

**Update on Mutford Lock**  
Report by Rivers Engineer and Asset Officer

**Summary:** This report sets out the background to the Broads Authority's involvement with Mutford Lock, its current condition and proposed future management. Members' views are welcome.

**1 Background**

- 1.1 Mutford Lock is the Broads second access to the sea, connecting Oulton Broad with Lake Lothing, and as such is an important link for vessels seeking to visit the Broads area
- 1.2 Due to different tides in Lake Lothing and Oulton Broad, the lock structure has an unusual bi-directional design. It has two pairs of opposing gates at each end to allow for high water levels on either side of the lock.
- 1.3 Its walls were originally constructed from masonry in the 1800s, however, following various repairs throughout its life, it is now a mix of masonry, reinforced concrete, steel piling and patch repairs. A brief overview of recent work at the lock is shown in the table below.

Year	Work carried out
1960s	Following a collapse of the masonry lock chamber, sections of the lock walls were reconstructed using reinforced concrete
1993	Localised masonry repairs and replacement of the lock gates. Like for like timber hardwood gates, but limited expenditure on cills and pintle bearings
2001	Hydraulic gate control system installed to negate hand winding
2007	Cill timbers removed between gates 3 & 4 and new concrete cill cast to address leakage problems
2014	Hydraulic control system and cable duct replaced following storm surge damage
2015	Two of the eight penstocks found damaged and leaking. Temporarily blanked to prevent leakage.
2015	Gate 2 South bearing failure. Works ongoing.

- 1.4 It is currently owned by Associated British Ports (ABP), although the Authority agreed with ABP and Suffolk County Council (SCC) in the late 1990's to

transfer the freehold of the lock and adjoining land owned by SCC to the Authority.

- 1.5 Whilst this agreement has still not been finalised, a commuted sum was passed to the Authority for the upkeep and repair of the lock, and the Broads Authority assumed responsibility for Mutford Lock in 1994 following a programme of refurbishment by Associated British Ports, which included some stitching repairs to the lock masonry and replacement gates

## **2 Current Condition**

- 2.1 In late March 2015 lock operators reported that during a locking it was not possible to achieve a good seal on gate 2 and therefore the saltwater gates could not be opened as the water level in the chamber could not be equalised with Lake Lothing. Vessels in the lock had to be returned to Oulton Broad. Subsequent attempts were made, however the issue persisted with a clear visible misalignment of the gates at the gate mitre (where the pair of gates meet).
- 2.2 Above and below water inspections were undertaken and repeated in various tidal conditions. The underwater survey showed that although there was a large build-up of mussels and mixed debris on the gates and bed, this did not appear to interfere with the gate swing or sealing faces at the cill. The above water survey found that Gate 2 South was not moving smoothly and was sticking unpredictably during operation even under hydraulic load. This suggested an issue with the pintle bearing (steel ball and socket type bearing upon which the gate pivots), either the position of the gate on the bearing or damage to the bearing. Two other gates were found not to be running smoothly but not to the same degree as Gate 2 South.
- 2.3 With the issue not fully clear the decision was made to use divers again to clear the area around the pintle bearing on several gates and undertake a detailed survey. Also in the absence of any detailed plans, advice was sought from Wheeler Trevitt Consulting Engineers who had experience of the gates at Mutford Lock when installed in the 1990s.
- 2.4 Following cleaning, the pintle on Gate 2 South was partly visible and it appeared to be out of position; the bearing cup in the gate also appeared not to be positioned centrally on the pintle. This had caused the gate to shift and the heel post to press into the quoin (wall) causing pressure, wear and misalignment. Deep soft material between the old timber cills of gates 1 and 2 also suggested the possibility of voids which would allow upwelling of water and add to the leakage problems. It was also noted that no other pintle bearings were exposed enough to allow observation.
- 2.5 A further concern raised by the consulting engineers was the hydraulic operation of the gates, which is much less sensitive than hand winding which the gates had been designed for. The gates require a degree of freedom in the closed position to allow them to settle and seal. The type of hydraulic system used since 2001 drives the gates with a much higher load than hand

operation and applies a constant load. This reduces the freedom of the gate to settle and potentially exerts high stress into the pintle when the gate is pushed against the cill.

### 3 Planned Work and Costs

- 3.1 Given the results of the dive surveys and consultation with the specialist engineers the following immediate actions are to be taken with costs and timescales shown:

Action	Cost	Result
Underwater clearance of debris/marine growth and investigative surveys	£5000 (Dive team)	Completed, damaged pintle found
Consult specialist engineers	£5000	Ongoing
Removal of Gate 2 South and repair the pintle in the cill and cup in the gate	£15,000 (Crane hire, dive team, fabricators)	Gate lifted 14 May. Repairs ongoing
Assess the gate heel post for excessive wear and add timber to the mitre face to compensate if necessary	£1000	Week commencing 18 May
Clear material from the between the old timber cills and infill with concrete if voids found	£5000 (Dive team)	Week commencing 25 May

- 3.2 Once the immediate actions are completed the lock should be returned to normal operation. It is then suggested that changes are made to the hydraulic control system to mimic hand winding operation and reduce the likelihood of similar issues. This may be achieved by incorporating pressure release valves and reducing the operating pressure (given smoother operation after pintle repairs).
- 3.3 If the removal and repairs to Gate 2 South are successful, but reducing the hydraulic pressure highlights issues with other gates then at the end of the season it is suggested that some of the other gates be lifted out to check the pintles and repair as necessary.
- 3.4 If the removal and repairs to Gate 2 South are not successful then it may be necessary to investigate the dewatering of the lock to allow more extensive cleaning, inspection and repair. This would however require careful consideration of the stability of the chamber walls and require the installation of a cofferdam or retro-fit dam boards. The cost of dewatering could easily exceed £200,000.

## **4 Legal Position**

- 4.1 The Authority is in the process of resolving the outstanding freehold transfer, and a formal Harbour Revision Order will also be required with ABP. These agreements have been significantly delayed from the date of the original agreement with the Authority.
- 4.2 At the members request a briefing note regarding Mutford Lock was prepared and presented to committee in June 2013. NPLaw confirmed that the Harbour Revision Order (HRO) has been agreed between the two parties and submitted in draft to the Marine Management Organisation (MMO) who confirmed that they were happy with the draft HRO and that both the agreement and plan attached seemed clear and acceptable.
- 4.3 However since that time a number of issues are still being raised by both Suffolk County Council and ABP in regards to both the tripartite agreement and the associated deeds and these are unfortunately still ongoing despite constant chasing from Broads Authority officers. A meeting has been arranged for the 28 May to seek to finally resolve all outstanding legal points, and a verbal update will be given at the Committee.
- 4.4 The next step is to lodge a notice of intention to submit an HRO. This will produce a formal response from the MMO setting out whether or not an Environmental Impact Assessment is required, which the Authority has been advised is unlikely, what the statutory fee will be; and the next steps.

## **5 Operating Agreement**

- 5.1 The Authority originally set up an operating agreement with Waveney District Council (WDC) who managed the Oulton Broad Yacht Station and operated the road and pedestrian bridges. In accordance with the agreement WDC provided a dedicated lock operator and undertook the routine maintenance of the lock.
- 5.2 The agreement was later revised with a reduction in the operating cost as WDC took the decision to disband the dedicated lock operator and operate the lock as a shared duty operation of the Yacht Station. The strategy for the agreed operating cost was that this would be approximately equal to the passage fees, which is transferred to the Broads Authority.
- 5.3 In recent years WDC have outsourced much of their operations to private enterprises. Therefore the lock operating agreement is currently between the Broads Authority and Sentinel Leisure Trust (who manage Oulton Broad Yacht Station) and Waveney Norse (who provide maintenance services).
- 5.4 The agreed annual cost for maintenance provided by Waveney Norse is £660. The level of service provided by Waveney Norse has declined and it is suggested the current agreement be terminated and that other potential service providers considered are invited to quote.

- 5.5 The agreed annual cost for operation provided by Sentinel Leisure Trust (SLT) is £6,678. SLT have provided this service as per the agreement for the last five years. However SLT have recently requested that the agreement be revised with a proposed annual operating cost of £20,000. This sum is based on their assessment of the operational cost, which is £9.83 per lock and at least two members of staff required for each lock. £20,000 equates to one full time member of staff and SLT propose this could be someone dedicated to the lock.
- 5.6 The current lock passage fee is £11. Based on this the income from passage fees over the last 3 years is summarised below:

Year	No. vessel passages	Total fee income
2012/13	749	£8239
2013/14	800	£8800
2014/15	882	£9702*

*\*actual income to date £6,523, remainder to be invoiced as completed fee books returned*

Currently the income to the Authority exceeds the annual operating cost paid to SLT. If the annual operating cost increased to £20,000, then this would need to be either subsidised by navigation budgets or the lock fee would need to be doubled.

- 5.7 Sentinel Leisure Trust do however receive an additional income from Suffolk County Council for the operation of the road and pedestrian bridges as required for lock passages.

## 6 Financial Position

- 6.1 Mutford Lock is the Authority's largest single liability and some significant sums of money will be needed to repair it, potentially in the order of £1 million. An endowment fund was established in the late 1990's with the commuted sum which was transferred to the Authority. A further annual contribution of £25,000 was agreed when the Asset Management Strategy was presented to the Broads Authority in January 2013.
- 6.2 The reserves for Mutford Lock as at 31 March 2015 stands at £320,218 but this does not include the annual interest which has not yet been calculated.

Background papers: None

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Broads Plan Objectives: None

Appendices: None