

**Incorporating Principles of  
Sustainable Development within the  
Design and Delivery of Major  
Projects: An international study with  
particular reference to Mega Urban  
Transport Projects  
for  
the Institution of Civil Engineers  
and the Actuarial Profession**

Working Paper 2

**The Perspective of the Actuary**

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**Omega centre**

**Centre for Mega Projects in Transport and Development**

A global Centre of Excellence in Future Urban Transport sponsored  
by Volvo Research and Educational Foundations (VREF)

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## **ICE/RAMP STUDY**

### **WORKING PAPER BY ANTHONY GOPAUL**

**How to incorporate principles of sustainable development within the design and delivery of mega urban transport projects whilst taking adequate account of social and environmental considerations: The Actuarial Perspective.**

#### **About the Author**

Anthony is a Senior Project Manager at Capita Symonds with 14 years experience in Regeneration and Economic Development Management.

#### **The Study Brief**

On behalf of Omega Centre and UCL we have been asked if recognised good practice as used in project appraisal (national/international) by actuaries / risk assessors / regeneration and development managers, takes into account social and environmental considerations, when assessing risk and managing risk for transport and infrastructure projects.

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## Context

On behalf of Omega Centre and UCL we have been asked if recognised good practice as used in project appraisal (national/international) by actuaries / risk assessors / regeneration and development managers, takes into account social and environmental considerations, when assessing risk and managing risk for transport and infrastructure projects.

The types of projects this research is focusing on are MUTP's (mega urban transport projects) – these are defined as large-scale (typically complex) land-based transport infrastructure link projects (and any service they may incorporate), including: bridges, tunnels, highways, rail links and their related transport terminals plus combinations of such projects, with construction costs *in excess* of US\$ 0.5 billion at 1999 prices<sup>1</sup>.

The actuary profession is governed by two professional chartered professional bodies - 'The Institute of Actuaries' and 'The Faculty of Actuaries'. Currently, a consultation process is taking place to merge these two organisations as there are clear synergies with combining committee groups, sharing best practise and providing guidance to Government with respect to financial regulation. Research for this study has included interviewing 3 actuaries and material has been obtained from two specialist actuarial books: RAMP (Risk Analysis and Management for Projects) and Strategic Risk (A Guide for Directors). The

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<sup>1</sup> This definition is akin to that employed by the LASTIN Study of mega transport projects conducted at Aalborg University in Denmark in the late 1990's which provided the basis of the *Mega Projects and Risk: An Anatomy of Ambition* publication by Flyvbjerg et al, Cambridge University Press, Cambridge, 2003.

RAMP process is the toolkit which actuaries use to measure and manage risk. Actuaries use a combination of qualitative and quantitative (probability and calculation of net present values) to make risk assessments.

An interview has been undertaken with a project manager (risk assessor) who is managing risk for a large infrastructure project using the computer software 'Monte Carlo' analysis. Details of the risk register have been provided which identifies the variables against which risk is measured.

In this context we have selected some regeneration programmes which are large complex schemes which the Regeneration and Development Management team within Capita Symonds have provided strategic support and guidance in the project appraisal process. The work in question has been provided to West Northamptonshire Development Corporation. This organisation is responsible for the development of regeneration programmes and comprises of individual projects.

A key aspect of this work which is developing is to pay greater attention as to how schemes are financed i.e. are they financed from a commercial loan/ private sector or organisations similar to the World Bank. When borrowing money there are terms / key indicators. Further investigation is required to establish the terms in a commercial loan i.e. are there any social or environmental considerations noted? With organisations similar to the World Bank there are clear defined key indicators which a scheme is required to achieve, however, it is not known what happens if a scheme does not achieve these key indicators, again further investigation is required.

## **Definitions**

### Definition of Risk (Encarta Dictionary: English UK)

1. chance of something going wrong – the danger that injury, damage or loss will occur
2. hazard – somebody or something likely to cause injury, damage, or loss
3. chance of loss to insurer – Insurance - the probability of loss to an insurer, or the amount that an insurer is in danger of losing
4. possibility of investment loss – Finance - the possibility of loss in an investment or speculation
5. statistical odds of danger – the statistical chance of danger from something, especially from the failure of an engineered system

### Definition of Risk from an actuary perspective – from telephone interviews undertaken with pensions actuaries

Actuary 1 - 'where there is uncertainty in a number of areas, each area of uncertainty is measured using a combination of qualitative and quantitative analyses

Actuary 2 'the world is full of uncertainties, risk is quantifying uncertainties and putting probabilities on uncertainties'

### Definition of Risk Management (Encarta Dictionary: English UK)

'analysis of possible loss – the profession or technique of determining, minimizing, and preventing accidental loss in a business, e.g. by taking safety measures and buying insurance'

### Definition of risk from RAMP – Risk Analysis and Management for Projects

'risk can be defined as a threat (or opportunity) which could affect adversely (or favourably) achievement of the objectives of an investment'.

Separately when evaluating risk there are six main concepts associated with evaluating risk.

- 1) Overall risk: the combined effect of all individual risk or sources of uncertainty in a situation. It can be divided into two portions: overall upside risk and overall downside risk.
- 2) Risk event: a possible occurrence which could affect (positively or negatively) the achievement of the objectives for the investment
- 3) Likelihood: the chance (or probability) of the risk event occurring within a defined time period
- 4) Impact: the value of the effect of the risk event on one or more objectives if it occurs
- 5) Expected value: a best estimate of the average outcome, i.e. all possible outcomes weighted by their probabilities
- 6) Risk efficiency: a state achieved when the downside risks have been sufficiently mitigated and the upside risks have been optimised

'Overall risk is the combined effect of all individual risks or sources of uncertainty in a situation, both upside and downside. A project is 'risky' if there is expected to be considerable downside variation or volatility in the eventual possible outcomes, or 'safe' if there is expected to be little significant downside variation. One way of measuring overall risk is to express all outcomes in monetary terms, allowing for time, so as to have a

common and meaningful unit of measurement – NPV – net present value – is used in the handbook’.

‘Risk events are the specific happenings that can influence the success of an investment – causes, risk events and possible outcomes are shown in the table below:

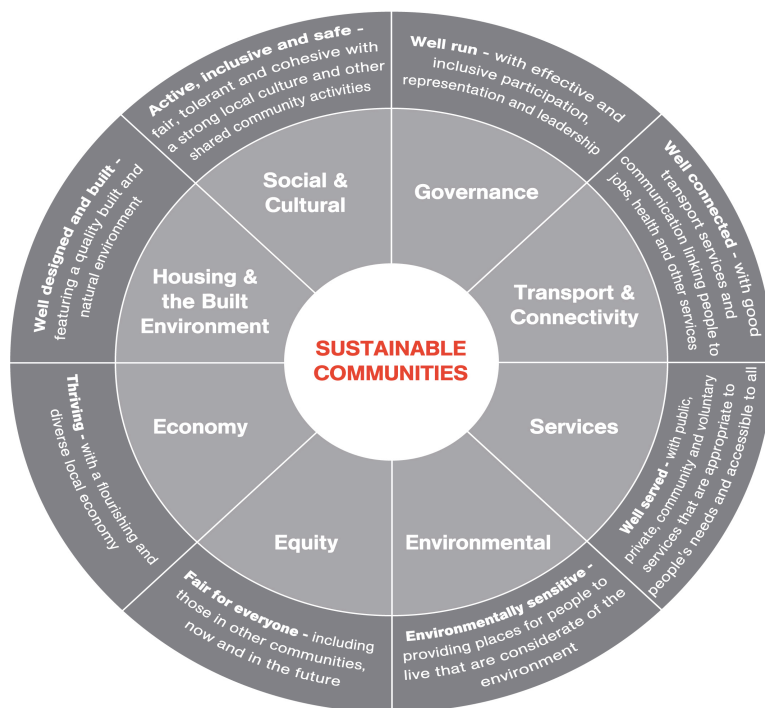
Causes	Risk events	Possible outcomes
Unforeseen geological conditions Man-made obstructions  Site flooding	Delay in tunnelling	Late completion Less time for installation of track and equipment  Increased capital cost
Higher property prices More land required Unexpected need for decontamination	Increased cost of land	Overspend on capital budget  Need to reduce scope
Reduced total investment Recent price rises Appeals from customers	Regulator limits prices	More customers Lower or higher value

## **Social and Environmental Considerations and how they link to the Egan Wheel**

At the heart of Regeneration and Economic Development is Sustainable Development. Sustainable Development was originally defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”. In 2004 Sir John Egan was asked by the Deputy Prime Minister to examine how communities could be more sustainable. Egan suggests that sustainable communities must meet ‘the diverse needs of existing and future residents, their children and other users by offering choice. In order to be sustainable, communities must:

- make effective use of natural resources
- enhance the environment
- promote social cohesion and inclusion
- strengthen economic prosperity

The diagram below ‘The Egan Wheel’ can be applied to the work we are undertaking, it links into the Goals highlighted above. It links the following to create sustainable communities; Economy; Equity; Environmental; Services; Transport & Connectivity; Governance; Social & Cultural; Housing & the Built Environment.



**The Egan Wheel suggests Social and environmental considerations should not be considered or examined on their own but looked at with other factors as a part of sustainable communities i.e. they include -**

- Social and cultural – active, inclusive and safe
- Governance – well run
- Transport and connectivity – well concerned
- Services – well served
- Environmental – environmentally sensitive

- Equity- fair for everyone
- Economy - thriving
- Housing and the built environment – well designed and built

The following are a set of questions taken from research work undertaken in Milton Keynes which asks - **Is it a sustainable community?**

**a) Well run?**

People are:

Included in decision-making – Not included

Feel responsible - Don't care

Proud of local community - Not proud

**b) Well-connected?**

Getting in/out and around your community:

Excellent bus service - Non-existent bus service

Easy access to rail service - No access to rail service

Safe local walking routes - Lack of safe pathways

Safe local cycle-ways - Lack of safe local cycle-ways

Roads clear - Roads congested

Off-road parking - Parking on roads

**c) Well served?**

Access to services:

Quality nurseries and/or childcare – none

Quality primary school – none

Good range of local shops – no local shops

Easy to get local information - Difficult to get local information

Health services accessible - Health services not local

Good range of other services for all groups - Limited services for some groups e.g. elderly, youth, family

**d) Environmentally sensitive?**

The impact the community has on the environment, people are encouraged to:

Recycle – no recycling

Save water – water wasted

Save electricity or use renewable sources – no energy saving

Reduce waste – lots of rubbish produced

Use of public transport – use cars

Build on brownfield sites – build on Greenfield sites

Reduce litter – litter

Reduce graffiti – graffiti

Keep public spaces pleasant – public spaces unpleasant

Provide wildlife areas – no wildlife areas

**e) Fair for everyone?**

People of all ages, races, cultures, sexes and abilities:

All can access services - Some groups cannot get services

All can get jobs - Some groups cannot get jobs



All get equal educational opportunities - Not everyone is equal

**f) Thriving economy?**

Standard of living:

Lots of local jobs - Few local jobs

Successful local businesses – Local businesses struggling

Things are getting better – Things are getting worse

**g) Well designed and built?**

Houses and local buildings are:

Attractive - unattractive

Safe – unsafe

Useful - Derelict (left empty)

Lots of public open space to relax and play - Little public open space

Area has 'character' and a positive feel - Area has little character, dull.

Very high BREEAM standard – no BREEAM standard

**h) Active, inclusive and safe?**

Social considerations:

Good community spirit – No community spirit

Neighbours look out for one another – Neighbours keep themselves to themselves

People respect each other – no respect shown

Low levels of crime, drugs and anti-social behavior – high levels of crime drugs and anti-social behaviour

Friendly effective police – no local police

People feel safe – people feel unsafe

## Actuaries

### The profession

Actuaries are used to prepare information for life assurance policies for up to 20 to 40 years in some instances. These are people who to take out a fixed premium for a whole variety of risks. Most of these risks are out of control and some risks are within control i.e. can forecast e.g. mortality rates and investment returns. Actuaries use a combination of qualitative and quantitative analysis (probability and calculation of net present values) to make risk assessments.

### The RAMP process

RAMP is a comprehensive and systematic process for identifying, evaluating and managing risks in capital investment projects. It covers the entire life of a project from inception to close-down, not just the construction phase and it comprises of the four activities:

#### *Activity A – Process launch*

- A1 Organise and define RAMP strategy
- A2 Establish baseline

#### *Activity B – Risk review*

- B1 Plan and initiate risk review
- B2 Identify risks
- B3 Evaluate risks
- B4 Respond to risks
- B5 Assess residual risks
- B6 Plan responses to residual risks
- B7 Communicate strategy and plans

#### *Activity C – Risk management*

- C1 Implement strategy and plans
- C2 Control risks

#### *Activity D – Process close-down*

- D1 Assess investment outturn
- D2 Review RAMP process

### Risk in major infrastructure projects

This table and information has directly been extracted from the RAMP handbook. It summarised some international past experience in one sector – urban rail based on Allport, (2002). The broad conclusion is that, with a few notable exceptions, not only have the capital costs been underestimated (typically by 50% to 100% ) but operating costs have been routinely underestimated (by a factor of two or three times), while revenues have been overestimated (typically by 100%). This has occurred in widely different environments and procurement regimes and there is no evidence of improvement. Major urban rail projects seem to be inherently more risky than most transportation projects.

**The question is are these projects built to last for 20 to 40 years ? As actuaries calculate insurance premiums up to 20 to 40 years, there is a case for actuaries to be involved in assessing risk for MUTP's.**

Note the term 'Ridership' in the table below refers to 'The passengers using a particular system of public transportation over a given period of time, or the estimated number of these'

Note The private sector was no more better at funding investment than the public sector

Where ?	Parameter	Outturn compared with Forecast	Source
Europe/ North America	Capital cost	Average more than 50% worse	Merewitz, 1973
USA	Capital cost	Average more than 50% worse	Wachs, 1986
Developing cities	Capital cost  Ridership	Half the projects 50% to 500% worse ) Other half not as bad at this )  Half the projects 50% to 90% worse ) Other half not as bad at this )	Allport and Bamford, 1998
USA	Capital cost Ridership	From 17% to 156% worse ) From 28% to 85% worse )	Pickrell, 1990
Worldwide	Capital cost Ridership	From 15% better to 500% worse ) From 30% better to 90% worse )	Skamris and Flyvberg, 1996
Worldwide (Private Sector)	Capital cost Ridership	No improvement over public sector ) No improvement over public sector )	Allport and Bamford, 1998
UK, USA	Ridership	2 out of 13 'successful'	Mackett and Edwards, 1998
Asia (private sector)	Capital cost Ridership	No improvement over public sector ) No improvement over public sector )	Halcrow, 2000
Worldwide	Capital cost	From 46% better to 200% worse ) (average 46% worse) )	Skamris, 2000

	Ridership	From 96% worse to 1% better ) (average 51% worse) )	
N. America UK	Ridership	From 82% worse to 89% better ) (8 selected systems) )	Babalik, 2000

Separately, a UK study, report by Mott MacDonald – studied 50 major projects, each costing over £40million, and compared their planned and actual capital costs. Mott MacDonald found that the top six causes of optimism bias for capital cost were

- Inadequacy of the business case (much the most important cause)
- Environmental impact
- Disputes and claims
- Economic factors
- Late contractor involvement in design
- Complexity of contract structure

There is a Member Interest Group which may be of interest for further research from viewing its Description and Terms of Reference –

### Description of the Resources and Environment Group and Terms of Reference

Resources and Environment Group - Why are we focussing on Resources and the Environment?

Environmental and resource constraints are having an ever increasing impact on the economy, society and business. Analysing and managing the impact involves complex risk issues for which actuaries' skills and training are greatly in demand.

Environment and resources, in particular energy issues, is now core to many business and investment decisions. Most professionals, including the Actuarial Profession, need to fully understand how this will affect their work.

Promoting a sustainable economy and society is key to the Profession's role of promoting the public good.

### **Terms of Reference**

1. The Group will seek to promote awareness of resource, environmental and sustainability issues and educate the Profession of their importance.
2. An increasing number of actuaries are working in related fields, or are seeing resource and environmental issues arise in their work. The Group aims to develop expertise and best practise to provide thought leadership in this area
3. The Group aims to support actuaries working in resource, environmental or sustainability fields or where resource and environmental issues affect their work. This will be done through resources, research and knowledge sharing platforms.
4. The Group aims to inform the policy debate issues, in particular where actuarial expertise is key, for example in risk management.
5. The Group will research the impact of resource and environmental issues, in particular climate change, on traditional areas of actuarial work, such as pensions, insurance, finance and investment.
6. The Group aims to become a resource centre for resource and environmental issues and develop a role for actuaries with respect to these issues.
7. The Group will provide support, if required, to relevant initiatives (eg UNFCC, ClimateWise, P8, IIGCC, CDP)
8. Resource and environmental issues are necessarily complex and require a range of expertise. The Group will therefore liaise with other professional organisations and relevant experts.

- 9.
10. The Group will be a communication and education channel for the Profession on environmental and resource issues.

**Assessor –  
Interview with a Senior Consultant – large infrastructure project**

Role on project - Financial and Risk Assessment

Background – Chartered Accountant

Project – large infrastructure project for a local authority

Scheme cost is £100 million.

Role:

Managing risk on a project

Setting strategy and policy

Setting governance procedures for delivery of the project e.g. responsible for a large risk register

Key areas highlighted on the risk register are;

- risks
- consequences
- programme impact
- likelihood
- financial impact

Uses the model 'Monte Carlo Analysis' which is the general name for the computer software and financial model used to generate estimates of the total risk exposure for a particular project. A risk register can have a number of variables – this particular example has 90 variables and some of these are social and economic considerations. Each variable is run into the model at different levels of risk i.e. if there was a 20% change of an archaeological finding the likelihood will be is that it will cost £50k for this particular project. Each of the 90 variables has a value of probability.

Confidence levels in the model are as follows:

Very high risk

High risk

Medium risk

Low risk

Very low risk

This form of statistical analysis provides more realistic estimates of the total value of risks associated with a project than traditional methods, as it is able to model many different scenarios of risk realization. It also promotes effective decision making as to whether to proceed with mitigation strategies by allowing a comparison to be made between the cost of mitigation and the cost of risk realization.

Monte Carlo analysis allows you to replace 'point' estimates (e.g. those based on an average time of say 1 week) with a range of values that reflect true uncertainty. This helps to characterise the range of potential outcomes you may end up with. Monte Carlo

analysis draws on the specified range of different variables to give a possible range of total costs for the project, as well as the most likely value of total costs.

The use of Monte Carlo analysis to appraise and manage the risks associated with a particular project is recommended by CIFPA, the National Audit Office, the Audit Commission and the Treasury.

The team involved in the project has assessed the probability of occurrence of each risk according to the following thresholds:

**Table - Risk probability categories**

Probability of occurrence	Percentage Profitability
Certain	100%
Very High	75 – 100%
High	50 – 75%
Medium	30 – 50 %
Low	15 – 30 %
Very Low	5 – 15 %

### **Risk values**

A second input, is the associated 'risk value'. A five-tier approach for classifying programme impact, outlined in the Risk Management Strategy, has been used in order to aid more detailed statistical analysis of the project's risks. These programme impact levels have been used to define thresholds for cost of occurrence – these are our risk values. In addition to specifying the range, we have indicated what the lowest 10% and highest 90% values are. The classification is as follows:

Risk Value	Lowest 10%	Highest 90 %	Impact
£10m +	£10m	£20m	Very high
£5m - £10m	£5m	£10m	High
£1m - £5m	£1m	£5m	Medium
£250k - £1m	250k	£1m	Low
£50k - £250k	50k	£250k	Very low
0 – £50k	0	£50k	insignificant



Layout of a risk register

								Inherent Risk		
Risk category	Frequency	Risk description	consequences	Probability % score	Programme Impact	Risk Value  Amount £ e.g.	Proximity	Inherent risk rating  Red Amber Green	Strategy  Mitigate Accept	Mitigate response

The risk category includes the variables shown below: –

Financial, Site Conditions, Political, Planning, Governance, Programme Management risk (time), business transformation, design, construction, project brief, functionality/operations, sustainability, diversity, human resources, health & safety, procurement, ICT, security, communication.

It is important to note that the risk register is evidence that the assessor takes into account social and environmental considerations and also taken into account all the considerations identified in the Egan Wheel – Sustainable Communities.

The Monte Carlo Analysis includes Sensitivity Analysis, Probability calculations, Net present value and mitigation factors to form calculations. This is very similar to what actuaries use in their financial calculations.

Effective mitigation strategies are employed in the analysis as well -

Effective mitigation strategies can and should focus on the two elements reflected in the sensitivity analysis:

- The cost of a risk should it occur
- The likelihood that a risk will occur

Both factors can be reduced given effective mitigation strategies.

In addition, the project regularly updates its risk register and regularly runs revised Monte Carlo analysis based on up-to-date inputs.

## **Regeneration and Development Management**

Work undertaken for WNDC – West Northamptonshire Development Corporation's £40million growth area programme (UK government funded regeneration scheme).

West Northamptonshire Development Corporation (WNDC) is an Urban Development Corporation. It was established in 2004 with a ten year life. WNDC covers Northampton, Towcester and Daventry and is funded directly by the Department for Communities & Local Government both through grant in aid and project funding.

The risk assessment and project management of risk is part of the overall strategic support provided to WNDC programme which includes:

- Developing and testing their proposed programme of activities
- Producing project management guidance and application forms for grant aid
- Providing project development and appraisal support
- Carrying out options and economic appraisals in line with Green Book standards
- Evaluating and recommending projects for approval
- Preparing Business cases for consideration by the Board and their sponsoring department
- Providing Programme Management Office, Programme and Project Management Consultancy

The projects where we have supported WNDC cover:

- Improvements to Castle Station
- Strategic Land Acquisitions
- Public Realm
- Town Centre Redevelopment
- Major infrastructure
- Leisure and Cultural Projects

The Business Case examines is pre-project start-up work and looks at if the project can be delivered. In its simplest case an options appraisal is undertaken and risk assessment is undertaken. Key to the business case is there a relationship between the outcomes, outputs (known regeneration key indicators of performance), budget of the scheme and activity (milestones). A risk assessment is also undertaken.

If a business is approved then a project appraisal is undertaken which is a more detailed examination of the project. This can take the form of a Treasury Green book appraisal when more detailed questions are asked relating to the following:

Deadweight  
Displacement  
Added Value  
Leakage  
Multiplier

The Regeneration and Development Managers do have a very good and broad understanding of factors included in the Egan Wheel.

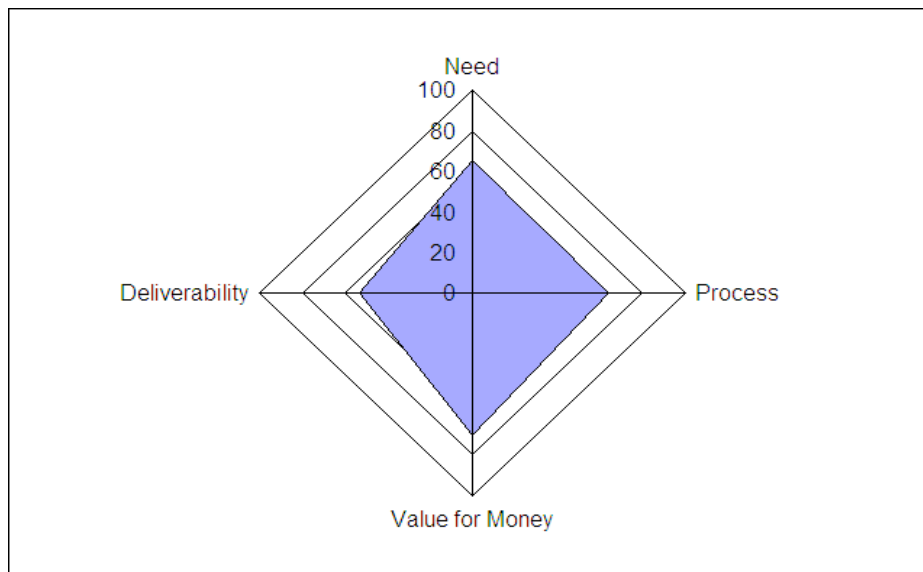
Upon completion of the project appraisal an evaluation toolkit is applied to recommend approval to a project steering group. The toolkit asks a series of detailed questions from which a score is obtained to assess deliverability, value for money, process and need.

An example of the results for one of the projects evaluated is shown below:

There is a scoring for the project against criteria – high risk, medium risk and low risk.

The example of the project scoring suggests that the project is medium risk and can be recommended for approval to be funded.

Bid Quality Profile –



### How schemes are funded

MUTP's are funded from a variety of organisations and include the World bank (ref: wikipedia):

The **World Bank** is an international financial institution that provides financial and technical assistance to developing countries for development programs (e.g. bridges, roads, schools, etc.) with the stated goal of reducing poverty.

The World Bank differs from the World Bank Group, in that the World Bank comprises only two institutions:

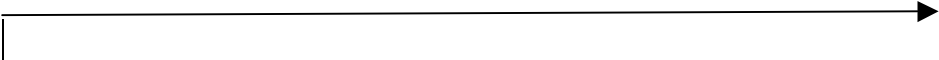
- International Bank for Reconstruction and Development (IBRD)
- International Development Association

## Appraisal Results

Segment	Total points available	Total points scored	Percentage of total available	Risk level
Does the project meet a clearly identified need, will it meet that need effectively	40	26	65	M
Project development process	70	45	64	M
Does the project offer value for money	30	21	70	M
Can the project deliver to time and budget	30	16	53	M
	170	108	64	M

### Bid Risk Profile

0-15%	16-35%	36-80%	81-100%
<b>Extreme</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>



Whereas the latter incorporates these two in addition to three more:

- International Finance Corporation (IFC)
- Multilateral Investment Guarantee Agency (MIG)
- International Centre for Settlement of Investment Disputes (ICSID)

Each of the above has a number of indicators and policies to receive funding which relate to e.g. social and environmental sustainability

### The International Finance Corporation's Policy on Social & Environmental Sustainability

If a project is to receive funding it must address specific social and environmental considerations. Through its *Policy on Social and Environmental Sustainability* (the Sustainability Policy), IFC puts into practice its commitment to social and environmental sustainability.

The Performance Standards consist of the following:

- Performance Standard 1: Social and Environmental Assessment and Management System
- Performance Standard 2: Labor and Working Conditions
- Performance Standard 3: Pollution Prevention and Abatement

Performance Standard 4: Community Health, Safety and Security  
Performance Standard 5: Land Acquisition and Involuntary Resettlement  
Performance Standard 6: Biodiversity Conservation and Sustainable Natural Resource Management  
Performance Standard 7: Indigenous Peoples  
Performance Standard 8: Cultural Heritage

These Performance Standards are essential documents to help IFC and its clients manage and improve their social and environment performance through an outcomes -based approach.

While managing social and environmental risks and impacts in a manner consistent with the Performance Standards is the responsibility of the client, IFC seeks to ensure that the projects it finances are operated in a manner consistent with the requirements of the Performance Standards. As a result, IFC's social and environmental review of a proposed project is an important factor in its decision to finance the project or not, and will determine the scope of the social and environmental conditions of IFC financing.

IFC's mission is to promote sustainable private sector development in developing countries, helping to reduce poverty and improve people's lives. IFC believes that sound economic growth, grounded in sustainable private investment, is crucial to poverty reduction.

When a project is proposed for financing, IFC conducts a social and environmental review of the project as part of its overall due diligence. IFC's position as an arm of the World Bank Group focusing on the private sector, together with its extensive network among private sector and international financial institutions, enables IFC to liaise with public and private sector stakeholders to promote a broader dialogue on sustainable private sector financing in emerging markets.

## Conclusions

Actuaries are involved in risk management as their skills in assessing premiums for life insurance are similar to those used by assessors who manage and assess risk for MUTP's.

Not able to identify specific case studies in which actuaries have been involved. This is something which the Actuarial Profession need to look into -

A report was produced jointly by the Actuarial Profession and the Institute of Civil Engineers – not seen sight of this report

MUTP are financed from 2 main sources – commercial loans / private sector and organisations like the World Bank who provide loans. When borrowing money there are key indicators which need to be met relating to social and environmental considerations.

Further research and development work is needed to confirm the role of the Actuarial Member Interest Group – Resources and Environment Group.

Is there anything different to the work an Actuary undertakes and that of an Actuary, Assessor and a Development Manager? Note all three individuals assess a risk register. The Regeneration and Development Manager is also, involved a lot earlier before a project starts in preparation of the business case. Further research work needs to be undertaken to confirm the Experience and skill set – see table below:

Individual	Experience and skill set to be confirmed
Actuary	Qualitative and quantitative experience - RAMP process
Risk Assessor – project manager	Experience of directly project managing projects Monte Carlo analysis
Regeneration and Development Manager	Experience of directly project managing projects Business Case, Funding Application, Evaluation toolkit Knowledge of Egan Wheel – Sustainable Communities

Is there anything different to the work an Actuary undertakes and that of an Actuary, Assessor and a Development Manager? Note all three individuals assess a risk register.

The work we have been tasked to take into account social and environmental considerations. However, we are moving towards the sustainable communities agenda. It is recommended that a more broader and holistic approach is undertaken to include the considerations highlighted in the Egan Wheel:

- Social and cultural – active, inclusive and safe
- Governance – well run
- Transport and connectivity – well concerned

- Services – well served
- Environmental – environmentally sensitive
- Equity- fair for everyone
- Economy - thriving
- Housing and the built environment – well designed and built

The RAMP – risk analysis and management for projects – a strategic framework for managing projects is currently being updated this year to include a more holistic picture with respect to including some / all of the considerations outlined in the Egan Wheel.



## **Questions to ask key players in MUTP's to draw out their views on the principle issues in these fields**

What toolkits / models are you aware of used to assess risk taking into account the following sustainable community considerations:

- Social and cultural – active, inclusive and safe
- Governance – well run
- Transport and connectivity – well concerned
- Services – well served
- Environmental – environmentally sensitive
- Equity- fair for everyone
- Economy - thriving
- Housing and the built environment – well designed and built

What is the time-frame for projects you have been involved in i.e. do your projects measure any sustainable community considerations after the project has been physically constructed? i.e. 5, 10, 20, 30 or 40 years after the project has been completed?

How are the projects you have been involved with financed? i.e. commercial loan, private sector or organisations similar to the World Bank? Are there any stipulations / criteria / key indicators which relate to sustainable community considerations?

Does your project fit within the local economy areas agenda for it developing a sustainable community?

Do you have an idea of the cost to calculate the following answers for your project, pre-project start- up and post project construction, which relate to considerations in the Egan Wheel?

### **a) Well run?**

People are:

Included in decision-making – Not included

Feel responsible - Don't care

Proud of local community - Not proud

### **b) Well-connected?**

Getting in/out and around your community:

Excellent bus service - Non-existent bus service

Easy access to rail service - No access to rail service

Safe local walking routes - Lack of safe pathways

Safe local cycle-ways - Lack of safe local cycle-ways

Roads clear - Roads congested

Off-road parking - Parking on roads

**c) Well served?**

Access to services:

Quality nurseries and/or childcare – none

Quality primary school – none

Good range of local shops – no local shops

Easy to get local information - Difficult to get local information

Health services accessible - Health services not local

Good range of other services for all groups - Limited services for some groups e.g. elderly, youth, family

**d) Environmentally sensitive?**

The impact the community has on the environment, people are encouraged to:

Recycle – no recycling

Save water – water wasted

Save electricity or use renewable sources – no energy saving

Reduce waste – lots of rubbish produced

Use of public transport – use cars

Build on brownfield sites – build on Greenfield sites

Reduce litter – litter

Reduce graffiti – graffiti

Keep public spaces pleasant – public spaces unpleasant

Provide wildlife areas – no wildlife areas

**e) Fair for everyone?**

People of all ages, races, cultures, sexes and abilities:

All can access services - Some groups cannot get services

All can get jobs - Some groups cannot get jobs

All get equal educational opportunities - Not everyone is equal

**f) Thriving economy?**

Standard of living:

Lots of local jobs - Few local jobs

Successful local businesses – Local businesses struggling

Things are getting better – Things are getting worse

**g) Well designed and built?**

Houses and local buildings are:

Attractive - unattractive

Safe – unsafe

Useful - Derelict (left empty)

Lots of public open space to relax and play - Little public open space

Area has 'character' and a positive feel - Area has little character, dull.

Very high BREEAM standard – no BREEAM standard

**h) Active, inclusive and safe?**

Social considerations:

Good community spirit – No community spirit  
Neighbours look out for one another – Neighbours keep themselves to themselves  
People respect each other – no respect shown  
Low levels of crime, drugs and anti-social behavior – high levels of crime drugs and anti-social behaviour  
Friendly effective police – no local police  
People feel safe – people feel unsafe

## Sources

### Web-site

Reference to the Actuarial web-site: [www.actuaries.org.uk/](http://www.actuaries.org.uk/)

### Interviews

(please note all interviewees wish to remain anonymous)

Interviews undertaken with the following who wish their comments to remain anonymous –  
3 actuaries –

(i) Actuary at Watson Wyatt – pensions actuary

(ii) Actuary at – Sakhalin Energy, subsidiary Shell

(iii) Actuary at Capita Technical Services Glasgow is a Pensions Actuary

Project Manager Managing Risk

Senior Consultant at Sector – wanted to be remain anonymous

Useful contacts

"The Institute of Actuaries" - Mark Symons

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