use back in the 13th century when the monks managed the land. We also know of water being penned (held back) to run the mill at Goldcliff, and operate fish garths. We read in the 17th and 18th century minutes of stanks being built across ditches, presumably in some instances to retain water for farming purposes, and mention is made of the use of hollow trees as overflow pipes, but there is never any mention of what level of water was maintained in the ditches, or whether different levels were maintained at different times of the year.

One can only presume that arrangements for water levels were as today; namely high levels were maintained in summer to supply farming needs and low levels in winter to provide storage for heavy rainfall at times when the sea doors were closed at high tide and prevented discharge. In days gone by, the summer water levels would probably have been kept the same throughout the season unless a storm caused a dangerous rise in ditch levels. Nowadays, accurate weather forecasts and more efficient sluices mean that, in summer, water levels can be dropped whenever serious storms threaten. This is an increasing requirement as more and more storm water needs to pass through the levels from the extending developments over the low-lying inland back-fen.

For centuries accurate water level control has been accomplished by the use of “drop board” sluices; timber planks, set in grooved masonry pillars, that can be dropped across ditches. This very simple, but reliable system allows instant alterations to be made to water levels. By adding or removing boards new levels can instantly be set. Leaks between boards below water level can be stopped by allowing sawdust to be sucked into the leak from the upstream side of the sluice, where it catches, swells and seals the leak. Leaks between the boards at the bottom of a sluice require a more subtle approach as these leaks are too far below the water’s surface for an arm to reach to place the sawdust! One trick is to drop coal ash onto the water on the upstream side of the sluice. It sinks down the face of the sluice and is drawn into the crack by the leaking water flow and, with luck, it lodges in the crack and stops the leak.

Relatively little mention is made in the Court minutes to putting sluices in new sites, though there are some instances described in the 1890s. This might be an indication of a large scale refurbishment of sluices following the Commissioners' assumption of responsibility for the whole system in 1884. However, building sluices in new places seems to have been an extremely rare occurrence, usually only coming about as a result of a significant change in land-use. This suggests that the sluice system that had evolved on the Levels' farmland over the centuries was pretty effective and has needed very little change.

In recent years, many sluices have been modified, not to handle more water, but to allow quicker, more precise and safer control of the water. Drop-board sluices are being replaced by tilting weirs, which are large plates that fit right across the ditch, but are hinged at the base, like a door on its side. The door can be mechanically raised and lowered. Water rises on the upstream side until it spills over the upper edge of the door. They can be set to give very precise water level control and are much safer to operate than the drop-board system. Their only disadvantages are their great expense and the fact that they prevent fish from travelling through the ditch system. However, simple, brush-lined, water chutes which connect the top of the weir to the water in the ditch below can be fitted to allow passage of eels, at least.

Figure 22. Controlling water levels.



AND FINALLY...

We have spent a long time looking at the origins of the present day Internal Drainage Board, and the way in which the sea and flood defences on the Gwent Levels have evolved and been managed over hundreds or even thousands of years. The Objectives of the present management of the Levels are comparable to those of our forebears, although there are obviously differences in efficiency and methods.

In one way the present Drainage Board is significantly different from the Court of Sewers. With a full-time staff of more than twenty people, modern machinery, equipment and assets and annual expenditure of nearly £1.5m it is an organisation of which the Commissioners could barely have dreamed. At any one time machines will be working on ditch and ree maintenance, except in spring and summer periods when some work is deliberately limited for ecological reasons. Tracked-excavators work slowly round the 10,000 hectare area, de-silting ditches and reens and, less frequently, 'casting' them where needed. Two specialist ditch-maintenance machines and two tractors go round all year, trimming bankside vegetation and de-weeding over 170 km of channels. Teams of men work with chainsaws, excavator-mounted tree-shears, brush-cutters and chippers, deal with tree and shrub-growth and another team works constantly maintaining and replacing sluices – over 200 of them. Both Levels are constantly checked by members of the Board's staff, who, as well as their other duties, check the condition of the reens, sluices and the water-levels in the ditches. These men have an intimate understanding of the way water flows through their section of the Levels and know how to manage flows, how to boost the supply to a particular area, or how to get water out to sea quickly in advance of storms.

The people responsible for managing the drainage of the Levels have over many years developed unique engineering expertise based on personal knowledge of the land and the way its drainage system works. This knowledge has been handed down through the generations to the present day Board staff, many of whom are local residents and started work for the Board straight from school. These employees are on duty throughout the normal working week, but in addition there is always a team on twenty-four hour standby to deal with emergencies. The fact that many of the employees live on the Levels means that they can be instantly available, but being residents they also feel a strong commitment to their work. To turn out in the dead of night to deal with a jammed culvert that's threatening to flood a village is viewed as much as a community responsibility as a job. In fact, it is not just the staff who are part of the community, the IDB as an organisation generally has always been part of it. In effect, the whole context and culture of the IDB's operations on the Gwent Levels has been borne out of the history, precedent and experience of the preceding centuries, if not millennia. As a result people living on the Levels feel secure in the knowledge that when floods threaten, as they inevitably do, they are always under control.

After the Environment Agency was formed in 1999, the IDB continued to manage the internal drains on the Gwent Levels under its own remit, but it also carried out the management and water-level control of the 'main rivers' on behalf of the Environment Agency. Thus the Board was still managing the whole system on the Levels. The Board's staff also kept an eye on the

sea defences for Environment Agency as part of their daily routines, although no longer with direct responsibility for them. This intimate connection between the government agency and the IDB worked well, but a major change was about to occur. As the 20th century moved into the 21st changes were taking place in the way in which Wales was governed.

The National Assembly for Wales came into existence in 1999. Agencies exercising devolved powers came under the control of the Welsh Government, rather than Westminster. The “Environment Agency” became the “Environment Agency Wales” and its policy and budgets were directly controlled by the Welsh Government. In 2013, the Welsh Government made the momentous decision to combine all the national organisations responsible for managing terrestrial, as well as its aquatic environment into one new body: “Natural Resources Wales”. Thus the Forestry Commission, the Countryside Council for Wales and the Environment Agency Wales were all put under the same “roof”, to some extent literally as well as organisationally. This was designed to enable opportunities for greater integration of expertise and more cohesive decision-making in the work of safe-guarding natural resources. There was recognition that in so many instances the work and decision-making of one body affect those of one or more of the others. Forestry practice in the uplands affects river flows and flooding downstream, which, in turn, have an ecological effect, both in the uplands as well as in the lowlands. Natural Resources Wales is designed to make inter-disciplinary consideration and action so more efficient and effective.

In November 2013, the then Welsh Minister for Natural Resources and Food announced his decision that the three IDBs wholly or partly, being the last in the chain of environmental management organisations in the freshwater system in Wales, should also be a part of this new body. From April 2015 the three Board’s functions, staff, assets (including reserves of almost £1m in the case of the CWLIDB) will transfer to Natural Resources Wales. This means that the Welsh Government in Cardiff will in future carry full executive and financial responsibility for flood prevention and drainage on the Gwent Levels.

This decision had not been part of the original Welsh Government proposals to create Natural Resources Wales, but came after a series of problems beset the IDB in the preceding two years. From 1999 the IDB had, in effect, been a contractor to the Environment Agency. However, in 2012 increasing concern over government “openness” forced Ministers to tighten up the process of government procurement. The IDB, which only ever carried out one, highly specialised and localised job, was affected by this change. Certification to international standards was deemed essential for tenderers to government contracts. Although the IDB had ISO certification for its working operation, it did not have any environmental accreditation. The paper endorsement of this side of its work had never seemed very important to the IDB. It already successfully managed tens of thousands of hectares of its drainage district as Sites of Special Scientific Interest and had a very close and harmonious relationship with the government’s Countryside Council for Wales. However, the lack of independent environmental certification was believed to have significantly influenced the decision of the Environment Agency when it appointed a large, commercial contractor to carry out its work on the Gwent Levels that had previously been carried out by the IDB. This had a seriously demoralising effect on the IDB, not least when it recorded a number of instances where the EA contractor, despite presumably fulfilling the conditions of his contract and his environmental accreditation, was clearly not working to the sensitivity and standards that the

IDB previously followed as a matter of course. It also seemed to make little economic sense, too, when an IDB machine would work down one of its reens to an EA main river, only to have to stop, while the EA contractor brought in a machine from outside to finish the job.

The Board also became embroiled in the High Court case over the present-day responsibility for maintaining the sea defences. At some time in the 20th century during the division of the original IDB responsibilities to River Boards and then, to their successor bodies, there had been some significant legislative shortcomings over who was responsible for sea defences. It seemed clear to the IDB that the original River Board had taken over responsibility for the sea defences, and this assumption was mentioned in the Monmouthshire Moors Investigation of 1954, where the engineer stated that "... certain of the channels...now maintained by the Drainage Board will become main rivers of the River Board... sea defences must pass to the River Board". This belief seemed to have been held by everyone in successive re-organisations. However, when some landowners pressed, through the IDB, for EA to bring the condition of its seawalls up to the same standard as the rest of the Levels, it transpired that, despite all that had gone before, the IDB still had a liability to maintain the sea defences, while the succeeding superior bodies had no liability at all! The IDB was severely criticised for becoming directly involved in the case, in what was deemed a private matter. This was a severe shock to many on the Levels who had always believed that the IDB was there, like the Commissioners before it, to serve the community in matters relating to sea defence and drainage. Obviously things had changed.

These matters also became entangled with an acrimonious internal staff dispute at the IDB culminating in whistle-blowing allegations that were investigated by the Wales Audit Office. The Public Interest Report that resulted was highly critical of the Board's governance and management. That there had been some mismanagement and poor governance by the Board was incontrovertible and there was a swift response by the Board in mid-2011 when a new General Manager was appointed, and later that year a new chair was elected. Following the local elections in May 2012 more than half of the Board's membership was changed and the new Board and its senior management systematically addressed all the shortcomings identified by the Audit Office, and modernised its financial and administrative practices.

A subsequent inquiry by the Welsh Assembly's Public Accounts Committee in 2013 paid scant regard to the action taken by the new management of the Board and in the report that resulted the perception was extended that the IDB was an organisation still requiring radical reform. This clearly influenced the decision by the Minister in late 2013 that the functions of the IDB (and the other two IDBs in Wales) should be transferred to its new single environmental body, Natural Resources Wales, and managed by that organisation. The Welsh Government's decision to take away from local representatives the control of the flood protection of such a complex system as the Gwent met with almost universal condemnation by members of the Board and by local stakeholders, including the three local authorities in Newport, Cardiff and Monmouthshire. They tried desperately hard to persuade the Welsh Government to reverse its decision, not least because the failures identified in the reports by the Wales Audit Office and the Public Accounts Committee had been addressed and rectified by the new management of the Board. An alternative proposal to streamline the Board by halving its size while extending its outreach through a new consultative body in the Levels was submitted by the local authorities to the Minister. Sadly this did not change

the Government's decision to abolish the Board as an independent executive body. As a consequence the functions, assets and liabilities of the three IDBs in Wales, including the Caldicot and Wentlooge Board, will transfer to Natural Resources Wales on 1 April 2015 and the Board will no longer exist.

However, the IDB's current operational work programme will continue and, according to the Welsh Government and NRW, will benefit from wider expertise and the economies of scale afforded by the larger grouping of environmental agencies. The needs of the Levels and the ongoing work programme will be taken into account when countrywide decisions are being made regarding Welsh environmental priorities. Climate change, sea-level rise, population distribution and resource availability, all mean that decisions now have to take account of much wider factors than just the local issues affecting the Levels. Whilst the Board will no longer exist, local engagement in the work carried out on the Gwent Levels in future will be secured through a Caldicot and Wentlooge Levels Advisory Group (effectively an NRW Committee) comprising representatives of local authorities, drainage ratepayers and local stakeholders. This Advisory Group will advise NRW on how to plan, manage and monitor water level and flood risk management across the Levels.

So the management of the Gwent Levels will soon come under completely new control and be part of a much wider national strategy for water level and flood risk management. The Board's work, previously determined almost exclusively by those who have lived and made their livings on the Levels, now has to take account of the political, financial and natural environment of the 21st century. The natural world has been changed dramatically, some would say potentially catastrophically, in the last two hundred years and man's effect on it increases almost daily. So, as this long and distinguished history of the Internal Drainage Board draws to a close, the work will carry on in a very different context. However, it will still be those responsible for managing the drainage of the Gwent Levels who will determine whether the landscape of the Levels might or might not return to one that would be recognised by our young, Mesolithic mother and her son, out walking off Goldcliff Point, all those thousands of years ago...

CHAIRMEN, CLERKS AND ENGINEERS OF THE CALDICOT & WENTLOOGE LEVELS IDB

Chairmen

| | |
|---------|-----------------------|
| 1942-45 | Sir L. Foster Stedman |
| 1945-48 | W.H. Williams |
| 1948-49 | J.O. Cullimore |
| 1949-50 | F.H. James |
| 1950-52 | J.O. Cullimore |
| 1952-54 | F.H. James |
| 1954-57 | W. Prosser |
| 1957-58 | S.L. Attewell |
| 1958-60 | J.P. Baker |
| 1960-61 | G.L. Pritchard |
| 1961-63 | A.R. Edwards |
| 1963-64 | A. Thompson |
| 1964-66 | D.W.I. Jones |
| 1966-69 | E.W. Anstey |
| 1969-72 | H. David |
| 1972-75 | E.P. Waters |
| 1975-78 | J.H. Cullimore |
| 1978-81 | W.N. Waters |
| 1981-84 | D.C. Jones |
| 1984-87 | S.H. James |
| 1987-90 | T.C. Anstey |
| 1990-93 | J.J. Turner |
| 1993-96 | W.P. Waters |
| 1996-99 | W.D. Prosser |
| 1999-02 | D.C. Shervington |
| 2002-05 | R.L. Park |
| 2005-11 | W.N. Waters MBE |
| 2011- | D.T. David |

Clerks

| | |
|-----------|--|
| 1942-1952 | F. Taynton Evans & W. Frost Roberts |
| 1952-1959 | F. Taynton Evans & J. Taynton Evans |
| 1959-2001 | J. Taynton Evans |
| 2001-2011 | D. Jackson-Johns |
| 2011- | R. Penn |

Engineers

| | |
|---------|------------------|
| 1942-47 | Bleddyn T. Rees |
| 1947-48 | R.T. Cooke |
| 1948-80 | A.R. Hanson |
| 1981-95 | D.H. Boddington |
| 1995-11 | D. Jackson-Johns |
| 2011-12 | A. Ross |
| 2012- | M. Bajowski |

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At the start of the project, the enormity of the task ahead was indicated by Miss Eleanor Cracknell, Archivist at Eton College. In a reply, almost by return to my enquiry, she sent me 350 pages of possible material! Fortunately, she kindly directed me to those pages that were probably of most relevance to this work!

The staff of the Gwent Archive in Ebbw Vale provided much help in retrieving and (helping to read) the Monmouthshire Commissioners of Sewers Archive held there. Many individuals in the Internal Drainage Board also gave much help, but I must particularly thank Mr. Neville Waters, who spent a long time answering my questions. As well as his deep knowledge of the drainage history of The Levels, the stories of his and his ancestors' experience of working, living and managing the drainage on the Levels helped so much to "humanise" the story.

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Tony Pickup
March 2015

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The Gwent Levels are an iconic, estuarine landscape of international significance. Reclaimed from the sea in Roman times, the Gwent Levels are a network of fertile fields and historic watercourses, known locally as reens. This special landscape of high skies and low horizons is one of the finest examples of a 'natural' landscape hand-crafted by people in Europe; and one of the largest tracts of bio-diverse wet grassland left in the UK.

This book celebrates the history and legacy of the Caldicot and Wentlooge Levels Internal Drainage Board (1942 - 2015).



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