

ENGINEERING ASSESSMENT OF GRANTHAM CANAL BETWEEN LOCKS 16, 17 & 18.

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Richard Leigh Senior Waterway Engineer

BACKGROUND

The Grantham Canal Society (GCS) are investigating whether it would be possible to use a boat on the Woolsthorpe flight of locks and associated pounds. The GCS have asked British Waterways (BW) to prepare an Engineering Report to detail the works that will be required to allow the safe use of this section of remainder canal.

Richard Leigh, Senior Waterway Engineer for the East Midlands Waterway Unit, carried out the assessment on the 16th February 2010. The weather on that day was sunny but cool. The assets were inspected to downstream water levels, but it was not possible to inspect the assets beneath the water line.

LOCATION

This section of the Grantham Canal is located approximately 1km from the village of Woolsthorpe in the Vale of Belvoir. It is in a rural location and is a popular destination due to its proximity to the Rutland Arms and good walking routes.



Site Location Plan - Scale: 1 to 20,000

The assessment was carried out in the downstream direction, from Lock 18 to Lock 16, the plan on the next page details the sections assessed.



ENGINEERING ASSESSMENT REPORT - 16/02/10.

Woolthorpe Top Lock, Lock 18: GR-007-001

This broad lock is typical of those found on the Grantham Canal. The lock chamber is constructed from brick work and has timber top and tail mitre gates. Major works were completed in November 2009; these works replaced the failed offside brickwork wall with a new reinforced concrete wall faced with brickwork.

The structure currently has the following asset score:

Condition Grade: C - Fair Consequence of Failure Grade: 1 – Single Minor Injury Serviceability Grade: 1 – Fit for purpose (as a remainder lock)



Lock 18

The following issues are known to affect this asset and will need to be addressed to allow the lock to be used:

- The top and bottom gates are life expired and will need to be replaced (Notification 10834968).
- The balance beams need to have handles securely fitted (Notification 10937882).
- A new lock ladder needs to be fitted in the offside recess (Notification 10548801).
- The upstream stop planks need to be removed
- The offside crack needs to be monitored.

The estimated cost of these works is £120,000 based on the typical cost of lock gate replacement schemes (and associated works) in the East Midlands.

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The Pound between Lock 18 and Lock 17.

The following works will need to be undertaken to allow this pound to be used:

- Dipping is required at 25m intervals to check navigation depth.
- If there is insufficient navigation depth the pound will need to be dredged.
- General vegetation clearance of overhanging trees and shrubs is required along whole length.

The estimated cost of the works is minimal if the works can be carried out by volunteers. If dredging is required it will be necessary to obtain an estimation of costs from BW's National Dredging Team.

Woolthorpe Middle Lock, Lock 17: GR-007-003

This broad lock is typical of those found on the Grantham Canal. The lock chamber is constructed from brick work and has timber top and tail mitre gates.

The structure currently has the following asset score:

Condition Grade: C - Fair Consequence of Failure Grade: 2 – Minor Injuries Serviceability Grade: 1 – Fit for purpose (as a remainder lock)



Lock 17

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The following issues are known to affect this asset and will need to be addressed to allow the lock to be used:

- There is water leakage through and around the lock chamber walls and needs to be grouted to prevent future leakage (Notification 10086367).
- There is a large pisser situated behind the offside lock ladder recess indicating a large void behind the wall. This will need to be grouted to prevent fines from being washed away (Notification 10834969).
- The balance beams need to have handles securely fitted (Notification 10937880).
- Steel lined stop plank grooves need to be installed to aid future maintenance (notification 10548800). These works are not urgent but should be considered if the canal is dewatered.
- General vegetation clearance on the offside will be required.
- The offside top quadrant will need to be extended to ensure safe use.

It is estimated that works to this lock would cost £25k for grouting, £1k for balance beams, £5k for stop plank installation and £1k for offside quadrant. The estimated cost of the remaining works is minimal if the works can be carried out by volunteers.

Bridge 5, Woolsthorpe Bridge: GR-007-004

Works have recently been completed to repair brickwork and remove vegetation from this bridge; no other works are noted as being required.

The Pound between Lock 17 and Lock 16.

The following works will need to be undertaken to allow the pound to be used:

- Dipping is required at 25m intervals to check navigation depth.
- If there is insufficient navigation depth the pound will need to be dredged.
- Minor vegetation clearance adjacent to the Rutland Arms.

The estimated cost of the works is minimal if the works can be carried out by volunteers. If dredging is required it will be necessary to obtain an estimation of costs from BW's National Dredging Team.

Woolthorpe Bottom Lock, Lock 16: GR-007-006

This broad lock is typical of those found on the Grantham Canal. The lock chamber is constructed from brick work and has timber top and tail mitre gates.

The structure currently has the following asset score:

Condition Grade: D - Poor Consequence of Failure Grade: 1 – Single Minor Injury Serviceability Grade: 1 – Fit for purpose (as a remainder lock)



Lock 16

The following issues are known to affect this asset and will need to be addressed to allow the lock to be used by a trip boat:

- There is water leakage through and around the lock chamber walls at both the upstream and downstream gates; this needs to be grouted to prevent future leakage. There is also a large bulge and cracked brickwork in the offside downstream approach wall; this will need to be taken down, rebuilt and possibly anchored back before the wall is grouted (Notification 10570108).
- The balance beams need to have handles securely fitted (Notification 10937878).
- Vegetation needs to be removed from behind the top gates and from the downstream towpath side quadrant (Notifications 10834970 & 10700355).
- There is a leak from beneath the downstream gate sills which needs to be repaired to allow the lock chamber to hold water (Notification 10347339).

It is estimated that grouting works to this lock would cost approximately £35k. Re-building the approach wall would cost in the region of £10k and the sill works would be approximately £10k. The estimated cost of the remaining works is minimal if the works can be carried out by volunteers.

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The Pound downstream of Lock 16.

The following works will need to be undertaken to allow the pound to be used by a trip boat:

- Dipping is required at 25m intervals to check navigation depth.
- If there is insufficient navigation depth the pound will need to be dredged.
- General vegetation clearance of overhanging trees and shrubs is required along whole length.

The estimated cost of the works is minimal if the works can be carried out by volunteers. If dredging is required it will be necessary to obtain an estimation of costs from BW's National Dredging Team.

SUMMARY OF REQUIRED WORKS

Detailed below is a summary of the required works broken down into short, medium and long term:

Works required in the short term			
Location	Requirements Summary	Estimated Cost (£)	
Lock 18	Replace top and bottom gates	£117,000	
Lock 18	Install handles on Balance Beams	£1,000	
Lock 18	Install Lock Ladder	£1,000	
Lock 18	Remove upstream stop planks	£1,000	
Pound Lock 18 to Lock 17	Dip pound at 25m intervals	£0 if volunteers	
Lock 17	Install handles on Balance Beams	£1,000	
Pound Lock 17 to Lock 16	Dip pound at 25m intervals	£0 if volunteers	
Lock 16	Repair bulge in offside downstream approach	£10,000	
Lock 16	Grout up lock chamber walls	£35,000	
Lock 16	Repair bottom sill	£5,000	
Lock 16	Install handles on Balance Beams	£1,000	
Pound downstream Lock 16	Dip pound at 25m intervals	£0 if volunteers	
	Total Estimated Cost =	£172,000	

Works Required in the medium term			
Location	Requirements	Estimated Cost (£)	
Pound Lock 18 to Lock 17	General vegetation clearance	£0 if volunteers	
Pound Lock 18 to Lock 17	Dredge pound if required	Circa £50k	
Lock 17	Grout up lock chamber walls	£25,000	
Lock 17	Minor vegetation clearance	£0 if volunteers	
Lock 17	Extend offside top quadrant	£1,000	
Pound Lock 17 to Lock 16	General vegetation clearance	£0 if volunteers	
Pound Lock 17 to Lock 16	Dredge pound if required	Circa £50k	
Lock 16	General vegetation clearance	£0 if volunteers	
Pound downstream Lock 16	Dredge pound if required (150m length)	Circa £50k	
Pound downstream Lock 16	General vegetation clearance	£0 if volunteers	
	Total Estimated Cost =	£176,000	

Works required in the long term			
Location	Requirements	Estimated Cost (£)	
Lock 18	Monitor offside crack	Ongoing BW cost	
Lock 17	Install steel stop plank grooves	£5,000	
Entire Section	General day to day maintenance	£0 if volunteers	
	Total Estimated Cost =	£5,000	

Please note these costs are estimates based on recent works / contract costs in the East Midlands Waterways and may differ from actual costs. If dredging is required it will be necessary to obtain an estimation of costs from BW's National Dredging Team.

CONCLUSIONS

In the short term, to allow a boat to safely use this section of waterway, it will be necessary to invest an estimated $\pounds172k$ to carry out essential works / repairs to this flight of locks. The majority of these costs are associated with replacing the lock gates at Lock 18 and repairs to the chamber walls at Lock 16.

If the pounds between the locks have insufficient navigation depth, it is estimated that a further investment of £150k will be needed on dredging works. This requirement needs to be determined by dipping the pounds at 25m intervals

In the medium term, it will be necessary to invest an estimated £26k to keep Lock 17 operational. The entire section requires the general clearance of vegetation, as it is all small shrubs and trees it should present no problems to a GCS work party.

In the long term consideration should be given to installing steel stop plank grooves at Lock 17, at an estimated cost of £5k, to aid future maintenance. It is assumed that the general maintenance required of this section due to increased usage will be undertaken by the GCS.

Both sets of gates on Lock 17 and the top gates on Lock 16 are currently in a satisfactory condition but depending on usage, they will need to be replaced in an estimated 12 to 15 years. The bottom gates on Lock 16 are currently drying out as the chamber is not holding water, this may affect their longevity and it is estimated that they will need to be replaced in 8 to 12 years depending on usage.