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Your ref: 18/02687/FULM

4<sup>th</sup> February 2019

#### BY EMAIL ONLY

Dear Alison

**Outline planning permission (with all matters reserved except for means of access) for up to 516 residential units (Class C3) with local centre (Use Classes A1-A4, B1a, C3, D1) public open space with pavilion and associated infrastructure and full application for demolition of existing buildings and structures and creation of ecological protection and enhancement zone.**

Thank you for consulting Yorkshire Wildlife Trust on the above planning application. Yorkshire Wildlife Trust works across the Yorkshire and Humber region managing more than 100 reserves and with a membership of over 43,500. The Trust is the second oldest of the 47 Wildlife Trusts which work in partnership to cover the whole of the UK. The Trust's principal vision is to work for a Yorkshire rich in wildlife, valued and enjoyed by people.

**Yorkshire Wildlife Trust would like to record an objection to the above application.**

Yorkshire Wildlife Trust own and manage Askham Bog SSSI, which is immediately adjacent to the proposed development site. The suggested "Ecological Barrier", for which full planning permission is applied for is just to the north of the SSSI.

The Trust will show that developing a housing estate as proposed to the north of Askham Bog has the potential to adversely impact the designated features of the SSSI. This would be contrary to the Wildlife and Countryside Act 1981, the Countryside and Rights of Way Act 2000 and the National Planning Policy Framework (NPPF) 2018. The site is also in the Green Belt and development would be contrary to Policy GB1 in the emerging York Plan. The site is also not an allocated site for housing or for removal from the Green Belt in the emerging Local Plan for York. The applicants suggest that as the site was put forward by the land owners for the sites consultation by City of York in June 2013 that it should therefore be considered as a suitable site for development. City of York Council consulted on sites put forward by landowners which did





not fail at the first check by council officers, for example if they were in Flood Zone 3 etc. The result of the consultations in 2013, and 2014 was that the site did not go forward in the Draft York Plan in 2016. The reasons the site was not allocated included that the site is in the Green Belt, and also concerns, which were not resolved, that development would affect the hydrology and designated features of Askham Bog SSSI. The site is also not included in the publication version of the York Plan which is now with the Planning Inspectorate.

### Importance of Askham Bog

Askham Bog was first notified as a Site of Special Scientific Interest (SSSI) in 1961 with a revision in 1984. The citation for the SSSI states that:

*"The importance of this site is such that.... it has.... been recognised as an integral part of the national peatland series."*

Askham Bog has been known as an exceptional site for wildlife for over 200 years and has an unparalleled natural history record. Formally, it was first recognised by the Society for the Promotion of Nature Reserves – the forerunner of the Royal Society of Wildlife Trusts, set up by Charles Rothschild in 1912. Rothschild gathered together a series of naturalists across the country to identify the very best sites for nature. Askham bog was one of these sites: see

[https://issuu.com/wildlifetrusts/docs/askham\\_bog\\_rothschild\\_reserve\\_docs\\_final](https://issuu.com/wildlifetrusts/docs/askham_bog_rothschild_reserve_docs_final). The recommendation noted that Askham Bog *"is an area of primitive undrained fox covert, which has a peculiar fauna of its own including various water beetles found nowhere else in Britain"*. The correspondence, dated January 1913, goes on to say that the site *"is so close to York City, it will always be in danger of enclosure and also of destruction by drainage, of itself or of the surrounding districts"*. It was gifted to the Yorkshire Naturalists' Trust in 1946 by Arnold Rowntree and Francis Terry from the two iconic York chocolate companies. The Yorkshire Naturalists' Trust was the former name of the Yorkshire Wildlife Trust, and Askham Bog was the Trust's first reserve and the reason for the formation of the Trust. Askham Bog is therefore of unusual significance in the history of nature conservation in Britain and Yorkshire and the cultural history of the city of York and is especially valued by Yorkshire Wildlife Trust and its nearly 44,000 members.

Askham Bog is probably the most biodiverse site in Yorkshire as a result of the unique position, history, soils, and hydrology of the site. As the ice-sheet retreated at the end of the last glacial period (the Devensian) some 15,000 years ago, the stuttering retreat left long mounds of debris (moraines) at the ice-front. One – the York moraine – now exploited by the A64 and Tadcaster Road in York, dammed the local landscape to form a lake which developed in a fold in the glacial moraine where Askham Bog is situated. The lake gradually filled with peat over 10,000 years. The glacial moraine to the south, approximately where the A64 is situated, has a calcareous character and water draining from the moraine is alkaline, leading to the development of base-rich fen communities at the margins of the SSSI. By contrast the peat in the centre of the reserve is acidic and mainly fed by rain water giving strong alkalinity gradients within the site. Peat extraction from Roman to mediaeval times further changed the habitats on the bog with ditches (some of which survive to this day) being dug and bare peat being present. The combination of a range of soil types, the variation from alkaline to acidic conditions, and the history of human management of the site have led to





a very wide range of plant species and animals that depend upon the varied habitats on the reserve (see **Appendix 1**).<sup>1</sup> The habitats of the bog are therefore irreplaceable.

The site is also important for the record it provides of past environments. Most of the peat-bogs that formed in the Vale of York were long cut-away for fuel (e.g. the Knavesmire in York has turbary (peat-cutting) rights for local commoners though no peat remains). As such, a lack of suitable coring locations means knowledge of long-term environmental change in the Vale of York is very limited compared to other areas such as the Humberhead Levels to the south. Askham Bog has provided the best evidence available for how the vegetation and local environment of our region has changed over the past 15,000 years. For instance, the bog provides rare direct evidence of use for mediaeval hemp retting (i.e. the preparation of rope and other fibres from stems of hemp *Cannabis sativa*) in shallow ponds on the bog surface.

Since the early 19<sup>th</sup> century Askham Bog has provided a valuable resource for a wide range of research by many environmental scientists. See **Appendix 4** for more detail of how the unique features of Askham Bog have supported research within Yorkshire.

Many of the species that have declined markedly in Britain are wetland species reflecting widespread drainage for agriculture. Askham Bog SSSI provides a sanctuary for some of the rarest wetland wildlife in Britain, hence its SSSI status. Fragmented wetland sites such as Askham Bog are exceptionally sensitive to disturbance. At Askham the unique wildlife is a combination of the natural features (a lowland raised bog), mediaeval peat cutting and also the relationship of the bog to the immediate landscape (the moraine to the south and the fields of Moor Lane to the north). Therefore Askham Bog is even more sensitive than other wetland sites. Askham Bog SSSI, and wetlands in the UK are a precious resource and are also very vulnerable to a wide variety of impacts. Changing climate has potential to lead to drier summers and less predictable rainfall further reducing the resilience of the site. Fragmentation and dislocation of wetlands from their catchment and from the lagg zone<sup>2</sup> can lead to the drying out and loss of important sites.

Since the last glacial period, the world's bogs have helped cool our climate. Poor land use is recognised by scientists as the biggest risk to this 'climate-cooling' function. The UK's peat bogs store far more carbon than all UK vegetation and ensuring that bogs are conserved (and degraded bogs restored) is a key component of the UK's attempts to tackle global climate change. As peat dries out it degrades and releases carbon dioxide. Giving planning permission for a housing estate near Askham Bog risks increasing carbon dioxide emissions.

<sup>1</sup> Fitter AH, Smith CJ (1979). *A Wood in Ascum: a Study in Wetland Conservation. Askham Bog 1879-1979*. 164 pp. York, Ebor Press and Yorkshire Naturalists' Trust

<sup>2</sup> This is the very wet **zone** on the perimeter of peatland or a bog where water from the adjacent upland collects and flows slowly around the main peat mass.





## Reasons for the Yorkshire Wildlife Trust's objection.

The Trust has four major areas of concern about the effect of the proposed development on Askham Bog SSSI nature reserve:

- **Impacts on Hydrology.**
- **Isolation of the reserve from the surrounding countryside.**
- **Damage and disturbance due to the proximity of housing.**
- **Impacts due to changes in air quality.**

The Trust also has specific comments on the full planning application for “demolition of existing buildings and structures and creation of ecological protection and enhancement zone”.

### Impacts on Hydrology.

There are a wide range of potential hydrological impacts on Askham Bog SSSI as a result of the proposed development. The most important is that the Trust does not accept the statements that Askham Bog depends to a critical extent on rainwater and not on ground or surface waters from the surrounding land<sup>3</sup> and that there is no surface water or groundwater hydraulic connectivity between the site and Askham Bog<sup>4</sup>. A technical analysis of the claims in the submission that are provided as evidence for these conclusions is given in **Appendix 2**, which demonstrates that the evidence base provided is seriously inadequate. The Trust has detailed evidence from four years of frequent recording of water table data that demonstrates that this hydrological continuity exists (see **Appendix 3**). In dry conditions lower water levels in Holgate Beck leads to water being drawn from Askham Bog into the beck, with consequent drying of the surface peat and severe damage to the wetland habitats. In wetter conditions, the beck floods causing eutrophic flooding of water onto the site. *Carex elongata* the rare gingerbread sedge which has its Yorkshire stronghold at Askham bog and is part of the designated features of the SSSI<sup>5</sup> relies on winter flooding of the wet woodland<sup>6</sup> at the west of the reserve. Alterations to local hydrology, for example as suggested in the PBA Hydrology report<sup>7</sup> by reducing runoff from the development site and hence lowering water levels in Holgate Beck, will affect *Carex elongata*. Conditions at the north of the SSSI are already far from ideal with eutrophication of Holgate Beck waters from surrounding farmland and the sewage works and the loss of the original lagg fen (surrounding wetland) from the raised bog site. There is clearly a very strong relationship between the catchment hydrology and peatland hydrology.

<sup>3</sup> Environmental Statement, Non-technical summary, 9.6; Environmental Statement Chapter 12, 12.4; Appendix 12.1, p.1; Appendix 12, Technical Note, pp. 97-98.

<sup>4</sup> ES Chapter 12, 12.10, 12.36; App. 12.1, 3.4; Technical Note, pp97-98, 99.

<sup>5</sup>

<https://designatedsites.naturalengland.org.uk/SiteDetail.aspx?SiteCode=S1000196&SiteName=Askham%20Bog&countyCode=&responsiblePerson=&SeaArea=&IFCAAarea=> accessed January 2019

<sup>6</sup> <http://sppaccounts.bsbi.org/content/carex-elongata-0.html> accessed January 2019

<sup>7</sup> Environmental Statement Volume 2 Main Text at paragraph 5.67





We also note:

- No modelling is provided of the effect of changes in the movement of surface water on the site and resultant impacts on the bog. The suggested changes and rerouting of ditches within the development site are very extensive and must have an effect on catchment hydrology and therefore will impact on the fragile state of Askham Bog itself.
- Runoff will be diverted from the development site and will not go into Holgate Beck but into the attenuation ponds. The suggested attenuation ponds within the buffer zone will increase evaporation. The ponds appear to be about 50cm deep in normal conditions and will dry out at times of low rainfall. The effect of this in dry periods has not been modelled and is likely to lead to lower water levels in Holgate Beck and potential changes in water quality.
- No conceptual model is provided of how the whole site works hydrologically and hence the impact of major changes.
- There is no analysis provided of how the ecology of Askham Bog SSSI is affected by the hydrology of the site. Areas which will be sensitive to changes in hydrology to dryer or wetter conditions are not considered.
- The importance of winter recharge and flooding to raise ground water levels in the bog, and also reduce growth of plants such as nettles which can shade out rarer plants has not been considered.
- Impacts of less predictable weather patterns due to climate change. The ES at 12.36 states: *“The connectivity between the watercourses has been validated through a review of water levels and water quality data observed over a 13 month monitoring period and it indicates that under ‘normal’ (our emphasis) flow conditions there is no continuity between surface water flows at the site/Askham Bog Drain and the Askham Bogs.”* The data for the PBA 2014 Hydrology Report has only been collected during “average or normal” years. However according to Met Office data<sup>8</sup> the North East region of the UK in 2018 had the 14<sup>th</sup> driest summer since 1873. If there are more frequent dry summers as predicted due to climate change<sup>9</sup>, wetland and bog habitats will be increasingly vulnerable. This is demonstrated by the detailed hydrological records that the Trust has from the extreme drought year of 1976, when water levels were >0.5 m below the Bog surface. Weather extremes are becoming more common and 2012, a year for which no data is provided, was ranked as the 146<sup>th</sup> wettest year since 1873. Increasingly unpredictable weather will have impacts on wetland areas and any changes in the drainage of the Holgate Beck catchment due to the development can only exacerbate this.
- The data only covers ‘normal’ years but even for such years measurements were only taken monthly and there are numerous gaps in the data (see **Appendix 2**). There was not continuous electronic

<sup>8</sup> See <https://www.metoffice.gov.uk/hadobs/hadukp/data/download.html> accessed 14/01/2019

<sup>9</sup> See for example <https://blog.metoffice.gov.uk/2018/07/27/summer-temperature-2018-the-new-normal/> accessed 4/02/2019





monitoring which would be best practice. A further problem is that vandalism of gauge boards GB 14/07 and GB 14/13 occurred in July and August 2015 so that there are no data after those times.<sup>10</sup> These gauge boards were in Holgate Beck at either end of Askham Bog reserve and therefore critical for the analysis.

### Isolation of the reserve from the surrounding countryside.

Askham Bog SSSI is already surrounded on all sides by a variety of developments which have the effect of cutting the reserve off from nearby open areas and semi natural habitats. For example to the south the A64 is 66 metres away, the East Coast mainline varies from immediately adjacent at the north of the site to 290 metres away at the centre of the reserve, the Askham Bar Park and Ride is less than 40 metres away at its closest point. The Pike Hills golf course is immediately adjacent to the reserve to the south west and part of the north of the site. The A1237 outer ring road is 398 metres from the reserve at its closest point. The open area between Moor Lane and the housing at Woodthorpe is at a minimum 466 metres to the north varying to 891 metres further west. See Figure 1 below for further detail of surrounding land use constraints. The development of housing in the one area where the reserve has some connection to the wider countryside will be totally contrary to all recommendations for conserving and improving biodiversity. One of the most influential reports in recent years is *Making Space for Nature* chaired by Professor Sir John Lawton<sup>11</sup> and this is also reiterated in the NPPF<sup>12</sup> paragraph 174 and 175. Sites which are isolated from surrounding habitats are destined to slowly deteriorate.<sup>1314</sup>

<sup>10</sup> PBA Technical Note from 29<sup>th</sup> October 2015

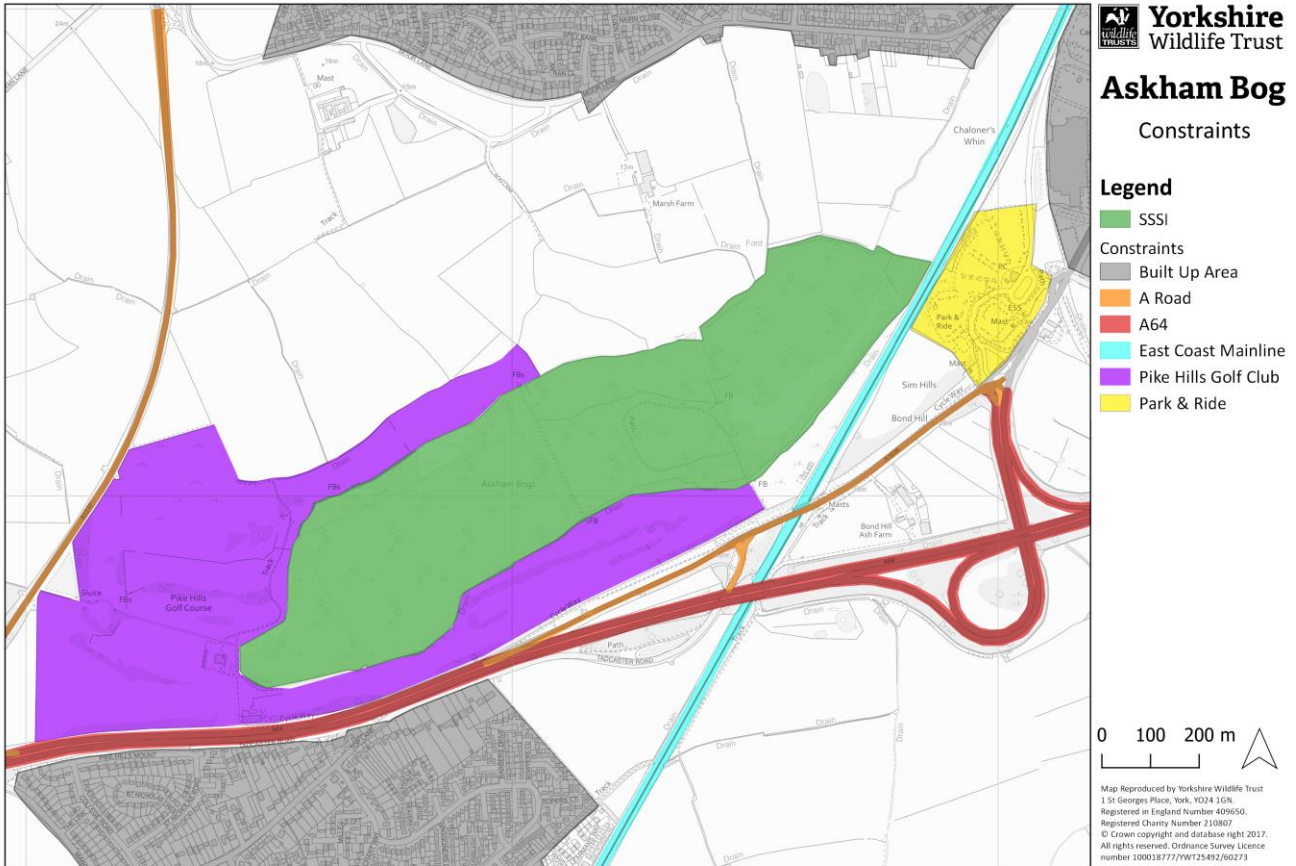
<sup>11</sup> J.H., Lawton et al (2010). *Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network*.

<sup>12</sup> Accessed January 2019 <https://www.gov.uk/government/collections/revised-national-planning-policy-framework>

<sup>13</sup> J.H., Lawton et al (2010). *Making Space for Nature: A Review of England's Wildlife Sites and Ecological Network*.

<sup>14</sup> Counsell, D. & Stoneman, R. (2018) *Planning, Sustainability and Nature*. Lund Humphries.





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Love Yorkshire, Love Wildlife

Figure 1 Showing the developments around Askham Bog SSSI nature reserve.

The proposed ‘impenetrable barrier’ (see below in terms of its effectiveness) is potentially a welcome approach to mitigate against the inevitable issues related to situating housing (and linked cats, dogs, rats and humans) next to such a sensitive site. Yet such a barrier – fencing, scrub and ponds – creates yet another disconnection between Askham Bog and its catchment. The wildlife of Askham Bog is dependent on its connection to its wider catchment, both in terms of hydrology – water quality and quantity, and the movement of plants and animals between the reserve and its catchment. The proposed ‘impenetrable barrier’ that the developers suggest will mitigate enhanced disturbance will, in so far as it is effective, merely exacerbate the isolation of the SSSI from the surrounding landscape. It is not feasible to resolve the inevitable conflict between restricting unauthorised access and maintaining an open boundary for wildlife: addressing one problem will always make the other worse.

It has been the long-held view of Yorkshire Wildlife Trust that a secure future for Askham Bog requires an expansion of the reserve into the wider catchment. Clearly, given current surrounding land-use, this is a very





long-term aspiration but as sites like Askham Bog are increasingly recognised by society as unique and immensely important for health and well-being and the wildlife they contain, we believe that funding will eventually be forthcoming to purchase surrounding land and to renaturalise that land to create a better functional setting for Askham Bog. Whilst such an aspiration is difficult to detail in a Local Plan, it is encouraging that surrounding land is designated as Green Belt in the emerging Local Plan to stop urban sprawl and enable such aspirations to stay in place. Planning permission for housing would of course make such aspirations untenable condemning this unique site to inevitable ecological degradation.

### Damage and disturbance due to the proximity of housing

Yorkshire Wildlife Trust analysed damage and disturbance on our reserves and compared the amount of damage and disturbance and the distance of development from our reserves. A paper<sup>15</sup> published in the journal of the Chartered Institute of Ecological and Environmental Managers (CIEEM) in 2017 showed that there were a wide range of types of impact on our reserves and these impacts increased the nearer developments were to our reserves. Despite the proposed barrier a greatly increased population to the north of Askham Bog reserve is bound to have deleterious effects on the reserve. See below for specific comments on the ecological protection and enhancement zone.

### Impacts due to changes in air quality.

Askham Bog SSSI is already experiencing nitrogen deposition in excess of the critical load<sup>16</sup> because of diffuse pollution and because it is so close to several main transport routes. Fens and wetlands which are stressed due to lowered water tables are known to be particularly vulnerable to extra nitrogen deposition and there is documented evidence for this concern from Askham Bog.<sup>17,18</sup> Introducing a new housing estate which will lead to increased traffic on surrounding roads and within the estate with a potential for up to 2000 more cars in the area will have further deleterious impacts which has not been modelled adequately by the developers.

<sup>15</sup> Rylatt F, Garside L, Robin S, (2017). Human impacts on nature reserves- the influence of nearby settlements. *In practice* 97: 40-45

<sup>16</sup> See <http://www.apis.ac.uk/src/choose-a-site?SiteType=SSSI&submit=Next> accessed 4/2/2019 and Farr, G & Hall, J. (2014). Atmospheric deposition and groundwater dependent wetlands: implications for effective catchment management and future Water Framework Directive groundwater classification in England and Wales. *British Geological Survey*, OR/14/047

<sup>17</sup> Hogg P, Squires P, Fitter AH (1995). Acidification, nitrogen deposition and rapid vegetational change in a small valley mire. *Biological Conservation* 71: 143-153

<sup>18</sup> Caporn, S., et al 2016. Assessing the effects of small increments of atmospheric nitrogen deposition (above the critical load) on seminatural habitats of conservation importance. *Natural England Commissioned Reports*, Number 210.







**Specific comments on the full planning application for demolition of existing buildings and structures and creation of ecological protection and enhancement zone.**

**Demolition of existing buildings and structures at Marsh Farm.** The Trust is concerned that there will be impacts on bats from the proposal to demolish all the buildings at Marsh Farm. The buildings are said to provide negligible opportunities for roosting bats and this is possibly true of the warehouse type buildings. However there is no detailed plan of the buildings, and little photographic evidence for the conclusion that there is negligible opportunities for bat roosts in any of the buildings. The farm house could not be accessed internally and there does not appear to have been an assessment of the possibility of bats roosting under tiles on the farmhouse roof or the brick built outbuildings. Or whether any buildings are suitable for hibernating bats. Also the recording of use of the site using Anabat recorders did not include the area around Marsh Farm.<sup>19</sup> Sparrows were noted going in and out of the roof space and similar access would be possible for bats. **The Trust is of the opinion that emergence surveys between late April and the end of August should be carried out before the buildings are considered for demolition.**

**Ecological protection and enhancement zone (EPEZ).** The Trust has a wide range of concerns about both the function and design of the EPEZ.

- Part of the EPEZ contains attenuation ponds as a wet barrier to deter domestic animals, in particular cats, from accessing Askham Bog SSSI. However the ponds will dry out in summer and will then not operate as a barrier (see comments in the hydrology section). Such shallow ponds will also rapidly fill in as a result of natural processes of ecological succession and would require frequent dredging in perpetuity. The Trust would not, however, be in favour of deeper ponds as this would further exacerbate the hydrological impacts.
- The wet barrier cannot be in place to the east of the site on land which is historical landfill.
- The EPEZ will only be along part of the northern boundary of the reserve and therefore access for domestic animals for example will still be possible at the western end of the barrier.
- The EPEZ is designed with gaps for access by the Internal Drainage Board so the reserve will be accessible at these points.
- The EPEZ will need to be maintained and in place in perpetuity if it is to provide a protective function for the reserve. However, the experience of the Trust is that fences, gates etc are nearly always damaged or removed over time when close to housing<sup>20</sup>.
- The erosion of agricultural topsoil from the bund could lead to the runoff of agricultural chemicals and eutrophication of the attenuation ponds or Holgate Beck.
- The growth of trees and shrubs will take a number of years, and during that time the earth of the bund will not be stabilised. During heavy rainfall this could lead to sedimentation of the ponds and Holgate Beck. Unless continually managed, the planting will eventually turn into woodland and no longer provide a barrier.

<sup>19</sup> Bat survey EDP 7 and Plan EDP 8 in Appendix 9.1

<sup>20</sup> Rylatt F, Garside L, Robin S, (2017). Human impacts on nature reserves- the influence of nearby settlements. *Inpractice* 97: 40-45





- The EPEZ will impact the reserve as mentioned above by further isolating the reserve from the surrounding countryside. For example grazing by deer which move in and out of the reserve can be important for managing habitats in areas of the reserve which are hard to access with grazing animals, woodcock which are found on the reserve and feed on the surrounding farmland at night will be affected.
- The inclusion of a 3 metre security fence and a bund within the EPEZ will have a very major impact on the way the reserve is perceived. At the present time there is a gradual change from the semi natural habitats within the reserve to farmland, with the Holgate Beck, trees and hedges in the transition zone. The imposition of a high security fence and artificial bund will create a very different perception of the reserve as separate, and no longer an area connected to the wider landscape.

**In conclusion Yorkshire Wildlife Trust wishes to record an objection to this application on the grounds that the housing development will be in an unsustainable position and will damage an irreplaceable site. Askham Bog SSSI has a unique assemblage of wildlife and is critically dependant on the hydrology, connectivity to the wider environment, and the protection from damage and disturbance provided by the open area to the north of the bog which will be lost to the proposed development.**

Do get in touch if you need any clarification or further details.

Best wishes

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## Appendix 1

### Askham Bog: biodiversity

Askham Bog is exceptionally rich in species. For its size, it is the most species-rich of all Yorkshire nature reserves (Usher 1979; see **Appendix 4** for references). It has attracted naturalists from all over the UK for nearly 200 years and the documentation on a broad range of taxonomic groups is therefore remarkably rich. National rarities are found amongst the plants, beetles, flies, spiders and moths on the site, and their apparent absence from some groups probably merely reflects the fact that those listed have received most attention.

Extensive lists of the species recorded from the site were given in the book by Fitter and Smith (1979), published to mark the centenary of a detailed survey of the site's biodiversity published in 1879. The long duration and intensity of recording are certainly unique in Yorkshire and in many respects also both nationally and internationally.

#### Plants

Askham Bog's very long plant species list – there were 424 species recorded up to 1979 (Fitter & Smith 1979) and several have been added since then. This species richness results from the presence on the site of a broad range of habitats, including open water, base-rich fen, base-poor fen, fen woodland and acid woodland. What is most striking, however, is that the site represents a meeting ground for geographically disparate plant species. There is a notable group of species characteristic of the East Anglian fens, such as purple small-reed *Calamagrostis canescens*, lesser tussock sedge *Carex appropinquata*, tufted sedge *Carex elata* and marsh fern *Thelypteris palustris*<sup>21</sup>, but in addition a group of species with a strongly western distribution, either north-western (such as royal fern *Osmunda regalis* and bog myrtle or sweet gale *Myrica gale*) or south-western (species such as meadow thistle *Cirsium dissectum* and gingerbread sedge *Carex elongata*). All the species listed above are rare in Yorkshire, and in most cases in all of East England outside East Anglia and the extreme south-east.

The 1979 list shows that historically there was a greater range of plant species present: about a quarter of the list of plants recorded historically appear to be locally extinct. Many of those that have disappeared probably succumbed to the drying out of the bog surface (which was especially pronounced in the mid 20<sup>th</sup> century) or to eutrophication from polluted water and atmospheric nitrogen deposition (a more recent phenomenon). The careful and targeted management regime introduced by the Yorkshire Wildlife Trust from the 1980s on, has led to the re-establishment, possibly from buried seed, of a group of species characteristic of fen habitats that had apparently become locally extinct. Notable re-colonists are the sedges *Carex echinata*, *C. vesicaria* and *C. pseudocyperus*, and perhaps most significantly given its association with the true bog habitats that used to occur at Askham Bog but have been lost, common cotton grass *Eriophorum angustifolium*.

<sup>21</sup> <http://sppaccounts.bsbi.org/content/thelypteris-palustris-1.html> nationally scarce with queries as to habitats.





## Insects

It was the exceptional insect fauna that was the main reason for the early inclusion of Askham Bog on the national list of sites for nature conservation, as early as 1912. In particular, the site was known nationally for the numbers of water beetle species, over half the British list having been recorded there, including many extreme rarities. Unfortunately in the 1950s permission was given by the council for a landfill site at Chaloner's Whin immediately to the north of the reserve. At Chaloner's Whin there were a large number of brick ponds and the infilling reduced the amount of habitat for some species. However if present management regimes and hydrology remain in place there will be opportunities for the reintroduction of some of these very rare species from other sites.

Important recent (post-1999) records include the Near Threatened diving beetle *Agabus uliginosus* and several Nationally Scarce water beetles: *Gyrinus paykulli* (a whirligig beetle), *Hydroporus neglectus* (a diving beetle), *Helophorus strigifrons* and *Helochares punctatus* (both scavenger water beetles). There is also a long list of wetland flies and terrestrial beetles with conservation designations including, for example, the Endangered fenland ground beetle *Philorhizus sigma* which has an important stronghold on the reserve.

Askham Bog has long been renowned for its moth fauna, but again there have been few recent records. Dentated pug *Anticollix sparsata* is still present in what has long been its only Yorkshire site prior to its discovery at a single site in East Yorkshire in 2013.

## Other invertebrates

The spider fauna of Askham Bog includes a number of notable rarities, including the linyphiid *Entelecara omissa* which is of significance because it elsewhere occurs only in the East Anglian fens, a striking parallel with the occurrence of a number of plant species with a similar distribution.

Among Mollusca, Pond Mud Snail *Omphiscola glabra* is globally Near Threatened and a UKBAP Priority Species (=NERC Act Species of Principal Importance).

The Trust commented on the Aquatic Invertebrate Survey by Dave Bentley from 2014 (page 156 Appendix 9.1) during the scoping consultation "The comment "*The surveys have confirmed absence of notable aquatic invertebrates within water bodies surrounding the site (including within Askham Bog)*" is incorrect. One survey in September and October of one year cannot show absence." In addition to this comment September 2014 was a particularly dry month and the invertebrate fauna in October 2014 when the survey was carried out was likely to be impoverished.

## Birds

Although there are no national rarities among the breeding birds, the avifauna is rich. The presence of both marsh tit *Poecile palustris* and the now very scarce willow tit *P. montanus* is notable. Numerous warblers, including reed warbler *Acrocephalus scirpaceus*, breed on the site and there are records of the rarer





Grasshopper warbler *Locustella naevia*. In winter the site is an important feeding location for large flocks of finches.

The breeding bird survey (Annex EDP 6) includes a reference to singing male wood warblers being on the site on 17<sup>th</sup> May 2017 *'Three males were heard singing from willow scrub during the third survey visit, although just one of these within boundary vegetation on the Site itself. 1 pair (up to three over the full study area)'*.

Wood warblers are a rare passage migrant in the York area and a very rare former breeding species in the north of the area. In 2017, there was only one published record from the York recording area, at Dunnington in mid-July (an autumn migrant). Passage birds move through at the end of April, with birds back on their breeding grounds by May. This would suggest these birds were not on passage at this time and were defending territories in completely unsuitable habitat. Without further proof, the record is doubtful and the York Ornithological Club Bird Recorder has been unable to confirm with the consultants that the record is correct.





## Appendix 2.

### Askham Bog: Assessment and critique of PBA hydrology study

Askham Bog depends for its long-term survival on the maintenance of a high water table, especially in spring and early summer. Active management by the Yorkshire Wildlife Trust, especially since about 1980, has been targeted at retaining water on the site, and this has resulted in a notable recovery of some of the more threatened habitat types, including the species-rich fen communities where a number of locally scarce species that had apparently become locally extinct, have recolonized. Any activity which resulted in a reduction in the water table would inevitably lead to severe damage to the site and lead to further losses of species.

In the development application, it is claimed repeatedly that:

1. Askham Bog depends on rainwater and not on ground or surface waters from the surrounding land (e.g Environmental Statement, Non-technical summary, 9.6; Environmental Statement Chapter 12, 12.4; Appendix 12.1, p.1; Appendix 12, Technical Note, pp. 97-98).
2. There is no surface water or groundwater hydraulic connectivity between the site and Askham Bog (e.g. ES Chapter 12, 12.10, 12.36; App. 12.1, 3.4; Technical Note, pp97-98, 99).

The evidence presented in the submission cannot justify these repeated claims.

#### 1 "Askham Bog depends on rainwater and not on ground or surface waters from the surrounding land"

The basis for this claim is stated in Appendix 12.1 (p.1) to be the 2003 Arup Report, which was not reviewed in the submission, as summarised by the 2013 WWT report. That report is, however, explicit in stating that "surface water runoff and groundwater are not the *primary* hydrological input to Askham Bog" (italics added), although no quantitative data are given to support that assessment. In fact the site receives extensive ground and surface water input from the south whereas the central part is predominantly rain-fed. This system is clearly demonstrated by the concentric pattern of peat pH (Fitter & Smith, 1979, Fitter *et al.* 1980; see Appendix 4 for references), with high pH on the margins due to the influence of ground and surface water from moraine deposits, and very low pH (~3) in the raised centre. Peat pH on the northern side is similarly high, showing there must be water infiltration from the Holgate Beck. The much greater abundance of nitrophilous species such as *Urtica dioica* on the north side than on the south also points to a major influence of the eutrophic Holgate Beck water.

This makes hydrological sense as peat can draw groundwater up through capillary action to at least half a metre, so for shallow peat there is a clear hydrological and chemical link between the surface conditions of the peat and groundwater (i.e. the water below the bog). In addition, Ingram (1975)<sup>22</sup> showed that the hydrology of raised bogs (Askham Bog is a cut-over lowland raised bog) is dependent on a ground water

<sup>22</sup> W. Rycroft, D & J. A. Williams, D & A. P. Ingram, H. (1975). The Transmission of Water Through Peat: II. Field Experiments. The Journal of Ecology. 63. 557. 10.2307/2258735.





mound which, whilst created from rainwater (and reflecting water run-off by gravity), sits upon regional water-tables. The shape of the ground water mound (that approximates to the shape of a drop of water on a flat surface) within the peat massif is therefore specifically controlled by the level of water in the surrounding land – if that level is drawn down, the whole ground water mound is inevitably drawn down also, especially towards the edge of the peat massif. Evidence from the detailed hydrological monitoring undertaken on behalf of YWT (see **Appendix 3** for details) demonstrates the existence of this groundwater mound very clearly (see Figure 2).

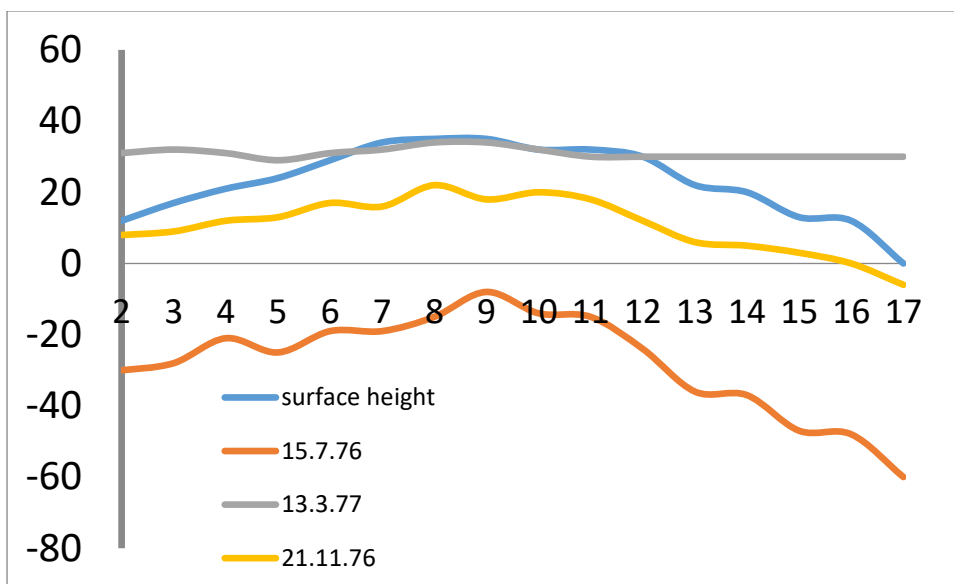


Figure 2. The water table at Askham Bog is domed. Graph shows the surface topography (blue line); the water table at a time when the entire site was under water (13 March 1977; grey line); the water table on a typical early winter date (21 Nov 1976; yellow line); and the water table in high summer (15 July 1976; brown line). Note that in summer the water table is deeper on the north side (pipe 17), adjacent to the Holgate Beck, compared to the south side (pipe 2). Measurements in cm.

Prior to mediaeval peat cutting, the Bog would have been surrounded by the undrained lagg fen typically associated with lowland raised bogs. The lagg fen has long since been drained and replaced with surrounding ditches, and it is the hydrology of the ditches that is now critical. In short, there is a very clear connection between catchment hydrology and bog hydrology.

It is therefore not justifiable to state that “The Askham Bog is reliant on rainfall for water supply rather than surface water runoff or groundwater inputs” (ES, Non-technical Summary, 12.4), or that “Askham Bogs is critically dependent on precipitation for water supply rather than surface water runoff or groundwater inputs” (ES, Ch. 12, 12.30). Both these statements go substantially beyond the evidence and are wrong.





A correct statement about hydrological inputs to Askham Bog would be that the site receives water from rainfall, groundwater infiltration and occasional surface water flooding events, and that sustaining this mix of influences is critical to the integrity of the site.

## 2 “There is no surface water or groundwater hydraulic connectivity between the site and Askham”

There are in fact two separate issues of connectivity that are confounded in the submission. The first is the statement that groundwater and surface water on the development site are not connected. This statement is based on three lines of evidence: (i) groundwater is encountered at different depths across the site and therefore exists as separate lenses (e.g. ES, Chapter 12, 12.31); (ii) groundwater and surface water levels do not change in concert on a seasonal basis (e.g. TN, p. 98); (iii) the chemical composition of surface waters are all similar but the groundwater samples are different from the surface waters and from each other (e.g. App. 12.1, 3.4). The argument is presumably that alterations to the groundwater will not result in any change in surface flows, and that therefore the water level in Holgate Beck, which we show below to be the critical issue, will be unaffected by the development. All these lines of evidence are either open to alternative interpretations or are based on inadequate data (see below).

The more important issue is whether “there is normally limited hydraulic conductivity between Holgate Beck and Askham Beck” (Technical Report, p. 99). [n.b. although the text refers to Askham Beck, it is presumed that this is a typographical error and that Askham Bog is intended]. The Environmental Statement affirms (Non-technical summary, 12.10): “There is no surface water hydrological connectivity between the Site and the SSSI (except) under flood conditions” and “there is no groundwater connectivity between the Site and the SSSI”.

The evidence for these statements is largely from the 14 month period of water level monitoring in a series of boreholes and gauge boards across the site and along the Holgate Beck (Technical Note, pp. 97-98). Two lines of evidence are adduced:

1. “surface water levels in the Bog are generally higher than levels in the Beck nearby, suggesting there is little hydraulic continuity between the Beck and the Bog” (TN, p.98). This finding is unsurprising: as a result of the active management YWT have undertaken to ensure the retention of water on the SSSI, all the water bodies on the site have been isolated from direct flows towards Holgate Beck. Since surface water flows are orders of magnitude greater than groundwater flows, it is inevitable that surface water levels in Askham Bog are higher than those in Holgate Beck, and this finding merely demonstrates the success of the management activity.
2. “When the water level data between adjacent groundwater monitoring boreholes and surface water monitoring locations is compared, the pattern of the data does not indicate that there is direct hydraulic continuity between the surface water and groundwater across the site” (TN, p.98). This statement is made without any supporting analysis and assumes that inspection of the water level graphs (Figs 1-13) will be sufficient. The first ten of these graphs (Figs 1-10) allow comparison of boreholes (groundwater) and adjacent gauge board (surface water) levels. Unfortunately, so much of the data is missing that proper comparisons are only possible in a single case (Fig. 9); in many







cases the majority of the gauge board data points are missing. It is not possible to use such a seriously inadequate data set to support any statements about hydrological continuity.

It is apparent, therefore, that the technical basis of the assertions made in the Environmental Statement is very weak. The Trust has, however, clear evidence that demonstrates that there is hydrological continuity between the SSSI and Holgate Beck, with data demonstrating that groundwater levels on the north side of the Bog are depressed over a distance of at least 50 m when water levels in Holgate Beck fall (see Figure 2 above and Appendix 3).

The critical issue for the conservation of Askham Bog SSSI is that the level and quality of water in Holgate Beck is maintained or enhanced. Flows of water (surface and subsurface) from the development site to the Beck contribute to those variables and no evidence has been provided to demonstrate that the development will do no harm.





## Appendix 3.

### Askham Bog: Analysis of Yorkshire Wildlife Trust hydrological data

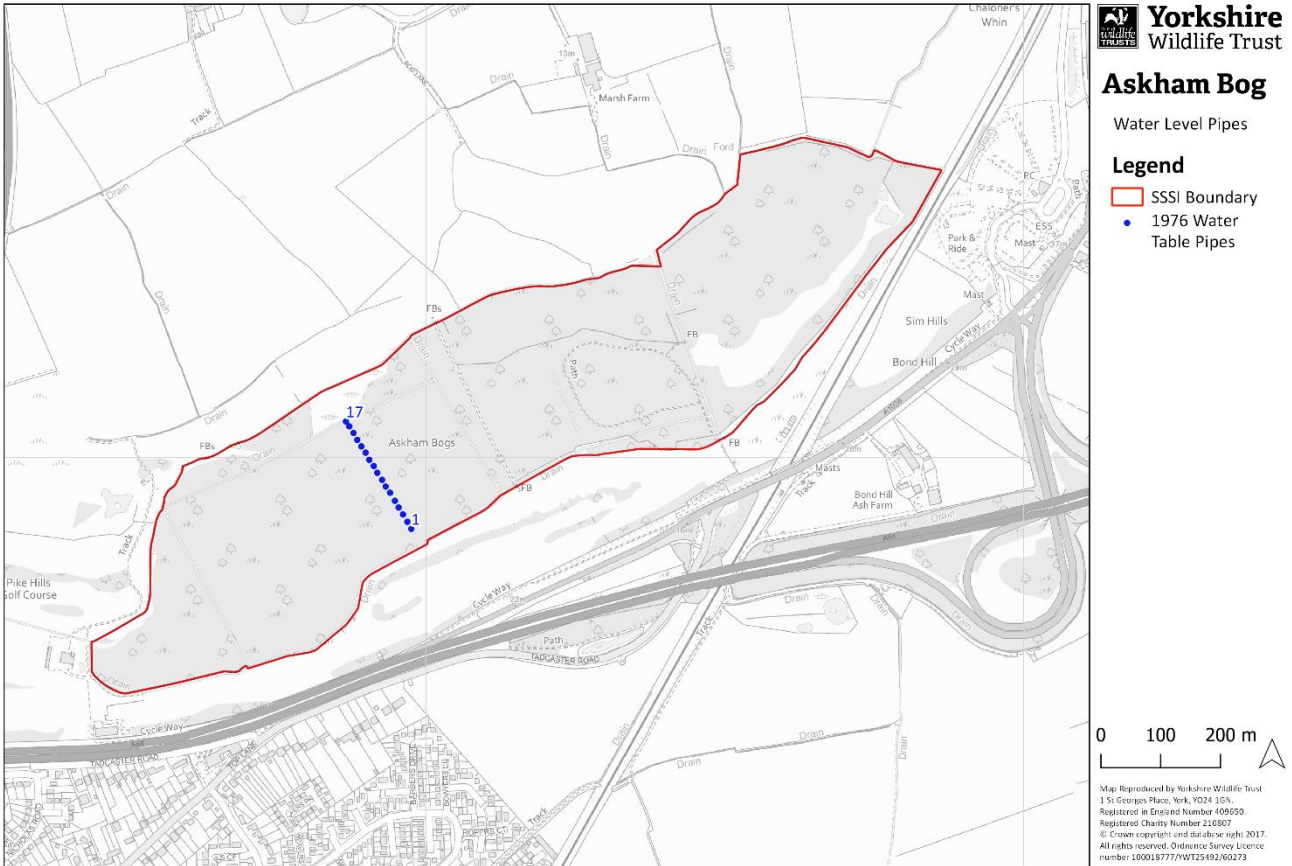
The best hydrological data are from an extensive survey in the 1970s, but they provide a spatially comprehensive picture of the hydrology of the site which is not expected to have changed in fundamental respects in the intervening decades. In this appendix a single example of the analysis of these data is provided as it directly contradicts the conclusions in the Environmental Statement.

Figures 4 and 5 show daily changes in water table depth (cm d<sup>-1</sup>) on 6 consecutive days in January 1976. The data come from a transect of pipes installed at even spacing across Far Wood (see Figure 3 for a map of the position of the pipes), and include data for the South Dyke and Holgate Beck. The pipes were 10-15 m apart. This short time period is revealing as it demonstrates the hydrological connectivity between the bog and the Holgate Beck.

On 1 and 2 January there was heavy rainfall resulting in the water level in Holgate Beck rising by a total of 30 cm over a period of 3 days. The level in the South Dyke, which is dammed and does not flow freely, changed by only 6 cm over the same time, reflecting its much smaller catchment.

Daily changes in the water table in the Bog itself are much greater on the north side, adjacent to the free-flowing Holgate Beck, than on the south. On 3 January in particular, a marked rise in the level of Holgate Beck is accompanied by a similar change in pipes up to 40 m into the Bog (pipes 15-17), showing that not only is the upper peat layer in hydraulic continuity with Holgate Beck, but that the permeability is very high, since the changes are almost immediate. This finding demonstrates that the unsupported assertions in the Environmental Statement, that the Bog is not in hydraulic continuity with the Beck, are incorrect.





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Figure 3. Map showing the location of the water table recording pipes in Far Wood, Askham Bog.



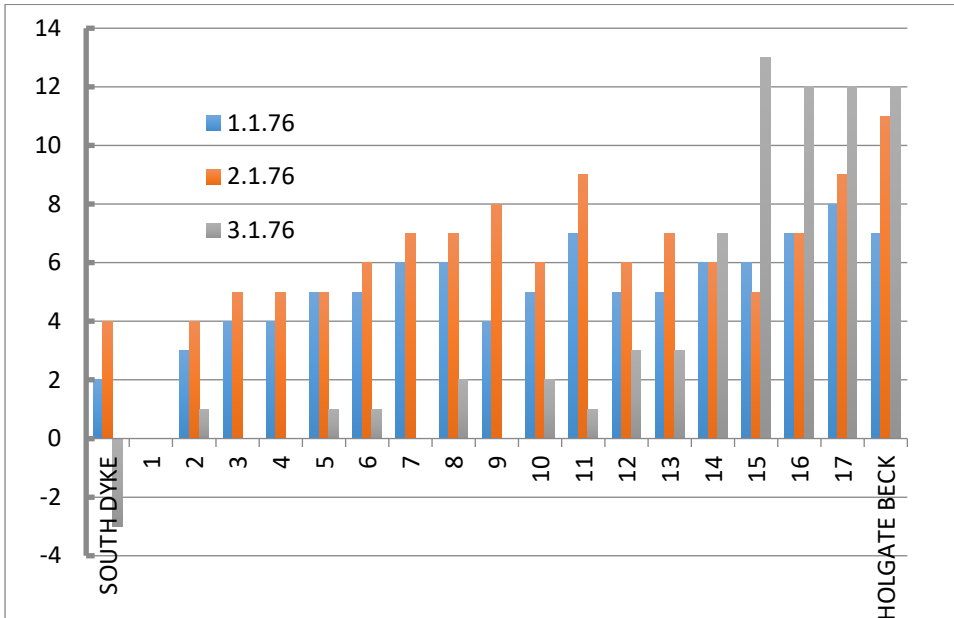


Figure 4. Daily changes in water table (cm d<sup>-1</sup>) along the pipe transect from 1-3 January 1976.

Over the period 4-6 January 1976 there was no further rainfall and water levels in Holgate Beck fell back by 20 cm. On 4 January in particular this fall was accompanied by a rapid decline in water table in pipes 15-17, again stretching about 40 m into the Bog. These data confirm both the hydraulic continuity and the high permeability observed as water levels rose in the previous period.

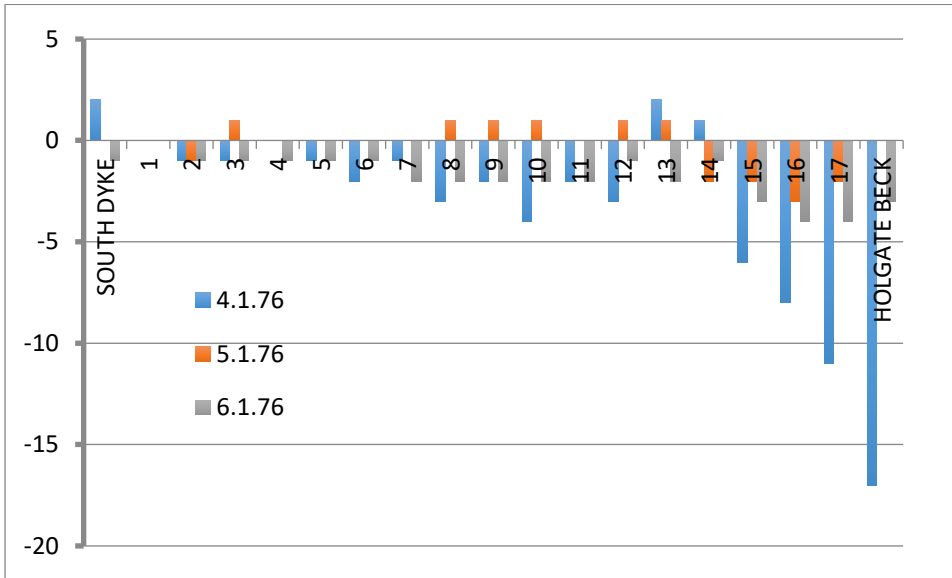


Figure 5. Daily changes in water table (cm d<sup>-1</sup>) along the pipe transect from 4-6 January 1976.

These data from a small part of an extensive series of observations (98 dates) over a period of 4 years from 1974 to 1978. They include periods of extreme low water (summer 1976, when the water table fell to over half a metre below the peat surface) and full flood (February 1977 when the entire site was under water). The data form the evidence base that YWT has used for many years to argue that Askham Bog is exceptionally vulnerable to changes in the amount, timing and quality of water in Holgate Beck, and which demonstrates the need to exercise extreme caution in considering any changes in land use that might disturb the hydrological balance.





## Appendix 4

### Askham Bog as a research and teaching resource

Natural history records at Askham Bog start in 1789 with a record of bog myrtle *Myrica gale*, now once again thriving on the site but rare in the region, followed by records from the first decade of the nineteenth century, some of which, for example water violet *Hottonia palustris*, are preserved as herbarium specimens in the Yorkshire Museum. In addition to the large numbers of visits by naturalists and others in the nineteenth century, many of which are documented in Floras (e.g. Baines 1840; Lees 1888), the staff and students of the Friends' School, York (now Bootham School) visited the site regularly from early in the century, and that interest continues. In 1879 they published a series of articles in *The Natural History Journal*, which were later collated and published as a book. This provides an almost unique baseline from which to measure changes in the flora and fauna of the site. It was to mark that remarkable event that the book *A Wood in Ascum* (Fitter and Smith 1979) was published; the title is a reference to a likely description of the site in the *Domesday Book*.

The first substantial research project at Askham Bog resulted in an MSc thesis by NE Day (1933), which again provides important insights into changes to the Bog since the early nineteenth century. In 1968, JF Handley's MSc thesis was the first to examine the hydrology of the Bog.

From 1972 Askham Bog was used for both research and teaching by ecologists at the University of York. In addition to a series of published papers (see *Bibliography*), there were numerous undergraduate final year project theses produced, and a regular series of undergraduate practical classes which examined the successional processes in the vegetation of Near Wood. All this material has been deposited in the Borthwick Institute for Archives at the University of York and is available for future research programmes.

Another area of research activity has been palaeoecological and palaeoenvironmental investigations, based on the unique status of Askham Bog as the only active deep peat site in the Vale of York. The site offers a distinctive source of information on the historic and prehistoric environments of the area around York.

Research continues. Since 2016 the bog has been part of a global network of wetland monitoring sites investigating the decomposition of plant litter. The bog is also being studied to understand its microbial communities and how they may respond to climate change. Any changes in the bog as a result of nearby development risk undermining this long-term science.

Askham Bog is therefore legitimately an important open air laboratory for the study of wetland ecology and environmental change.





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