NEC contracts: best practice tools for risk allocation and management

BY **RICHARD PATTERSON**, BA(Cantab), MBA, CEng, MICE, procurement and NEC specialist,
Mott MacDonald

1 Introduction

NEC contracts provide an ideal basis to allow and encourage appropriate risk allocation and risk management through all stages of any project or service provision. This paper explains how NEC contracts can

- reflect the particular risk allocation intended by the parties to the contract, and
- help the parties manage risk after the award of the contract.

Partly because they are good for risk management, NEC contracts have anecdotally helped avoid disputes.

This paper includes an update of one published in November 2008[1] to include for the effect of NEC4 that was published in 2017. The fundamental NEC principles are not affected but ECC4 changes some language and clause numbers. NEC has also been drafted to be 'gender neutral' and that principle has been carried through into this paper.

For a summary note on the key changes from NEC3 to NEC4, see the author's paper: 'NEC3 to NEC4 – evolution, not revolution; some fixes and some good ideas!' [2]

NEC has a convention that 'defined' terms are capitalised, and terms identified in the NEC's 'Contract Data' are italicised. In this paper, however, the convention is used only when quoting directly from the contract.

The NEC family of contracts includes the

- NEC Engineering and Construction Contract (ECC)
- NEC Engineering and Construction Short Contract (ECSC)
- NEC Engineering and Construction Subcontract (ESC)
- NEC Engineering and Construction Short Subcontract (ECSC)
- NEC Professional Services Contract (PSC)
- NEC Professional Services Short Contract (PSSC)
- NEC Term Service Contract (TSC)
- NEC Term Service Short Contract (TSSC)
- NEC Supply Contract (SC)
- NEC Supply Short Contract (SCC)

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NEC4 included also:

- NEC Professional Services Subcontract (PSS)
- NEC Design, Build and Operate Contract (DBOC)
- The multi-party NEC Alliance Contract.

The NEC's approach to risk is explained in this paper by reference to the ECC. This is the member of the NEC family appropriate for implementation of a significant project and can include (any level of) design and construction. It is a contract between a 'client (ECC4) or employer (ECC3) and a 'contractor'. (The term 'client' is used throughout this paper). Thanks to the commonality of the language and principles across the entire family of NEC documents, many of the principles discussed here apply also to the other NEC main (not 'short') contracts in the NEC family, namely the PSC, the TSC and the SC. The structured approach to

[1] Using NEC contracts to manage risk and avoid disputes, Richard Patterson, Proceedings of the ICE, Management, Procurement and Law, 2009, No 4.

[2] 'NEC3 to NEC4 – evolution, not revolution; some fixes and some good ideas!', ICE's Management Procurement and Law, December 2017 and on NEC website from 26 Feb 2018

risk allocation and management can, where appropriate, be passed along the supply chain using the NEC subcontracts.

The paper will follow risk through the project and contract process and look at:

- the dimensions of a deal
- risk in the words of the contract
    - general principles
    - quantity and efficiency risks
    - allocation and limitation of specific risks by choice of ECC secondary options
    - allocation of the risk of occurrence of other specific events
        - changes to what the client wanted – changes to the scope (ECC4) (works information in ECC3)
        - design risk
        - weather risk
        - physical conditions risk
    - compensation events and client's liabilities ('employer's risks in the ECC3 have been revised and renamed 'client liabilities' in ECC4, to better indicate the additional protection given to the contractor.)
- risk through the use and management of the contract
    - early warning and early warning registers (The 'risk register' in ECC3 has helpfully been renamed the 'early warning register' in EEC4) and
    - allocating risk in compensation event quotations

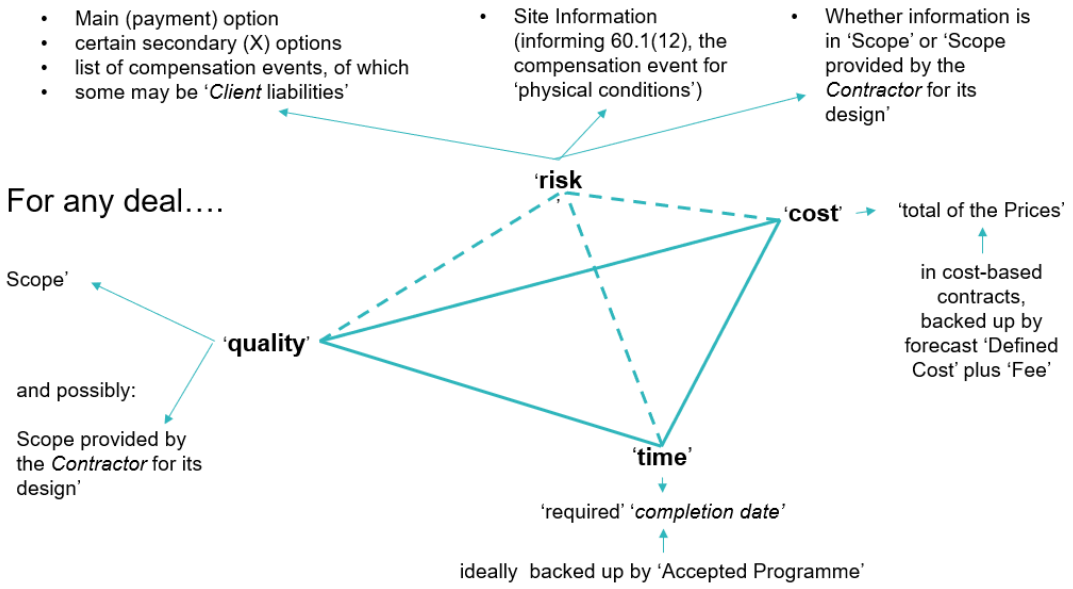
This paper is informed by experience over 21 years of procurement with the NEC in many sectors with Mott MacDonald and of providing training on the NEC for Mott MacDonald and its clients and for the NEC division of ice publishing, publishers of the NEC contracts.

2 The dimensions of a deal

The 'project management triangle' of quality, cost and time is well known. Figure 1 illustrates what might be called the 'contract tetrahedron'. It introduces 'risk' as the fourth 'dimension'. Any 'deal' requires the agreement of:

- quality – 'Scope (ECC3 Works Information)' and possibly 'Scope provided by the Contractor' for its design (see section 3.4.3)
- cost – the 'total of the Prices', NEC's language for the 'contract sum'
- time – the 'completion date', which is the date in NEC when completion is to be achieved
- risk – how the risk is to be allocated.

This is illustrated in Figure 1. The elements of risk allocation shown in Figure 1 are described in detail in the following sections.

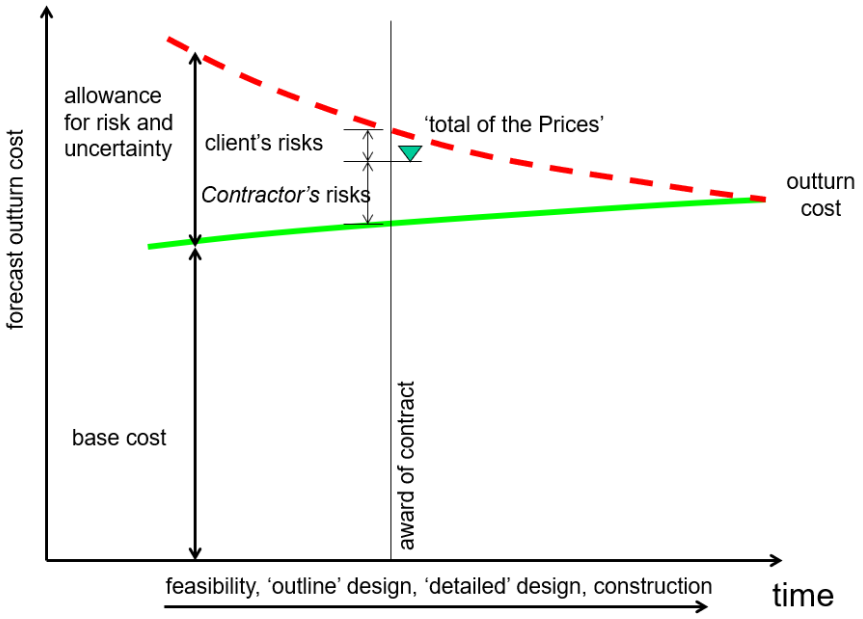


3 Risk allocation

A key aim of any contract should be the clear allocation of risk. This part of the paper shows how NEC contracts are flexible and allow the client to achieve its desired risk allocation with clarity.

3.1 General principles of risk allocation

Figure 2 shows schematically how, throughout the development and implementation of any project the requirements of the work in any particular contract are progressively refined. As this is done. uncertainty and risk are driven out by successive stages of project development, design and risk management. The y-axis on the figure is shown as 'forecast outturn cost'. The 'base cost' is the best estimate of the cost of delivering the works at any point in time. On top of this is shown an allowance for 'risk and uncertainty'. This should include an estimate of the cost of uncertainties – e.g. in the quantity of work required – and an estimate of the consequences of specific risks that might impact on the cost of delivering the works. The concept of gradually driving out risk and uncertainty applies equally to the 'forecast time to completion' and the gradual determination by the client, up to the award of contract, of what it is that the client wants. As indicated, the actual outturn cost will be known only when the project is completed.



By the stage that the parties wish to enter into a contract for the works, they (usually led by the client) have to decide and articulate just which risks are to be carried by the contractor and which are to be retained by the client. Under the ECC the only specific events that may entitle the contractor to a delay to the (required) 'completion date' (equivalent to an 'extension of time' in some contracts) or cause 'the prices' (the 'contract price' in some contracts) to change are called 'compensation events'. The contractor, in its bid (or negotiations) must make due allowance in the prices and in its programme for all risk events except those that are stated in the contract to be 'compensation events' and so are at the risk of the client. This is indicated on Figure 1.

The ECC is modular in structure. The contract includes a comprehensive set of 'core clauses' which include all the key project management processes – e.g. those for time management, defect management, cost management, payment and compensation events. It requires the parties – usually led by the client – to build up the conditions for each particular contract by selecting from options within the ECC.

The client augments the core clauses with:

- one 'main option' (A, B, C, D, E or F) relating to payment[1]
- one dispute resolution option (W1, W2 or W3)) (W3, dispute avoidance board, was introduced in ECC4)
- any number of its chosen 'secondary options' (numbered X*)
- jurisdiction-specific secondary options (numbered Y*) and
- additional conditions of contract (option Z).

Figure 3 shows diagrammatically how the conditions of contract for a specific ECC contract are built up by selecting options that are appropriate for the particular contract. (The options for ECC4 are shown. ECC4 has some additional options compared with ECC3). It shows by shading an example of the options selected for one particular contract. Only the options explicitly chosen from those available in the ECC document are part of the particular contract.

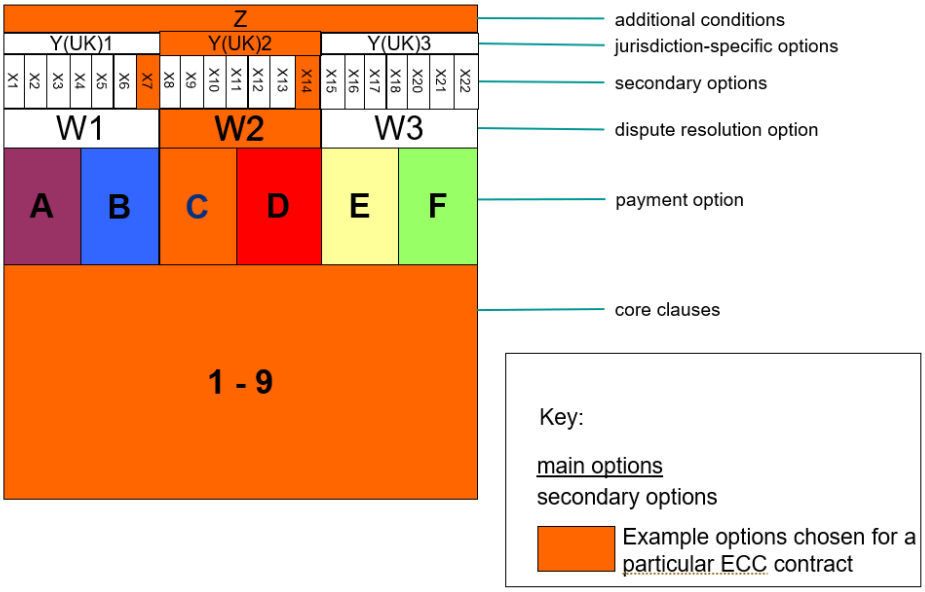
The choice of options is a fundamental part of the allocation of risk in the contract:

- The choice of main option effectively allocates the risk involved in estimating the quantities of work and the efficiency of providing the works.
- Some of the secondary options allow the client to choose to retain specific risks.
- The additional conditions of contract allow the client to

- retain specific risks that may impact on the project by introducing additional compensation events (In ECC4 additional compensation events can more easily be added in the 'Contract Data') and/or
- to pass more risk to the contractor by deleting or amending those in the standard words of the ECC.

More detail of these options are explained in the following sections.

Full details of all of the options are provided in the NEC Guidance Notes[2].



3.2 Quantity and efficiency risks - the choice of the main option

The ECC enables the parties to articulate how specific risks inherent in carrying out the works are allocated between the parties to the contract. However, irrespective of how those specific risks are allocated there is a fundamental level of risk allocation inherent in how the contractor will be paid. The choice of how to pay the contractor effectively determines how the risks of quantities and forecasting the contractor's efficiency are allocated.

The ECC's flexibility allows and requires the client to select a payment mechanism appropriate to how it wishes to share the risk in quantities, and the efficiency of the contractor. This part of risk allocation is affected by the choice of 'main option' within the ECC. The options for the client are as follows:

- Pass the whole quantity and efficiency risk to the contractor – choose main Option A, (priced contract with activity schedule) – a 'lump sum' contract.
- Pass the efficiency risk to the contractor but retain the risk of the correctness of a bill of quantities - choose main Option B (priced contract with bill of quantities).
- Retain the majority[3] of quantities and efficiency risk and simply pay for the contractor's resources to help achieve the client's requirements – chose main Option E, Cost reimbursable contract.
- Use a 'target contract' to:
  - share the quantity and efficiency risk – chose main option C, target contract with activity schedule or
  - share the efficiency risk but retain the risk of the quantities – choose main option D, target contract with bill of quantities.

  If the client chooses a target contract, it will also have to set appropriate 'share percentages' to define how to share the 'pain' of the contractor exceeding the 'target' or the 'gain' of the contractor making savings compared with the target. These share percentages are critical. The nearer the share percentages are to 0%, the closer (financially) the contract is to reimbursable (option E); the

nearer the share percentages are to 100%, the closer (financially) the contract is to a lump sum contract (Option A)[4].

- Use Option F, management contracting, where the client pays the management contractor for the costs of its subcontractors and might enforce or accept the choice of options A, B, C, D or E for various (NEC) subcontracts.(The typically small amount of work done directly by the main contractor is paid via tendered prices.)

For a given level of definition of the works that are required, using option A gives the client the most price certainty. This certainty though comes at a premium as the bidder will include in its price for the quantity and efficiency risks. The use of Option B in some circumstances may be appropriate, particularly when the client is responsible for the design. Option E may be appropriate and sometimes necessary for emergency works, an ill-defined scope or research and development work. Options E and F and the target options (C and D) with 'open book' accounting encourage openness and collaboration, but require significant administrative effort to review, audit and reimburse the contractors 'actual' costs.

The target options, C and D, are radically different from more traditional priced contracts. Indeed, one specific reason for the early popularity of the ECC was that it was thought to be the first published standard form to provide for a target contract. The Institution of Chemical Engineers does now publish a target contract, the 'Burgundy Book', but, unlike the ECC that has no standard structure for the target mechanism and no standard definition of cost. Both have to be developed by the user[3],[4].

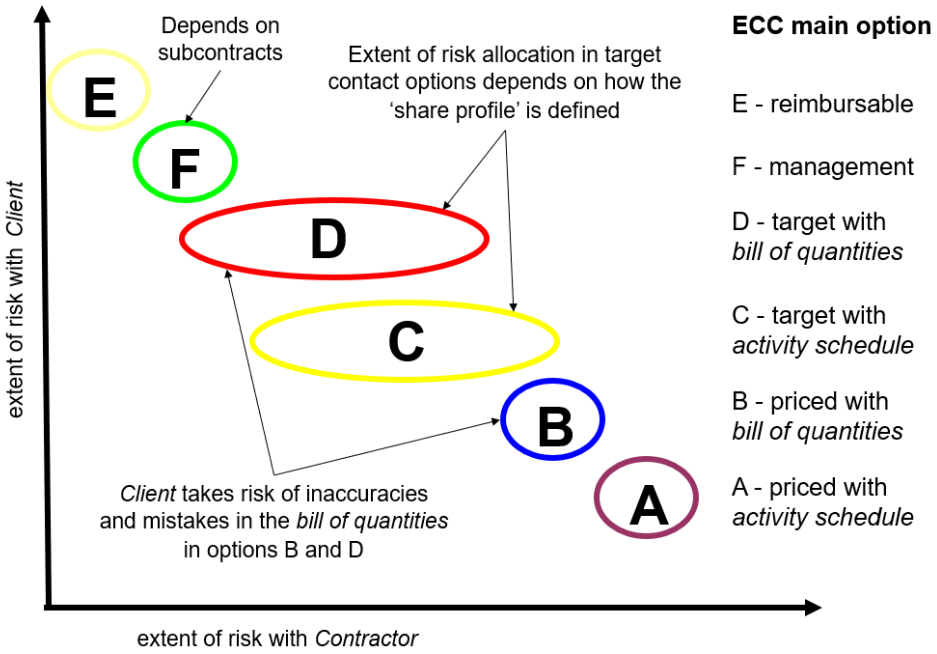
Under the priced options ECC A and B, the client simply pays the fixed amounts in an activity schedule or the fixed rates in the bill of quantities respectively. The client thus has no direct commercial interest in the real costs of the contractor, or indeed in how the contractor manages the project-specific risks not retained by the client. In contrast, the target options commercially incentivise the client to collaborate with the contractor to help reduce the project cost and manage risk. The fact that client pays the contractor something close to its real costs of carrying out the work and shares the 'pain' and 'gain' compared with the final target acts to change the way that the client and the contractor work together. The cost impact of any specific risks that are not compensation events are effectively shared between client and contractor thanks to the share mechanism. Hence the commercial incentive is for the client to assist the contractor in managing those risks[5].

Aside from the fundamentally different risk allocation between the main options, there are a number of advantages and disadvantages associated with the choice of the main option to be considered depending on, for example, the level of design carried out prior to entering a contract and the amount of the remaining design to be carried out by the contractor. These are not considered in full here and the reader is referred to the ECC Guidance Notes[6] for details.

This fundamental choice of main option in the ECC determines the overall level of quantity and efficiency risk for providing the works required[7] and taking all the specific risks carried by the contractor under the contract. This choice is illustrated schematically in Figure 4.

[3] Form of Contract for Target Cost Contracts (Burgundy Book), Second Edition, 2013., Institution of Chemical Engineers

[4] NEC3 Compared and Contrasted, Second Edition - chapter on NEC vs IChemE contracts, Richard Patterson and Barry Trebes, ICE publishing



3.3 Allocation of specific risks by choice of ECC secondary options

Certain specific risks can be allocated directly by the inclusion or otherwise of certain of the ECC's 'secondary options. In designing the contract to reflect its desired risk allocation (and certain other requirements) the client must choose the secondary options that it wishes to be included. For example, the client should include[8]:

- option X1 (Price adjustment for inflation) if it wishes to provide protection for the contractor from inflation
- option X2 (Changes in the law) if it wishes the contractor to be protected from the risk of changes in the law. (This works by the simple addition of an extra compensation event)
- option X15 contractor's design (ECC4) (Limitation of the contractor's liability for his design to reasonable skill and care (ECC3)) if it wishes to reduce the contractor's liability for defects due to its design to the level of applying 'reasonable skill and care'[9]
- option X18 (Limitation of liability) if it wishes to set maximum amounts for certain types of of liability and/or a specific end to period within which he can notify a matter to the contractor.

3.4 Allocation of the risk of occurrence of other specific events

3.4.1 General

As far as the contract is concerned, the risk of any particular event has to be either 'with the client' or 'with the contractor' – ie a compensation event or not a compensation event. Like nearly all contracts, the ECC requires the risks retained by the client to be stated explicitly: all other risks are with the contractor. Unlike many other contracts, the ECC is very clear about compensation events.

The clear list of compensation events in one core clause (Clause 60.1) is a real strength of the NEC contracts. If the client wants to retain a particular risk – so that the tenderer does not have to include for it in its price - it has simply to make sure that the risk is listed as a 'compensation event' under the contract. Compensation events are the *only* events that allow the contractor even the possibility of an increase in the 'Prices' or a delay to the contractually required 'completion date'. When a compensation event happens, the ECC sets out the rules on how it is to be notified, quoted for and assessed. It requires the parties to consider and agree on the forecast effect (if any) of the event on both the time and the cost of getting the job done. The process by which the effect is assessed is the same for all compensation events.

Clause 60.1 sets out the list of compensation events that forms the starting point for the risk allocation for specific events in the contract. It was developed by the drafters of the contract to reflect good practice and be appropriate as a starting point for a 'typical' project. The list is supplemented in options B and D by compensation events relating to the bill of quantities. Certain secondary options (as discussed above) also add compensation events. Prior to entering in to a contract and usually led by the client, it is up to the parties, to add additional compensation events to or indeed (in some circumstances) to delete compensation events from the ECC's standard list so as to reflect the specific risk allocation required for the contract.

It is important to note that, in the case of a target contract (Option C or D under ECC), the overall cost (but not programme) effects of events 'at the contractor's risk' are effectively shared with the client – because of the pain/gain mechanism. This feature of the target cost contracts gives the client a direct commercial incentive to help the contractor manage the contractor's risks. To emphasise this key difference from price-based contracts and encourage the collaboration that the adoption of target contracts should incentivise, the author has found it useful in project teams to talk of 'project' risks rather than 'contractor's' risks.

The following sections set out how the ECC deals with the allocation of some common and important specific risks.

3.4.2 Changes to what the client wanted – changes to the scope (ECC4 uses the term 'scope' for what was 'works information' in ECC3.)

The contractor's main obligation is to 'Provide the Works in accordance with the Scope'. (Clause 20.1). Hence a vital part of any ECC contract is this scope. This is the part of the document containing 'information which

- 'specifies and describe the *works*[10] or
- states any constraints on how the *Contractor* provides the *works*'[11].

The ECC project manager can change the Scope by issuing an instruction to the contractor (Clause 14.3). Unsurprisingly the first event set out as a compensation event in Clause 60.1(1) is a change to the scope – known as a 'variation' in some other contracts. The very real risk for a client is that their requirements are not clearly stated in the scope at the time of award of contract and that the management of the contract is plagued by numerous instructions to change the scope and the compensation events that rightly follow. Research has shown that some 90% of compensation events are caused by changes to the scope, whether a real change in the client's requirements or the correction of an ambiguity in the scope.

3.4.3 Design risk

Who is responsible for what?

The ECC in Clause 21.1 includes the simple statement 'The *Contractor* designs the parts of the *works* which the Scope states it is to design.' Thanks to this statement the ECC can be a contract for client-designed works or contractor-designed works or any combination of the two. It is up to the client to include a clear statement in the scope. If the scope is silent on this point, then the default is that the contractor does not design any part of the works. Then the contractor can expect the client to design the whole of the works.

As stated above, the contractor has a simple obligation to provide the works in accordance with the scope. One would 'expect' in a contract that a contractor should take the risk that its designs actually do allow it to meet the requirements of the (client's) scope.

In the case of any design by the contractor required to be submitted after award of contract, the project manager has an obligation to accept them or not accept them (for limited stated reasons) (Clause 21.2). However, any such acceptance should not and does not change the contractor's responsibility to provide the works or its liability for his design (Clause 14.1).

The client often requires that a certain amount of design is carried out by the contractor prior to the award of contract. (This might be submitted as part of a tender or developed during negotiation). If this is the case, the client also has to decide if it wants the contractor to be required to use the design that he has carried out up to that stage. If so that 'design' must be included somewhere in the contract.

Most model forms of contract for design and build by the contractor include terms and parts of the documents like ‘client’s requirements’ and ‘contractor’s proposals. Any design by the contractor prior to the award of contact is then included in contracts as part of the contractor’s proposals. The ECC does not use these terms - the obligation is to provide the works only in accordance with the Scope. In the ECC, the client therefore needs to set out its requirements in the Scope. If the client wishes to include in the contract any of the design carried out by the contractor prior to the award of contract, there is a very specific ‘place’ for such information: the ‘Scope provided by the contractor for its design’. This ‘subset’ of the scope is pointed to from the contract data part two – the part of the contract data completed by the contractor as part of the tender. The term ‘Scope provided by the *Contractor* for its design’ is referred to in only one line in the ECC conditions – Clause 60.1(1). The effect of this clause is that if the contractor requests a change to ‘its’ part of the scope so as to meet a requirement elsewhere in the scope

- the project manager (on behalf of the client) has the option to accept the proposed change or not to do so and
- the resulting change to the scope will NOT be a compensation event.

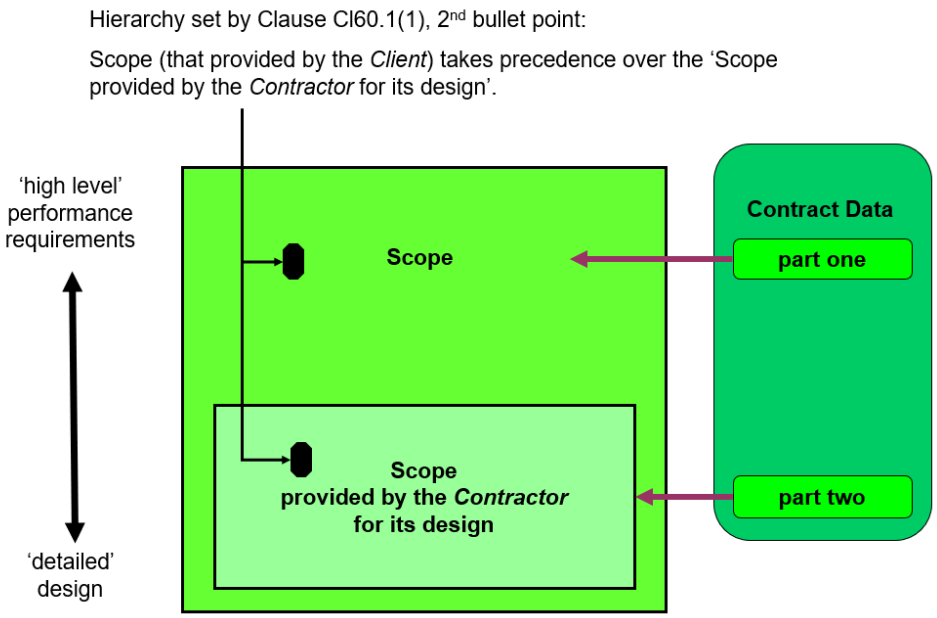
Because of this, the risk of the pre-contract design by the contractor and the possible need for design development for elements to be designed by the contractor is clearly where it should be: with the contractor. This establishes a clear hierarchy: in the event of any conflict between them: the scope (that provided by the client) takes precedence over the ‘Scope provided by the *Contractor* for its design’.

This distinction is important. The author has been involved in many projects where the client and contractor have worked together prior to the award of a construction contract to develop and articulate the requirements of the client and to develop the design to meet those requirements. The price (often a target price) has to include for any remaining detailed design and construction. This process is becoming increasingly common (in the UK at least) as ‘early contractor involvement’ (ECI). (ECC4 includes a specific option, X22, for ECI). The project team should consider the question of who takes the risk that the design developed at this stage may need to be corrected or changed after award of the contract to meet the requirements of the client. In the ECC, the allocation of this risk will be determined by exactly *where* in the contract the design information is located:

- If the information is in the ‘Scope provided by the *Contractor* for its design’ the risk of needing to change this information to meet the client’s scope is with the contractor.
- If the information is in the scope the risk is with the client.

The parties must therefore make sure that the location of information in the scope reflects the risk allocation that they intend.

This is illustrated in Figure 5 and mentioned on Figure 1.



Type of design liability

If the contractor is to design parts of the works, it is responsible for achieving whatever required performance is stated by the client in the scope. Under many jurisdictions, the contractor will have a strict 'fitness for purpose' liability for the design of elements which it designs and builds. If the client (or most likely the contractor) wishes to limit the contractor's liability to that of 'reasonable skill and care' then secondary option X15 should be included in the contract, as discussed above in section 3.3.

Limit of design liability

If the client wants to limit the financial level of the contractor's liability for defects due to design then secondary option X18 should be included in the contract, also as discussed above in section 3.3.

3.4.4 Weather risk

In terms of precision, the ECC moves a long way from the 'exceptionally adverse weather' provisions of many less modern contracts. Instead, in Clause 60.1(13) the ECC sets out as compensation events certain well defined 'weather measurements. If and only if a recorded specific weather measurement is shown, by comparison with stated weather data, 'to occur on average less frequently than once in ten years', then the contractor is entitled to a compensation event. The risk of any weather measurements less than the 1 in 10 year event and the risk of any types of weather about which the ECC is silent – like, for example, wind speed - remains with the contractor. It is up to the client at tender stage to consider if the 'default' weather risk allocation is appropriate for the project. If not, modifications must be made, normally by adding to or changing the weather measurements referred to from Clause 60.1(13) or adding additional compensation events.

3.4.5 Physical conditions risk

For physical conditions it is less easy to be precise. The default risk allocation in the ECC is set in Clause 60.1(12[12]). Three tests have to be passed for physical conditions to be a compensation event: they have to be:

- within the Site
- not weather events and

- such that an experienced contractor would have judged at the Contract Date[5] to have such a small chance of occurring that it would have been unreasonable for him to have allowed for them.'

Clause 60.2 requires the contractor to take in to account the 'site information' (amongst other things) in judging the physical conditions. As is the case with any contract where physical conditions are important, the client is usually well advised to invest in quality factual information about eg ground conditions and existing services (common problems in works below ground level) to allow all parties to assess the risks associated with physical conditions. The place for this information in an ECC contract is clearly in the part of the contract called 'site information'.

This risk allocation may be appropriate for your project. However, if for example, excavation is a significant part of the project, it may be more appropriate to include instead more specific compensation events relating to the occurrence of specific values of stated parameters. This is the case on one major metro project with which the author has been involved. Here additional compensation events are related to the values of certain parameters set out in a 'Geotechnical Baseline Report' (GBR)[13] The geotechnical data report that is part of a GBR will be included within the site information and additional compensation events will be defined by reference to key parameters in the GBR[6].

The fact that the content of the Site Information will affect risk allocation is mentioned on Figure 1.

3.5 Compensation events and client's liabilities

In section 3.1 and Figure 2, this paper has explained how anything intended to be at the client's risk should be a compensation event under the contract.

One of the standard compensation events (clause 60.1(14)) is the simple statement, 'an event which is a 'client's liability stated in the contract' (ECC4 uses 'client liability' for what ECC3 unhelpfully called an '*employer's* risk'). The contract sets out particular 'client liabilities in clause 80.1. The client's liabilities are set out separately from the other Clause 60.1 compensation events for good reason. The distinction allows a statement to be made in the contract about the risks against which the contractor is required to obtain insurance – those events that are at the contractor's liability. The client's liabilities include things like war, revolution and wear and tear after taking over. In ECC4 the client liabilities and contractor liabilities are set out explicitly (clauses 80.1 and 81.1 respectively). (In ECC3 contractor's risks were defined as anything that is not an employer's risk).

If a 'client's liability (clause 80.1) occurs, the event is a compensation event and the contractor will be compensated for any effect of the event on both time and on the defined cost of providing the works as is the case for any compensation event. However, additionally for 'client's liabilities, because of clause 82,2, the client pays to the contractor the costs it incurs because of third party claims against it resulting from the event. (In ECC3 the term 'indemnify' was used. ECC4 has simplified the language.)

As an example, one might add a compensation event for a level of flooding on a river affecting the site. If the flood happens, the compensation event would protect the contractor against the time and cost effects of the event of providing the works. If the flood event was included instead as an 'additional client liability the contractor would also be protected by the client against the cost of the damage to third parties done as a result of the event - e.g. by the contractor's temporary equipment as it was washed down the river.

The contract is clear also that the contractor is required to provide insurance to 'cover for events which are contractor's liabilities (Cl 83.3).

Despite these differences, in the author's experience of training on ECC, even some regular users of the contract, do not understand this distinction between client's liabilities under the contract and other compensation events. For example, if a project risk register is developed (separate from and in advance of any contract or even tender documents), one often sees terms such as 'ownership' of risk being used to

[5] The 'Contract Date' is when the contract came into existence.
[6] Ground Conditions and Risk Allocation: Combining the NEC Engineering and Construction Contract (ECC) and the Geotechnical Baseline Report (GBR), Richard Patterson and Randal Essex, Mott MacDonald, Tunnels and Tunnelling Magazine, Dec 2010

describe the preferred risk allocation between the contractor and the client. If the risk is to be 'owned' by the client, one must decide if it should a client's liability under the contract (and so a compensation event) or whether it should be 'just' a compensation event.

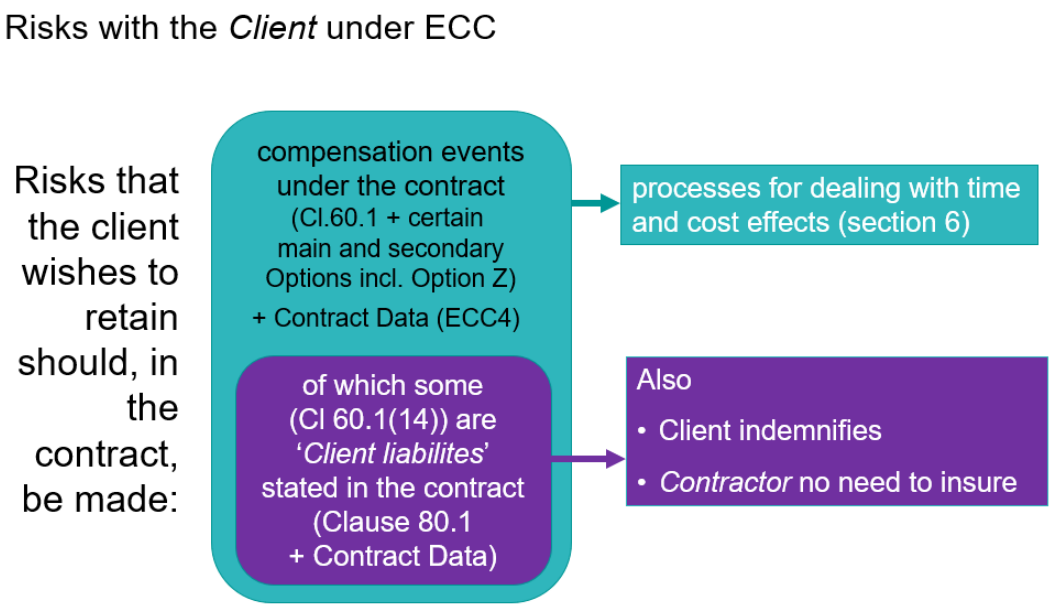
If changing the default list of 'compensation events' and 'client's liabilities in the contract, one must be careful. In ECC3 there is no option of adding 'additional compensation events' in the contract data. Instead, one must use the additional conditions of contract (Option Z). However, the contract data part one includes the option to add 'additional employer's risks. Document compilers should note carefully the difference between 'employer's risks' and 'compensation events' and act – or at least draft – accordingly. Under ECC3, those that do not understand the distinction may, as they complete the Contract Data, add events as ''employer's risks' rather than as compensation events when prompted for an entry for the former in the Contract Data. This is often without understanding the consequences of doing so as explained above.

This problem has been resolved in ECC4 by providing the opportunity for the client to add in the contract data

- additional compensation events and/or
- additional client liabilities.

It is hoped that, when confronted with this choice, clients will be prompted to make sure they understand the difference!

The distinction between client's liabilities and other compensation events and where they are found in an ECC contract is illustrated in Figure 6.



4 Risk Management

4.1 Risk in the programme

The programme (called a schedule in North America and elsewhere) is critical to the management of any project and so is central to the ECC. The ECC is unusual amongst standard forms in specifically requiring all programmes submitted by the contractor.
o includes provisions for 'time risk allowances. In effect the contractor has to show how the durations of operations on the programme allow for the time impact of risks that are risks that are with the contractor. This has no direct effect in the contract other than to assist in convincing the project manager that the programme is 'realistic' and so should not be 'not accepted' for being 'unrealistic' (Cl 31.3).

4.2 Risk registers and early warning

It is good practice to consider risk management from the start of a project. If a formal risk management process in place, the client may operate some form of project risk log or register well before any construction

contracts are let. This often sensibly shows the risks intended to be 'retained by the client' in the contract(s) used for the project.

This risk log should inform the development of specific contracts for the project above. The client should consider the need to modify the lists of compensation events and client liabilities in the 'standard' starting point in the ECC to reflect the risk allocation it desires as described in section 2 of this paper.

So what is the 'Risk Register' in the ECC3? How does it relate to any other 'risk registers' used on the project? Feedback from various ECC training courses and the NEC Users' Group helpline suggests this can cause confusion. This has been helped enormously in ECC4 by renaming the 'Risk Register' as the 'Early Warning Register' The following paragraphs are intended to explain.

'Early warning' (Clause 16) is the critical process for notifying and dealing with risk under the ECC. The contractor and the project manager are required to use the procedure (they 'shall act as stated in the contract', clause 10.1) and there are strong sanctions on the contractor for not notifying early warning. In particular, under Clause 63.8 (63.5 in ECC3), if the contractor did not give early warning 'which an experienced contractor could have given', any subsequent compensation event is assessed as if it has given that early warning – ie if the project manager had been given the opportunity to deal with the event in another way[14]

In ECC3, notified early warnings are recorded by the project manager in the 'risk register 'and discussed at 'risk reduction meetings' . Now, in ECC4 early warnings are recorded by the project manager on the 'early warning register' and discussed at 'early warning meetings'. Prior to award of contract, the parties, in the contract data parts one and two are prompted to include 'items **to be** included in the early warning register'.

The definition of 'early warning register' (clause 11.2(8)) is:

'The Early Warning Register is a register of matters which are
- listed in the Contract Data for inclusion and
- notified by the *Project Manager* or the *Contractor* as early warning matters.

It includes a description of the matter and the way in which the effects of the matter are to be avoided or reduced.'

The statement, 'The following matters will be included in the Early Warning Register', appears in:

- contract data part one – data provided by the client – and in
- contract data part two – data provided by the *contractor*.

Hence, prior to the award of contract, both client and potential contractor can, by including events in these entries, ensure that certain risks are talked about after award of contract. However, there is no 'early warning register' included as a contract document.

The early warning register is not for risk allocation but is a document to help promote risk management - after award of contract. It comes into existence at the after award of contract.

The 'early warning register' (including the entries in the contract data) should not be allowed to hint at which party carries a particular risk after award of contract. The risk allocation intended (perhaps stated in the non-contractual pre-contract risk register, if the project has one) must be put in place clearly via changes to the ECC's starting point for compensations events and client's risks as described above.

The rigorous structure of the ECC means that a statement relating to risk allocation in the contract data entry, 'The following matters will be included in the early warning register' should have no contractual effect unless explicitly pointed to as a compensation event. It must though, be better for both parties to follow the rules and set out the risk allocation as the contract intended – and to avoid loose wording in the 'early warning register'. For this reason, the client, in its instructions to tenderers, might suggest that tenderers avoid attempting to change risk allocation through the contract data part two entry: 'matters to be included in the early warning register….' Then, during tender assessment, the client should pay close attention to the tenderers' words. Any attempts by the tenderer to shift risk to the client here should be treated by the client like any other qualification to the tender.

Best practice in project risk management would see the team managing a project risk register throughout the project until the end of the 'funnel' in Figure 2. That 'project risk register' is not a requirement of the ECC contract. However, the person responsible for managing that project risk register may also be the person acting as the ECC *Project Manager*, who is required by the ECC to maintain the 'early warning register'.

Project risk registers vary. However, a look at typical fields in a project risk register suggests that a small subset of the fields in a project risk register may serve the purposes of the 'early warning register' required under the contract. By careful labelling of the relevant fields in a project risk register, the ECC *Project Manager* could do what is required under the contract to be done with to the 'early warning register', without duplication (see Table 1).

Table 1. Example of a project risk register – the ECC's 'early warning register' might be managed as part of this

Description of the risk (3)	Probability	Time impact	Cost impact	'Owner'	Client's risk under the contract (Y or N)	Other compensation event under the contract (Y or N)	Cost risk allowance in total of the Prices (1)	Cost risk allowance for events outside the Prices: managed by the client as a contingency (2)	Predicted risk expiry date	Actual risk expiry date	Actions which are to be taken to avoid or reduce the risk (3)

Notes
(1) Risks 'below the line' in Figure 1: a specific allowance by the tenderer may or may not have been made apparent during the tender process but has no contractual relevance after award of contract
(2) Risks 'above the line' in Figure 1.
*(3) Columns **required** to be included in the (ECC) 'early warning register'*

In discussing and updating the 'early warning register', the project manager should be aware that, under the contract, they have no power to alter the risk allocation under the contract with regard to the contractor providing the works as set out in the scope. The project manager and only the project manager can change the scope and an update to the early warning register is not a change to the scope. If decisions made at an early warning meeting do require a change to the scope, then it is for the project manager to instruct such a change separately.

4.3 Allocating risk in compensation event quotations

A key feature of the ECC is its detailed and flexible procedures encouraging and requiring the parties to manage and agree the effects of compensations events. The process requires the parties to forecast and agree the effect, if any, of each compensation event on the contractor's costs and programme. These are required to be agreed within tight timescales when or, in the case of proposed changes, before, they occur. This is the essence of good project management and allows both parties to maintain a better ongoing forecast of the cost and completion date for their project than is the case with many others forms of contract. It also often leads to earlier settlement of the final account and less disputes. The ECC is sometimes criticised for the 'administrative burden' required to maintain this degree of control. This is particularly the case if there are a lot of compensation events – which are often due primarily to client changes. While it is true that the process requires effort and effective systems from both project manager and contractor, a client considering the use of the ECC must decide if it wants to invest to achieve the benefits that the ECC can deliver compared with other forms.

The assessment of a compensation event should include a risk allowance for cost and time for matters which have a significant chance of occurring and are at the contractor's risk under the contract (clause 63.8). The contractor is required therefore to sensibly consider and allow for all such risks in its assessment of a

compensation event. However, there is no need to allow in the assessment for risks that would in themselves be compensation events; if they happen then a further compensation event will be notified.

Importantly, assessments are not revisited even if the forecasts used to develop them are later proved wrong (Clause 66.3).

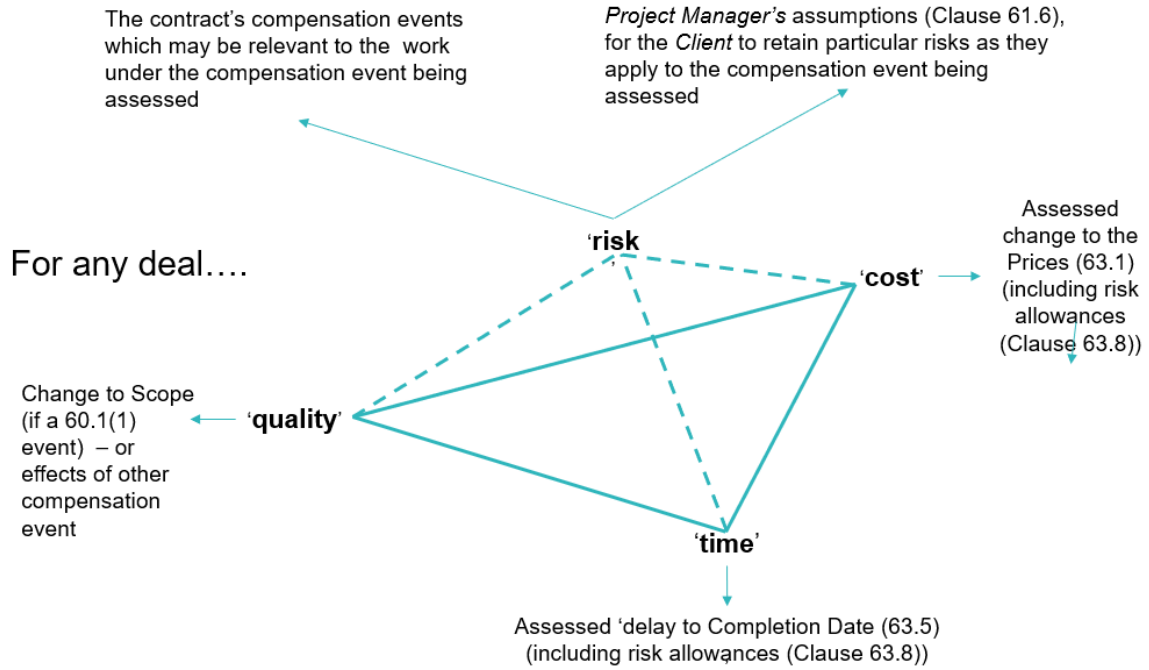
Sometimes the risk allowance that the contractor considers appropriate may lead to a quotation considered to be excessive by the project manager. In such instances, the ECC gives the project manager the power and tools to manage this aspect of risk differently.

If the project manager decides that the effects of a compensation event are too uncertain to be forecast reasonably or if he simply determines that it is better for the client to retain a particular risk in a quotation, then under clause 61.6 the project manager may state specific assumptions to be used in the contractor's quotation for that compensation event. If any of those stated assumptions are later found to have been wrong, the notified correction of the assumption is a further compensation event (clause 60.1(17)).

On the other hand, if for a compensation event notified at a particular time, it is in the client's interest to obtain more time and cost certainly, the project manager can 'buy' that certainty on behalf the client by requiring a quotation without assumptions. Hence by using assumptions appropriately, the project manager can allocate and 'buy out' the risks caused by the compensation event. Rightly, only the project manager may state assumptions to be used in a quotation, but it is good practice to discuss appropriate assumptions with the contractor prior to asking for a quotation.

Strictly, the risk of an assumption needing to be corrected later is a client's risk. It might therefore appear on any project risk register as a risk held back by the client.

The 'contract tetrahedron' was explained in Figure 1 as it applies to an ECC contract. The same principles as they apply to a single ECC compensation event, are illustrated in Figure 7.



4 Summary

The fundamental strengths of the NEC contracts and the intended guiding principles in their drafting are clarity, flexibility and being a stimulus to good management.

In the specific context of risk, NEC contracts allow a client to implement any procurement and contract strategy and to allocate risk in contracts both clearly and flexibly to suit its objectives. This is thanks to the flexibility of the main and secondary options from which a contract is built up and to the simplicity and generality of the concept of compensation events as the only events that are at the client's risk.

The ECC's clear procedures also support effective risk management after contract award. The early warning process and the early warning register are simple but effective risk management tools to encourage and require the ongoing assessment and management of risk throughout the period of the contract.

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[1] The flexibility within the ECC regarding payment is delivered by using the *term* 'Prices' in the core clauses, irrespective of the main option chosen. The clauses in each main option include a differing definition of 'Prices'.
[2] NEC4 Preparing and engineering and construction contract, Volume 2, ice publishing, 2017
[3] In the cost-based options (C, D, E and F), the bidder bids fee percentages that are applied to its 'Defined Cost' and so must cover for profit, any element of its real cost not included in the Defined Cost and the components of the defined 'Disallowed Cost'. Even in the 'cost reimbursable option E', the bidder has to take the risk that its tendered fee percentages are not sufficient to cover these costs.
[4] More detail on target contracts and share percentages is included in Broome, J. Procurement Routes for Partnering, Thomas Telford, 2002
[5] It should be noted that under the target cost contracts, whilst the cost impact of contractor's risks is effectively shared in accordance with the share mechanism, the contractor is not relieved from the time effect of the occurrence of such risks.
[6] NEC4 Preparing and engineering and construction contract, Volume 2, ice publishing, 2017
[7] 'Scope' in ECC4 ('Works Information' ECC3), is the document within an ECC contract that described and specifies the works (what is left when the contractor has finished) and sets out any constraints on how the contractor provides the works. It may include specifications and/or drawings.
[8] The market practice for using or not using these options depends on the sector and on the state of the market. The author recommends the use of Option X18 even if some or all of the 'limits' are stated (in the contract data) as 'unlimited'. In this way the client is very clear on the levels of liability it wants in the contract and, if there is some negotiation on limits prior to award of contract, there is a clear place in the contract for the results of that negotiation.
[9] In the UK, the default level of liability for a product provided by a contractor is one of 'fitness for purpose'. In such circumstances, there is no defence of having applied the 'reasonable skill and care' to be expected of a competent designer. Often consultants (who a contractor might like to use to carry out his design obligations) can not obtain professional indemnity insurance for such 'fitness for purpose liability' and the client should consider the effects of not selecting option X15 for an ECC contract giving the contractor responsibility for design.
[10] The level of detail in the specification of the works is up to the client. This can range from high level performance requirements (typical if the contractor is required to carry out design) to detailed specifications and drawings. It may be appropriate for the level of detail to be different for different parts of the works.
[11] ECC Clause 11.2(19)
[12] The lead author of the ECC, Martin Barnes, has suggested that the decision to have this compensation event referenced with a '12' was for the benefit of a generation of UK civil engineers used to 'Clause 12' claims relating to ground conditions under the ICE (Institution of Civil Engineers).
[13] Geotechnical Baseline Reports for Construction, Suggested Guidelines, Randall J. Essex (Editor), 2007, American Society of Civil Engineers, 2007
[14] Additionally, in the case of target cost and reimbursable contracts (Options C, D, E and F), the Project Manager may disallow costs that were incurred because the contractor did not give early warning (ECC Clause 11.2(27).