



## Dredging: the views and experience of Internal Drainage Boards

### Introduction

This document aims to discuss the role of dredging as a part of the water level management activity conducted by Internal Drainage Boards (IDBs). IDBs manage flood risk and land drainage within areas of special drainage need, typically in lowland areas.

### Benefits of dredging – flood risk

Over time sediments are deposited in slow-moving watercourses. Dredging, also referred to as desilting and mudding, removes the build up of sediment from a watercourse. Dredging is therefore essential for maintaining the capacity of the watercourse to the required standard. For IDBs that are maintaining the transmission of water, in low-lying areas where catchments are relatively flat, flow velocities are slow and pumps are often used, dredging is a crucial activity. It is important to take full advantage of hydraulic gradients to achieve flow. This is most effectively achieved if the capacity of channels is maintained through dredging and other maintenance activity such as weed removal.

Regular dredging ensures adequate conveyance of floodwaters so when water levels in a channel are high, the channel's greater capacity allows water to flow freely through the channel. Where an event exceeds the capacity of the watercourse and there is overtopping and flood storage areas (washes, reservoirs) are under water, higher capacities in the channel maintained by dredging activity means water can be evacuated at a faster rate, providing the ability to recover before the next rainfall event. If the watercourse is working as efficiently as possible, the duration of the flooding is minimised.

Man-made channels will 'naturalise' if left alone. Evidence from IDBs supports the view that where rivers and watercourses in low-lying areas have not been maintained to ensure that they have a high enough capacity, the risk of flooding is higher and there is an increase in the time that flood storage areas are underwater. Well dredged systems ensure land is well drained, increasing soil moisture deficit which provides additional capacity to absorb water at the start of a high rainfall event, slowing discharge to drainage channels and rivers.

The optimal frequency of dredging activity is dependent on many factors including soil type, type of deposits, gradient, influence of tides and whether the drain is used to transfer freshwater through the area. Ultimately, the scheduling of dredging activity is an operational decision that should take into account experience and local knowledge of the area. IDBs hold the view that dredging, along with wider maintenance activity, is a cost effective solution for reducing flood risk in low-lying areas with artificial drainage. Maintenance work offers a high return on public investment with an estimated return of £10 for each £1 outlaid. However it is important to keep on top of the maintenance works across the catchment. It can be uneconomic to only fund a portion of the work that may be considered as more urgent, without considering the wider picture.

### Benefits of dredging – ecological and wider benefits

Dredging activity, if carried out sympathetically and as a planned operation, has no detrimental effect on wildlife or species using the watercourse as their habitat. Dredging and other maintenance activity can actually enhance the water body ecologically. Failure to carry out regular dredging can result in the watercourse becoming so silted up there is insufficient water to sustain a balanced ecosystem. A build up of silt and rotten vegetation can also impact on oxygen levels. Dredging watercourses on a rotational basis ensures that there is always a mixed and varied habitat at various stages of siltation.



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Dredging of rivers and watercourses is also important in order to maintain an adequate depth of water for the purposes of navigation, abstraction and recreation.

## When dredging is not appropriate

As discussed in [ADA's 10 point plan to managing flood risk](#), there are a number of different ways of managing water within a catchment. Dredging is just one activity that should be considered within the perspective of the catchment as a whole. Dredging is critical in lowland areas where there is the need to maximise the conveyance of water through drainage ditches, channel and rivers. Other techniques may be more effective both in practice and economically higher up the catchment where gradients are greater.

As mentioned earlier in this document, dredging and maintenance work should be planned across the total catchment area. Dredging only part of an area in response to an emergency may not be economic. It is much more cost effective to do maintenance and dredging on a regular and systematic basis.

There is no benefit in dredging watercourses below invert levels of culverts as this will not increase the receiving capacity of the watercourse.

## Specific examples on the role of dredging for Internal Drainage Boards

### Black Sluice IDB:

Dredging has a pivotal role within the annual maintenance works of Black Sluice IDB. The Board maintains over 750 km of watercourse. Watercourses have a maximum 10 year cleansing cycle however some watercourses require a higher frequency of cleansing than others. Scheduling the activity is an operational decision that also takes into account pre-inspections and local knowledge. The importance of maintenance activity is highlighted by the Board's commitment of £300k+ expended each financial year on continuous annual cleansing of their maintainable watercourses.

### Lower Severn IDB:

The Lower Severn IDB carries out dredging and bank re-profiling of channels approximately every 7 years. Due to their annual mowing and weed cutting maintenance operations, the quantity of silt that builds up is small as this other maintenance activity allows the free flow of water, reducing silt deposition. Bank re-profiling is necessary in their area due to subsidence of the banks over a period of time due to the nature of the ground (clay layer on peat).

The Board has recently undertaken dredging and re-profiling work to a high-level carrier channel which conveys water over a flood plain towards the Severn Estuary. This channel is tide locked during high tide. In addition to the highland water, the Board pumps approximately 1500 hectares of lowland water into the high-level carrier. During the past 10 years, severe rainfall events have resulted in the levels remaining high for a period of days. The high-level channel has been regularly dredged but last June the Board decided to dredge and re-profile the channel. The Board has noted major improvements during the latest rainfall events in December 2013 and January 2014. The water still rises to the same level but when the tide allows, the channel discharges at a higher rate than before meaning receiving capacity is restored more quickly prior to subsequent high rainfall events, improving resilience.



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## North Level IDB:

Dredging is an essential part of North Level IDB's routine maintenance programme. The Board carries out dredging on approximately 25,000 m of watercourse per annum. The Board assesses its watercourses to determine the frequency of its dredging operations. Broadly speaking, some require mudding out every 10 years with others every 20 years. North Level IDB has direct experience of the problems associated with lack of maintenance including dredging. Historically, Moreton's Leam, a Main River that runs through their district has been adversely affected by lack of maintenance. The Board recently signed a ten year agreement with the Environment Agency to "take-over" the maintenance of Moreton's Leam. Maintenance is conducted in co-operation with Natural England and the RSPB.

## Ouse and Humber IDB:

The Ouse and Humber IDB has a 5 year rolling programme in place which sustains regular desilting of the Board's watercourses. The Board desilts about 70 miles of watercourse each year and the area it drains would suffer serious problems if it did not.

## Swale and Ure Drainage Board:

Swale and Ure Drainage Board aims to maintain the bulk of their watercourses every two years. The maintenance operations involve dredging but also flailing the banks and overhanging brush, and removing the failings and weeds from the channel. The conveyance of the channel is managed for the benefit of the environment, land drainage and flood risk. The channel needs optimal conveyance in wet times to reduce flood damage.

## Welland and Nene IDB:

Welland and Nene IDB covers an area of approximately 32,400 hectares and much of this is below sea level. Watercourses here have very shallow gradients and thus "self-cleansing" velocities are not always available. Dredging therefore plays a very important role in not only maintaining conveyance but also to create freeboard to provide capacity for storage of water in the drains during wet periods. The Board has a rolling dredging programme that means all drains are usually dredged every 5 – 12 years. In some parts of the area where the drains run through gravel strata the frequency for dredging is less as accumulated material is slower to build up. However, in areas where peat and silt is prevalent there is a need for more frequent dredging. Without regular dredging many channels would not perform to their design parameters and efficient evacuation of water would not be possible.

## Witham Fourth IDB:

Routine maintenance is the key to the efficient drainage of Witham Fourth IDB's catchment. De-silting programmes are based on need (some watercourse require more regular dredging than others) which ensures that work is only carried out where necessary. The Board has moved away from a simple time-based rotation to a more risk-based approach (still very much based on experience and local knowledge of catchments/watercourses but also using survey or modelling data where necessary). The Board has experienced some fluvial flooding problems in recent years linked to where Environment Agency managed watercourses have not been dredged. When these watercourses fail water enters the IDB system placing additional burden on the Board's assets.