

Managing a Dredging Contract

by
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INTRODUCTION

1. The method you adopt for your dredging operation will depend on local factors such as, width of waterway, location, surroundings and amount of debris. If you have a narrow waterway with little more than a couple of boat widths you will probably have no choice but to dredge the whole width. The assumption on which this chapter has been written is that dredging is needed over a substantial length of waterway.

ENVIRONMENTAL ISSUES

2. There is at present no legal requirement to undertake an 'environmental impact study' prior to carrying out works on waterways. In spite of this it would be foolhardy to ignore environmental considerations. A visual survey will be adequate for most purposes, especially in a highly contaminated built-up area.
3. Main considerations for evaluation are flora, fauna and fisheries, the local value placed on the site and its susceptibility to change in the water quality. The removal of contaminated and black organic sediments is likely to give long-term improvements in water quality. Dying weed reduces oxygen levels in the water, which may adversely affect any fish stock in the short term. Winter working will minimise the effects of any pollutant release caused by dredging and the spoiling of fish spawning grounds.
4. How far the investigations are taken may well depend on the budget. A full environmental impact study carried out by a suitably qualified person could cost approximately £3000. For this you can expect a map with vegetation marked, a report including suggestions as to what should be left at all costs and, if the surveyor understands you want to enhance the ecology and not to obliterate it, suggestions as to what can be sacrificed if necessary. Also included will be a list of species found. When commissioning your report ask for common English names to be given as well as the botanical name so that everyone can understand the content. It is also helpful to have a percentage indication of how widespread each species is over a fairly large local area; for example when dredging in East London I would define the local areas as Greater London.
5. If you do not know of anyone qualified to give you assistance, it is worth enquiring of your local authority planning department. Many local authorities have a running contract with a local ecology unit to provide surveys when required through their area. As this is already paid for, the survey may be free. It goes without saying that enquiries should be made at the local authority, British Waterways (BW) and Environment Agency (EA) as to whether the area has already been surveyed. Both BW and EA have conservation departments which could be useful to contact for assistance.
6. With the use of any heavy plant it is inevitable that some damage will be done to the ground: make sure any concerns you may have are included in the contract.
7. If the waterway has fish in it, you should consult the EA or BW fisheries departments for advice. Local angling consortia should also be advised well in advance of work starting, which will minimise potential conflict.
8. Re-instatement of any damage should be high on the list of things to do when the dredging work is completed.

SURVEYS & PROFILES

9. There are numerous companies who will carry out hydrographic surveys. Whilst carrying out this work they can also collect soil samples, if you require them, and draw up profiles.
10. Again it is worthwhile contacting the engineering department at your nearest regional office of British Waterways. BW have a computer package which draws profiles and calculates quantities of silt for removal; this would save a lot of surveyor time and reduce the potential for errors. BW may be willing to work on the survey data and print it out. This system makes fitting your silt removal to your budget easy, having obtained an estimated price per cubic

metre from your potential contractors. The package will bring up on screen cross sections of waterway with the surveyed existing profile shown as a solid line. From this you can add on your desired profile, be it taking the top off high spots or lowering the silt level over a large area. When the desired profile has been entered, the computer will calculate the quantity of silt to be removed, from which the work can be priced. If the cost is over budget, the client simply redraws the lines, or reduces the length of waterway to be dredged, to reduce the amount of spoil to be removed!

11. Commonly surveying is carried out by one of two methods: these are electronically (similar to sonar) or dipping with a blunt-ended pole. The latter is the most common because of price and accuracy - a person can tell the difference between debris and canal bed, which sometimes the 'gadgetry' mistakes. It is for each individual organisation to decide how much do-it-yourself you employ and how much you pay others to do it for you. Some funding bodies may require to see reports from professional organisations throughout the project.
12. To carry out a survey the length of the waterway is usually measured off in metres with distances being marked along the piling etc., using marking paint (this needs to be visible to the person doing the dredging). Suggested intervals of every 50 metres would suit most circumstances. The weir and datum levels need to be found and from these depths are measured. From the marks the surveyor can then start dipping across the canal/river bed at one metre intervals. This will give the information needed to establish the existing profile, from which the volumes of silt for removal can be calculated.
13. It should be borne in mind that the consistency of dredgings varies from waterway to waterway and slippage from the sides is likely to occur.
14. If any abstraction takes place on the waterway the client should check that the licensing body has informed the abstractor about the dredging works.

DISPOSAL OF SOIL

15. To establish where the spoil removed can be disposed of, evaluation of its content has to be made. The EA will be able to advise whether it considers that soil samples should be taken and give an indication of how many and where from. This decision will be based on local knowledge of pollution incidents, industrial discharges, fly-tipping, fish stocks and previous dredging.
16. As mentioned earlier, if there is a need to take samples the surveyors can collect these. Most water companies can carry out testing on sediment. Samples should be clearly labelled to identify where they were taken from. The client should allow approximately three weeks for a report to come back.
17. If the spoil is heavily contaminated the only choice is a landfill site. If it is not heavily contaminated there are two choices (1) tipping on the bankside or a nearby field (if the owner is willing) or (2) sending to landfill. If the quality is really good there is also the potential for selling it to mix with top soil.

Bankside Disposal

18. Bankside disposal has the advantage of an immediate saving transport and landfill costs. References to disposal can be found in section 35 to 44 in the Waste Management Licensing Regulations, which establishes the new Waste Management Licensing system. Make no mistake: the site will look like the biggest quagmire in the country and as a consequence may cause a great deal of hostility. A good year may pass before the area starts to regain an acceptable appearance. Considerations which should be made when deciding whether it is appropriate to use the bankside disposal method are:
 - landowner's permission
 - changes to habitat by nutrient rich silt

- avoidance of tipping on reeds and other flora
- visual impact
 - image and character
 - exposure of debris
 - change to bank profile
- physical dimensions of area to be tipped
- obstruction to towpath, warning notices
- drainage
- need to fence off area to prevent access until silt is dry and stable (this may take many months)
- re-profiling when silt is dry
- re-instatement of land with planting schemes.

Landfill Option

19. The landfill option is appealing due to the lack of eyesore on site at the end of the contract and, apart from a final clean-up (by the contractor), the work is 'instantly' finished. The Environmental Protection Act requires all waste to be securely contained (no slopping out of the back of the haulage vehicles), with transfer only to an authorised site via a carrier accompanied by an appropriate written description. Waste Management Licences are required and every handler along the line must be registered. The results of the soil testing will largely dictate which landfill sites the spoil can be taken to. Provided the contract is for the entire works your contractor will deal with all this, but make sure you know where it is ending up.
20. This is the most costly part of the dredging operation but generally presents fewer headaches, and the sight of a lorry load of silt disappearing from your waterway is hard to beat.

SITE ACCESS & LOADING

21. In this section there are no general solutions to the potential difficulties: these can only be sorted out locally. Below are some of those the author has encountered and a few hints on what can be done to eliminate problems.
22. If the majority of heavy plant can be brought to and from site by water a lot of access problems are immediately solved. The amount of plant will vary from contractor to contractor and site to site. Some will be one man and a dredger - others may bring a team of eight people (all with cars), one tug, one dredger, four mud hoppers and an excavator - not forgetting the fleet of muck-away lorries and the port-a-cabin.
23. Most likely the contract will be running for months rather than days. What is tolerable for two days quickly becomes the nub of dispute and discomfort over two months. Always think ahead: the client and the contractor will need to bring in some form of port-a-cabin or caravan for this team to store kit and have a break in; the client will need somewhere to layout/pin up copies of the profiles and to hold site meetings. Experience indicates that a shared facility, although having its drawbacks, generally proves invaluable in keeping the client informed as to what the contractor is doing (not always obvious) and saves duplicating other essentials like gas. The weather has a role to play here as well: rare is the person who is prepared to stay outdoors through rain, sleet and snow, so allow sufficient space in the port-a-cabin.

The Access Route

24. The site's neighbours may support the project initially but having the muck-away fleet passing a hundred yards from their house several times a day, dropping silt for the children to walk through may well decrease their level of support. If the operational site and access route are

situated on either derelict land or in an industrial area it may increase security and lessen the dangers of the public strolling through the site.

25. It is advisable to walk the route which the plant, machinery and lorries will use and clarify any doubts regarding clearance through gateways or between buildings. Find out the dimensions needed from the various firms involved. The contractor if faced with not passing through a gap is unlikely to think twice before widening it himself (usually with an excavator bucket). This is when they prove how fast they can work and the brick gate-post will be rubble before you can shout "No".

The Operational Area

26. Issues to consider are as follows:
27. What will be the space requirements? How will the dredger be brought to site? If it arrives on the back of a low loader a crane may well be needed to unload it and put it in the water.
28. Will the site office and porta-loo need to be fenced off? Is it safe to leave plant unsecured? Both public safety and vandalism will help to reach a decision. Floating plant: will ropes be good enough or are chains and padlocks needed?
29. If the operational area (unloading of hoppers and loading of lorries) is across or next to the towpath the client will have to take measures to control the public passing through the site. Large signs at either end of the site stating, "Please wait here to be escorted through this construction site", or similar, should be produced.
30. Is there adequate turning space for the bulkier lorries?
31. A copy of the Construction (Design & Management) Regulations 1994 (CDM) should be obtained. These regulations require safety issues to be included at the development stage of a project.
32. **Water point.** This is required not just for those cups of tea and hand washing but to wash off the bulkier lorries. The drivers can be pulled over and fined by the police if silt falls off the lorry onto the highway. The Environmental Protection Act requires waste to be securely contained. The client should watch the backs of the lorries as they drive away and, if there is any seepage from the rear tipping door, note the licence plate number, phone their office and tell them the door has a defective seal. The Company should then radio to the driver instructing him to call in when he has tipped to have the seal checked and replaced before taking another load. This is a frequent occurrence: seals flatten and wear very easily.
33. It is important to ensure that the area where the excavator is working is kept as clear of debris as possible. It will not only help reduce accidents but give the appearance of an efficient site.
34. Depending on the length of waterway being dredged the client may decide to move 'camp' part way through to be closer to the action.
35. Bridges over waterways tend to be low: will the dredger pass under? If not, the only solution is for it to be craned out and put back in, creating more access problems - unless the dredger is amphibious and can pull itself up the bank, along the towpath and back in the water. At this point it is also worth thinking about bridge strengths: will they support the weight?

TENDER DOCUMENTS

36. For a high value contract the client will normally invite tenders for the works from several companies. This will require preparation of a comprehensive set of documents which should be bound together and sent out to the to be invited to tender. Many of the large organisations which carry out deep water dredging, e.g. for coastal harbours, will be interested in tendering for the work. The client should not be put off from approaching them by thinking your works are too small for them to be interested in: many companies like these "smaller" works because they fit in well between their large contracts.

37. A 'standard' document, e.g., The Institution of Civil Engineers (ICE), 'Minor Works' or Edition V of 'Civils', is recommended.

Invitation to Tender

38. Below are a few clauses from past documents: these are only an indication of what to cover as it will be for the client to decide based on local knowledge and the aims of the works.
39. The document should start with a clause along the lines of, "Failure by a Tenderer to comply with this specification may invalidate his/her tender".
40. the client should insist on a conducted site visit and state this is given in good faith with a clause stating "the information given is as accurate as possible based on existing drawings and records". The client may also wish to add something similar to: "The Tenderer should note that because of the history of the waterway, records of the physical structure of the waterways are not complete and may not be up to date". Costs incurred attending the site visit will be solely the Tenderer's responsibility.
41. Other suitable clauses are as follows:
42. "Where sampling and testing for contaminants has been commissioned the results are enclosed. Any information shown in these documents and surveys is given without guarantee of sufficiency but what is given is believed to be accurate within the generally accepted limits of the procedures and tests. Interpretation of the information is entirely the responsibility of the Tenderer.
43. "The Tenderer is free to carry out surveys, sampling and analysis prior to submitting a tender. These or similar activities shall only be carried out with the prior permission of the Client. The issuing of permission shall not place any responsibility whatsoever upon the Client or any waterway authority (if appropriate) for the consequence of such activities by the Tenderer.
44. "Tenderers are reminded that many structures are very old and working alongside or around them can be hazardous. The Tenderer must make himself fully aware of the safety measures and precautions necessary for him to fulfil his obligations under the contract before submitting a tender. In addition, due to the great age of many structures, particular care must be exercised to avoid damage to them". (Add here any particular structures you may have concerns over, e.g., weak bridges that plant should not cross).
45. "It is a condition of the contract that the successful Tenderer will be deemed to have visited the site prior to the submission of its tender and no claim against the Client based on the Tenderer's failure to do so will be considered.
46. "Information to be supplied by Tenderer. It is a condition of the contract that the Contractor shall transport and dispose of all wastes removed under this contract strictly in accordance with the requirements of the Environmental Protection Act 1990, the Waste Management Regulations and the Duty of Care Code of Practice.
47. "Acceptance of Tenders. The Client does not bind itself to accept the lowest or any tender, or to defray any expenses in connection therewith.
48. "Period of acceptance. The tender is to remain open for acceptance for a period of 30 days from the tender return date".

Schedule

49. This includes the description of the work to be carried out with details of discharge sites and permissions granted. If the waterway is navigable does it have to remain navigable during the Works?
50. Should the contractor use the works for his own publicity? Should he, or anyone acting for him be prevented from publishing any information, drawings or photographs, or allow any

journalist, photographer etc. to obtain any such information or material concerning the works without the client's written consent which would be subject to any conditions laid down? If so, a clause to prevent such publicity should be included.

51. On a similar note insist that the contractor has to seek the clients approval for any notices or hoarding at the site.
52. The contractor should provide continuous supervision of the works by a competent person. The supervisor may not be substituted or removed without the written agreement of the client. Details of the numbers and grades of all staff and labour, quantities and type of plant on site to be provided by the Contractor by a certain time each week for the previous week.
53. If a nearby drinking water tap is not readily available the contractor should be given the job of having a supply run to the site with necessary drainage.
54. The client should consider whether to make the contractor liable for providing any equipment for the client's use, such as a boat and sounding pole to enable checks of the work done.
55. If the client wishes the Contractor to submit a written weekly progress report, then this should be stated under the Specification.
56. **Materials and workmanship.** This section is where the client states that the dredging is to be carried out over the area specified on the drawings to the specified depth in material and to the slopes at the limits of dredging as shown on the drawings or as directed by the Client. "The works are to be executed in sections in such a manner that the work can be accepted within a reasonable time of its completion. The Client's representative will make their survey of each section as soon as possible after the contractor has advised him that, in its opinion, dredging of the section is completed. Should any high spots be found the Contractor shall return to remove them as instructed. All debris, solids and other materials arising shall be removed to a licensed waste disposal site".
57. It is also worth adding a clause to cover spots where the drawings show the existing level to be lower than the proposed new profile. The contractor will be earmarking these places to push silt into, hence saving him muck-away costs, a saving you will not benefit by. Any low spots should not be filled in in this way, as natural slippage needs a place to go and we are aiming to have as much depth of water as possible.
58. **Survey and soundings.** Specify that the works in each area prior to being signed off should be demonstrated by means of sounding across the required profile to have been carried out to the required lines and levels. It should specify at what intervals this should be done (usually those matching the profile marks, so you have something accurate to compare with). These should be carried out in the client's presence. The right to order sweeps or sounding at any time should be reserved.
59. Dredging should be measured in lengths of canal as shown in the bill of quantities.
60. The contractor should be required to execute a sweep and collect floating debris along the full length of the works before the issue of the final signing off certificate. The Schedule should note that the dredging will disturb debris previously buried in the canal bed which may subsequently float.
61. **Pollution.** The Contractor should be required to take all necessary precautions to prevent pollution to all rivers, streams, watercourses, drains etc. Anything, which has the potential to be damaged, should be described.

Form of Tender

62. This is simply a form on which all companies who are tendering for the works will enter the fixed price sum they will do the works for. By producing a form, rather than letting them write individual letters, essential wording can be included, e.g. that the price given is to remain open for acceptance for a given number of weeks.

Site Investigation Information

63. These enclosures are copies of the profiles, any written information from the Surveyor, soil sample results and a map identifying the location of the site.

APPOINTMENT OF THE CONTRACTOR

64. In their tender responses the contractors will have detailed how they will carry out the works. This will influence the selection decision together with price. The contractor winning the contract will be notified in writing and asked to provide written confirmation of accepting the work and confirm a start date.
65. When the client has the contractor's written acceptance and is satisfied with progress, he/she will then write to the other companies who tendered informing them of the tender decision.
66. Before the appointed contractor begins work the client should arrange a site meeting when you can discuss any further details and their plans for moving on site. At this time the client should obtain the office and mobile phone numbers of the contractor's staff responsible for the work.
67. The client should ensure that the firm being appointed will be the one doing the work. It is not unknown for a sub-contractor to be appointed and for no-one to mention it until someone queries why all the plant has another company name on it.

SUPERVISION OF WORKS

68. Ideally supervision of the site should be constant. However, if the client is restricted to short visits every day, the time of visits should be varied so they cannot be anticipated and any problems covered up.
69. The client should make sure a phone number where he/she can be contacted is displayed in the site office. He/she should decide if there is a time when he/she does not want to be contacted. For example, if the contractor is called out because one of their boats is on fire at 2.00am does the client want to be informed at the time or at 9.00am? Whatever is decided, it should be emphasised that if they have any queries or problems the client is only a phone call away and will help them.
70. It is inevitable that some problems will occur when the client is not around. This is when a good relationship with the people doing the actual work pays dividends: they will say if there have been any problems in the client's absence.
71. Equipment breakdowns will probably occur at some stage; the contractor must make a note of when the plant goes down and for how long. If it is frequent you may be able to get some compensation for overrunning. This, of course, depends on there being a suitable clause in the contract.

Appendix A

Example of a Species List drawn from an Ecological Survey

English Name	Latin Name	% of London
1 Annual meadow-grass	<i>Poa annua</i>	99.50
d Annual mercury	<i>Mercurialis annua</i>	74.00
1 Ash	<i>Fraxinus excelsior</i>	100.00
1 Bittersweet	<i>Solanum dulcamara</i>	98.75
1 Black horehound	<i>Ballota nigra</i>	98.50
1 Bramble	<i>Rubus fruticosus</i> agg.	99.75
d Bristly oxtongue	<i>Picris echioides</i>	34.25
1 Broad-leaved dock	<i>Rumex obtusifolius</i>	99.50
e Buddleia	<i>Buddleja davidii</i>	73.50
e Canadian fleabane	<i>Conyza Canadensis</i>	88.50
1 Cleavers	<i>Galium aparine</i>	93.00
1 Cock's-foot	<i>Dactylis glomerata</i>	97.25
1 Common chickweed	<i>Stellaria media</i>	99.50
1 Common comfrey	<i>Symphytum officinale</i>	23.75
1 Common mallow	<i>Malva sylvestris</i>	96.75
1 Common nettle	<i>Urtica dioica</i>	100.00
1 Common water-crowfoot	<i>Ranunculus aquatilis</i>	3.25
Cotoneasters	<i>Cotoneaster</i> spp.	
1 Cow parsley	<i>Anthriscus sylvestris</i>	98.50
1 Creeping bent	<i>Agrostis stolonifera</i>	89.00
1 Creeping thistle	<i>Cirsium arvense</i>	100.00
1 Cut-leaved crane's-bill	<i>Geranium dissectum</i>	67.25
1 Daisy	<i>Bellis perennis</i>	99.50
1 Dandelion	<i>Taraxacum</i> sp.	100.00
d Dwarf elder	<i>Sambucus ebulus</i>	1.75
1 Elder	<i>Sambucus nigra</i>	100.00
1 False oat-grass	<i>Arrhenatherum elatius</i>	99.50
e Feverfew	<i>Tanacetum parthenium</i>	73.00
e Fig	<i>Ficus carica</i>	9.50
e Flowering currant	<i>Ribes sanguineum</i>	2.25 c
1 Goat willow	<i>Salix caprea</i>	67.75
1 Great reedmace	<i>Typha latifolia</i>	26.75
1 Great willowherb	<i>Epilobium hirsutum</i>	99.25
1 Greater plantain	<i>Plantago major</i>	100.00
1 Groundsel	<i>Senecio vulgaris</i>	99.50
e Guernsey fleabane	<i>Conyza sumatrensis</i>	0.00
1 Gypsywort	<i>Lycopus europaeus</i>	44.00
Hawkweeds	<i>Hieracium</i> spp.	g
1 Hedge bindweed	<i>Calystegia sepium</i>	100.00
1 Hedge mustard	<i>Sisymbrium officinale</i>	98.75
e Horse-radish	<i>Armoracia rusticana</i>	92.25
1 Ivy	<i>Hedera helix</i>	95.00
1 Lesser burdock	<i>Arctium minus</i>	92.00
e Lucerne	<i>Medicago sativa</i>	9.25
1 Marsh foxtail	<i>Alopercurus geniculatus</i>	29.50
e Michaelmas daisy	<i>Aster</i> spp.	86.75
1 Mugwort	<i>Artemisia vulgaris</i>	99.75
1 Oxeye daisy	<i>Leucanthemum vulgare</i>	83.00
e Oxford ragwort	<i>Senecio squalidus</i>	99.00
1 Pale persicaria	<i>Persicaria lapathifolia</i>	54.00
1 Perennial rye-grass	<i>Lolium perenne</i>	100.00
1 Red clover	<i>Trifolium pratens</i>	98.25
1 Red fescue	<i>Festuca rubra</i>	75.00
1 Reed sweet-grass	<i>Glyceria maxima</i>	27.50
1 Ribwort plantain	<i>Plantago lanceolata</i>	100.00

1 Rough meadow-grass	<i>Poa trivialis</i>	86.25
1 Scentless mayweed	<i>Tripleurospermum inodorum</i>	94.75
1 Shepherd's-purse	<i>Capsella bursa-pastoris</i>	100.00
1 Smooth sow-thistle	<i>Sonchus oleraceus</i>	99.50
1 Spear thistle	<i>Cirsium vulgare</i>	99.75
e Spotted dead-nettle	<i>Lamium maculatum</i>	37.25
e Sycamore	<i>Acer pseudoplatanus</i>	100.00
1 Wall barley	<i>Hordeum murinum</i>	98.75
1 White campion	<i>Silene latifolia</i>	76.00
1 White clover	<i>Trifolium repens</i>	100.00
1 White dead-nettle	<i>Lamium album</i>	99.50
1 White willow	<i>Salix alba</i>	22.50
d Wild radish	<i>Raphanus raphanistrum</i>	40.50
1 Yarrow	<i>Achillea millefolium</i>	100.00
1 Yellow iris	<i>Iris pseudacorus</i>	39.25
1 Yorkshire-fog	<i>Holcus lanatus</i>	98.50
1 Zigzag clover	<i>Trifolium medium</i>	26.25

The status of each species is:

1	=	native to London
d	=	doubtfully native to London
b	=	native to Britain but not London
u	=	doubtfully native to Britain
e	=	not native

The figures given in the column headed "% of London" are an indication of how widespread the species is in Greater London: the percentage of the 400 Greater London 'tetrad' recording units with records of the species in Burton's (1983) Flora of the London Area. The figures give an inflated indication of the distribution of all species, as a single record in one of the recording units suffices for the species to be counted effectively as if present throughout the entire four square kilometres. Some species are difficult to record through being inconspicuous, seasonal, or occupying a difficult habitat, like open water. Nevertheless the gross difference in the percentages represent real differences in distribution. No figure is furnished for plants not mapped in the Flora (such as species that were not fully identified 'g', and lower plants 'l'). Other species produced poorly, or not at all, in London but occur widely in cultivation or as remnants of previous cultivation 'c'; the percentage of these is low as Burton's atlas is confined to natural records.