Catfield Fen. Changes in Land Management 1970-2012

Catfield Fen management

Historically Catfield Fen produced some of the best Norfolk reed in the county through careful management by the McDougal family. This was achieved by maintaining the height of the reed and sedge beds at or below the highest water level possible. Daily management of the water level was essential and this was also carried out by the McDougal family and Percy Neave who managed some of the Fen.

Reed and sedge beds need different water levels relevant to the height of the Fen at different stages of growth. An example would be in January or February the water levels would have been dropped, the top dried out and burnt to remove all traces of trash after reed harvest. This prevented the trash from turning into peat and maintained the height of the Fen at a low level.

The ditches were well maintained and had two jobs. Firstly to get shallow boats around the marsh to collect bundles of reed and secondly to enable water to be moved from outside the Rond around the marsh to flood the Fen.

When reedbed burning was banned about 30 years ago, a valuable tool was lost. However it is possible to burn reedbeds and trimmings under guidelines set out by Natural England.

The water level in the Fen is about as high as it can get with the limiting factor being the South Western corner. The top of the reed and sedge beds is about 250-500mm above this water level. So it is impossible to get the water to move uphill and the only solution is to reduce the height of the marsh.

Currently the top of the Fen is about 500mm too high for good management.

Mr Alston reports that his field at Fenside is difficult to keep in an arable rotation recently due to the higher water levels in the Fen making his land too wet. The field currently has an HLS plot in the wettest part of the field. Also the public road to Fenside always have water from the marsh on it whereas this was not the case years ago. This indicates that the marsh water level is too high.

Recommendations: The Fen’s ditches should be cleaned out. A proper management plan on water levels is agreed by all parties, including better sluice management. The top of the Fen should be brought back to 150mm below the highest possible water level. The management plan should be agreed by all the landowners and surrounding land owners, local house

owners, the Highways Authority and local reed cutters as all these people and bodies are affected by trying to keep water levels too high.
Once all this is achieved the Fen can be managed properly, the sluice can control the water levels and let water too and fro.
To find out more about managing a reedbed at Catfield Fen, speak to the reed cutter Andy Hewitt on 01692 581721. Also the previous staff at Catfield Hall Estate knew how to manage the water levels and marsh. Contact Colin Firman on 07776 491766.
This might seem dramatic management but it has happened before in about 1920 when the marshes grew too high out of the water and the top peat was cut off, dried and sold as fuel to the village. The reeds grow back quickly and are very healthy. In fact the owners of Catfield Hall Estate cut the top off North marsh about 12 years ago and the reeds are thriving there.
A Natural England topographical survey has been agreed to be carried out by Sarah Dawkins and the Environment Agency have agreed to be the contractors but access has been refused. A survey of the current height along with the critical low points in the Rond will give the guidelines to a successful water management policy.

Changes in land management on Catfield Hall Estate
When the farm was sold about 18 years ago about half the upland was in arable, the cattle were over-wintered inside and the muck was spread on the arable fields, ploughed in and crops removed the nutrients from the manures. The crops and straw were removed. Now all the farm is in permanent grassland and the cattle, sheep and pigs are outside all the year round.

Dr Mason's report of February 2012 reported that the water moving horizontally above the impermeable clay layer is the water along with rainfall that fills the Fen. The catchment area that fills the Fen is very small and includes all of the Catfield Hall Estate plus about 50 acres of AW Alston's surrounding arable land and a drain near Catfield school. On the 2nd March Mr Alston visited this catchment and found his arable land to be almost at field capacity with soil moisture deficit of 25mm but the grassland around Catfield Hall was very dry, possibly with a deficit of 100mm or more. The over-wintering cattle had not poached any of the land but had been in ditches to drink. Also some of the ditches were clogged with weeds. Mr Alston was very surprised how dry the Catfield Hall Estate was as this did not used to be the case.
Now consider the horizontal movement of water in this small catchment. The grassland and newly planted trees on the Catfield Hall Estate are

intercepting the horizontal movement of water on its way to the Fen. The result is that not only is the Fen relying on rainfall and horizontal water movement to recharge the Fen but the change in land management of the Catfield Hall Estate over the last 18 years is responsible for slowing the water recharge of the Fen.

Conclusions: Clean out ditches, fence off ditches, farm more sensitively to the needs of the Fen. Revoke the abstraction licence in the Fen.

Climate change

Recent changes to weather patterns mean that we are experiencing prolonged dry spells and more intensive rainfall. The Fen's water levels seem to hold up quite well for 6-8 weeks of a prolonged dry spell. Then the water levels begin to fall. Reed and sedge beds use 3-5mm of water a day when growing in the middle of summer and without rainfall or a good management plan of the sluice, the Fen will dry out. In 2011 we had two prolonged dry periods and one in 2010, but oddly enough they were very good years for the designated species of the Fen (Hemp Agrimoney and Wild Carrot). Natural England are now saying these designated plants like drier conditions.

Water quality of the Fen

The water samples taken on 24.5.11 either side of the Rond showed a 2.5 times increase in Phosphate levels inside the Rond. As the catchment is very small and the sluices had not been opened then the obvious conclusion is that this Phosphate is as a result of diffuse pollution on the Catfield Hall Estate. Reasons could be cattle getting into the ditches to drink in conjunction with cattle, sheep and pigs being outside on fields all year round.

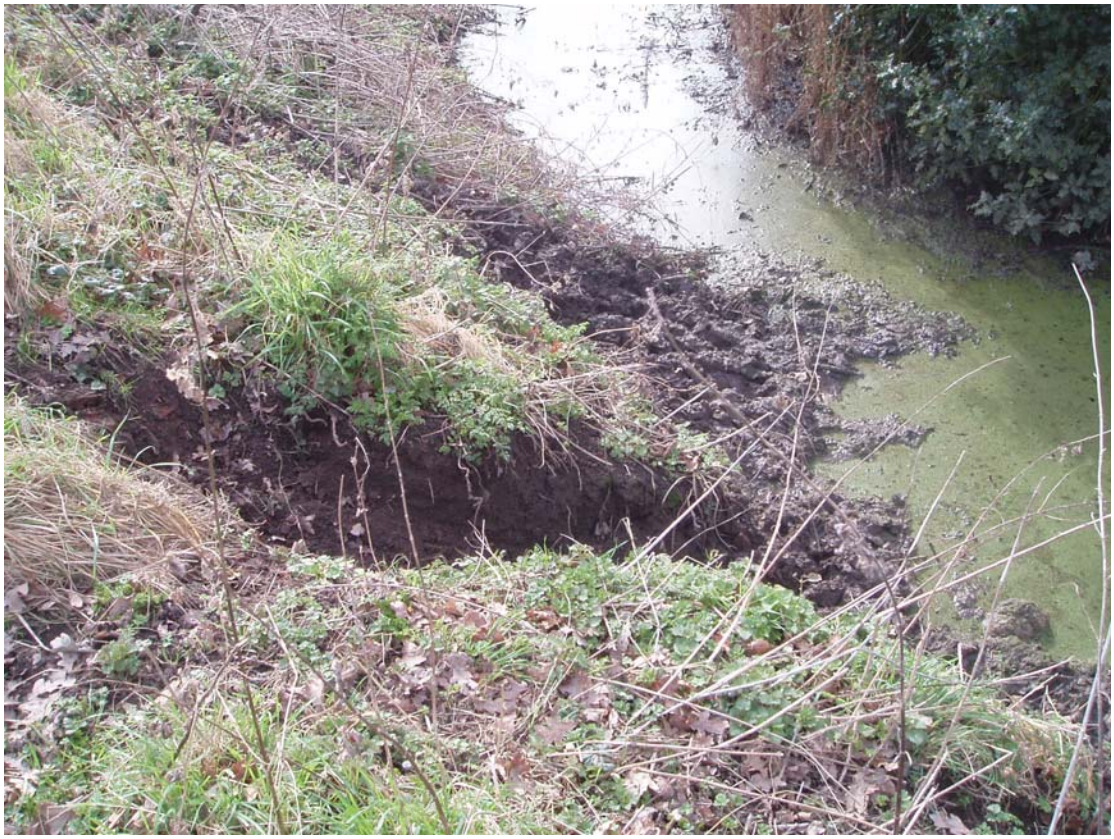
This diffuse pollution may also be the cause of increases in annual growth on the Fen, adding to the height of the peat in the Fen.

Conclusions: Involve Natural England's Catchment Sensitive Farming organisation.

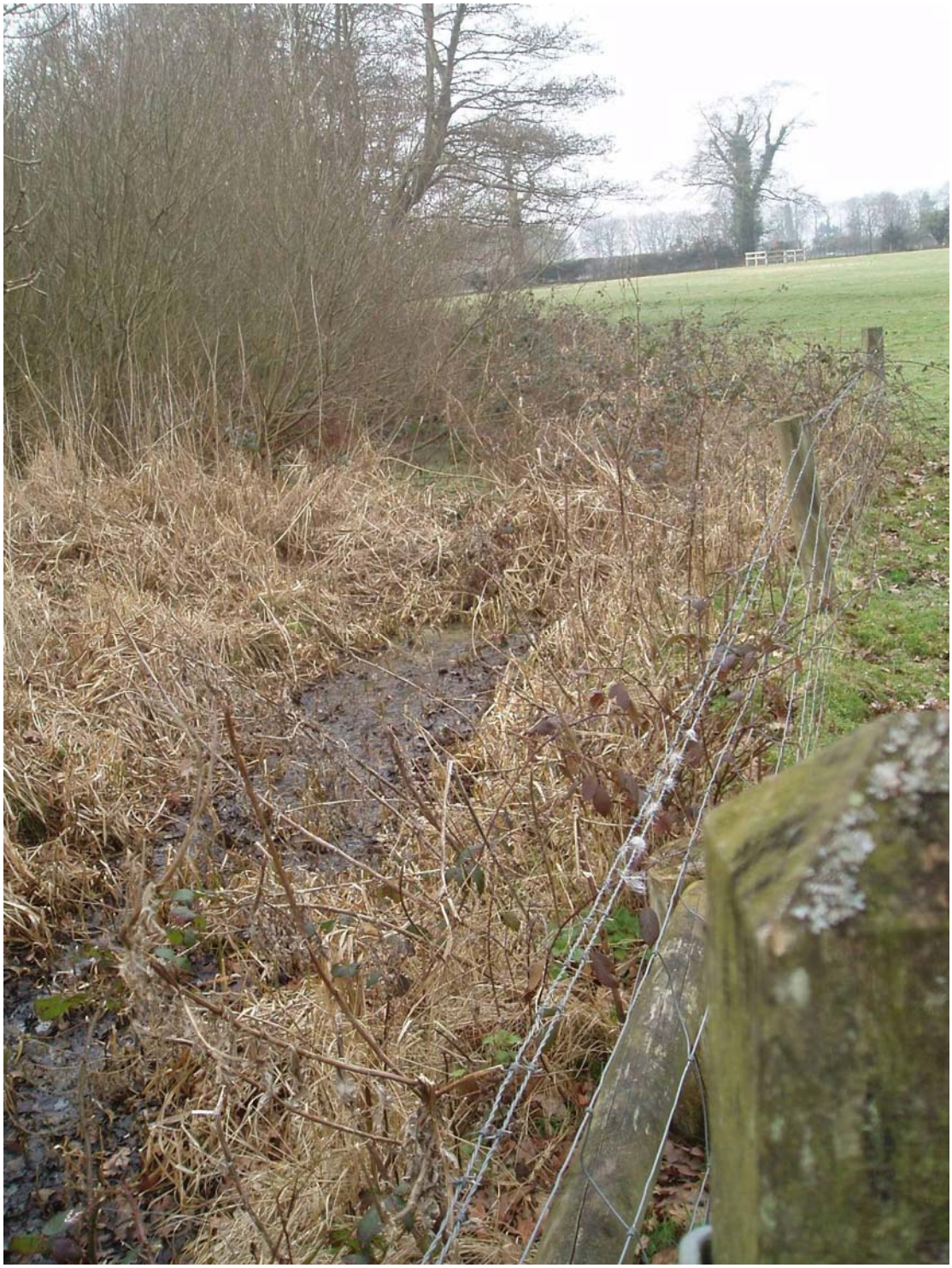
Pictures

1. Showing cattle over-wintering at Catfield Hall Estate. Note that the ditches have been poached by cattle as they drink. Conclusion: fence ditch and clean out ditch.

2. Red Deer have been crossing ditch and poached soil. Also note algae on water surface from Phosphate diffuse pollution. Conclusion: fence water course from red deer and clean out ditch



3. Showing clogged up ditch. Holding the water back will reduce water flow to Catfield Fen. Conclusion: clean out ditch



4. Outdoor pigs at Catfield! The pigs dig up soil and create diffuse pollution. Catfield is not a suitable soil type for outdoor pigs

5. Algae growth in ditch caused by diffuse pollution. Conclusion: fence ditches, clean out ditches and reduce Phosphate diffuse pollution

AW Alston
8.3.2012

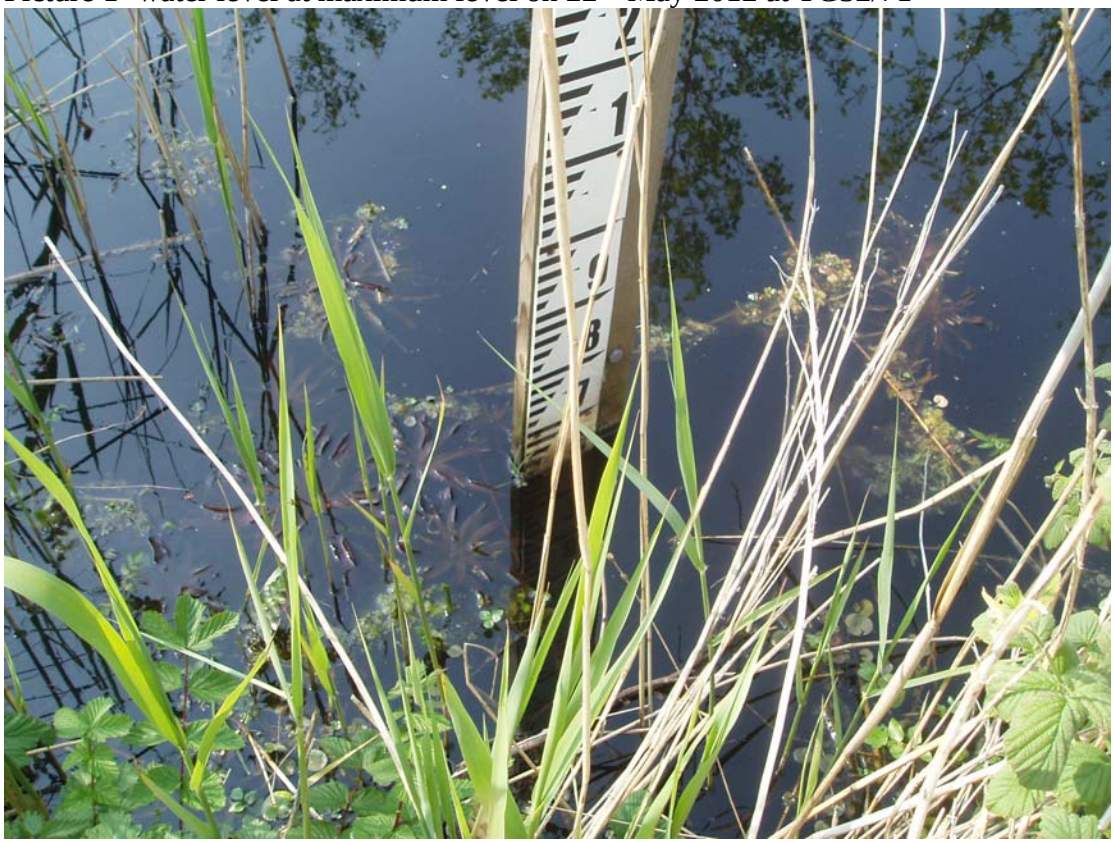
Catfield Fen: Hydrological Investigation and Reasons for Fen Drying out

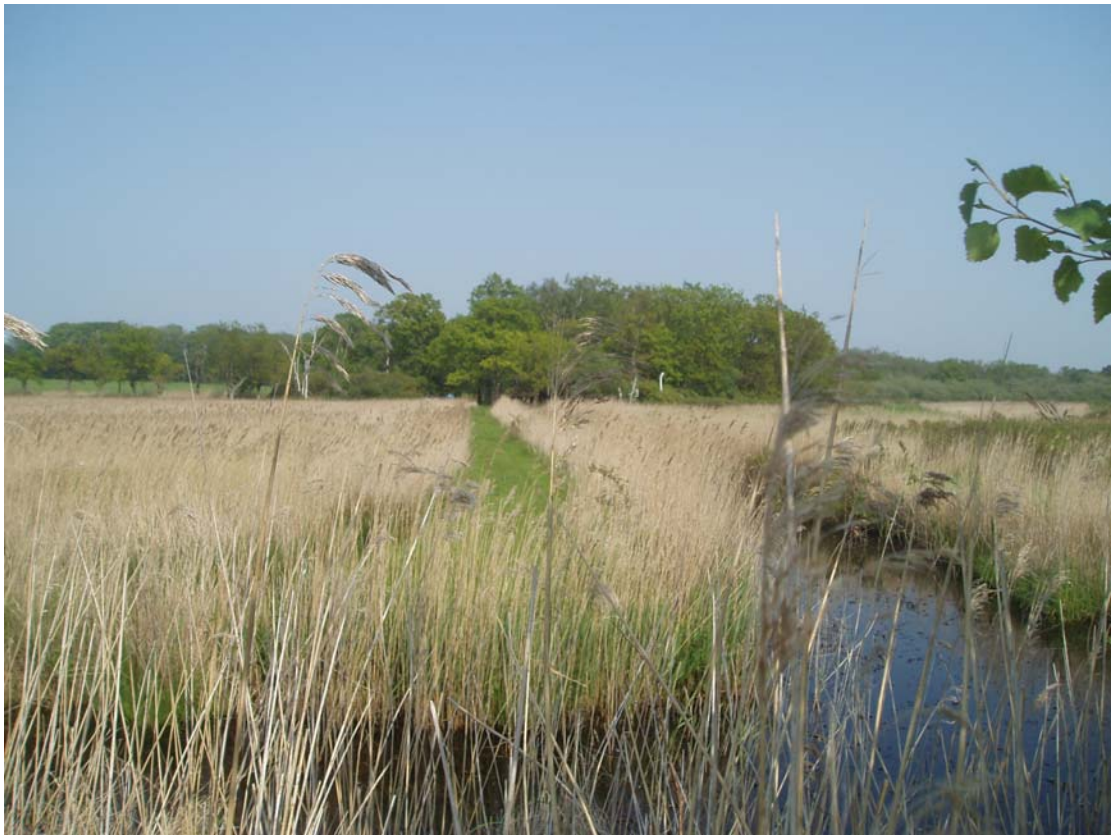
Areas of Agreement

1. The area outside the Rond does not have a problem. Which rather indicates that something is not right inside the Rond. I believe all parties want to restore Catfield Fen to its former glory and have first class reeds and sedge growing on the Fen.

2.Terrestrialisation is occurring at Catfield Fen. The attached pictures show raised marshes at maximum water level on Middle Marsh. The pictures were taken on 22nd May 2012 with the water level at the over topping level (maximum water level- see picture 1 showing water level at around 6.4 at the gauging board near the Mill TG32/71). The marsh is 18 inches above the maximum water level.

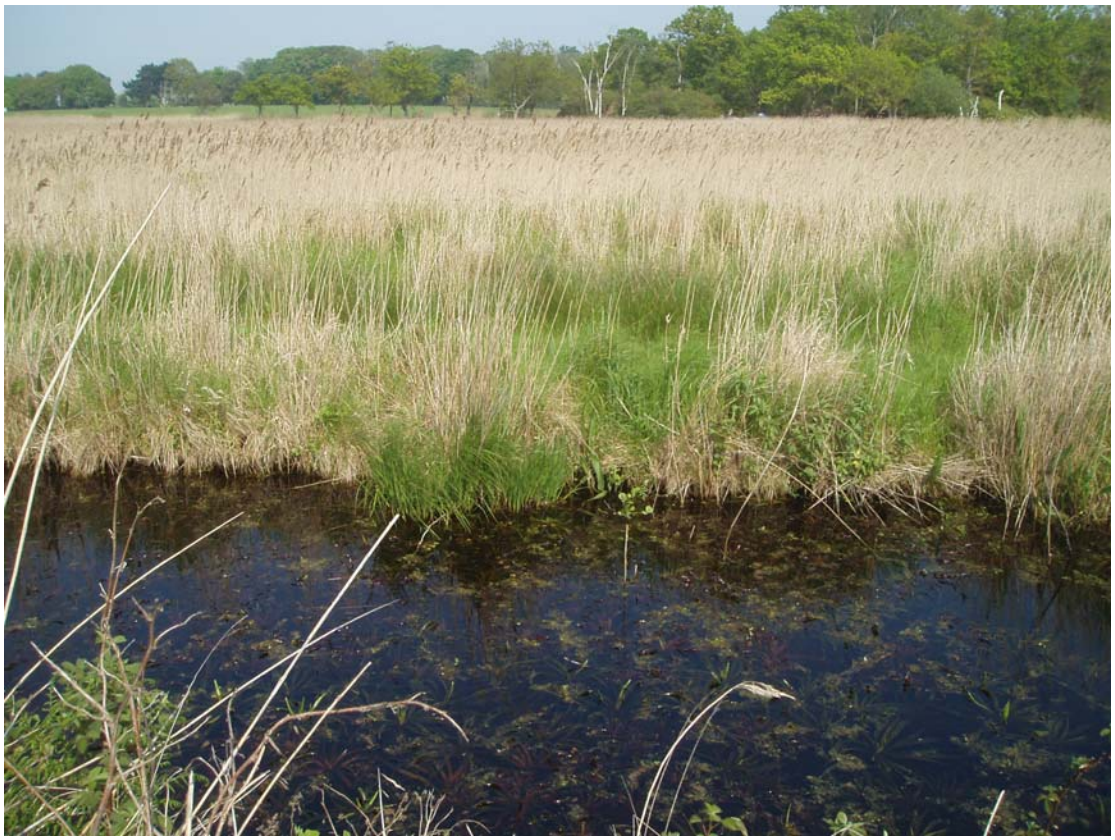
Picture 1- water level at maximum level on 22nd May 2012 at TG32/71





Picture 2: Middle Marsh and adjacent Mill marsh are 18inches higher than maximum water level on 22nd May 2012, also note well mowed grass access margin

Picture 3. Another view of Middle Marsh showing how high it is from the top of the water



The importance of maximum water level is that it is impossible for the water to be any higher and marshes higher than this level will dry out very quickly and can only be wetted by actual rainfall. The pictures 2 & 3 show a mechanically mown grass access around the marsh. It should not be possible to mow grass on these marshes with a lawn mower- they should be under water at this time of year. Where marsh height is too high it is impossible for water to access the surface, resulting in poor reed growth and rotting vegetation. Also the top 18 inches is not at full moisture capacity and will dry out rapidly, which is what the owner's complaint is.

Picture 4 shows a good reedbed where water can freely access the surface, which is vital for good reed growth. Note the water level is slightly higher than the marsh top. Also note that the previous crop has been removed and terrestrialisation has not occurred. The ditches are clear of vegetation allowing free movement of water.

30 years ago these marshes were the pride of Norfolk reed growers, it is sad to see them in this state. Other parties don't believe terrestrialisation has happened- here is the proof.

3. If Professor Gilvear's theory of groundwater rising up from the groundwater is correct, on 22nd May 2012 the water should have been over topping as I was not pumping any water, but it was not overtopping. Also we know that the groundwater has very high Iron content and any groundwater entering the Fen will show the classic red staining. There is no red staining anywhere on Catfield Fen. In fact the water samples taken in 2011 shown very low Iron content in the Fen water.
We can conclude that there is no groundwater (from the same aquifer as my boreholes) getting into the Fen. Additionally, if this Red Orchre water was to get into

Catfield Fen there would be an uproar from Natural England and they would want it stopped.
Also on 4th July 2010 Anna De'ath asked me to stop pumping on my Ludham Rd system, I agreed despite being in the middle of a hot dry period. The water levels in the Fen fell after that date, indicating than my Ludham Rd abstraction was not responsible for the lowering of the water levels in the Fen.
Finally we know that the groundwater is under pressure of around 50cms. If groundwater is getting into the Fen, the water levels should be much higher, they are not. This positive pressure in the groundwater is why the water levels recover so quickly after any abstraction.
There is no proof for Professor Gilvear's theory.

4.We all agree than the Plumsgate Rd bore is not causing any problems to Catfield Fen. The data from 2010 proves the Ludham Rd bore is not responsible for any problems. The water quality tests in 2011 prove the water in the bores is not the same water as in the Fen. The data collected over 15 years shows no effect on Catfield Fen and therefore the Precautionary Principle cannot be invoked and the true reasons for the state of the Fen need to be explored more fully.

5.We know that the Fen is reliant on rainfall to recharge the water. We also know that the water levels in the Fen are reasonably constant for 6-8 weeks when there has been a period of no rainfall in the summer, then they begin to fall. We know that in the summer the reed and sedge beds use 3-5mm of water a day and without adequate rainfall the levels inside the Rond will fall. This is why the water levels must be recharged from the water outside the Rond by opening the sluices at high water levels.

6. The leakage of water through the Rond and sluices needs to be investigated. As the original construction of the Rond was by hand, it is unlikely that the workers removed all the peat before constructing an impermeable barrier. Lately mechanical diggers cleaned the ditches out and placed the spoil on the Rond.

7. The area is man-made and needs to be managed by man. Relying on rainfall is not a solution to the Fen's water levels in dry weather.

8. The Commissioner's Rond was originally built in an attempt to drain the land within the Rond using the wind pump. For this to occur the owners would have realised that there was no groundwater input before they embarked on such an extensive project.

9.The surface water catchment area around Catfield Fen is very small. Diffuse pollution on the land at Catfield Hall is raising Phosphate levels in the marsh water. This is accelerating plant growth and thereby using more water. Natural England should review the farm management practices of stock over-wintering on grassland and drinking directly out of ditches- see separate paper on diffuse pollution at Catfield Hall.

Areas of Disagreement
1.I don't think there have been any major changes in water levels in Barton Broad, if anything the area is wetter now than 10-15 years ago.

2. The maximum water level cannot be raised as houses at Fenside will flood and the Fenside road will get wetter.
3. The sluice management needs to be improved and recorded. Only last week the reed cutter was refused a request to drop the water level by 1 inch. This was because he needed to cut sedge. Correct management of sedge beds must be to keep water levels low for a few weeks after cutting to allow plants to heal and prevent infection.
4. The top of the marshes needs to be brought down to the maximum water level. Natural England should investigate this further under their responsibilities in the Natural Environment and Rural Communities Act 2006.

5.The change in land management at Catfield Hall to an all grass system is preventing lateral movement of water as the grass uses the water to grow before it can reach ditches- see previous paper on changes of land management.

Conclusions.
There is no evidence to suggest my abstractions are having any effect on Catfield Fen SSSI. I also think it is highly unlikely that HA Overton & Sons' abstraction is having any effect.
The problems of the fen drying out are as a consequence of long term changes to land management at Catfield Hall, restrictions of lateral water movement and clogged up ditches not only at Catfield Hall but also in the area to the West of the Rond.

Recommendations
It would seem sensible to carry out work, which needs to be done such as ditch maintenance and lowering marsh levels. This has been done before and it is just in the cycle of Fen management. Once these areas have been corrected, I'm of the belief that the marshes will return to their former glory.
A water level management plan involving all stakeholders needs to be in place and acted upon. Better sluice management will keep water moving on the Fen in times when rainfall is low. This might involve pumping water if climate change continues to deliver prolonged periods without rainfall. Data collected needs to be freely available to all parties on request. The height of the marshes needs to be reduced, ditches need to be cleaned and the HLS agreement needs to be monitored to ensure that the work is being carried out correctly. Natural England needs to carry out a topographical survey of the marshes (although there is the photographical evidence now).

AW Alston
27.5.2012

CATFIELD FEN CHANGES IN MARSH MANAGEMENT

Comments by Peter Riches on a paper by Andrew Alston

I have been involved with the management of Catfield Fen since 1978, initially as Land Agent for the Nature Conservancy/English Nature and from 1999 as a land management advisor to Mr and Mrs Harris. I have read Andrew Alston's paper and would comment as follows:-

1. Changes in land management

There has been no basic change in the management prescriptions as between the McDougalls and the Harrises. Sluice management has not altered, water has not been let onto the fen since I have known the site – river quality was too poor to even consider the idea – and Natural England has confirmed that this is still the case.

2. Rise in land levels

The management record over the period of the Harris' ownership of the site shows that the suggestion that the drying of the site because of a rise in land levels is not tenable.

- North Marsh and Rose Fen have been turf stripped-there is no question of raised levels on these marshes. Natural England did not consent to turf stripping on South marsh which would otherwise have been included in the programme.

- Foot drains have been installed in North Marsh, Rose Fen and Long Marsh with the specific aim of improving water circulation on the fens

- Improved water circulation has occurred following the cutting of new dykes and the improvement of existing dykes, again with the specific aim of encouraging water flow around the Fen.

- Existing dykes both on the fen and the upland are cleaned out on a rotational basis – the photographs included by Mr Alston are all on the periphery of the site where run off pollution has occurred from outside the Catfield Estate – *see section 3.*

- The marshes are cut on a rotational basis with the material being cut and removed from site – some litter is burnt on special cast iron sheets with the ashes being removed.

- The reed growth following turf stripping has not improved as Mr Alston suggests. The reed is still short and lacks vigour which suggests that it is lack of water during the growing summer months which is the problem. It is a hydrological issue not one of land levels.

- Peat creation is a very slow process in natural conditions; the rotational cutting and removal of litter makes it almost non existent at Catfield.

- It is not correct to state that the area outside the Rond "does not have a problem". Some of the fens in the external system, eg the areas owned by the Poors Trust, are in poor condition. The aerial photographs show the extent of the scrubbing up.

- The BBCS land where Mr Hewitt advises on management and cuts reed and sedge has been poorly managed with the development of extensive scrub which has not been cleared in previous years. In contrast the Catfield Hall Fens have remained open. This is readily confirmed by the photographic evidence.

- Dr Mason indicates that there is no evidence to suggest a rise in land levels.

- The Catfield Hall fens have been managed with advice from and the approval of Natural England. Since they acquired Catfield Estate, the Harrises have also consulted with other local specialists to obtain their views about appropriate management practise.

3. Water quality

A major change that has taken place since the Harrises bought Catfield Hall is the vast improvement in the water quality, resulting in the reduction in agricultural run off and pollution from intensive arable farming on the upland portion of the Catfield Hall Estate when it was managed by the previous owners. The improved water quality is acknowledged by all the statutory bodies as being a major contribution to the site. Natural England acknowledge that the major problem for the site at present is drying due to water abstraction (see Natural England website).

Water pollutants do enter the site unfortunately from three sources:

- the inflow from the Glebe where E.A. have confirmed pollution from human excrement. On a number of occasions the Harrises have complained of this to the relevant authorities, including Natural England, but to no effect.

- agricultural pollution from Mr Alston's land to the north of Catfield Hall which crosses under the road via a pipe and has caused a serious pollution incident raised by Mr and Mrs Harris with Natural England who, I believe, insisted that the land be placed in an HLS option to protect the fen from further run off. As can be readily demonstrated, the dykes and pond in the immediate vicinity of North Marsh are still suffering from the effects of this pollution incident.

- The Northern side of the SSSI, including the BBCS land, is exposed to and affected by run off pollution from the neighbouring intensively managed agricultural land.

- The wider catchment for the fen includes areas of intensively managed agricultural land from which diffuse pollution will enter the site.

- The photographs attached to Mr Alston's report show the effects of external sources of pollution .Mr Alston includes a picture of one pig at Catfield Lodge in a block of woodland well outside the SSSI. His wording would suggest that the there are a large number of outdoor pigs at Catfield -there are two which are kept in woodland off the SSSI and certainly not causing a diffuse pollution problem!

- It should be noted that the cropping on Mr Alston's land has become more intensive in recent years, increasing the possibility of diffuse pollution to the fen.

4. Water catchment

The water catchment for Catfield is not large but Dr Mason's report indicates that it is substantially greater Mr Alston suggests and does include areas of intensively managed arable land. The Catfield Hall grassland, which is unfertilized, prevents diffuse pollution immediately adjacent to the fen. The evapotranspiration from this grassland during the summer months is lower than intensive, irrigated arable crops. It does not slow the fen recharge.

5. Sluice Management and water management

The water management regime at Catfield is the result of consultation and agreement with Natural England, who took independent specialist advice to determine the appropriateness of the policy. It is

designed to maintain water levels on the Fen and to keep out polluted river water. The water management is now controlled and managed for the conservation interest unlike former times when there was a constant battle between the McDougalls and Mr Neave with Mr McDougall seeking to hold up water in the internal system while Mr Neave opposed this. Even in recent years there has been vandalisation of the sluices. The southern sluice, which was constructed by Mr McDougall in 1965, has been replaced by Mr Harris after repeated vandalism.

5. Conclusion

Mr Alston's comments do not advance a credible theory to explain the drying of Catfield Fen. The site is actively managed to a plan agreed with Natural England and with advice from other local conservation specialists. The failure of the reed beds to thrive, even after turf stripping and other investment in foot drains and new dykes to encourage water flow, indicates a hydrological problem.

O P Riches

love every drop anglianwater

Memo

To: Jonathan Thompson

From: Nick Walters

Copy:

Our ref: Ludham/Catfield Fen

Your ref:

Subject: Response to Catfield Fen Report

Date: 25 May 2012

AWS Comments on Catfield Fen Final Report

General Comments

It is not clear from reading the report exactly what the basis is for the concerns about the fen drying out. Concerns were raised by Natural England following the production of their Compendium of ecological and eco-hydrological evidence in 2011 that "the evidence presented demonstrates a long term trend of drying out on this site which appears to be accelerating". The NE statement went on to say that there was evidence of vegetation change, yet the conclusions presented in this report (section 8.1 Expressions of Concern) were of no 'major shifts' in vegetation community.

The evidence given in section 8.2 Past Studies indicated no concerns between the 1970s and 1980s, but that in the 1990s the vegetation recorded was 'impoverished'.

It is not clear from these excerpts either what is causing the concern or the period over which this has taken place.

It is notable that concerns about the drying out of the fen seem to be raised during extended periods of below average rainfall.

Section 5 Hydrology and Geology

The water levels in the fen dykes go up and down in response to the seasons and rainfall conditions, closely mirroring water levels seen in the Crag aquifers. It would be useful to see a chart which shows how these water levels respond to the level of rainfall. Figure C4, the composite rainfall record, shows data from 1980 onwards but because this is given in daily totals it is very hard to see any overall trends. It would be interesting to see this record as a rolling 12 month record of monthly totals. Given the major impact that high rainfall periods have on the fen water levels overall (and consequently also the impact of low rainfall periods) it would be interesting to see these charted over the longer term.

In the final paragraph of section 5.2, the report states that the data "does not show any clear long-term trend showing increasing or decreasing net rainfall". Whilst this may be true,

there is evidence of shorter term changes in net rainfall. Most of the data in the report for borehole, gaugeboard and piezometer water levels run from 2006 to date. Following the major recharge event in 2007, the Anglian region as a whole has seen a decline in annual rainfall totals, culminating in the current drought. This is bound to have had an effect on the fenland within the region, but is part of the natural variation we would expect in rainfall. This variation is seen in the Crag and Broad water levels presented in this report.
From reading the report it is not clear whether we are seeing a genuine long term drying out of the fen or whether this is just a symptom of the current dry period, which sooner or later should end.

Section 7 Impact of Licensed Abstractions

Although the fen is largely perched on a layer of clay, the evidence shows that this is thin or absent towards the north and east of the site, so it is quite likely that there is some continuity with the upper Crag. It is confirmed by the water chemistry that there is Crag groundwater input into the dykes around North Marsh (i.e. NE corner of the fen). This seems to be mostly from the shallow and middle Crag. There appear to be no dipwells or gaugeboards monitoring water levels on this side of the site. The closest OBH is TG32/815B, which does not show any great decline in water levels over the period monitored (1992 to 2012).

Section 7.3 AWS Ludham

The Ludham PWS source consists of three boreholes. Boreholes 1 and 2 are in the deep Crag. In 2003 Anglian Water drilled a third borehole, this was screened to take water from the deep Crag, but also from the lower middle Crag.
Pumping tests of the deep Crag boreholes showed no discernable impact on the upper Crag, so it is therefore unlikely that the PWS abstraction could have impacted the fen prior to 2003.
The 2003 pumping test of borehole 3 showed a very small impact on the upper Crag at Sharp Street P3 (about half way between the abstraction point and the fen). This is probably due to the screening of borehole 3 to include some flow from the lower middle Crag having a small knock on effect on the upper Crag. Owing to the need to maintain public water supplies during the test, the overall abstraction from the three boreholes in combination was 4 Ml/d (i.e. in excess of the normal abstraction licence). At normal abstraction rates it is unlikely that there would be a discernable impact on water levels in the fen. If this were discernable then a reduction in water levels would be seen following the commissioning of borehole 3 in 2004.

We therefore do not agree with the statement on p64 that the 2003 pumping test has shown that "over the period of PWS abstraction since 1973 it seems likely that there will have been a decline in the shallow groundwater heads in the vicinity of the fen". All the pumping test showed was that there was a potential for impact on the shallow groundwater heads following the commissioning of Ludham PWS BH3. This potential impact has not been seen in subsequent monitoring data.

The potential for abstraction to impact in the fen has been investigated by the Environment Agency using a groundwater model. This model predicted a potential 3cm drawdown at Rose Fen (SE corner of fen) using real fully licensed abstraction. This model is likely to have

overestimated the drawdown due to abstraction as it currently does not include any differentiation between the different layers of Crag and it is clear from the AWS pumping test data that the layers of Crag have very different responses. It would be very interesting to see the outcome of the model once modified to include the responses in the different layers of Crag and the reduced annual abstraction at AWS Ludham.

Section 8.3 Possible Reasons for the Fen Drying Out

This section includes the statement: "The impact from the PWS source may be relatively widespread since it has been abstracting continuously since 1973, and the amount of draw down could be several centimetres." The pumping test in 2003 indicated the potential for borehole 3 to have an impact on water levels in the upper Crag some distance from the fen. There is no evidence of widespread impact going back to the 1970s.

Section 9 Conclusions and Recommendations

This section repeats the statement about the impact from the PWS source given in section 8.3. We do not believe that this is supported by the data.

It is clear from this report that Catfield Fen is a complicated site and the drying out may not have a single or simple cause. We therefore support the recommendations in the report to extend the monitoring to develop our understanding of the site. We also support the development of the existing groundwater model as probably the best tool for assessing the potential impacts from the various licensed abstractions.

Alison Selby/Nick Walters
Water Resources
24 May 2012

Catfield Fen – Hydrological investigation
Broads Authority comments on points of agreement and disagreement regarding EA (AMEC) report

25 May 2012

Firstly I would like to thank the Environment Agency for continuing to involving the Broads Authority in this consultation. This shows exemplar practice to ensure that the interests of and all evidence pertaining to the Broads floodplain fen, covered under European WFD and Habitats Regulations, are considered.

The report provides a constructive and valuable summary of important site information. I agree that a range of explanations need to be explored for a thorough examination of the observed drying of the site. Some of these are beyond the scope of this hydrological investigation. Yet they are included, and now these other potential causes of drying out have been brought to attention in this report, they need to be signed off as either significant or otherwise. I welcome discussion on how this might occur and what the role of Natural England might be in this process.

Points of agreement include the report's findings that the site is drying based on the evidence presented. Also that ground water is important for the summer water supply and the connection of water in the crag with the surface.

During the meeting we discussed a number of pieces of information that were not dealt with adequately in the report. As a result there can only be an agreement in principle that the site is drying and receives both surface and ground water. This information includes assessment of accurate topographic levels and associated water levels, cones of depression as result of abstraction and their interaction, the use and relevance of the EA model to this area in determining impact on the designated feature of the site, the timing and volumes of abstraction taken at certain critical growth seasons. It would seem appropriate that these potentially important local site information and mechanisms are fully considered in order to judge the impact on the site.

The majority of the points I raised to you in March remain as relevant.

We are keen to continue to work together to on the correct process and assessments for this important fen site.

Andrea Kelly
Senior Ecologist

Catfield Fen Investigation, Final Report 5 April 2012

Comments by Environment Agency

Overall we have no significant areas of disagreement with the AMEC report and consider the report to be a thorough, balanced assessment of the hydrology/hydrogeology of the Fen and surrounding area. We made comments on the previous version of the report and the 5 April 2012 version was amended to incorporate those comments where they were judged to be appropriate and accurate.

Section 1: Introduction
No comments.

Section 2: Data Considered in this Report
No comments.

Section 3: Overview of Catfield Fen and its Setting
We do not have any further information or knowledge that would result in disagreement with this section of the report.

Section 4: Geology
We do not have any further information or knowledge that would result in disagreement with this section of the report.

Section 5: Hydrology and Hydrogeology
This section analyses a huge amount of information from current data sources and it also considers previous studies.

We feel that the evaluation of data is very detailed, and the report synthesises the various data sources into a plausible understanding of 'how the fen functions hydrologically'. We agree with the general conclusions in Section 5.6, although it has not been possible to review all of the data analysis in sections 5.2 to 5.5.

Section 5.3 Topographic Data
We agree that there is a case of re-surveying the installations referred to in the report. We think that it is unlikely that dyke water levels measured at gaugeboards GB-A, GB-B and GB-C are about 0.3m higher than in the western part of the internal system, especially since the hydrographs for TG32/711 and TG32/710 are very similar in shape (e.g. Figure E18).

Section 5.4 Water Levels

Figures E10 and E13 show dyke levels and NTG 3262p1 recovering through 1996 and 1997 long before regional levels respond to the rainfall at the end of the drought in March 1998. This response is counter to control data off site. Is there an explanation for this? For example do we know of any changes to management as a response to drought?

The rapid drop in levels in 2009 is a feature to be found in both external and internal systems as shown in figures E20 and E22. The rate and duration of this fall is not consistent with the observed declines in 2011. We would have expected the 2011 recession in a closed fen compartment to significantly exceed that of 2009 in both its rate and duration. Is there an explanation for this?

Section 6: Licensed Abstractions

We agree that the groundwater abstraction under licence 7/34/09/*G/0058 held by Simply Strawberries Ltd is unlikely to have an impact on the fen because of its size and distance to the fen.

We agree that the surface water abstraction under licence 7/34/09/*S/0084 held by Catfield Hall has not caused any impact on the fen since the abstraction apparently has never been used.

Figure G5: We assume that the six-monthly periods are based on the usual licensed abstraction period for spray irrigation licences, i.e. April – September, and hence the abstraction quantities in the graph show totals for the periods April to September and October to March respectively.

Page 49, paragraph before last: Licence 7/34/09/*G/141C allows abstraction in the period **April** to October rather than March to October as stated in the report.

Page 49, last paragraph: "… the current replacement Ludham Road abstraction borehole is screened from about 4.5-3.5 m bgl…" should be "4.5-**33.5** m bgl".

Page 50, 3rd paragraph: Licence 7/34/09/*G/144B allows abstraction in the period **April** to October rather than March to October as stated in the report.

Page 50, 6th paragraph: Licence 7/34/10/*G/111 allows abstraction in the period **April** to September rather than March to September as stated in the report.

AMEC added - all these last 4 point corrected in the text

Section 7: Impact of Licensed Abstractions

Section 7.2 Alston Abstractions

We are in agreement with the independent assessments of the Alston spray irrigation licences. The assessments are similar to those made in the 2010 licence determination and subsequent reports.

We acknowledge the general difficulties in estimating the impacts from spray irrigation abstractions from water level hydrographs which also capture the effects of long-term and seasonal climatic trends, short-term responses to rainfall/recharge events and also effects introduced by the measurement method and human errors. The estimation of impacts in hydrographs is

especially difficult in the case of abstraction for spray irrigation, since abstraction normally starts when conditions are dry and water levels are falling naturally and stops as soon as rainfall occurs when water levels in ditches and shallow groundwater observation points are rising.
It is therefore thought important to commence the analysis with observation points close to the abstraction where impacts will be largest and then work 'outwards' to try and trace specific drawdown signals related to specific abstraction periods in the hydrographs. This was generally done in the report.
Due to the difficulties described above, the "estimated water level falls due to abstraction" as listed in Table 7.1 and Table 7.2 should be taken as indicators for the magnitude of impacts only.

We also think it is important to be clear about which part of the aquifer a particular observation borehole is constructed to and measures water levels in and how this relates to the part of the aquifer the abstractions are taken from. Again, this was generally done in the report, although we have suggested some further analysis in comments for Section 7.2.1. Since geological logs and construction details are not available for all of the observation and abstraction boreholes near Catfield Fen, there remain some uncertainties in the interpretation of the hydrographs.

Section 7.2.1 Plumsgate Road
Page 53, 1st paragraph: First sentence should read: "At the Plumsgate Road **3.5 m** borehole, 320m to the north of the abstraction, drawdowns were consistently about **0.03-0.04**m for abstractions of 600-800 m^3/d."

AMEC added - this point corrected in the text

We do agree that the cone of depression from the Alston Plumsgate Road abstraction is unlikely to extend to the north-western corner of the fen (at observation boreholes TG32/616d and NTG3261P1 about 1700m distant from the abstraction) based on the drawdowns of up to 4cm and 11cm respectively observed in the upper Crag (incl. Corton Formation) and middle Crag units within 320m distance from the abstraction.

Based on the drawdowns observed within 320m from the abstraction, we also consider that any drawdown impacts in dykes and at the groundwater table at the fen closest to the Plumsgate Road abstraction are likely to be in the order of millimetres, if at all noticeable.

We think that, if the Theis equation is applied to get a theoretical indication of how far the cone of depression is likely to extend, further consideration and explanation is required. It is not clear, which abstraction quantities and pumping duration have been assumed to derive the drawdown curves.
We also think that the statement "these are the predicted drawdowns within the middle Crag aquifer, and those in the shallow Crag may be less" is not entirely correct. By using observed drawdowns from TG32/815d - monitoring upper Crag unit (incl. Corton Formation), and Plumsgate Road 15 m borehole - monitoring middle Crag unit, this is mixing the responses of the two units, and the results therefore need to be viewed with caution. We think that,

ideally, only observation data from the (presumably) pumped middle Crag unit would be used.

We also think that the statement that the Theis equation, in principle, overestimates the drawdown response compared to reality due to its inherent assumptions and, therefore, always presents a 'worst case' cannot be accepted per se. For example, one assumption is that the spatial extent of an aquifer is unlimited. This is not the case in reality and the actual drawdown response in a bounded aquifer could sometimes be larger than predicted. Further explanation would therefore be required why, in the case of Catfield Fen, the Theis predictions do present the 'worst case', before the predictions can be considered.

Page 54, last paragraph, first sentence: should read Figure **E51** instead of E27.

AMEC added - this point corrected in the text

The report states: "Three boreholes located between the abstraction and the closest part of the Fen at about a 1km distance from the abstraction are responsive to water level change but less so than would be ideal in seeking to determine short-term drawdown." This statement appears to imply that the observation boreholes are not functioning correctly and may therefore not detect any impacts from abstraction. However, we think that the comparably 'smooth' water level response to rainfall/recharge events may well be a explained by the local hydrogeological characteristics, such as depth to water table and storage properties of the aquifer unit monitored.

The three boreholes are located at elevations about 3-6 m higher than TG32/815d near the Plumsgate abstraction. Whilst at TG32/815d the depth to water table is between 1-2m, the depth to water table is 3-4m at TG32/815b and between 5m and 7m at TG32/815a and TG32/815c. The borehole logs in Appendix I are of poor quality but appear to indicate high storage sand/gravel throughout the depth profile for the three boreholes but some overlying silt at TG32/815d. The above differences between TG32/815d and the other three boreholes may at least partly explain the differences in water level response characteristics.

The lack of drawdown response to abstraction may actually show a genuine lack of impact in the part of the aquifer that is monitored by these observation boreholes. A brief further review of the geological and topographical data has been carried out here but it is suggested that this could be done in more detail elsewhere.

The borehole log for the Plumsgate Road abstraction borehole in Appendix I indicates sand and gravel to a depth of about 5.2mbgl followed by 3m of clays and then sands and interbedded clays. With an estimated ground level of 2mAOD at the Plumsgate Road abstraction borehole the base of the 3m thick clay layer is at about -6mAOD. Although the length of the screened section in the 20m deep abstraction borehole is not known, it can be assumed that the

main water abstracted originates from the aquifer below the 3m thick clay layer.

Due to their higher elevations, the base of observation boreholes TG32/815a, TG32/815b and TG32/815c is at about -2 and -3 mAOD respectively. They therefore appear to monitor the sand and gravel unit (presumably Corton Formation) above the 3m thick clay layer that was encountered in drilling of the Plumsgate Road abstraction borehole.

If the Plumsgate Road abstraction is mainly from the Crag beneath the clay layer, any drawdown response in the sand and gravel unit above the clay layer would be subdued and may, if at all, only become apparent after longer periods of pumping. However, there is no information about the spatial extent of the clay layer and how the thickness may vary since the drilling for the observation boreholes did not reach or even go through this clay layer. In the Ludham Road abstraction borehole only layers of “Sand, Gravel, Clay” (approx. 1.5m thick) and “Clay, Sand, Stone” (approx. 0.3m thick) were encountered at similar depth beneath the superficial sand and gravel unit.

In summary, it is suspected that observation boreholes TG32/815a, TG32/815b and TG32/815c were constructed to monitor the water levels in the sand and gravel above the clay layer rather than the Crag from which at least the majority of the abstraction takes place. It therefore appears plausible that these observation boreholes do not show any noticeable response to the short-term pumping events at Plumsgate Road.

Observation borehole TG32/815d is about 100m from to the Plumsgate Road abstraction borehole and probably at a just slightly lower elevation. The base of TG32/815d is at about -4.5mAOD but the borehole did not encounter the clay layer that was found in the Plumsgate Road abstraction borehole. This may indicate that the clay layer is thinner in this location and this would explain why the hydrograph for TG32/815d shows some drawdown response.

Section 7.2.2 Ludham Road

Since the estimated impacts from abstraction at observation borehole TG32/801 in the shallow Crag unit have been in the order of 2-6cm only, any impacts in the dykes connected to the shallow Crag would be less than that and unlikely to be detectable due to the larger distance from the abstraction and the large storage in the dyke system.

The dykes connected to the shallow Crag would be expected to show responses to impacts from abstraction on the upper Crag unit before any impacts would become apparent on the groundwater table in the peat at the fen surface.

Taken the above into account, we agree with the report that the water level observation data for the dipwells and dykes do not show any response to the Alston Ludham Road abstraction. In addition, we agree that no impact can be observed in the water level data for the Crag observation boreholes in the NW corner of the fen.

Section 7.3 AWS Ludham
The analysis of impacts from abstraction at the AWS Ludham source based on observed data for the period 1996-2011 and signal testing in 2002, 2003 and 2007 has various limitations. The abstraction started in 1973 and has been operating continuously at different rates since then. Therefore, any abstraction impacts will have become part of the 'background' conditions. There is no pre-1973 monitoring data available that would allow a comparison with the more recent water levels. During the signal tests it was also not possible to switch off the abstraction completely to see the full recovery of water levels, which would have indicated the full scale of impact.

The signal tests were based on a slight increase in abstraction rate over a limited period of time. These time periods may not have been long enough to show the full impact from abstraction in the middle/basal Crag unit propagated up into in the upper Crag unit and the fen deposits.

We think that the introduction of groundwater modelling results from the Environment Agency's Habitats Directive Review of Consents work for the Ant Broads & Marshes SSSI in the context of this report is problematic. It would require further information on this modelling work to be included to allow readers to evaluate and appreciate the results appropriately. We understand that this report was intended to evaluate observations and field data in the context of actual historical abstraction rather than to assess the theoretical impacts by using models or other analytical tools.

Section 7.4 Overton Abstraction
Page 62, last paragraph: Licence 7/34/10/*G/111 allows abstraction in the period **April** to September rather than March to September as stated in the report.

AMEC added - this point corrected in the text

We agree that abstraction under the Overton licence is unlikely to have resulted in any discernible impact on water levels at the fen.

Section 8 Possible Reasons for the Fen Drying Out
We think the report draws together the different plausible mechanisms that may have contributed to the fen drying out.

We agree that the following mechanisms may, in principle, have contributed to the fen drying out:

- effects of groundwater abstraction
- overflow of dyke water over the low-lying bund at the southern end of the internal system
- leakage through sluices
- changes in water management

- terrestrialisation leading to infilling of former pond areas and general rise in ground surface (including the cessation of former fen management practice of “turfing out”).

The report is restricted to the information and data available and, therefore, there remain uncertainties about the quantitative contribution of each mechanism.

Based on the data collated for this report, there appears to be no evidence in the form of long-term declining water level measurements that would concur with the perception that the fen has been drying out for some time which is mainly based on anecdotal and ecological evidence. However, the current water level monitoring was installed in stages from 1996 onwards and, hence, the water level records available do not capture any changes that may have occurred before 1996.

We agree that the drawdown effect caused by the Ludham PWS source may be relatively widespread since it has been abstracting continuously, although at varying abstraction rates, since 1973. The current monitoring cannot capture the total impact of this abstraction unless the abstraction is switched off completely in a long-term test until full water level recovery has occurred.

We agree that the Alston Ludham Road abstraction appears to cause small drawdown effects of a few centimetres in the upper Crag unit near to the fen at Church Wood about 500m distant from the abstraction. These drawdowns recover immediately after cessation of pumping. Any drawdown effects on water levels in the dykes and in the near surface deposits at the fen itself are likely to be less. We feel that it is unlikely that these small, short-lived drawdown effects are ecologically significant for the fen, especially in view of the natural water level variations in response to rainfall and evapotranspiration. However, the judgement of the ecological significance is outside of our area of expertise.

Although we do not entirely agree with the approach used to derive theoretical drawdowns as commented on in Section 7.2.1, we agree that, based on the drawdowns observed within 320m from the Alston Plumsgate Road abstraction, any drawdown impacts in dykes and at the groundwater table at the fen closest to the Plumsgate Road abstraction are likely to be in the order of millimetres, if at all noticeable. As above, we feel that it is unlikely that these small, short-lived drawdown effects are ecologically significant for the fen, especially in view of the natural water level variations in response to rainfall and evapotranspiration.

Section 9 Conclusions and Recommendations

The conclusions have been commented on in more detail in previous sections.

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Dear Dr Haines

Catfield Fen – invitation to comment

Thank you for your email dated 11 May 2012 asking for my comments on areas of agreement and disagreement with Dr Mason's revised report (the Report). I have not attempted a line by line analysis, which I could if you would be interested, but have restricted myself to commenting on Section 9 – Conclusions and Recommendations. My most important area of disagreement is that the Report does not recommend any action now, other than further monitoring study etc. To me ACTION now in terms of restricting abstraction immediately, is imperative under the precautionary principle in view of the following:

- It is accepted that Catfield Fen, an SSSI and RAMSAR site of international importance, is drying out
- We first voiced concerns about this four years ago
- The Mason Report in 2010 recommended further monitoring - but very little happened
- Any analysis of the Report confirms that abstraction is by far the most likely suspect

Possible causes of Drying (Sections 8.3 and 9 – Conclusions and Recommendations)

These are accepted to be:
1. Effects of ground water abstraction – see 1
2. Overflow of dyke over the low lying Southern Bund – see 2
3. Leakage through sluices – see 3
4. Changes in water management – see 4
5. Process of terrestrialisation leading to general rise in ground surface – see 5

Our main contention is that objective, critical analysis of all of the above except abstraction, shows them to be most unlikely to be a significant cause of the drying which is killing Catfield Fen.

1. Abstraction

The following aspects of the Report are <u>not</u> agreed:

i. Too little attention is given to the potential effect of irrigation in the critical Summer months – irrigation is consistently downplayed in all of Dr Mason's analysis.

ii. Dr Mason does not consider / analyse the size of the water catchment area of Catfield Fen nor the likely disruptive effect of any cones of depression on the lateral movement of water to the Fen. A further serious drawback of the Report is that there are no reliable historical records of crag water levels.

iii. The deficiencies and inadequacies of the data are glossed over or given inadequate emphasis - in particular:

- Dr Mason does not analyse whether or to what extent an immediate measurable effect from abstraction could be expected in a complex site such as Catfield Fen
- the original test data, which has suddenly appeared in Dr Mason's final Report, is deeply suspect
- the monitoring devices either have not worked or are in the wrong places - this is particularly relevant to the Plumsgate Road site
- Dr Mason quotes from but does not analyse the EA's modeling record at Catfield, for which the interpretation has changed radically in recent years in that the estimated effect of abstraction has been reduced drastically. Why? On what new evidence?

Overall Dr Mason's definite conclusions on both Plumsgate and Ludham Roads are not considered to be merited by the evidence and are not accepted.

2. Overflow of Dyke over the low lying Southern Bund

It is considered that this item is given too much emphasis in the Report because:

i. there is no evidence that this is a new issue
ii. all the evidence suggests that it represents an "overflow" from the internal system not a "leak"
iii. the recent requests to open the sluices (late May 2012) confirms this analysis

It is inconsistent to argue for the sluices to be opened in late Spring while at the same time arguing that the Southern Bund is reducing the water holding capacity of the inner system after Winter.

3. Leakage through sluices

It is agreed that some minor leakage is possible but it is understood that nobody is claiming this is a major issue.

4. Changes in Water Management

This part of the Report is just plain wrong in stating that "the reason keeping the sluices largely closed is to prevent Broad water from entering the internal system". The main reason is to keep water in the internal system as is made clear in the Water Management Agreement drawn up with and monitored by Natural England.

It is incongruous and unbalanced that Dr Mason has not discussed water management with the people most involved in and responsible for it over the last twenty five years, if he wanted to include this topic in his Report.

Dr Mason also does not comment on or otherwise highlight the inconsistency that the main complaint against current management practice is that it attempts to hold up water in the internal system in Spring whereas the marsh men, like Andy Hewitt, say they would like it let out so that they can cut sedge. It is difficult to argue that the Southern Bund is reducing the water holding capacity in the internal system after the Winter, when this is exactly what opening the sluices in May would achieve!

Again, it is inconsistent to argue for the sluices to be opened in late Spring while at the same time arguing that the Southern Bund is reducing the water holding capacity of the inner system after Winter.

This whole section of the Report is based on a false premise and needs redrafting.

5. Process of terrestrialisation leading to general rise in ground surface

This is not accepted as potentially a significant cause because:

- Dr Mason produces no evidence of any measurable change in levels in his Report
- management practices on the Catfield Hall Estate can be demonstrated to have been consistent for many years with the clearing and removing of scrub and litter buildup
- the levels of the dykes cannot be affected by terrestrialisation

Yours sincerely

Tim Harris

cc Natural England **-** Sarah Wilson / sarah.wilson@naturalengland.org.uk
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Date: 31 May 2012
Our ref: 53934_EA Catfield Fen Investigation
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Dear Jonathan

Case name: Environment Agency Catfield Fen Hydrological Investigation

Thank you for sending Natural England the final draft report 'Catfield Fen Investigation, 5th April 2012', and for giving us the opportunity to provide final written comments. Thank you also for the opportunity to discuss the report again with the author, Dr Mason, on the 23rd April 2012.

Section 3 Overview of Catfield Fen and its setting

Natural England is not aware of any additional or conflicting information in this section. We are therefore happy with its content.

Section 4 Geology

Natural England agrees that the understanding of the system is made more complex by variations in geology and the variable extent of clay layers within fen deposits and crag. We note the presence of two clay layers within the fen and agree that the evidence indicates groundwater influences at the eastern side of Catfield Fen, influencing some areas of the fen and the dyke system. We are not aware of any additional or conflicting information.

Section 5 Hydrology and hydrogeology

We agree that, overall, rainfall is the dominant input of water to the fen and that groundwater is a minor input, if important locally, in particular at the eastern side of the fen.

We agree that there is significant ground water input into the dykes from the edges of the fen, which is likely to influence water levels within the network of dykes. We also agree that, as a consequence, changes in groundwater levels are likely to affect dyke water levels.

The new data presented on the regional hydrological setting (5.4.2) provides an interesting context for longer term water level behaviour on Catfield Fen. We agree that changes in levels of Barton Broad on a weekly / monthly to longer term basis (rather than daily) appear to influence levels across the fen system as a whole. This is demonstrated by the similar water level patterns in Figure E37 and the apparent lag between changes in levels in the Broad and within the Fen. This combination of factors may provide part of an explanation for changes in the overall wetness or dryness of the fen over a period of several years.

We agree that the low bund towards the southern end of the internal system is an important factor for water levels in the fen, primarily in controlling the maximum water levels and therefore the amount of water that can be stored in the internal system. There is no evidence at present to suggest that the level of this bund has become lower and thus reduced water storage capacity. However, this is something that could be monitored in future. It may also be interesting to analyse whether rainfall patterns have changed over the years, and whether this may have affected water availability in the fen (given that more intense periods of rainfall are likely to lead to overtopping of the bund).

We agree that it is likely that there is some leakage from the internal system, for example at sluices and possibly through the Rond. However, this may not be significant in terms of the overall water balance of the fen, and there is no evidence to suggest that leakage rates have increased over time. It is therefore difficult to conclude that this is a significant factor in the drying out of the fen.

Section 6 Licensed abstraction

We agree that Simply Strawberries and Mr Harris's abstraction licences are not considered to have an impact on Catfield Fen, especially as the latter is not used, and can therefore be screened out from this analysis.

Section 7 Impacts of licensed abstraction

We note that the data from the monitoring boreholes in relation to the Plumsgate Road abstraction have been re-analysed, and that there is more confidence in the data coming from TG32/815 a, b and c, in particular their apparent lack of responsiveness. In assessing this data we agree with the conclusion that the Plumsgate Road abstraction is not having a discernable impact on Catfield Fen. However, the potential impacts of this abstraction on Sutton Fen will need to be considered separately as part of the renewal of the abstraction licence.

We agree that Mr Alston's Ludham Road abstraction may have an impact on Catfield Fen. It is unlikely to be causing long term drying out of the fen because of the short term nature of the abstraction and the rapid recovery of water levels in the Crag when the pumps are turned off. However, as the abstraction inevitably takes place during dry periods there is the potential for short term impacts on water levels in the dykes, if only a few centimetres, which may add to the stress on wetland plant species within the fen. We therefore agree that it is currently unclear what the overall impact of this abstraction may be on the fen.

We agree that the Anglian Water PWS abstraction at Ludham may be a factor in long term reduction of water levels in the Crag beneath the fen and that the impact of this abstraction needs reviewing.

Section 8 possible reasons for drying out

We agree that there are likely to be a number of factors in the apparent drying out of the site. We note the relationship between regional groundwater levels and dyke water levels, with variations

occurring over periods of several years (such as the progressive declines following recharge events in 2001 and 2007). We also note the apparent relationship between levels in Barton Broad and the fen. These factors are likely to influence the long term periodicity in dryness and wetness of the fen.

We agree that controls on water levels within the fen include leakage from the system and the height of the low lying bund, the latter as it controls the maximum water levels within the internal system. There is no evidence that these have changed over time, however, and thus they may not be a factor in the drying out of the fen. Any significant variations in rainfall patterns may be a factor, as may the longer term fluctuations in regional water levels mentioned above.

We agree that abstraction, in particular Mr Alston's Ludham Road abstraction and the Anglian Water PWS abstraction at Ludham may have an impact on the fen. It is our opinion, however, that only the latter may be having a significant long term impact on water levels, with the former only having short term localised impacts.

Natural England agrees that water level management on the site needs to be considered further and will be following this up separately.

Section 9 conclusions and recommendations

Natural England agrees that the site is very complex and we agree with the potential reasons for the fen drying out. It is likely to result from a combination of factors: however, we believe that overflow of dyke water is unlikely to be a factor unless the bund has become lower over time. In addition there is no evidence to suggest that any leakage has increased over time.

We are increasingly of the opinion that a topographic survey is important for understanding this site. It will enable us to see if ground levels are higher towards the eastern side of the fen, and thus whether this is a factor in different levels of dryness across the site. Surveying in gauge boards and also the level of the low lying bund will be important, in combination with levels adjacent to the fen, such as at Fenside. This will help with analysis of water level management options.

We agree that the impacts of abstraction, in particular Mr Alston's Ludham Road abstraction and the Anglian Water PWS abstraction at Ludham, need to be reviewed and appropriate licence changes made via the normal regulatory mechanisms.

For any correspondence or queries relating to this consultation only, please contact Anne Ramsay on 0300 060 4941. For all other correspondence, please contact consultations@naturalengland.org.uk.

We really value your feedback to help us improve the service we offer. We have attached a feedback form to this letter and welcome any comments you might have about our service.

Yours sincerely

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