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**“RISK MANAGEMENT IS NOT A COST,  
IT IS AN INVESTMENT!”**

**Peter Buckland,  
Hunter Water**

Anyone who has spent much time in asset management, whether in Australia or the USA, would know Peter Buckland as the leading thinker in terms of Risk Management. Peter Buckland, Manager Assets Policy, Hunter Water Corporation explains there are three things that every asset manager needs to know about risk management, namely

- 1. It is not a cost, it's an investment** – and therefore follows the basic investment rule, which is ‘don't do it if the benefits fail to exceed the costs’.
- 2. Quantify your risks – ALL of them**, the direct and indirect, the tangible and the intangible
- 3. Economic life is a function of risk**

In this issue Peter explains the first two. The third, *Economic Life is a Function of Risk*, will be covered in a subsequent issue.

Peter Buckland has over 35 years experience in the steel and water industries covering asset management, risk management, systems engineering, engineering logistics and maintenance management. He has published extensively on asset and maintenance management, and had major input to the Australian Water Industry's new Asset Management Benchmarking System, *Aquamark*. For many years Peter has held local and national office in the Maintenance Engineering Society of Australia (MESA) and is the current technical director. These issues are excerpted and updated from Peter's paper “Asset Life – Is Bigger Necessarily Better?” presented at the second IQPC Conference on Life Extension for Ageing Assets, Sydney, August 29, 2006.

.... And also in this issue, we continue our story on “Fund Renewal, not Depreciation” with a word of warning from Ken Harlow and a look at the relationship of funding renewal to the concept of Condition Based Depreciation.

**Consider and Enjoy!**

*Penny Burns*

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# RISK MANAGEMENT BASICS

## Key Ideas

- Risk definition
- The difference between Qualitative and Quantitative risk assessment
- Risk calculation, how to
- Risk is a cost of asset ownership and can be amortised
- Risk can be managed

## Definition of Risk

**“A measure of the degree of exposure to unwanted probabilistic loss events.”**

Courtesy: Anderson & Robinson

**Risk Cost** = Projected frequency of a loss event X Consequences of the loss event

### Qualitative assessment – Easy.

No pain. However, little gain.

Which risks do I mitigate first? What expenditure is justified to mitigate a risk which is a Medium, a 6, or a 10 ?

### Quantitative assessment – Hard, but useful

Risk is a measure of loss exposure

Risk Cost is a cost of asset ownership and can be amortised (ie spread over time) as \$ per annum.

**Risk in dollars per annum** = projected frequency of a loss event (quantified as the number of projected events per year) X Consequences of the loss event (dollar equivalent cost of event)

## Risk Calculation

A particular event has consequences totalling \$10,000  
Projected occurrences are about one every 10 years

Therefore projected frequency of occurrence is 1/10 or 0.1

Risk = Projected Frequency x Consequence

= 0.1 p.a. X \$10,000

= \$1,000 p.a.

(This is how the insurance company works out your premium)

## Risk can be managed

## RISK MANAGEMENT IS NOT A COST, IT IS AN INVESTMENT

### Key Idea

- It is not the risk that should determine our spending but the return on our investment in mitigating that risk.

Consider the likelihood/consequences matrix below. What use can be made of this?

There is a tendency to look at the top right hand corner (high likelihood, catastrophic consequence) and start there with the mitigation effort (“X” marks the spot)– and, conversely, to ignore the lower left hand corner altogether (low likelihood, low consequence).

But what we should be asking is “Where can our mitigation efforts be most beneficially applied?”

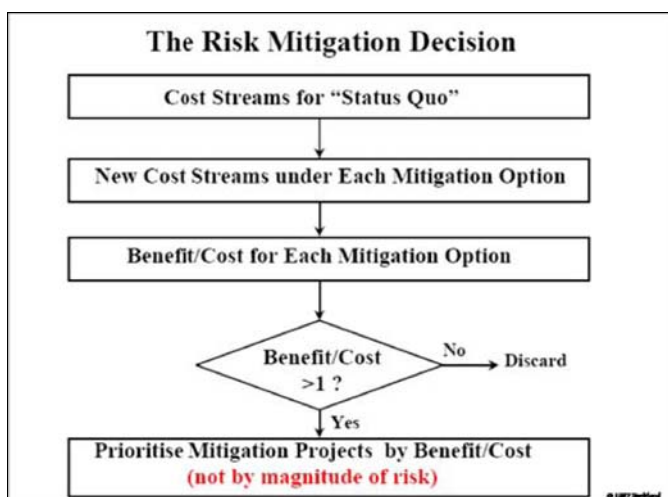
We need to look at *what actions we can take*, at *what cost* – and with *what benefits in term of reduced risk cost*.

	Consequence				
Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Medium	High	High	High	High <b>X</b>
Likely	Medium	Medium	Medium	High	High
Possible	Low	Low	Medium	Medium	High
Unlikely	Low	Low	Low	Medium	High
Rare	Low	Low	Low	Medium	Medium

If all of the actions that we can take at the top right hand corner would be extremely expensive and only minimally effective, then a better return for our dollar could come from tackling those risks more amenable and responsive to action even if lower in the matrix ordering.

This means for each risk we should be asking what are the benefits of each possible action and comparing it with the costs involved to determine for which risks mitigation provides the best return on our risk-management investment dollar.

**These high return risks are the highest priority for mitigation.** This approach is demonstrated in the diagram to the left.



**RISK MANAGEMENT IS NOT A COST, IT IS AN INVESTMENT**

Applying this risk-return thinking to our likelihood/consequences matrix, this could well result in a very different series of actions, as shown below. (Again “X” marks the spot)

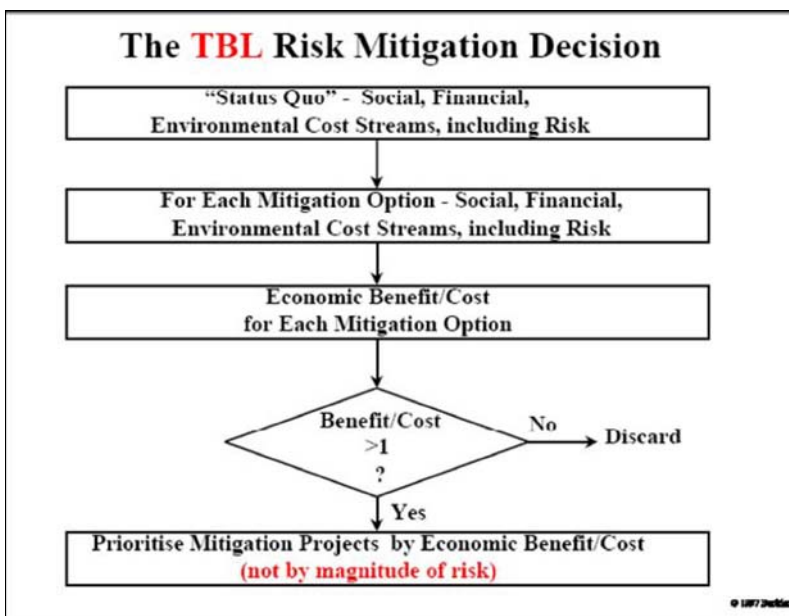
	Consequence				
Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost Certain	Medium	High X	High	High X	High
Likely	Medium X	Medium	Medium	High	High
Possible	Low	Low	Medium	Medium	High
Unlikely	Low X	Low X	Low	Medium	High X
Rare	Low	Low	Low	Medium X	Medium

Analysing the risk-return equation for each risk requires, of course, that we dollar quantify all of our benefits and costs.

And that means **ALL** benefits and costs.

**Internal costs** - direct and indirect

**External costs** - direct and indirect.



This is the Triple Bottom Line approach to risk management, as represented in the flowchart to the left.—” The TBL Risk Mitigation Decision”.

The **COST** of undertaking a risk management action is not too difficult to establish, but **BENEFITS** are another matter.

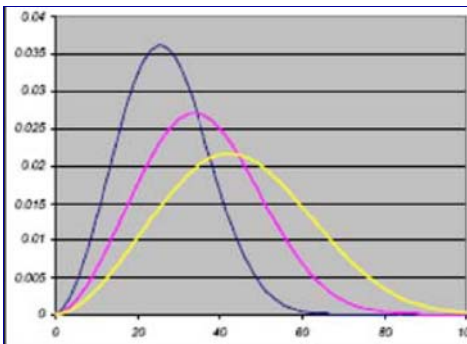
The **Benefits of Risk Mitigation** are the risk costs that are avoided.

# QUANTIFYING THE BENEFITS OF RISK MITIGATION—A 3 STEP PROCESS

## Key Ideas

### 3 Step Process

1. Determine likelihood of the event occurring
2. Calculate the dollar consequences of the event occurring—the DIRECT costs
3. Calculate the dollar consequences of the event occurring—the INDIRECT costs



Frequency of event occurring

**Ultimately determining likelihood or frequency is just maths!  
Not opinion.**

Remember **Risk Cost of a failure** (the benefits of mitigation) =  
**Projected frequency of the event occurring**  
**X**  
**Consequences of the event occurring**

### Step 1 - Determine projected frequency of the event occurring

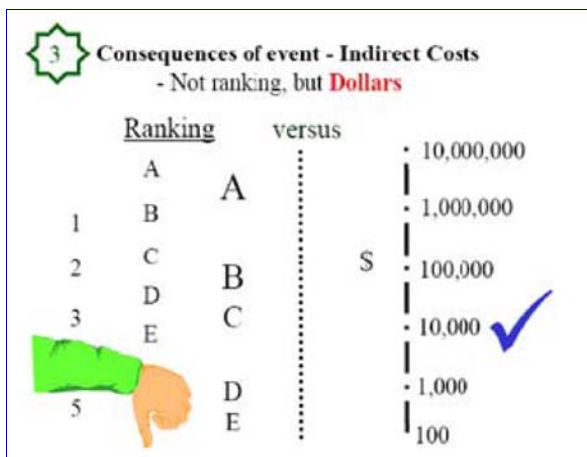
#### Typical considerations

- What is failure?
- Age of equipment
- Location/environment
- History of failure
- Failure modes
- Maintenance history

### Step 2 - Consequences of the event occurring – Direct Cost (to you)

There is the cost to fix the failure, and various internal intangibles such as image damage. There may also be legal costs, third party claims, event administration, loss of production, etc. All cost estimates should include the business overheads. Be wary of treating fines, penalties, customer rebates as costs. They are designed to encourage certain behaviours, and they are not reflective of costs associated with the breach which precipitates them. Including a small fine in decision making may result in your deciding to break the law. The end game will be that fines will increase until ultimately your benefit cost analysis will promote your obeying the law, if you are still around.

### Step 3 - Consequences of the event occurring – Indirect Cost (to the community and to the environment)



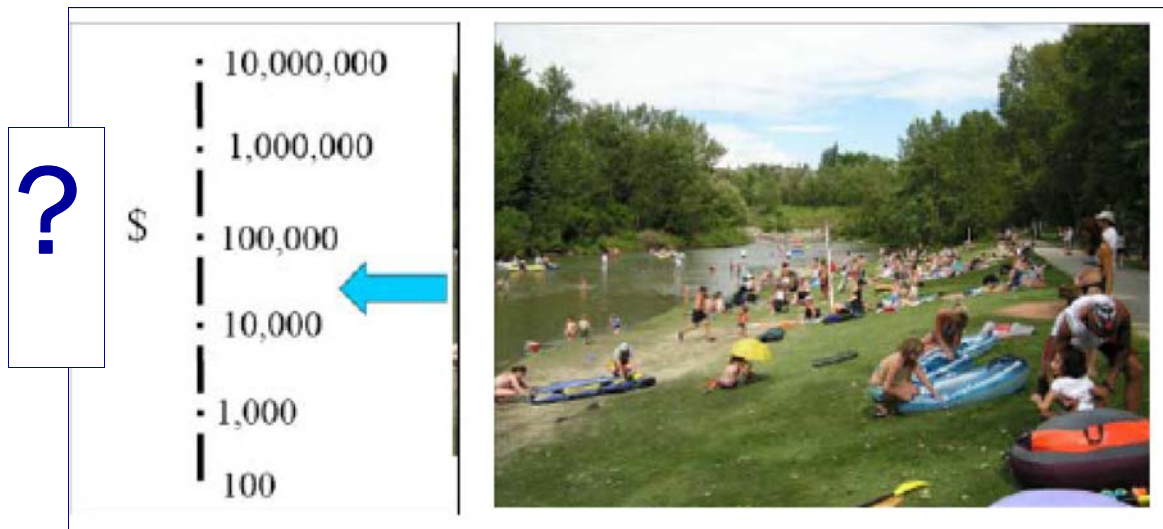
These costs are harder to estimate than direct costs and at this stage most people give up trying to quantify and fall back on ranking. Don't!

Ranking gives you no basis for demonstrating an appropriate return on the mitigation dollar and therefore no justification for proceeding.— see the chart opposite.

***You can do better—turn the page!***

## CALCULATING THE INDIRECT COSTS TO THE COMMUNITY AND ENVIRONMENT

What would society pay to avoid a sewer spill affecting this area?



**You can calculate these Indirect Costs  
Here's How**

**You need Dollar (\$) estimates, so**

**1. Assemble a socially representative group.** This can easily be from within your own organisation but choose people according to the social, ethnic, interests mix of your society—.i.e. not only asset managers but accounting, catering, cleaning, managerial staff. A refinement may be to use community focus groups

**2. Present the group with clearly defined scenarios so that they all relate fully to the situation they are paying to avoid.** What assumptions should you make?

- (a) costs should include financial loss to society, outrage, disruption, environmental damage
- (b) if you assume it is a first time event then there is no cumulative outrage (on the other hand, if you are considering mitigating a sewer spill or water outage and there has already been a series of these in recent memory, you will need to deal with this.)
- (c) in your scenarios assume typical events —with 'most likely' consequences rather than the most extreme conceivable consequences.

**3. First, estimate the \$ consequences in a broad order of magnitude until the group is comfortable that this is within the right ballpark.** Eg, sewage spill to the local swimming spot rendering it unusable for two days – between \$10,000 and \$100,000.

**4. Now, narrow down from the order of magnitude if possible.**

**You now have all the information you need to tackle the Triple Bottom Line Risk  
Mitigation Decision Flow Chart on page 180**

– the event likelihood or projected frequency, the complete TBL dollar consequence of the event and therefore the TBL risk cost, ie the benefit, for comparison with the mitigation cost to demonstrate the return on the

## THE “FUND RENEWAL, NOT DEPRECIATION” STORY CONTINUED

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### Key Ideas

**Modelling provides estimates of the cost and timing of funding renewal**

**Renewal activity itself should always be based on an actual assessment of the service needs of the asset**

**Funding Renewal does what Condition Based Depreciation was intended to do—ensure needed renewal is funded**

**Money is wasted by assessing the condition of assets for depreciation purposes—when a simple desk top exercise based on age and economic life would do**

### **A warning on using projections without checking the individual asset**

Penny,  
Just a note on my discussions of the renewal funding work at the Santa Margarita Water District last issue. The methods described should be used only for forecasting aggregate renewal funding requirements and absolutely not for making real-life asset decisions. The only exception might be where a time-based renewal strategy has been decided for a particular – and undoubtedly critical – asset. Such a situation should be quite rare, however.

Ken Harlow

Few asset managers would follow the prescriptions of their pavement management systems as to what to renew and when – *without doing an inspection first!* The same applies to any asset renewal prediction method.

In addition, agencies adopting the prescription to ‘fund renewal and not depreciation’ will also want to review the asset renewal treatments listed in the funding plan before carrying out the work. It may be that they may need to be brought forward or, alternatively, can be safely deferred for a few years. In these cases, the adjustments should be made – *and the funding plan notated with the reasons for the change.*

### **Does “Fund Renewal, not Depreciation” also refer to Condition Based Depreciation?**

#### **Absolutely!**

Regular readers may remember that, starting in 1992, I spent many years arguing the case for condition based depreciation based on an justified asset management plan. I ran conferences on it, spoke to the Auditors-General about it and tried everything I knew – but I was not successful. For a short time, the AG in New Zealand saw the potential of CBD for overcoming the double counting problem inherent in depreciating infrastructure that is constantly being renewed and it was adopted by many councils there until being over-ruled by the accounting profession. Now with the harmonisation of accounting practices across the world there is little scope for any ‘go it alone’ method. Is this a problem? Actually, no it is not.

**In theory, it would be nice if accountants and engineers could work from the one set of figures, but ...**

## THE “FUND RENEWAL, NOT DEPRECIATION” STORY CONTINUED

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### 1. In practice this is unrealistic as the needs of the two groups are very different.

The accountants need a figure that allows them to amortise the cost of the asset over its lifetime; that is, they need an *averaging* mechanism.

The engineers need a figure that tells them when they need to intervene to produce the lowest life cycle cost; that is, they need to know the *distribution* of wear and tear over time.

### 2. Condition based depreciation is not an averaging mechanism and doesn't meet the accountants' needs for costing (and, perhaps, pricing).

It doesn't help the accountant to know that the physical condition of the asset declines slowly at the beginning and rapidly at the end of its life.

For example, if this depreciation figure were to be built into the pricing mechanism, consumers would end up paying more for the asset at the end of its life, when the asset service is less reliable, than at the beginning – in other words they would be paying more for less!

So the accountant uses an average depreciation figure (straight line depreciation) because it is the best and fairest means of allocating depreciation costs over the asset's lifetime.

### So, stay onside with your accountants and remain financially viable

#### 1. Funding renewal rather than depreciation enables you to be independent of the accountant's depreciation figures which is at it should be.

At the same time it enables you to assist them in their need for an amortisation figure for depreciation by providing information that you also need—namely, age, replacement value and economic life.

#### 2. You don't need depreciation for your decision making .

You need an assessment of the remaining life of individual assets and an assessment of the appropriate treatment for those whose remaining life falls within the ten year planning period.

#### 3. Funding Renewal actually does everything that CBD was intended to do

That is, to figure out the cost of remaining viable over a rolling ten year financial time frame and to fund this cost.

#### 4. But it avoids the costs of assessing the condition of assets that do not fall due for renewal within the planning period

#### Save Money!

You don't need to assess the condition of ALL of your assets – just the ones whose age indicates it is time to have a closer look. It is a waste of money to do a condition assessment on assets that a simple desktop exercise can tell you are going to come in at the level 1 or 2 condition because they are still young. If by some aberration an asset is going to fail far short of its economic life, there will be other indications that will be picked up in the course of ordinary operations and maintenance activities – you don't need a condition analysis exercise even for these.

**Organisations could save a large part of their valuation/condition assessment budget if they were to apply a simple desk-top filter based on residual life and check only those assets that were close to the renewal time frame.**