

Lower Todmorden & Walsden Flood Alleviation scheme cost control through application of risk management

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The focus of this budgeted £23m construction project at Todmorden, West Yorkshire, is to reduce the frequency and severity of flood damage to properties together with reducing the risk of injury or death to the general public within the Walsden and Lower Todmorden areas. The scheme offers the majority of properties a 1 in 50 year standard of defence with the remainder still receiving 1 in 25 year level of defence.



Typical flood scene at Todmorden & Walsden

courtesy: EC Harris LLP

The works briefly comprise of:

- * flood storage at six sites;
- * raising, strengthening and constructing 3km of walls alongside the river;
- * regrading of the riverbed from Scott Street weir to and including the Unity Street culvert;
- * gravel traps on the on-line storage sites & immediately upstream of the Safeway supermarket where accretion has been a problem in the past;
- * the provision of non return valves to drains and sluices to allow water back into the river.

With a project of this scale and complexity, it was vital that the risk and value management process instilled confidence that the best value scheme was being procured and that all of the risks and unknowns associated with the project were highlighted, quantified and actively managed by the entire team.

Challenge

The challenge, therefore, was to set a realistic, robust budget very early in the project lifecycle (conceptual design), therefore an

effective risk and value management strategy played an integral and vital role. A key tool to assist in the delivery of risk and value management was the medium of workshops, professionally facilitated by *EC Harris*. This working environment encouraged consensus decision making, innovative and creative thinking and allowed knowledge sharing through the entire team.

A holistic value/risk programme of interventions was established (see fig 1) encompassing and built upon best practice principles to managing risk and value. This included interventions focusing on:

- * risk management – identification, evaluation, prioritisation and management of risk;
- * value management – option, validation, analysis, positive challenge and solution production;
- * value engineering – solution enhancement/improvement and positive challenge;
- * team building – developing roles/responsibilities, communication strategies & performance management;
- * project reviews – developing & identifying lessons learnt – driving for continuous improvement and best value.

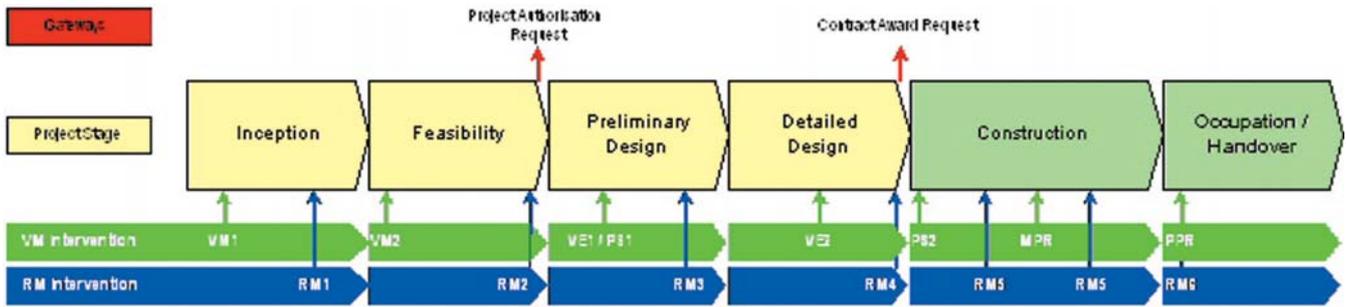


Fig 1. Holistic programme of interventions

This holistic programme of interventions has enabled the project team to:

- * only expend capital against clear business objectives understood by all;
- * gain consensus of the project strategy;
- * ensure that the scope of the solution encompasses only those functions that are necessary to satisfy the defined problem or opportunity;
- * ensure that the risks taken are identified, quantified, assigned owners, managed and reported;
- * maximise value opportunities, encourage innovation and realise lessons learnt;
- * develop collaborative team working and buy in;
- * ensure that the investment delivers the required objectives at the best value whilst fulfilling the essential needs;
- * have a robust managed financial budget with more reliable and accurate planning/programming/forecasting, thus ensuring the budget is met and providing the team a platform to beat the budget.

The risk management approach adopted comprised the following key elements:

Risk analysis

The team sought to identify the key project risks, how they may evolve, and the likely impact on the project. Each risk intervention would consider the risks impacts and likelihood for two scenarios, namely:

1. The current situation eg (Conception Stage).
2. The forecasted situation at the next key gateway;
3. Risks were evaluated both qualitatively & then quantitatively.

Risk planning

The risks were ranked using a traffic light qualitative system and management action plans (MAP's) with clear ownership generated for each key risk. The key emphasis of the MAP's was 'what are we going to do to manage the risk from scenarios 1 to scenario 2' (eg Conception Stage to Budget setting).

Risk output

The quantitative risk data was then used to calculate a risk contingency. The process adopted utilised a Monte Carlo simulation technique, which provided cumulative probability, distributions, and confidence level. This then enabled the team to create a robust project budget based simply on:

Project Budget	Analogies
Base cost	
+risk P50	
=Sub Total	Fence Line
+ Risk P95-P50	
= Overall Total	Cliff Face

The project can then be managed and analysed based upon the risk analysis at each gateway, such that the success of beating the budget lies with the MAP's and their respective owners. (see fig.2).

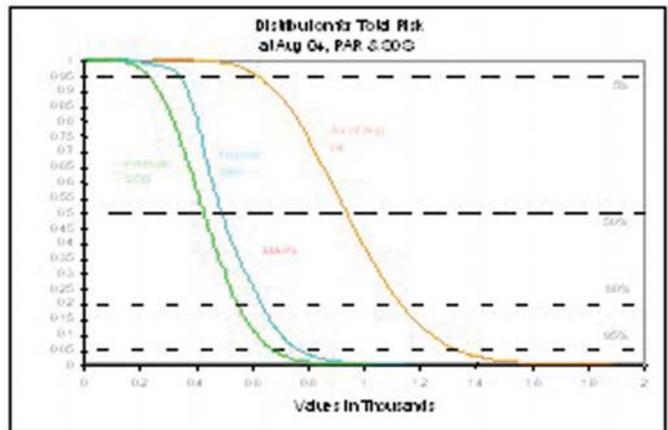


Fig 2 Graph illustrating key gateways and risk profile on each, showing importance of MAP's taking you from far right to the left.

- August 2004 80% chance of meeting £1.15m
- PAR 80% chance of meeting 640k.
- Start on site 95% chance of meeting £640k.
- The steeper the curve the better the risk profile, i.e. more confidence of meeting or bearing the budget.

Whilst this risk management process was fully adopted, the team were instrumental in adopting a culture of value engineering where there is a constant challenge of how and why things are being done now focussing on value and not just cost;

$$\text{Value} = \frac{\text{Achievement of specified customer requirements}}{\text{Expenditure of resource}}$$

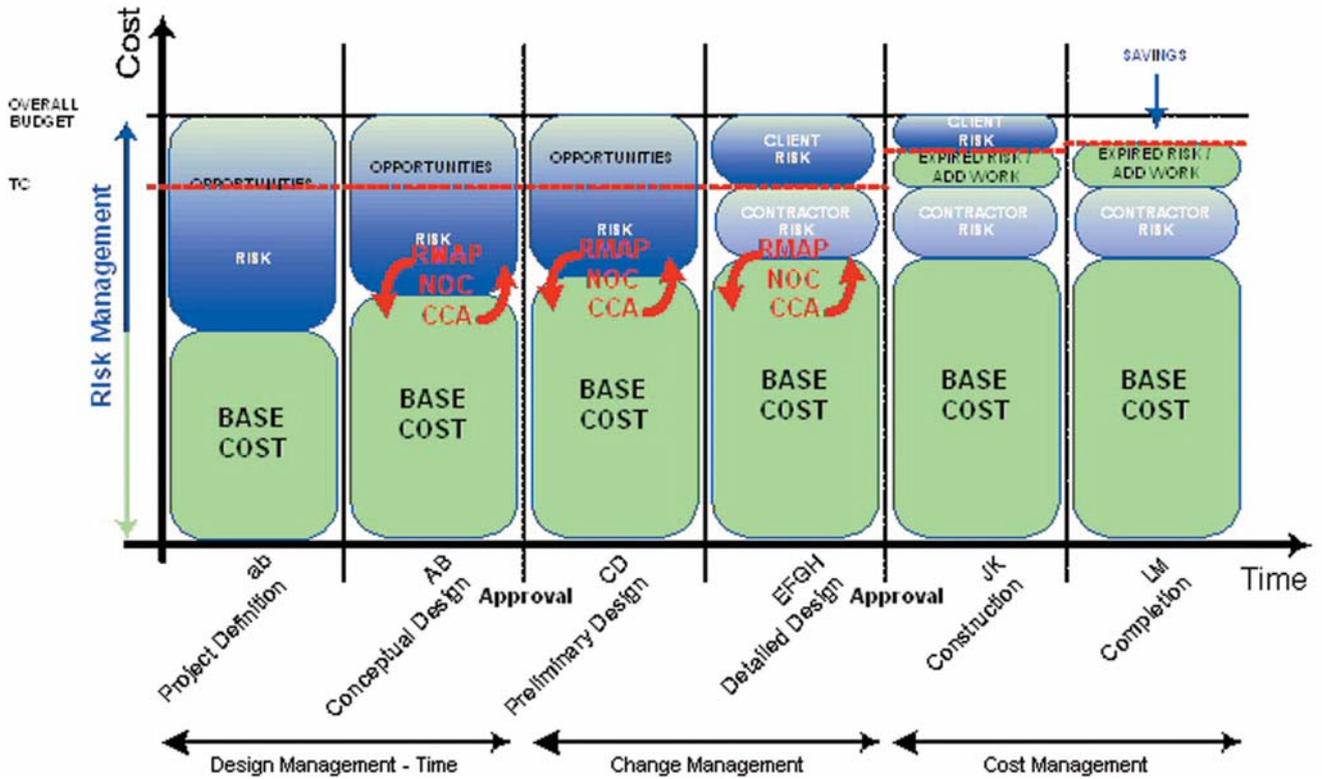
This risk and value approach adopted by the team has been an essential collaborative ingredient in beating the budget constraints.

Cost control process

By adopting a collaborative risk management strategy and developing this into a quantified risk analysis model we found that instigating an integrated change control process (or building on an existing process) enables the team to have a robust managed financial budget with more reliable and accurate planning/programming/forecasting.(see fig 2).

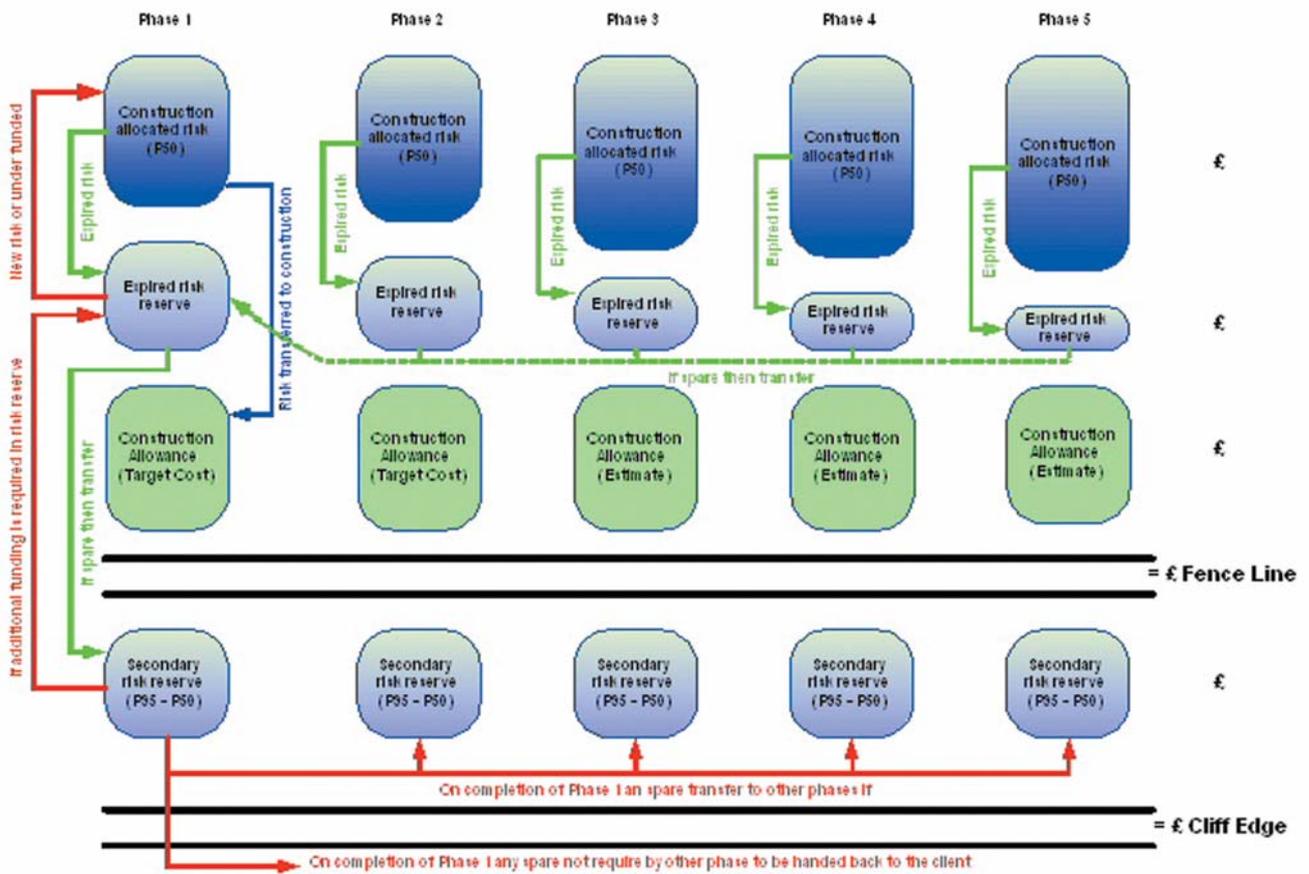
Fig 2 illustrates the project lifecycle and controlled migration of risk into the base cost – thus never exceeding the overall budget and in fact beating the budget.

The management of cost, any underspend is known in sufficient time to be reallocated across other phases or back to the EA.



Rmap = Risk Management Action Plan
 NCO = Notification of change
 CCA = Change control Authorisation

Management of cost or any underspend is known is sufficient time to be reallocated across other phases or back to EA.



Wastewater Treatment & Sewerage



In the early stages of a project the risk allowances for each element may be greater than the base estimate (known items). A robust budget set early in the project comprises both base cost and risk and opportunity cost analysis (see fig 2). As the project develops and becomes more clearly defined, with investigations and feasibility studies being undertaken, the risk allowance is steadily reduced and the base cost increased. This migration of cost is controlled via the change control process and enables the management of a robust project budget.

Traditional approaches to setting contingencies, if adopted here, may well have underestimated the full extent of unknowns and risks and thus underestimating the contingency allowance and providing an inadequate budget.

The protocols established were as follows:

- * risks identified will have an individual owner who will be

responsible for developing, instigating and updating the Risk Mitigation Action Plan (Risk MAP);

- * the risk will have a budget (as submitted within the budget document based on a Probability & Impact P50). Any change in the base cost (e.g. design development) through pre-contract will be managed through the change control procedure using “NOC”s and funded from the budget risk;
- * **the overriding principle is that the budget is not exceeded.**

The adoption of the holistic risk and value management approach and the culture formed within the team has been instrumental in ensuring the budget has not only been met but also beaten. ■

Note: The authors of this article, Howard Benton & Mike Connolly are with EC Harris LLP .