

# MANAGING RISKS:

HOW TO  
SELECT THE  
APPROPRIATE  
DREDGING  
CONTRACT

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The contracting environment for dredging and offshore works is diverse. Moreover, increasing financial and/or managerial constraints are requiring contracting parties to change the apportionment of commercial risk. Contractors and suppliers have to adapt to the contractual set-up, which is chosen unilaterally by the owner, and they need to reconsider how to manage their risks and how to procure their service providers. Turnkey and engineering, procurement, and construction (EPC) contracts are becoming more common in the industry and bring their own benefits and challenges.

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**Different types of dredging have different inherent risks and require different procurement solutions in order to be effective.**

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The Working Group on Effective Contract Type Selection (WGECS) proves guidance on contracting for key stakeholders participating in a contract. This article has three component parts:

1. The first part is a generic procurement process flowchart that visualises the procurement process as a whole. Five stages are described and explained that set out the main considerations to be taken into account by those procuring works, resulting in the selection of the contract type;
2. The second part, a table setting out certain key aspects that may be taken into account when assessing the contracting method, ties seamlessly in with the CEDA Checklist for Successful Dredging Management. The strength of this table is that it is established by a DMC-recognised group of specialists operating at both sides of dredging and offshore industry – both owners and contractors. The table includes six key aspects of procurement route/ contract selection and details numerous sub-aspects that can be used to assess the optimum procurement strategy;

3. The third part combines the output of the first two parts, resulting in an objective scoring methodology that allows users to compare their specific project with various standardised contract types.

The principle of this guidance article is two-fold. Firstly, it is meant to provide a simple, easy-to-access guide to the general procurement path, including the overall process, important points of consideration that may be taken into account, and guidance on the various factors influenced by certain standard contract types. Secondly, it provides a more in-depth, analytical method of objectively measuring a user's specific project and related requirements/constraints and comparing this measurement against standardized contract types. This allows a user to apply a more scientific, auditable, and demonstrable basis for the ultimate contract selection, and it compares with the more generic and basic methods of selection.

The drafting of this guidance article is specifically made to allow each part of it to be used either independently or together as

a whole (i.e., depending on a user's specific requirements, value can be gained from referring to only one section or the document as a whole in assisting the selection of a suitable contract type).

Further, this article is specifically designed to be able to be read alongside, and be complementary to, the CEDA Checklist for Successful Dredging Management (CEDA, 2017). Together, these publications set forth tailored guidance that can be utilised by organisations involved in the practical and contractual delivery of dredging projects worldwide.

### **Procedure for contract/procurement selection**

#### **Introduction**

Choosing an effective contract type for dredging projects is not just a simple decision made by selecting an 'off the shelf' standard. It takes time to properly consider the risks and the conditions of the project. In Figure 1, CEDA seeks to provide a structured approach to the relevant steps and options that bear consideration.

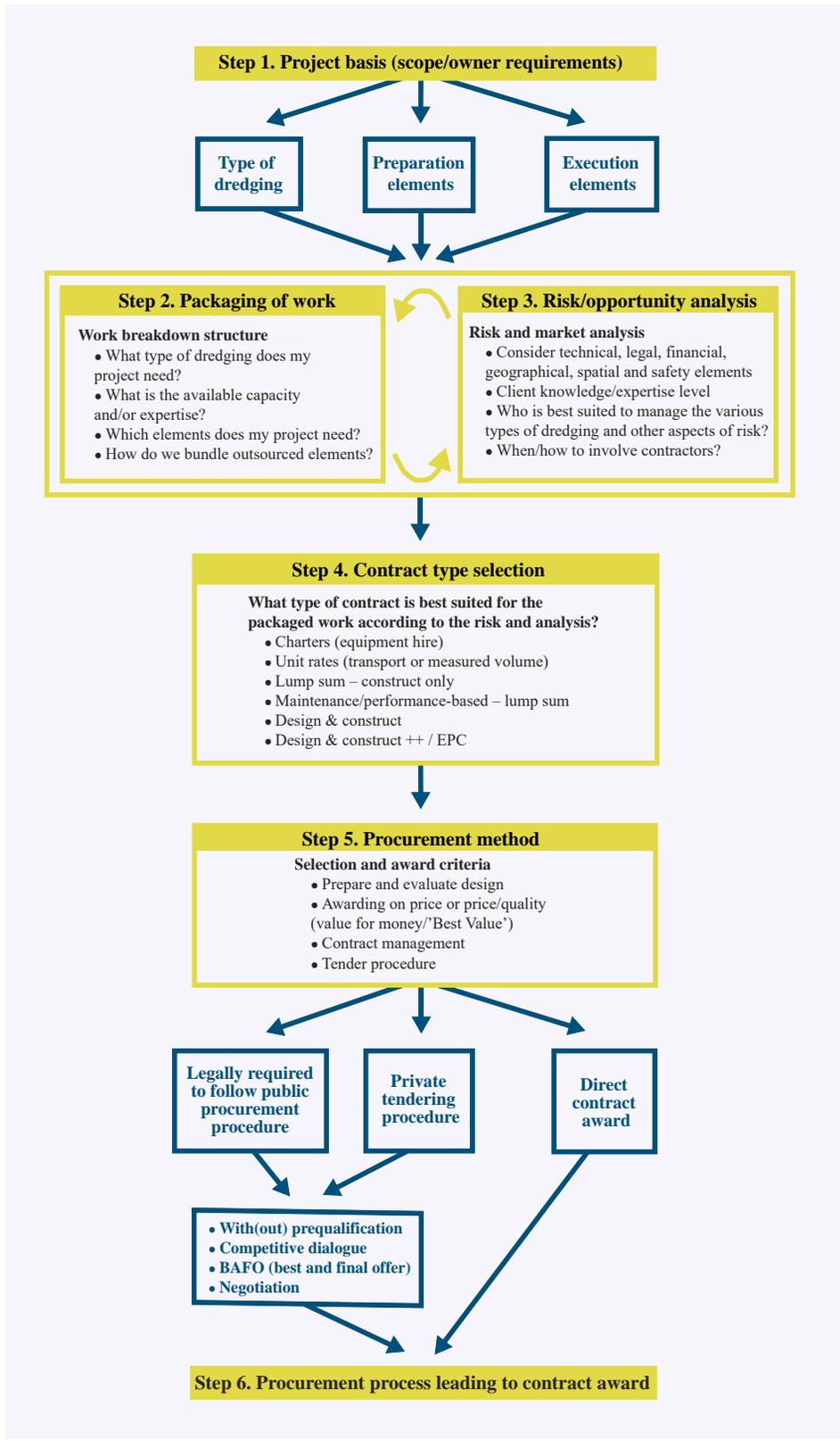


FIGURE 1

Staged flowchart outlining transition from establishment of project basis to procurement of works contract.

Step 1: Project basis

[scope/owner requirement]

Firstly, the type of dredging work that needs to be performed requires consideration ('What is the goal of the project?'). Different types of dredging have different inherent risks and require different procurement solutions in order to be effective. During this step, all the phases of a particular project merit consideration, as well as the goals sought to be achieved by the project. An approach whereby these points are already considered comprehensively during the procurement phase is of assistance to better design the overall procurement strategy.

The different types of dredging that a project requires are to be considered:

- maintenance dredging (e.g., a fairway needs to be dredged to guarantee nautical depth or minimum discharge);
- capital dredging (e.g., deepening and/or widening of a fairway);
- land reclamation (e.g., building a new harbour or an island at sea, perhaps with protection of flooding and new quay walls, etc.);
- coastal protection (e.g., beach or foreshore nourishments);
- offshore (seabed) dredging (e.g., trenches for pipelines and cables).

Notwithstanding the type of dredging envisaged to be employed, the following (preparatory) elements also warrant consideration, all of which may be required for a particular project:

- preliminary studies, including surveys, incl. multibeam, hydrographic, soil, environmental, UXO (unexploded ordnance), underwater installations/ infrastructure, archaeological, morphological;
- design;
- engineering;
- permits;
- financing.

During this first phase, various elements that might be of relevance during the contract execution also need consideration:

- contract management requirements;
- monitoring;
- inspections;
- surveys;
- research as required internally or by other stakeholders.



**FIGURE 2**

Equipment/vessel availability and capacity are part of contract type selection.

The CEDA Checklist for Successful Dredging Management (CEDA, 2017) can be of further assistance to gather all elements that need further consideration.

### Step 2: Packaging of work (iterative with step 3)

If the project is sufficiently defined, the phase of packaging of the project work commences. Packaging of work can best be achieved by dividing the project into different components of work. Most projects are based on a work breakdown structure to assist the engineering. The following non-limitative questions merit consideration:

- The 'make or buy' decision: Is outsourcing the best decision for each component of work? If so, in how many contracts are the works divided? While considering which and how many contracts are outsourced, the following should be considered:
  - what type of contracts are appropriate (i.e., integrated contracts, stand-alone contract for various disciplines and contract work types (e.g., basic and detailed) engineering, surveys, civil construction, blasting, maintenance,

finance], different contracts for various geographical locations where works have to be performed or through another logical combination of works relating to market characteristics and the number of potential competitors);

- which party has the best capacity to prepare, tender, execute, and manage (a particular type of) the contract works;
- more contracts increase the dependency of various contractors and lead to more interfaces.

### Step 3: Risk/opportunity analysis

A risk and opportunity analysis needs to be performed to establish a procurement strategy. The packaging of work should be considered simultaneously with the risks and opportunities involved in a particular division of works. While considering various combinations for the division of works, the risks involved with each combination should be weighed. Dividing works into various contracts may lead to more interfaces and, consequently, a risk for the owner to be responsible for disputes arising out of improper alignment of the interfaces. The same division may also lead to the

opportunity that the overall project contract expenditure is less.

After careful analysis of the division of work and risks and opportunities associated therewith, project owners should decide which division is most appropriate for it and/or the project. During a risk/opportunity analysis, at least the following elements should be considered: technical aspects, legal and financial matters, geographical locations, and spatial and safety elements. For the main work components, it is important to properly consider what negative consequences there may be and if and how these can be avoided. Elements like health and safety, the environment, the schedule, budget overruns, and the quality of work should be considered, as well as what the causes might be of negative consequences and which party is best suited to take and to influence the risk.

A good market analysis, including an estimation of the equilibrium of demand (for services) and supply (of providers), is very useful in procurement. Such an analysis

## CONTRACTS

**TABLE 1**

In the following table, a number of standard contract types with different risk allocations are set out. The last column gives boundary conditions and key checks to be considered.

\*This is based on a generalisation – the specific risk allocation is always dependent upon the specific terms of a particular contract.

Contract type	Characteristics	Responsibility allocation*		Boundary conditions/checks the Owner should consider
		Owner	Contractor	
Construct only Charter (for capital and maintenance work)	<ul style="list-style-type: none"> <li>• Price variable – per m<sup>3</sup>/hour</li> <li>• Flexible arrangements</li> <li>• Less information needed</li> <li>• Availability can be defined in the contract</li> </ul>	<ul style="list-style-type: none"> <li>• Production risk</li> <li>• Quality/outcome risk</li> <li>• Risk of quantities</li> <li>• Soil conditions</li> <li>• Availability equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Availability of equipment</li> </ul>	<ul style="list-style-type: none"> <li>• Knowledge of what is suitable equipment for the dredging needs</li> <li>• Ability to give the right directions</li> <li>• Inspection of performance needed</li> </ul>
Construct only Remeasurable (for capital and maintenance work)	<ul style="list-style-type: none"> <li>• Volumes are measured by in- and out-survey</li> <li>• Quantities can be defined in the contract</li> </ul>	<ul style="list-style-type: none"> <li>• Risk of quantities</li> <li>• Soil conditions</li> <li>• Design</li> </ul>	<ul style="list-style-type: none"> <li>• Production risk</li> <li>• Performance risk</li> </ul>	<ul style="list-style-type: none"> <li>• Correction of tender volumes after in-survey</li> </ul>
Construct only Lump sum (for capital work)	<ul style="list-style-type: none"> <li>• Clear scope required to allow effective pricing</li> <li>• Risk for unknowns to be allocated</li> </ul>	<ul style="list-style-type: none"> <li>• Scope change/flexibility</li> <li>• Lack of flexibility/ability to influence</li> </ul>	<ul style="list-style-type: none"> <li>• Production risk</li> <li>• Result risk</li> <li>• Risk of quantities</li> </ul>	<ul style="list-style-type: none"> <li>• Allocation of risk</li> <li>• Setting clear scope</li> <li>• Design development</li> </ul>
Maintenance Performance-based Lump sum	<ul style="list-style-type: none"> <li>• Price is higher</li> <li>• Result is described and contracted</li> <li>• Focus on performing to contract</li> <li>• Less flexible</li> </ul>	<ul style="list-style-type: none"> <li>• Level of price</li> <li>• Lack of flexibility/ability to influence</li> </ul>	<ul style="list-style-type: none"> <li>• Production risk</li> <li>• Result risks</li> <li>• Risk of quantities</li> <li>• Soil conditions</li> <li>• Risk availability of equipment reduces</li> </ul>	<ul style="list-style-type: none"> <li>• Having historical data to calculate the needed volumes to be dredged</li> <li>• Ability to control the quality and result (performance)</li> </ul>
Design & construct	<ul style="list-style-type: none"> <li>• Higher risk on contractor</li> <li>• Owner has to clearly define scope</li> <li>• Lack of flexibility for owner</li> </ul>	<ul style="list-style-type: none"> <li>• Production is as foreseen/expected</li> <li>• Sufficiency of preliminary design</li> <li>• Soil conditions</li> </ul>	<ul style="list-style-type: none"> <li>• Output</li> <li>• Quantities</li> <li>• Soil conditions</li> <li>• Quality</li> <li>• Design responsibility/liability</li> <li>• Resource availability</li> </ul>	<ul style="list-style-type: none"> <li>• Quality of preliminary design</li> <li>• Permits/approvals</li> <li>• Clear scope of work and/or functional requirements</li> <li>• Define design liability</li> </ul>
Design & construct +/-EPC	<ul style="list-style-type: none"> <li>• Highest risk on contractor</li> <li>• Owner has to clearly define scope</li> <li>• Lack of flexibility for owner</li> </ul>	<ul style="list-style-type: none"> <li>• High cost</li> <li>• Definition of scope</li> <li>• Lack of ability to influence</li> <li>• High cost of changes</li> </ul>	<ul style="list-style-type: none"> <li>• Output</li> <li>• Quantities</li> <li>• Soil conditions</li> <li>• Quality</li> <li>• Design responsibility/liability</li> <li>• Resource availability</li> </ul>	<ul style="list-style-type: none"> <li>• Quality of preliminary design</li> <li>• Permits/approvals</li> <li>• Clear scope of work and/or functional requirements</li> <li>• Define design liability</li> </ul>

**A good market analysis, including an estimation of the equilibrium of demand (for services) and supply (of providers), is very useful in procurement.**

**TABLE 2**

Key aspects and parameters or considerations.

Key Aspects	Parameters/Considerations
<b>A. Project Scope</b>	How fixed or open is the scope of work?
<b>B. Physical/Environmental Site Conditions</b>	How well known are the physical conditions at site?
<b>C. Risk Allocation/Liabilities</b>	What balance of risk do the parties wish to make? Who is best placed to manage risk?
<b>D. Owner's Control/Contractor's Flexibility</b>	How much control does the owner want? How much flexibility to work will the contractor have?
<b>E. Time &amp; Schedule</b>	Is the end date critical or is there flexibility regarding when the works can be completed?
<b>F. Price &amp; Valuation</b>	How much security of price does the owner want?

**TABLE 3**

A. Project scope	
Sub-category	Remarks/clarifications
(Environmental) Permitting	Final (environmental) permitting can be granted before a tender is issued, or environmental permitting might be made during tendering phase, or even with input by contractor, after project award.
Complexity of project	Complexity of project to be appreciated by owner for contract and procurement type selection, influencing content or project outlining documents and determining pricing and risk assessment by contractor.
Fitness for purpose	Checks to be made by owner if deliverables/products are fit for purpose.
Achievability of the owner's requirements	Owner to verify if requirements indeed can be/are met, contractor to accept during contracting.
Selection of placement site	Selection of placement site to be defined as often restricted by authority regulations, largely affecting pricing of the works.
Design effort needed	Design effort needed to be reflected by party in charge of design development: (consultant on behalf of) owner, (consultant on behalf of) contractor, or jointly.
Design requirements	Design requirements to be unambiguously specified, in principle by owner, but depending on contract type, with input by contractor, especially when cost savings are achievable.
Technical requirements	Achievability of technical requirements to be checked and accepted by contractor.
Measurement of volumes	Method of volume measurement to be specified and adhered to, as basis for acceptance and payment.
Survey requirements	Survey requirements are to be specified, to provide essential data for contract evaluation.
Material supply	Owner's specifications on material supply to be priced, accepted and adhered to by contractor.
Performance/quality of service	Checks to be made by owner if deliverables/products are of required quality.
Quality control	Owner's specifications on quality control procedures to be priced, accepted, and adhered to by contractor.

**TABLE 4**

<b>B. Physical/environmental site conditions</b>	
<b>Sub-category</b>	<b>Remarks/clarifications</b>
Material to be dredged	Characteristics of material to be dredged are essential for project development options and directly influence contract pricing and risk assessments by contractor. Owner to provide required information, possibly in combined effort with (tendering) contractors. Responsibility for correctness of data to be identified.
Site conditions	Site conditions, influencing design and construction limitations, to be provided by owner. Consequences thereof to be incorporated by contractor in work plans and pricing, with adequate margin for natural or operational variability.
Site information/data quality	Reliability of site information/data quality clearly to be specified by owner, with adaptive procedures if deviations are encountered.

should lead to a balanced decision as to what procurement strategy is employed, how work is divided, and which party can be best suited in controlling and managing risks.

**Step 4: Contract type selection**

After a work division is decided upon following a risk and reward assessment, the question turns to which type of contract is best suited to allocate the risks and rewards in accordance with the outcome of steps 2 and 3. If the previous steps lead to the conclusion that various project works are combined, this will lead to an integrated contract. In addition, in this phase the risk allocation of the work packages is important. Although the previous steps may result in shifting risks towards a contractor, it may not always be feasible to exclude all risks sought to be shifted away. It will therefore be necessary to consider which party is best equipped to absorb certain types of risk.

Among the important risks are the quantities of material to be dredged, the probability of variance of scope, the physical site conditions, the chemical substance of dredged material, and weather and wave conditions. The ability to ascertain if there is insufficient information may lead to one contract type or another.

General aspects such as permits, a legal framework, stakeholder engagement, financial boundaries, environmental impact, and political pressure might also play a part in the type of contract used. Parties

should, amongst other things, consider the following questions during this step:

- Is it clear what the result of the contract should be (functional, designed, engineered, service provided, needed production capacity of equipment hired, number of hours equipment rented)?
- Is it reasonable and calculable to ask for a lump-sum price or should there be unit rates or a mixture of both?
- What is the right proportion to allocate the risks in terms of money (think of the mentioned aspects of dredged material, survey, weather, tide, permits, etc.)?
- Is the project owner capable of managing the contract and the specified result?

**Step 5: Procurement method**

If the project is designed and the contract(s) is designed, the way to select a contractor needs to be chosen. For public authorities, in many countries there are public procurement laws that should be complied with. For private clients, it is important also to consider alternative procurement mechanisms. Important questions are:

- Should the contract be awarded only on price or also weighted between price and quality? This depends on whether the owner requires added value and whether a contractor can add value upon the minimum quality defined in the contract and if one is able to measure this added value and verify the promised efforts during the course of the contract.
- Should the number of competitors be limited? What are minimum requirements for subscribers?

- It is also important to consider the number of possible competitors and the complexity of the projects, the contract and the risk allocation standard, and an understanding of whether there should be a dialogue between stakeholders to manage expectations and clarify requirements.
- How much time and dialogue are needed for contractors to understand the contract, to investigate the situation, to calculate their price, and to offer the quality needed? The extent of the time and input needed will be dependent upon a number of factors, which should be allowed for.

**Step 6: Procurement process leading to contract award**

If the previous choices are made, the procurement strategy is designed, and the user will pass step 6. Thereafter, it will further be important for the project stakeholders to consider the ways to control the execution of the project. There should be a verification mechanism to learn if the contract deliverables are met and the quality is acceptable. Choices are to be made on:

- relying on quality management and certificates of the contractor;
- monitoring systems or mankind control of amounts or constructions;
- independent inspection to be hired.

**TABLE 5**

<b>C. Risk allocation &amp; liabilities</b>	
<b>Sub-category</b>	<b>Remarks/clarifications</b>
Permitting issues	If permitting issues might be expected during procurement process and/or during execution of works, mechanisms to deal with implications are to be (basically) specified.
Risk allocation/management/ownership	Owner to specify and contractor to accept how project and process risks will be managed and who has ultimate ownership of implications thereof.
Risk compared against project value	Owner to assess project value in relation to project risks, in evaluation of overall project feasibility.
Impact on third parties/unavoidable consequence of the execution of the works	Owner to specify how to handle project impacts/process impacts, identifying task of contractor in monitoring and mitigation procedures.
Losses of material during beach nourishment	With open reclamation sites (beach nourishment projects), fill losses are to be foreseen and to be priced by contractor. Adequate frequency and method of volume determination for partial/sectional handover will reduce risk and price for both owner and contractor.
Scope variations	Effects of scope variations to be foreseen in contract, potentially influencing design and execution.
Equipment/vessel availability	Availability by (tendering) contractor(s) are welcomed by owner, it needs to be specified which freedom is accepted and how variations to original will be valued.
Innovative design	If innovative designs by (tendering) contractor(s) are welcomed by owner, it needs to be specified which freedom is accepted and how variations to original will be valued.
Dealing with innovations	When innovations are introduced during design and/or construction process, improving project quality or reducing project cost, benefit sharing mechanisms between owner and contractor shall be foreseen in contract documents.
Information required by owner from contractor – pre-contract and during contract	Owner may require extensive information from contractor during tendering and negotiations process and during execution of the works. It is instrumental that these requirements are clearly identified from onset of tendering.
Form of dispute resolution	Procedures on dispute resolution are to be specified in contract.
Suspension of work	Implications of suspension of works to be fixed in contract and to be administered during project execution and closing.
Force majeure	Consequence of force majeure to be foreseen in contract.
Defect liability	Liabilities for defects to be identified in contract.
Design liability	Liabilities for design faults to be identified in contract.
Liability for consequential losses	Liabilities for consequential losses to be identified in contract.
Delay damages	Liabilities for delay damaged to be identified in contract.

**Within each key aspect, several sub-aspects have been identified that are of importance during various stages of a project and that need to be considered in assessing the scores for the key aspects.**

TABLE 6

D. Owner's control/contractor's flexibility	
Sub-category	Remarks/clarifications
Freedom of execution/opportunities for innovation	In case new developments are welcomed, mechanisms to handle these are to be addressed in contract documents and work plans.
Equipment/vessel selection	Contractor requested to identify equipment (intended) to be used.
Flexibility in dealing with unforeseen circumstances/ variations/risk/events/change	Flexibility to control deviation from original specifications to be tailored in contract documents and work plans
Managing interfaces	Owner to identify who best can/has to/will handle each project interface, possibly in consultation with contractor.
Contract management/administration	Management and administration requirements to be specified by owner and to be fixed during final procurement.

TABLE 7

E. Time & schedule	
Sub-category	Remarks/clarifications
Programme/schedule/ milestones	Owner is to set milestones for project from start to finish. Realistic timing with ample float for natural variations and some unforeseen events will reduce tender price and risks for both owner and contractor.
Tendering time	Adequate time for tendering is to be foreseen, depending on tender requirements. Extension of tendering time, if needed, cannot shift construction period to unfavourable seasons without cost and time implications.

FIGURE 3

There are contract types where the Owner should consider having knowledge of equipment's suitability for the dredging needs.



**Users can quantify the various key aspects based on their specific and project requirements.**

**TABLE 8**

<b>F. Price &amp; valuation</b>	
<b>Sub-category</b>	<b>Remarks/clarifications</b>
Attractiveness to tenderers/supply chain	Owner to put project on the market in a way which is attractive to potential bidders for works and for supplies.
Tender costs	Owner to indicate in tender documents whether, and to what extent, tender costs will be reimbursed to non-successful tenderers.
Price/costing certainty	Owner will aim for reliable pricing by (tendering) contractor(s) with adequate securities against uncontrolled cost overruns and non-performances
Cost/time overruns	Mechanisms to handle cost and/or time overruns are to be specified in contract.
Stand-by/demurrage	Procedures whether and how stand-by times and demurrage will be handled at end of project to be specified in contract documents.
Funding	Owner to assure proper funding when initiating project and when closing project.
Market conditions	Owner to consider market conditions in its final project investment decisions and in contract award.
Payment and securities	Contractor will aim for reliable and secure payment by owner against (partial) handover certificates.
Tax	Regulations on taxes to be informed by owner to contractor, next to contractor taking care of his own obligations.
Insurance	Owner to clearly specify which insurances he has taken out and which insurances are to be taken by contractor.
Currency exchange rate and fluctuations	Procedures regarding whether and how payments in different currencies will be handled to be specified in contract documents.

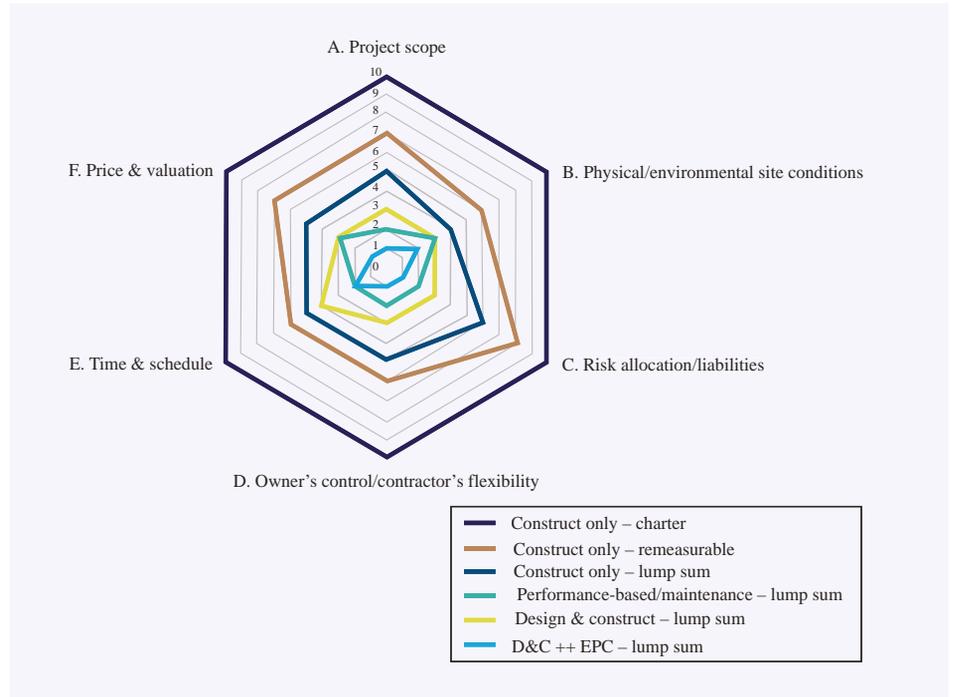


**Key Aspects**

When assessing the most suitable procurement method/contracting type, CEDA considers the matter to comprise certain 'key aspects', being general categories of consideration of significant importance, which can be appraised or 'scored' in determining the optimum method.

The selection of key aspects is specific to individual projects and users, but for guidance, six key aspects represent common influential factors to a party awarding a contract. These can be found in Table 2.

Within each key aspect, several sub-aspects have been identified that are of importance during various stages of a project and that need to be considered in assessing the scores for the key aspects. Although many sub-aspects are of relevance in many more stages than indicated, they are primarily related to the marked stages – either governing decisions to be made by the contractor awardee or affecting actions by the (tendering) contractor(s), even those influencing the owner's interests. The users can utilise, amend, or prioritise the



**FIGURE 4**

In this 'Visualisation of Owner's Uncertainty', the higher value indicates increased uncertainty.

**TABLE 9**

Key aspects	Qualification – uncertainty for owner to be assessed within upper and lower end of range		Standard/typical types					
	Lower end (score = 1)	Upper end (score = 10)	Construct only – charter	Construct only – remeasurable	Construct only – lump sum	Performance based / maintenance – lump sum	Design & construct – lump sum	D&C++/EPC – lump sum
<b>A. Project scope</b>	Fully fixed	Very open/uncertain	10	7	5	2	3	1
<b>B. Physical/environmental site conditions</b>	Fully explored	Very uncertain	10	6	4	3	3	2
<b>C. Risk allocation/liabilities</b>	Risks and liabilities with contractor	Risks and liabilities with owner	10	8	6	2	3	1
<b>D. Owner's control/contractor's flexibility</b>	Contractor freedom to operate	Owner in control	10	6	5	2	3	1
<b>E. Time &amp; schedule</b>	Strict time frame	Flexible time frame	10	6	5	2	4	2
<b>F. Price &amp; valuation</b>	Fully fixed	Remeasurable based on rates	10	7	5	3	3	1

sub-aspects, giving relevant weight in 'scoring' these items. The key aspects and their sub-categories are found in Tables 3-8.

For example, for key aspect 'project scope', the first listed sub-aspect is the '(environmental) permitting'. The user may wish to consider how much of the permitting process has been completed, how many permits are secured at the start of the procurement process, and what implications will the permitting conditions have on the project scope. An assessment of this sub-aspect, if included, can be made by the user and appropriate weighting applied.

The remarks/clarifications on the right side of the table provide (limited) information on why and how the specific sub-aspect might influence procurement and contract type selection, and possibly indicate directions on how the user can prepare a suitable procurement process.

## The scoring matrix

### Introduction

The principle of the method developed by CEDA in advising the procurement route/ contract type selection is the 'scoring' and subsequent comparison of the six key aspects set out in Tables 3-8. For each of the key aspects, a relative 'score', ranging from 1 to 10, can be assessed and applied. This scoring range can relate to either the amount of

variability/fixity the user can accept, based on matters such as the ability to manage and control risk, or the level of knowledge/certainty of a specific key aspect.

In assessing the score for each key aspect, the user can choose to utilise or develop its own sub-aspects and to weight the importance of each of these sub-aspects within each key aspect. For example, for key aspect 1 – project scope, CEDA has identified 13 subcategories.

The user may consider these are all relevant or may wish to remove some or add others. In addition, the user may then wish to place more importance on half of the sub-aspects and can carry out objective scoring on that basis.

Each of the six 'scored' key aspects can then be plotted against other, standardised results, providing valuable insight, advice, and guidance to inform the user on what the optimum contract type may be for any particular project.

### Standard Scoring Charts

Six standard types of contract model are addressed including:

- Construct only – Charter;
- Construct only – Remeasurable;
- Construct only – Lump sum;
- Maintenance – Performance-based – Lump sum;

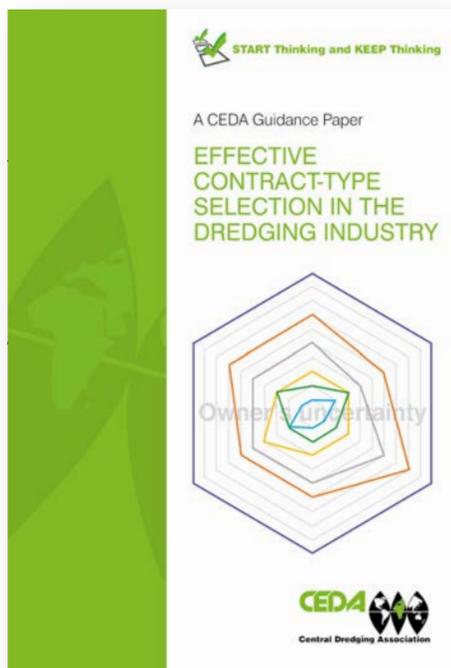
- Design & construct – Lump sum;
- D&C+/EPC – Lump sum.

For each contract type noted, typical scores against each of the key aspects are found in Table 9.

This plotting of the key aspect scores graphically illustrates the differences between the contract requirements/parameters in question against the six standard contract types listed in Table 9. The farther away from the centre of the chart, the higher the uncertainty/variability of the key aspect for the user.

As an example: lump sum contracts (should have) greater fixity of outturn cost than a remeasurable or charter/hire form of contract. Accordingly, for the 'price & valuation' key aspect, this scores highly for 'Construct only – Charter' and low for lump sum forms of contract (see Figure 4).

This approach can be utilised by a user wishing to carry out a comparative assessment. It can also be used to illustrate the basis of a decision on the type of contract that may be appropriate for the project to be procured, which can be presented or used accordingly internally within the user's organisation.



**By using this guidance, a party selecting and procuring contracts can extract and utilise any or all of the different sections to provide points of consideration when making such a selection.**

TABLE 10

Key aspects	Qualification – uncertainty for owner to be assessed within upper and lower end of range		Sample score compared against standardised scores						
	Lower end (score = 1)	Upper end (score = 10)	Sample Score	Construct only – charter	Construct only – remeasurable	Construct only – lump sum	Performance based / maintenance – lump sum	Design & construct – lump sum	D&C+ /EPC – lump sum
<b>A. Project scope</b>	Fully fixed	Very open/uncertain	5	0.50	0.71	1.00	2.50	1.67	5.00
<b>B. Physical/environmental site conditions</b>	Fully explored	Very uncertain	7	0.70	1.17	1.75	2.33	2.33	3.50
<b>C. Risk allocation/liabilities</b>	Risks and liabilities with contractor	Risks and liabilities with owner	10	1.00	1.25	1.67	5.00	3.33	10.00
<b>D. Owner's control/contractor's flexibility</b>	Contractor freedom to operate	Owner in control	10	1.00	1.67	2.00	5.00	3.33	10.00
<b>E. Time &amp; schedule</b>	Strict time frame	Flexible time frame	5	0.50	0.83	1.00	2.50	1.25	2.50
<b>F. Price &amp; valuation</b>	Fully fixed	Remeasurable based on rates	5	0.50	0.71	1.00	1.67	1.67	5.00
			Score	0.60	0.91	1.20	2.71	1.94	5.14
			Delta from unity	0.40	0.09	-0.20	-1.71	-0.94	-4.14

**Example: utilisation of the scoring method**

Against this standard table, users can apply and compare their own assessed key aspect 'scores'. This comparison can be made either to the standardised scores in the table or using the radar charts.

These sample scores can then be compared, on a proportional basis, against the standardised scoring for each key aspect and each standard contract type. This comparison is represented by way of variance, as a factor, from each of the standardised scores for each specific item.

dashed line) closely to 'Construct only – Remeasurable' (the orange line) based on the summation of each proportional scoring assessment. This scoring method provides valuable assistance to the user when making an informed decision on the contract mechanism to be adopted.

**It can be seen that the smallest delta relates to Construction Only - Lump Sum.**

The sum of the variances between the sample project and the standardised scores can then be made. The closer the sum total for each standard contract type is to the value of 1, the closer the sample is aligned to that standard contract type overall (see Table 10).

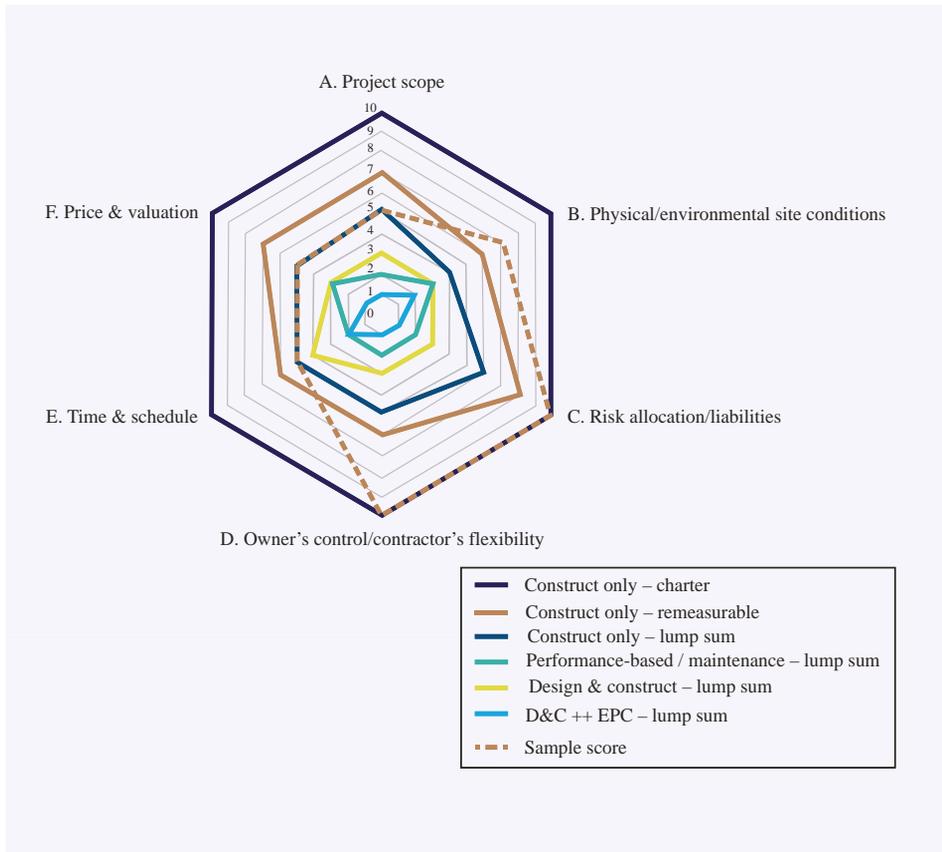
It can be seen that the smallest delta relates to Construction Only – Lump Sum. The resulting project requirement profile, shown in Figure 5 as the orange dashed line, can be compared against the standard contract type profiles visually.

In the case of the example provided, the user's sample project scores (red

**Conclusions**

By taking into account and giving careful consideration to all salient matters relating to the delivery of a project, a procuring party can optimise the contractual model used. This can have the advantage of selecting a model that is most suited to both the procuring party's specific requirements and those of the project itself. This can allow flexibility for the user to manage contractual risks and opportunities and to suitably assist in allocating such management in the most appropriate manner.

In considering the procurement flowchart included in stage 1, users can compare this model process with their own internal procurement and contract selection



**FIGURE 5**

In this 'Visualisation of Owner's Uncertainty', where the higher value indicates increased uncertainty, it can be seen that the smallest delta relates to Construction Only – Lump Sum. The resulting project requirement profile, shown below as the red dashed line, can be compared against the standard contract type profiles visually.

processes and procedures. From this, users may adjust, amend, or otherwise update their processes as may be deemed appropriate.

Stage 2 allows users to look at, consider, and appraise their own specific project and contract key aspects. These are based upon the six listed key aspects which include numerous sub-categories (which will be of greater or lesser relevance to individual users) and can be taken into account when determining the most appropriate contracting route.

Finally, users can quantify the various key aspects based on their specific and project requirements. This quantification can be directly compared with the standard contract type scores. This can provide helpful, visual assistance in considering the optimum contracting route, along with the ability to calculate the level of overall parity between a specific project and the standard profiles explained.

By using this guidance, a party selecting and procuring contracts can extract and utilise any or all of the different sections to provide points of consideration when making such a selection. In this way, CEDA hopes to have provided a means by which dredging contracts can be further optimised and delivery efficiency can be improved.

## Summary

This paper has been prepared by the Central Dredging Association (CEDA) Working Group on Effective Contract Type Selection (WGECS). The Working Group was initiated by the CEDA Dredging Management Commission (DMC).

The WGECS was established by the DMC to follow on from and complement its Checklist for Successful Dredging Management (CEDA, 2017). This checklist has been produced by a group of industry experts with various backgrounds, perspectives, and a broad range of expertise and experience with dredging projects. It presents a number of topics and subtopics that may give rise to problems/issues in the different stages of a (dredging) project. The first edition of this checklist is currently freely available for download from the CEDA website to all CEDA members ([www.dredging.org](http://www.dredging.org)).

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## REFERENCES

CEDA (2017).

CEDA's Checklist for Successful Dredging Management. Information Paper. Available at: <http://www.dredging.org/media/ceda/org/documents/resources/cedaonline/2017-checklist.pdf> [Accessed October 2019]

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