

**Broads Lake Review and Hoveton Great Broad (HGB) Restoration Project**  
Report by Director of Planning and Resources

<b>Summary:</b>	The report outlines for Members the key elements of the Hoveton Great Broad Restoration Project which is being led by Natural England. The Project has emerged from the findings of the wider Broads Lake Review which was jointly commissioned by Natural England and the Broads Authority. Natural England are seeking Heritage Lottery Funding and are intending to submit a Life+ funding bid in October 2014.
<b>Recommendation</b>	<p>Members are asked to note the emerging findings of the Broads Lake Review and to:</p> <ul style="list-style-type: none"><li>• support the Hoveton Great Broad Restoration Project and its role in the delivery of objectives in the Authority's Biodiversity and Water Strategy;</li><li>• support Natural England's applications for external funding; and</li><li>• press Natural England to continue discussions with the landowner to see if enhanced public access to the site can be agreed and achieved.</li></ul>

## **1 Background to Broads Lake Review**

- 1.1 The Broads are among the most well studied group of lakes in Europe. A major scientific review of 45 years of lake ecological data has been commissioned by the Broads Authority, Natural England and other partners to help inform future decision making.
- 1.2 Each of the key broads, (including Hoveton Great Broad) are being assessed for current water quality, water plants, fish and water birds and the palaeolimnology (past ecological record) is being set out. There will be an overall analysis of ecological, environmental and management interactions, including an evaluation of climate change on the lakes. The most useful management approaches, constraints on their effectiveness and the most promising avenues for future management will be set out. The review is not yet fully complete.
- 1.3 The Hoveton Great Broad survey element is completed in draft and the overall analysis is due to be completed in Winter 2014. The review will be used to support funding bids for future lake restoration projects, which includes a

proposed Heritage Lottery Fund (HLF) and LIFE+ project for Hoveton Great Broad as well as assessing the options for Hickling (and other) Broad.

- 1.4 The research is being undertaken by Stirling University, University College London, Centre of Ecology and Hydrology, ECON Ecological Consultancy and Dr Geoff Phillips with funding from Broads Authority, Natural England, Environment Agency, Essex & Suffolk Water and Norfolk Wildlife Trust.
- 1.5 In terms of the key findings, the review of restoration techniques in the Broads is not yet complete and this may yet refine understanding of the effects of techniques in different types of broads and the time scales over which they operate. It must also be understood that techniques, such as sediment removal, have rarely been employed in isolation, but rather have been used alongside, following or prior to other methods such as fish removal and external load reduction. Consequently it is difficult to state with high levels of confidence what the effects of a particular form of management will be. However, the following can be stated with certainty and are relevant for Hoveton Great Broad:
  - There is insufficient evidence to demonstrate that sediment removal will significantly reduce Phosphorus (P) release from sediments during the summer compared to unmanaged broads, although it can remove a significant amount of P from the sediment which may have longer term benefits.
  - The absence of fish will result in clear water conditions that will persist for as long as fish can be excluded.
  - Clear water conditions are typically associated with macrophyte dominance in the broads but, after biomanipulation, there is typically a delay of 1-5 years before macrophyte-dominance is achieved. The reasons for this are not fully understood but probably involve propagule bank quality, dispersal limitation, competition from filamentous algae and herbivory by birds and macroinvertebrates.
  - Without any form of management it is very unlikely that Hoveton Great Broad would revert to clear water, macrophyte-dominated state unless there are significant further reductions in riverine nutrients which are unlikely over the next decade. There are no examples of river-connected broads that are currently macrophyte-dominated.
- 1.6 The draft lake review also considers management options for Hickling and notes that several points need to be borne in mind:
  - Hickling is highly responsive to agricultural and drainage management within the catchment of Horsey Mere.
  - External factors which cannot be controlled, such as weather conditions and bird numbers, are likely to influence the effectiveness of any management activities.
  - Macrophytes respond to but also promote changes in environmental variables so underlying mechanisms can prove hard to discern.
  - Although the Lake Review points to several factors or combinations of factors that have probably contributed to the changes in aquatic plants in

Hickling, this cannot be explained with any certainty and consequently confidence in the effectiveness of any particular form of management is low.

1.7 Three main groups of options can be identified, none of which should be considered exclusive:

- Extensification of agriculture in the catchment through conversion of existing arable land to pasture, accompanied by a resumption of higher ditch water levels. Direct benefits are likely to both Horsey and Hickling through reduced iron, phosphorus and salinity inputs.
- Source control of nutrient addition, accompanied by increased freshwater input where possible.
- Sediment removal from a nutrient-reduction perspective sediment removal is unlikely to be effective, as Hickling sediment appears to be a relatively thin layer in many areas and likely to retain little phosphorus under current levels of salinity. Bed stabilisation, propagule bank exposure and increased water depth may all benefit macrophytes directly. The opportunities for bank reclamation and creation of hydraulic refugia (sheltered bays and areas) and habitat complexity appear to offer the most compelling ecological arguments for sediment removal in Hickling.

1.8 It is anticipated that once completed the review will further our understanding of management options.

## **2 Background and Context to Hoveton Great Broad Restoration Project**

2.1 The project covers areas around the margins of the waterbodies of Hoveton Great Broad and Hudson's Bay and around Wroxham Island. Hoveton Great Broad and Hudson's Bay are private broads owned by the Hoveton Estate and there is no public access to the water or surrounding land. They form part of the Bure Marshes National Nature Reserve (NNR) and Natural England is the Project lead partner. Natural England already operates a seasonal nature trail on the southern edge of Hoveton Great Broad, accessed by moorings on the main river. There is a locked gate that gives private access by water from the main river. These two broads are also designated Ramsar, SPA, SAC and SSSI. Wroxham Island is approximately 700 metres long and varies in width to less than 10 metres at some points. Wroxham Broad is in private ownership with public access permitted, it does not form part of the main navigation. There are no habitat designations here and the Island is just outside the Wroxham Conservation Area.

2.2 Natural England intends to facilitate a lake restoration project to improve water quality in Hoveton Great Broad and Hudson's Bay. Both waterbodies are currently assessed to be in an 'unfavourable no change' condition and failing to meet 'good ecological status' as defined under the Water Framework Directive. The two broads have turbid water conditions with a decline in macrophyte (aquatic plant) abundance and diversity from historic conditions; considered to be a result of the high nutrient content of the water. In order to improve water quality, it is proposed to remove nutrient rich sediment from

both broads and biomanipulate<sup>1</sup> the system to 'tip' it back to a clear water, macrophyte-dominated condition.

- 2.3 It is Natural England's intention to apply for external funding to support the delivery of the project. A Stage 1 Development funding bid to the Heritage Lottery Fund (HLF) has already been submitted and an announcement is expected in mid September, as to whether this has been successful. Natural England are also preparing a separate Life+ Bid. The Life+ funding bid is due to be submitted on 10 October and planning permission is required to be in place to support that funding bid.

### **3 Project Description**

- 3.1 The scheme involves sediment pumping from Hoveton Great Broad and Hudson's Bay and the construction of a number of soft engineering structures utilising geotextile membranes to create bunded areas within Hoveton Great Broad and Wroxham Broad, within which areas of fen would be created. The geotube method is very similar to that used recently in the restoration of Salhouse Spit.

- 3.2 In addition to the lake restoration, the project will also include:

- Reinstatement/strengthening of Wroxham Island. Erosion over the last 60 years has caused the land between Wroxham Broad and the River Bure to become significantly narrowed, down to 6m in places, threatening the integrity of the river bank and riverside moorings. Part of the proposal therefore includes the use of dredged sediment from Hoveton Great Broad and Hudson's Bay to reinstate the island.
- Sediment removal from the dyke system of Hoveton Marshes to both improve their ecological quality and create a canoe access route which will encompass sediment removal, the creation of a canoe launching staithe, a new footbridge and a new viewing platform on the edge of Hoveton Great Broad.
- Subsequent to the initial habitat creation works, there will be a requirement for 7 temporary 'fish barriers', so that fish can be excluded whilst restoration proceeds. These will be constructed from gabion baskets, held in place by two rows of wooden piling, and installed at all locations which currently link the Broad to the main river and the adjacent marshes. They will remain in place for between three and ten years, depending on the rate of lake recovery and duration of the project.

- 3.3 It is only the laying of the geotubes to create bunds, backfilling to create new fen areas and the temporary fish barriers which require planning permission and an application covering these elements was approved by the Broads Authority's Planning Committee on 12 September 2014. It is envisaged that a second application to create the canoe access trail and associated infrastructure will be submitted later this Autumn.

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<sup>1</sup> Biomanipulation is the removal of selected fish species to increase grazing of algae by zooplankton

- 3.4 The geotubes would each measure 6-8 metres in diameter when filled, they would be secured in position with alder poles and would be planted with turves of vegetation that would be sourced from within the National Nature Reserve area. Three new areas of fen would be created around the eastern end of Hoveton Great Broad, measuring 4.29 hectares. The same technique would be used along the length of the western bank of Wroxham Island creating a further 1.67 hectares of fen to reinstate areas that have been eroded. Sediment would be pumped to Wroxham Island from Hudson's Bay and Hoveton Great Broad by a 0.25 metre diameter pipeline laid temporarily across the bed of the river.
- 3.5 To facilitate the biomanipulation, seven fish barriers are proposed: four on entrances to the two broads from the river and three where these broads connect to a dyke network to the north. These would consist of rows of gabion baskets filled with flint and faced with timber piling. The largest opening to be closed is approximately 15 metres wide and public access is currently prevented here by a line of timber poles and this would be retained, with the fish barrier placed on the Broad side of it. These barriers would allow some water to flush through, but would keep the fish, that would be removed from the two broads by electro-fishing and other methods, out in the river.
- 3.6 The project is intended to take place in two phases over successive winters with the fish barriers being installed in the second phase and retained for up to ten years. Monitoring and post-restoration management plans are proposed.
- 3.7 Plant would access the site by water through one of the existing openings from the river to Hoveton Great Broad. By land, the site would be accessed from the A1062 through the private roads of the Hoveton Estate. A temporary site compound would be established in the southeast corner of an area of grassland known as The Haugh to the north of Hoveton Great Broad.

#### **4 Technical Assessment of the Project**

- 4.1 Whilst planning permission has now been granted for the elements of the project that require it. Natural England is still seeking the support of the Broads Authority on the wider scheme. In order to inform the debate for Members a brief assessment of the project against the statutory purposes and the Broads Plan objectives is shown below.

##### **4.2 Principle**

- 4.2.1 The objectives of the overall project are to improve the ecological status of Hoveton Great Broad and Hudson's Bay. As a result of removing sediment in order to facilitate an improvement in water quality, new areas of fen and reedswamp habitat would be created and Wroxham Island would be restored and protected from further erosion. These objectives are consistent with those of the Broads Plan (BD3 and BD4)) and the Biodiversity and Water Strategy.

## 4.3 Environmental Considerations

### Flood Risk

- 4.3.1 The level of the fish barriers is to be set 'below normal water' to ensure that there is no increased risk of flooding for the surrounding area. As part of the planning process additional information was been sought on the actual height of normal water level in this area and how far below this level the barrier needs to be set to ensure that there is no flooding impact. The Environment Agency were satisfied and raised no objection to the planning proposal on this basis.

### Water Quality

- 4.3.2 The intention of the project is to improve water depth and water quality by removing nutrient rich sediment and subsequently excluding fish to allow the macrophyte community in the natural seed bank to regenerate. Silt curtains would be used to manage sediment entering the river from the two broads and nutrients in the relocated sediment would be bound with the addition of ferrous compounds. It is accepted there may be some disturbance of nutrient rich sediment in the water, but this is anticipated to be temporary and water quality would be monitored throughout the project with appropriate mitigation covered in a monitoring plan to be agreed by condition.
- 4.3.3 The systems of the two broads and river would remain connected, but water flows would be reduced by the temporary installation of the fish barriers. Whilst there may be some short-term impacts, overall it is anticipated the proposed method would improve water quality in the long term as evidenced from restoration on many broads over the past four decades and is consistent with a number of Broads Plan Objectives (BD3 and BD4).

### Ecology

- 4.3.4 The proposed development is within national and international habitat designations and the area is particularly important for breeding birds and wintering wildfowl. The Broads Authority has traditionally been supportive of proposals which seek to conserve or enhance biodiversity and restore or create new habitat, but development which results in adverse impacts on designated sites that cannot be mitigated has not been supported.
- 4.3.5 Mitigation measures are proposed to manage any short term impacts on species and habitats and in the long term it is the objective of the project to significantly improve the ecological status by virtue of the lake restoration and fen creation. The fen creation in the Wroxham Broad and Hoveton Great Broad would result in a loss of open water habitat, however the species rich fen proposed in Hoveton Great Broad is of greater conservation value and would replace that eroded and there are wider benefits from the restoration of Wroxham Island. Within Hoveton Great Broad historic areas of reedswamp that have been lost are anticipated to regenerate naturally as result of the

sediment removal and improvement in water quality and a kingfisher bank is proposed on Wroxham Island to enhance this habitat.

- 4.3.6 Provide that the appropriate mitigation measures are provided, it is considered the proposal would result in positive impacts on ecology by improving the remaining open water habitat for associated species, such as the rare holly-leaved naiad that occurs in the restored Cockshoot Broad and herbivorous waterfowl (e.g. coot, pochard and mute swan) and creating new areas of fen and reedswamp, in accordance with the aims and objectives of the Broads Plan and the Biodiversity and Water Strategy

#### Landscape

- 4.3.7 The proposed development will result in changes to the landscape in the short and long term. These will be most visible to the public on Wroxham Island and there will be a short term adverse impact during construction and until the fen plants are established. Where a similar technique has been used at Salhouse, it has been necessary to install fencing to prevent geese from grazing the establishing plants. In the interests of limiting any short term landscape impact on Wroxham Island, species which are unpalatable to geese are proposed to avoid the need for any fencing here.
- 4.3.8 Within Hoveton Great Broad different fen species are proposed and there is a risk of goose grazing so temporary fencing is proposed which would be removed when monitoring indicates it is appropriate to do so. Carr woodland borders Hoveton Great Broad to the river so there are no direct public views of the fen creation areas here. Visitors can enjoy views across Hoveton Great Broad and appreciate the tranquillity and wildness of this area from the seasonal nature trail but there are no immediate or direct views of the fen creation areas and the work is proposed to be undertaken during the winter months when the trail is closed.
- 4.3.9 Monitoring of the proposed fen turf planting is considered appropriate and a monitoring plan (which would be required by planning condition) should include appropriate contingencies should it not be successful or should additional protection measures be necessary.
- 4.3.10 The project at Salhouse Spit has been successfully colonised by the species planted and this has mitigated any adverse landscape impact. The application of the same technique at Wroxham Island and Hoveton Great Broad is considered appropriate and it is not considered any long term adverse impacts would result on landscape character or visual amenity.

#### Heritage Assets

- 4.3.11 Sediment removed from the two Broads will be used to fill the geotubes and backfill the areas for fen creation and this has the potential to disturb heritage assets. As sites of medieval peat digging, Hoveton Great Broad and Hudson's Bay are of historical and archaeological interest, furthermore they are considered likely to include surviving peat deposits which potentially hold

information relating to archaeology and past human interaction with the environment. English Heritage consider the peat resource and the two Broads to be undesignated heritage assets of national importance.

4.3.12 English Heritage and the Norfolk Historic Environment Service had originally asked for further information about the proposal to enable them to sufficiently assess the likely direct impact on peat deposits. Further information was submitted, including results from previous surveys which suggests the upper surface of the peat is 1.4 metres into the sediment, significantly below the 0.3 metres which is proposed to be removed and the 0.36 metre level of the trench that the geotubes would sit in. Previous research also suggests the upper 0.3-0.4 metres of sediment is post-1860 and largely early- to mid-twentieth century. English Heritage and the Norfolk Historic Environment Service are satisfied with the further information submitted and a condition is attached to the planning permission, requiring further investigation work to be undertaken prior to commencement

4.3.13 The proposed development on Wroxham Island is outside, but adjacent to, Wroxham Conservation Area, a designated heritage asset, and it is not considered the proposals would adversely affect this asset.

4.3.14 Monitoring of the silt removal is considered appropriate and a monitoring plan and watching briefs (which would be required by planning condition) include appropriate contingencies should additional recording measures be necessary.

#### **4.4 Recreational Considerations**

##### Access

4.4.1 The project specifically includes the creation of a canoe access trail and associated infrastructure and will facilitate some incremental increase in public access to the area which is welcomed. (it should be noted that this is the second stage of the Project and will be the subject of a future planning application) However public access to the area as a whole remains limited which is regrettable. This is also seen by many stakeholders as a weakness in any applications for public funding. The Authority would have preferred to have seen the opportunity taken to provide for more tangible opportunities for public access on foot, canoe and by boat to this area consistent with the Authority's statutory purposes, Broads Plan objective TR1 (specifically TR1.1 and TR1.6) and the objectives of the Integrated Access Strategy. The Broads Authority would therefore strongly encourage Natural England to maximise the opportunity to make more positive provision in the Project for enhanced public access to the site.

## Angling/Fishing

- 4.4.2 The project includes the creation of fish barriers in the form of gabion baskets. It is imperative for the success of the project that fish are excluded once they have been removed. Concerns have been raised as to whether this method of fish exclusion is an appropriate method and whether another less formal technique might be more appropriate. Other projects elsewhere in the Broads have successfully used curtains suspended under buoys (Barton Broad), however these have been trialled elsewhere in Hoveton Great Broad with less success. The concern from the project Partners has been that where a barrier still lets some fish through it will jeopardise the success of the project and that barriers in tidal waters can be more easily be breached, undercut or moved out of position by daily changes in water levels.. However conditions are attached to the planning permission requiring a robust the method statement for installing them, monitoring them and removing them.

## **4.5 Navigation Considerations**

- 4.5.1 Hudson's Bay and Hoveton Great Broad are not currently open to navigation by the public. This project does not materially alter that position however the perceived "permanency" of the fish barriers as an impediment to any potential future navigation is a genuine concern from boating interests. Aspirations and objectives to increase the publically navigable waterways are supported and the Broads Plan contains an objective (TR1.6) which seeks to expand navigable water space for recreation where it is consistent with conservation interests and flood risk management. This project is seen by many navigation interests as the only opportunity or mechanism to facilitate future boat access in the area and therefore there is considerable disappointment that the project does not provide this or give any hope that this might improve in the future.
- 4.5.2 The proposed pipeline across the river to facilitate the work on Wroxham Island does cross the public navigation but it is not considered to endanger or inhibit navigation providing it is appropriately designed and installed. It would be in place temporarily over one winter and appropriate warning signs are proposed. Subject to the final details of the pipeline, trenching, fixing and the warning signs, this is considered acceptable.
- 4.5.3 The proposed geotubes and backfilling on Wroxham Island has been designed to protect the existing uses on the Broad, whilst restoring eroded areas of the Island and manage future erosion. As a form of bank protection, the geotubes, matting and planting are considered appropriate. It would not be appropriate to encourage mooring against the new bank, particularly in the short term whilst the structure is stabilising and planting is establishing so this should be managed by condition.
- 4.5.4 Construction would be undertaken in winter when the river is quietest and the seasonal nature trail is closed. There would be some disruption to members of Norfolk Broads Yacht Club during the work on Wroxham Island but the scheme has been designed to maintain their existing start point and moorings. It is not considered the proposal would result in any unacceptable impacts on

amenity of adjoining occupiers or recreational users in the local area either during construction or post-completion

## **5 Funding Issues**

- 5.1 The overriding driver for this project is that of conservation benefit . This is widely understood and supported. There are some outstanding concerns in relation to a paucity of public access which it could be argued may affect the attractiveness of the project to public funders.
- 5.2 A number of concerns that have been expressed about the HGB Project relate to the impact that it might have on any future Hickling Lake Restoration Project – in terms of competition for funding or resources. From the results of the Lake Review so far it can be seen that Hickling is a much more complex and vulnerable lake when compared to Hoveton. The issues around Hoveton seem to be more straight forward and better understood whilst there is still some doubt about what specifically the “Hickling Project” would need to be. There is also a much wider, more complex and potentially more sensitive set of potential stakeholders. There may also be some benefit for a future Hickling Project to learn from the experience of the current HGB Project and it should be welcomed that Natural England has taken the initiative in respect of this Project and sought to deliver a tangible and credible water quality improvement.
- 5.3 Clearly where opportunities for funding projects of this nature are relatively limited there will always be some concern that some funding bodies may be reticent to fund successive similar projects and this is acknowledged. HGB is seeking HLF and Life+ funding and the conservation benefit of the project is the clear driver for it and will be the key issue looked at by various funding bodies. The HLF will consider the opportunity for heritage gains within the HGB project with the area being viewed as a non-designated Heritage Asset by English Heritage and LIFE+ is a conservation driven funding regime
- 5.4 In respect of Hickling the drivers, the benefits and therefore the attractions for any potential external funding body are not yet as sufficiently developed and therefore it cannot be automatically assumed that the two lakes are therefore in “competition” for the same funding streams. . However, given that a project is already developed for Hoveton by Natural England, ; this enables the Broads Authority to focus its resources in terms of Lake Restoration on Hickling over the next few years. At its meeting on 4<sup>th</sup> September 2014, the Navigation Committee agreed that Hickling Broad needed urgent attention and Members asked for more details about the project and about the options to be explored. It remains a Strategic priority for the Authority over the remainder of this financial year to develop the Project for Hickling and produce a robust and tangible rationale for a strong funding bid for which can then be presented to an appropriate funding body.

Background papers:	Broads Lake Review; Planning Application Case File BA/2014/0248/FUL
Author:	Andrea Long, Director of Planning and Resources
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Broads Plan Objectives:	BD3 and 4, TR1.1 and TR1.6
List of Appendices:	None