

Briefing Note

Mytholmroyd channel maintenance

What types of channel maintenance have we considered on the River Calder through Mytholmroyd?

- Dredging – this involves excavation to remove soil, gravel, silt and vegetation from the side and bottom of the channel. Shoals and debris within a channel can reduce the area through which the river can flow. This can result in an increased water level for a given flow.
- Vegetation control – this involves manual labour to cut and/or treat vegetation (including native and non-native species) and remove it from the channel. Vegetation increases the roughness of the river channel and can slow the passage of water. As a result the water level for a given flow can be increased.

What is the current state of the River Calder through Mytholmroyd?

There are shoals of gravel and soil that have built up in parts of the river channel in Mytholmroyd. An example of this is around New Road Bridge (see plate 1 below). The shoal varies in size and extent over time as it is subject to both erosion and deposition due to the varying effects of river. At present, the shoal has been much reduced in size by the recent high flows. Many stretches of the watercourse are free from shoals. An example of this is opposite Royal Oak Apartments (see plate 2).



Plate 1. New Road Bridge looking upstream. Shoal has built up under the left arch of the bridge.

The channel is also susceptible to vegetation growth. This varies across the year, with vegetation, particularly invasive species such as Himalayan Balsam and Japanese

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Knotweed, dying back in the winter but rapidly growing within the channel in the summer months. Plate 3 and 4 show changes in seasonal vegetation.



Plate 2. Royal Oak Apartments looking downstream. No shoal has been deposited on either bank of the river.



Plate 3 Looking downstream towards Caldene Br. Stone pitching and small amounts of winter vegetation

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Plate 4. Looking downstream towards Caldene Br. Stone Pitching no longer visible through Summer Vegetation

In the 1960s, our predecessors improved the channel capacity through Mytholmroyd. They widened and lowered the river. We have design drawings of the scheme showing the cross section of the river. Below is an example of the cross section at New Rd Bridge. This drawing indicates that the depth of the central channel is approx. 3ft.

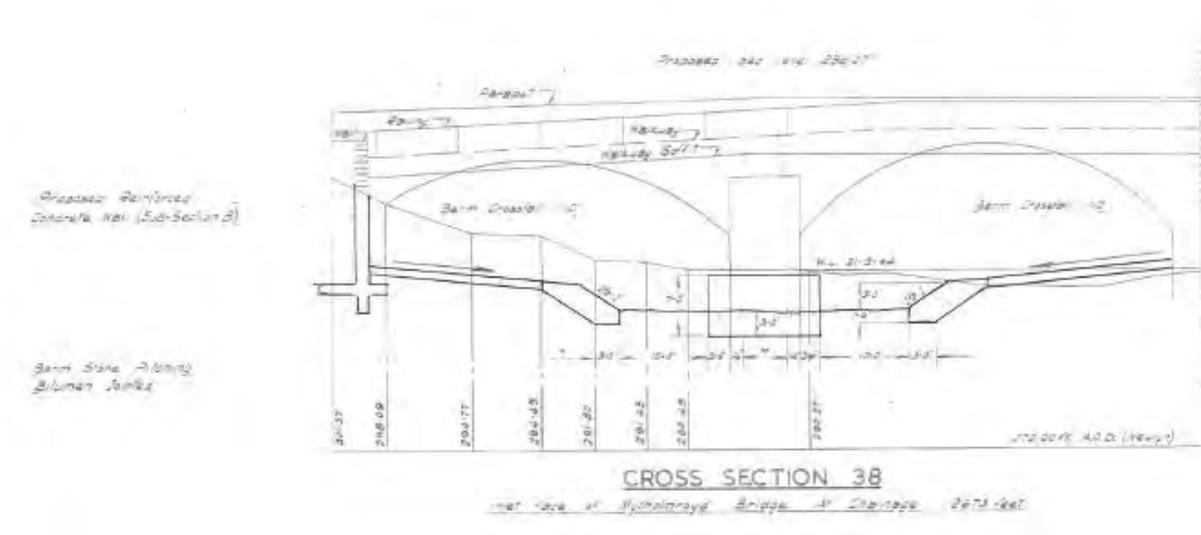
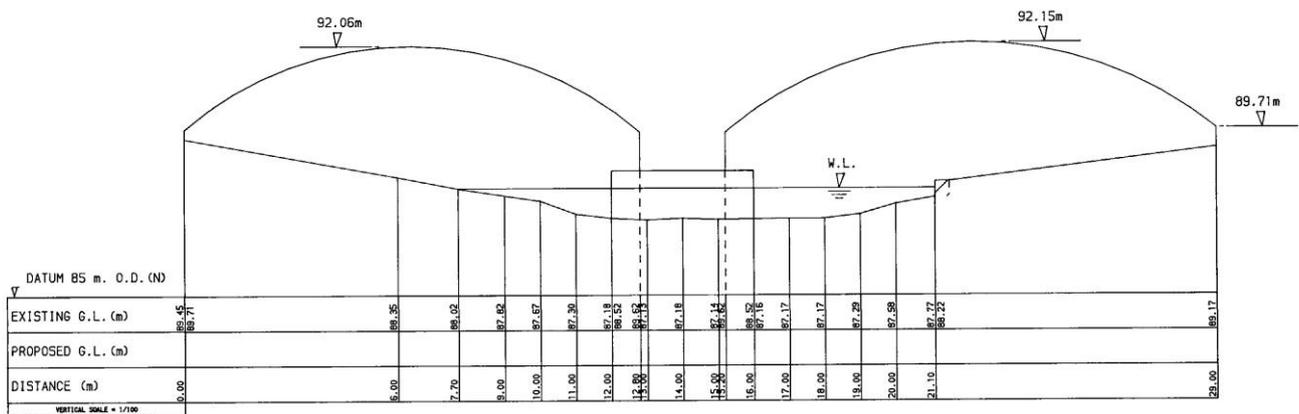


Fig 1. Cross Section of the River Calder at New Rd Bridge from 1960's scheme

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We also have cross sections of the river from 1993 and 2009. These show that the depth of the central channel at the bridge has not changed and there is still a depth of 3ft from bed to the top of the central channel.



C.S. 12A Upstream Face of Mytholmroyd Bridge

Fig 2. Cross Section on the River Calder at New Rd Bridge from 1993

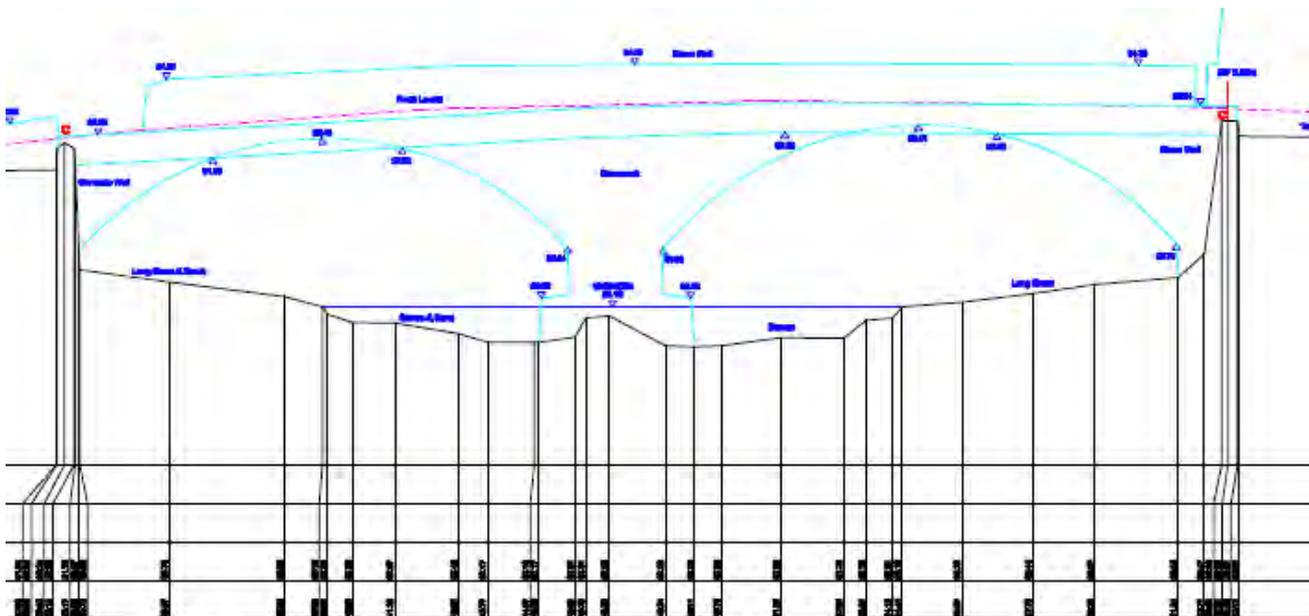


Fig. 3 Cross section of the River Calder at New Rd Bridge from 2009

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What assessments have we carried out?

We have used our models to investigate the impact of different channel maintenance activities. This involves modelling three different scenarios:

- Existing channel conditions with shoal and winter vegetation
- 'Hard bed' channel – removal of shoals and vegetation
- Existing channel conditions with summer vegetation

In this way we are able to determine the impact of shoal removals via dredging and vegetation management. The table below shows the reduction in water levels for the 10yr and 25yr floods for four locations in Mytholmroyd. As can be seen, the impact of dredging reduces water levels by 2-5cm (1-2inch) whereas managing vegetation reduces water levels by 30-40cm (1-1.3feet).

Location	Standard of Protection				Reduction in water level (10yr/25yr) in cm	
	Existing	Shoal Removed	Vegetation managed	Vegetation not managed	Shoal Removed	Vegetation managed
White Houses	200	200	200	200	0.9 / 0.6	37.3 / 38.1
Caldene Bridge	25	25	25	10	4.8 / 3.4	33.2 / 32.3
New Rd Bridge	25	25	25	10	2.3 / 2.1	30.8 / 32.1
Royal Oak	<10	<10	<10	<10	1.9 / 1.7	29.0 / 30.2

Dredging does not therefore improve the overall standard of protection against flooding. However, by not removing vegetation the standard of protection reduces from 1 in 25 yrs to 1 in 10 years for the centre of Mytholmroyd.

Why does dredging not have a bigger impact?

Dredging is effective when it makes the river channel larger so more water flow can through it. In Mytholmroyd, the channel size varies significantly as the river flows through the town. As a result the capacity of the channel also varies.



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Plate 5. River Calder widening between Caldene and New Rd Bridge.

The locations with the largest shoal accumulations are located in the wider and larger sections of the river where it flows more slowly and deposits materials. The channel sections with shoal accumulations are larger, even with the shoals, than the smaller and narrower sections which have no accumulations. The removal of shoals from the wider sections would not therefore lead to an increase in channel capacity.

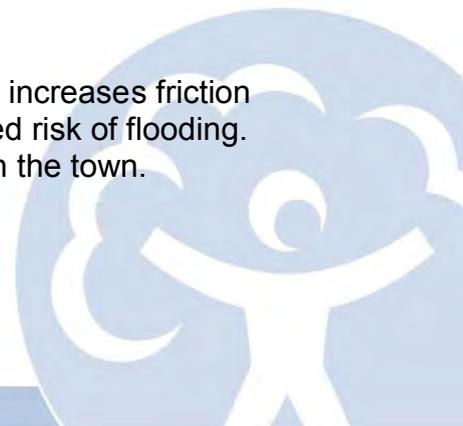
The variation in channel size can be seen in plates 5 and 6 as well as in the appendices to this document.



Plate 6. River Calder narrowing downstream of New Rd Bridge.

Why does removing vegetation have such a big impact?

Vegetation grows along most of the channel through Mytholmroyd. This increases friction and slows down the flow, resulting in higher river levels and an increased risk of flooding. This impact is accumulative and acts over the length of the river through the town.



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What next?

In view of the effects of vegetation on the river level, we have begun a programme of vegetation management through Mytholmroyd. We are working with local voluntary organisations, such as Mytholmroyd Flood Action Group and Calder Future, to promote River Stewardship and ensure that local people are actively involved in making decisions about managing their river.

We are currently undertaking assessments for the rest of the Calder Valley to ensure that we have the best evidence to manage flood risk on the River Calder and its tributaries. This process is due to report in May 2014 and will allow us to make further investment decisions in channel maintenance across the Calder Valley.