

Deficiency  
Database and  
Prioritisation  
Workbook – v3.1  
February 2010

Prepared for

# NZ Transport Agency

by

## **AECOM Limited**

6th Floor, DTZ House, 76 Cashel Street, Christchurch 8011, New Zealand  
P O Box 710, Christchurch Mail Centre, Christchurch 8140, New Zealand.  
T +64 3 363 8500 F +64 3 363 8501 www.aecom.com

## **NZ Transport Agency (NZTA)**

Published November 2009  
ISBN 978-0-478-33451-7 (print)  
ISBN 978-0-478-33452-4 (online)

## **Copyright information**

This publication is copyright ©NZTA

Material in it may be reproduced for personal or in-house use without formal permission or charge, provided suitable acknowledgement is made to this publication and the NZTA as the source.

Requests and enquiries about the reproduction of material in this publication for any other purpose should be made to:

## **Manager, Information**

NZTA  
Private Bag 6995  
Wellington 6141

The permission to reproduce material in this publication does not extend to any material for which the copyright is identified as being held by a third party. Authorisation to reproduce material belonging to a third party must be obtained from the copyright holder(s) concerned.

**Disclaimer:** This document does not override governing legislation. The NZTA does not accept liability for any consequences arising from the use of this document. If the user of this document is unsure whether the material is correct, they should make direct reference to the relevant legislation and contact the NZTA.

## **For more information...**

National Office  
NZTA  
Private Bag 6995  
Wellington 6141  
New Zealand  
T 64 4 894 5400  
F 64 4 894 6100

This document is available at [www.nzta.govt.nz](http://www.nzta.govt.nz)

# Quality information

Document Deficiency Database and Prioritisation Workbook - v3.0



AECOM Ref 60021494  
 N:\Dept\_72\Current Projects\CAD LTNZ001 DDPP (60021494)\DDPP  
 Users Guide\DDPP Users Guide v3\Deficiency Database and  
 Prioritisation Workbook v3 1 0.doc

Date February 2010

Prepared by George JasonSmith

Reviewed by Brendan Bisley, Mark Gordon

## Revision history

Revision	Revision date	Details	Authorised	
			Name/Position	Signature
Production	27/06/2007		Mark Gordon Regional Manager Maunsell Ltd	
Peer review	17/07/2007	Opus international Consultants Ltd	Mike Petersen	
Version 1.0	09/08/2007	Reformatted to Land Transport NZ style	Lesley Regan Land Transport NZ	
Software v2.0	20/12/2007	Update to Software v2.0 build 4	Mark Gordon Regional Manager Maunsell Ltd	
Workbook v2.0	Feb 2008	Reformatted to the Land Transport NZ style	Lesley Regan Land Transport NZ	
Workbook v2.1	Jan 2009	Reformatted to the NZTA style with minor amendments.	Lesley Regan NZTA	
Workbook V3.0 (draft)	Sept 2009	Updated to reflect software changes	Mark Gordon Regional Manager AECOM Ltd	
Workbook V3.0	Nov 2009	Updated to reflect government policy changes	Bill Greenwood Principal Engineer NZTA	
Workbook V3.1	Feb 2010	Updated to reflect software changes	Bill Greenwood Principal Engineer NZTA	

Users wishing to update to the latest version of the Deficiency database or wishing to update cost indices should refer to **Appendix B Updating the database** on page 43.

Appendix C details the changes made to the spreadsheet between versions.

## Contents

<b>1</b>	<b>Introduction.....</b>	<b>1</b>
1.1	Deficiency databases	1
1.2	Legislation	2
<b>2</b>	<b>Some definitions .....</b>	<b>2</b>
2.1	Hazards	2
2.2	Deficiencies	3
<b>3</b>	<b>Actual/real problems versus potential problems/concerns.....</b>	<b>3</b>
<b>4</b>	<b>Addressing deficiencies.....</b>	<b>3</b>
<b>5</b>	<b>Reducing data needs.....</b>	<b>5</b>
5.1	The effect of routine maintenance	6
<b>6</b>	<b>Using the information .....</b>	<b>7</b>
6.1	Current recording methods	7
6.2	A spreadsheet solution	7
<b>7</b>	<b>Prioritisation .....</b>	<b>8</b>
7.1	Prioritisation methods	8
7.1.1	Risk	8
7.1.2	Benefit cost ratio	8
7.1.3	First year rate of return (FYRR)	9
7.1.4	Weighted multiple criteria	9
<b>8</b>	<b>Risks .....</b>	<b>9</b>
8.1	Quantitative	10
8.2	Qualitative	10
8.3	A note of caution	12
<b>9</b>	<b>Multi-criteria analysis .....</b>	<b>12</b>
<b>10</b>	<b>A suggested approach.....</b>	<b>12</b>
<b>11</b>	<b>Future developments .....</b>	<b>13</b>
<b>Appendix A.</b>	<b>A spreadsheet solution.....</b>	<b>17</b>
<b>Appendix B.</b>	<b>Updating the database .....</b>	<b>43</b>
<b>Appendix C.</b>	<b>Change Log .....</b>	<b>49</b>
<b>Appendix D.</b>	<b>Attachments.....</b>	<b>54</b>

# 1 Introduction

In its major policy statement on road safety, *Road safety to 2010*, the Government set goals to reduce road fatalities to less than 300, and hospitalisations to less than 4500, by 2010<sup>1</sup>. Despite initial success in reducing road trauma these targets are unlikely to be achieved. These goals are now being reviewed to carry NZ forward into the next decades. The Governments 'Safer Journeys' vision is that by 2020 New Zealand will have *A safe road system that is increasingly free of death and serious injury*. *Safe System* is an international concept built on three key principles:

1. the fallibility of the road user - errors must be expected even among compliant users
2. the physical vulnerability of the road user in a crash - humans have limited ability to withstand kinetic impact
3. responsibility for road trauma is shared between users and designers of the system.

Road safety is built on these foundational principles. The challenge then becomes how to design and manage the system to minimise crashes and reduce their severity, through managing interactions between the road, the driver's speed and the vehicle, minimising the consequences of human error.

An on-going effort is required to meet these goals; to help achieve them, the NZ Transport Agency (NZTA) has been supporting and encouraging road controlling authorities (RCAs) to develop safety management systems (SMS) for their road networks. All but one of NZ's territorial RCAs has developed an SMS.

## 1.1 Deficiency databases

While all of these SMSs require road hazards and safety deficiencies to be recorded, there are few proven or off-the-shelf systems available for doing this. Many RCAs have these lists in various forms.

Late in 2005, Land Transport NZ published a report entitled *Deficiency database and prioritisation process report November 2005*<sup>2</sup> (the DDPP report) that reviewed the state and availability of deficiency databases in NZ. Among other things, it concluded:

*'... a safety deficiency database is comprised of two key parts – a deficiency database and a prioritisation process.*

*The deficiency database is a system used to capture, store, manipulate and manage information on deficiencies on the road network, collected from a range of data sources.*

*The prioritisation process is a risk assessment model that can be applied to the data collected and stored within the database to produce a range of responses. It helps the user decide*

---

<sup>1</sup> *Road safety to 2010*, Minister of Transport (<http://www.landtransport.govt.nz/strategy-2010/docs/2010-strategy.pdf>)

<sup>2</sup> Ministry of Transport and Land Transport New Zealand; *Deficiency database and prioritisation process report November 2005*; <http://www.landtransport.govt.nz/roads/sms/docs/deficiency-database-report.pdf> (link valid on 20 March 2007)

*which deficiencies need to be treated and the value of the treatments (ie the safety return gained by the use of the treatments).*

*In order for a safety deficiency database to assist an RCA in delivering its SMS, it must have these two functions to allow it to capture required information about a range of deficiencies identified on their network and then be able to analyse and assess these deficiencies.*

*In the context of road-crash reduction two of the principal matters to be considered by the road controlling authority are whether the crash stimuli can only be managed (eg flooding) or whether something can be done about them (eg improve an intersection).*

This booklet, and the associated workshop, has been developed on the basis of the Land Transport NZ report and stem from the NZTA's desire to ensure that RCAs have the tools to allow them to follow the procedures they have established for themselves in their SMS and thus meet the goals set out in *Road safety to 2010*.

## 1.2 Legislation

In addition to these drivers, there is a very clear requirement for local authorities controlling roads to act in the interests of the safety of the public and road users; – this is contained in Section 353 of the Local Government Act 1974, which states:

*353. The council shall take all sufficient precautions for the general safety of the public and traffic and workmen employed on or near any road and, in particular, shall – ...*

There is a tendency for RCAs to get involved in the detail of this clause and thus overlook its key requirement, which is detailed in its first phrase: 'The council shall take all sufficient precautions for the general safety of the public and traffic ...' This places a clear unequivocal duty on councils to manage their roads safely and severely moderates the broad discretionary powers to maintain roads as they see fit, conveyed under Section 319 of the Act. The Act can be found at: <http://www.legislation.govt.nz/act/public/1974/0066/latest/DLM415532.html><sup>3</sup>

## 2 Some definitions

In the context of road crash reduction, two of the principal matters to be considered by the road controlling authority are whether the crash stimuli can only be managed (e.g. flooding) or whether something can be done about them (eg improve an intersection). These agents are called **hazards** and **deficiencies** (sometimes **safety deficiencies**) respectively.

This workbook, and the presentations made at the workshop, will use the term **deficiencies** rather than **safety deficiencies**.

### 2.1 Hazards

A hazard is a deficiency for which there is no reasonable fix available, for example, flooding or landslide. Consequently, hazards are managed to limit their effects.

---

<sup>3</sup> Link correct at 29 Jan 2008. Many sections of this Act have been repealed but the bulk of the roading section is still in force.

## 2.2 Deficiencies

Deficiencies are fixable. They include:

- poor alignment
- detritus
- insufficient surface friction
- poor pavement width
- high roughness
- capacity/number of lanes
- 'side friction' from roadside development and activities

Road management is moving into sustainability and similar concepts and it is becoming more relevant for RCAs to record deficiencies in network performance. Most RCAs have some record of network deficiencies to help them track levels of service. However, this workbook and the workshop do not specifically include identification or prioritisation of non-safety network deficiencies. The NZTA is currently developing some tools to assist in the identification and prioritisation of deficiencies other than safety deficiencies. *The Cycle network planning guide* is one example of such a tool.

The definition of a hazard or deficiencies is independent of method or methods that might be used to remedy the problem or to fund it.

## 3 Actual/real problems versus potential problems/concerns

There is another division of road safety issues that is important. There are often sites where the consequences of a crash are obvious but where there has never been one, ie potential sites, and those where there is a recorded history of crashes (real problems) eg crash black spots.

Until the advent of the Land Transport Management Act 2003, the benefit cost ratio approach to funding directed us towards considering only actual problems. Potential problems have been considered to a much lesser extent, often only when looking at the effects of a possible solution or in carrying out a 'full procedures'<sup>4</sup> crash analysis. When a deficiency approach is used, both actual and potential effects must be considered.

Tools to help manage the differences between these two types of deficiency are presented below.

## 4 Addressing deficiencies

Before anything can be done systematically about hazards and deficiencies they need to be identified and recorded. This is best done by compiling a computerised list of hazards and deficiencies – often referred to as a deficiency database whether it is a formal 'database' or not.

---

<sup>4</sup> As defined by Land Transport NZ's *Economic evaluation manual*

In its *Deficiency database and prioritisation process report November 2005*, Land Transport NZ identified and discussed three proprietary safety deficiency databases currently available in NZ. None of them has been widely adopted by RCAs, apparently because they appear to be complex and difficult to use.

The report also identified the data needed for a deficiency database, with over 50 data items identified and over seven pages of detail devoted to it. While this is a large volume of information, much of it is already held in RCAs' RAMM databases.

The need for fieldwork, duplicated effort and complications around data maintenance, database complexity and administrative burden can all be reduced by:

- giving careful thought to the structure of the database during its development phases
- making maximum use of existing data eg that held in RAMM and CAS
- using standard site identifiers
- using standard terminology
- automating calculations where feasible and possible
- automating links to existing data held in other databases.
- A review of the data requirements suggests that if RAMM data is good and has been properly maintained, only the following additional information will need to be collected in the field:
  - Site location in terms of RAMM/GPS coordinates
  - Site dimensions (for estimates of remedial works)
  - Traffic operating speed
  - The nature and description of the problem
  - The realistic likelihoods and consequences of the deficiency/hazard. (Can be done in the office if necessary)
  - Are there any realistic solutions or interventions that will reduce the risks associated with the issue? <sup>5</sup>
  - Photographs of the hazard or deficiency, including photos of the likely 'resting place' of the vehicle or vehicles encountering it; these will be important for supporting assessments of the likelihood and consequences for crashes.

Collection of this additional data should take around a half an hour per site in the field, depending on the complexity of the problems presented.

The following data can be collected, or established on-site or in the office. If it is to be done in the office then the photographs taken in the field and sound network knowledge will be particularly relevant.

- The realistic consequences of the deficiency/hazard (best done in the field)

---

<sup>5</sup> If there are realistic solutions or interventions then a **deficiency** has been identified. The solutions/interventions should be identified and developed. This can be done on-site or in the office, or more usually, they will be developed in the office after initial assessment in the field.

If there are **no** realistic solutions or interventions then a **hazard** has been identified. It should be registered as such and management practices developed for it.



- The likelihoods of these consequences (best done in the field)
- The likely consequences AFTER each intervention
- The realistic likelihood of the post-intervention consequence occurring.

Once this data has been recorded there still are a few items remaining to be detailed. They are probably all office-based and are:

- the crash record (from CAS or RAMM)
- an estimate for each solution or intervention.

You should also note:

- the cost index for each estimate
- the status/accuracy of each estimate
- traffic volume (from RAMM).

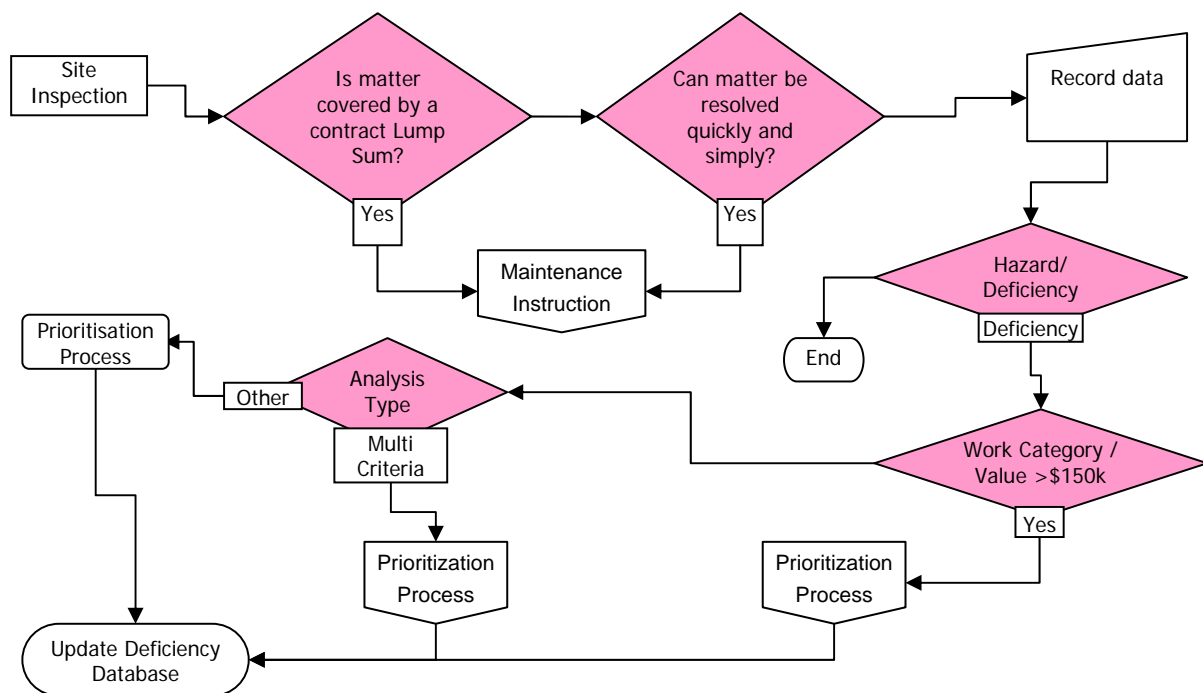
## 5 Reducing data needs

The appropriate use of filters can significantly reduce the amount of data that is collected and recorded in the database. Similarly, inappropriate use of filters can leave you with a database that does not do what it is supposed to – record the deficiencies on the network.

Filtering is the process of removing some of the data from consideration, differentiation between hazards and deficiencies is one form of filter. Other possible filters include funding methods, work type and level of risk. Large numbers of filters can be developed, their range being limited by only practical considerations.

Not all filters have to be applied at the same stage in the process. The data collection and prioritisation process outlined in the flow diagram at Figure 3 on page 15 includes five filters; these are shown in simplified form below – two are employed very early in the process, before data is recorded, and three during prioritisation. Their places in the process are also shown in the following summary flow chart:

Figure 1 Database filtering Filter



## 5.1 The effect of routine maintenance

Most network inspections will throw up problems or deficiencies that fall within the scope of a maintenance contract and that should be addressed / repaired through the appropriate contract. This gives rise to the question:

If a problem will be addressed by specific work required by a maintenance contract, should it be recorded as a deficiency?

The answer to this question is: It depends! Once more, it is appropriate to refer back to the context in which the deficiency database is being used:

- Road safety to 2010
  - <300 fatalities
  - <4500 hospital admissions
- LGA 1974 S 353
- The '*Safer Journeys*' vision is that by 2020 we will have *A safe road system that is increasingly free of death and serious injury* and the challenge to design and manage the system to minimise crashes and reduce their severity.

If recording a deficiency that will be addressed under routine maintenance will help in achieving these aims, it should be recorded – otherwise, it need not. Some other matters that will influence this decision are:

- When will/can the work be actioned?

- Is it part of a contract lump sum?
- Do existing contract management procedures provide a sufficiently robust and reliable record of the problem's identification and the actions taken to remedy it?
- Whether a maintenance intervention is the only solution.

The answers to these questions may show that the deficiency is not worth recording. However, if the maintenance intervention is only one of a number of possible, mutually exclusive, interventions:

- the deficiency should be recorded with the maintenance intervention noted as one potential solution
- the deficiency should be recorded so that the other interventions can be assessed and prioritised.

Some people may prefer to err on the side of caution, recording the deficiency and then noting it as 'resolved/fixed' under the maintenance contract.

## 6 Using the information

Because of the potential size and complexity of the registers, relational databases<sup>6</sup> are the best tool to use for recording deficiencies. However, as not many people have access to a relational database other than RAMM, and as reporting from databases can be an issue, spreadsheets (eg MS Excel<sup>®</sup>) are a good and easy alternative. Paper or computer-based lists may work in the very short term for a small number of deficiencies but are unlikely to be a suitable tool for most RCAs.

### 6.1 Current recording methods

The DDPP report found the following systems in use in NZ in 2005:

- Opus SNAP – a purpose-built database. A hazard register and deficiency database is part of wider functionality.
- MWH NM2 – a purpose built database.
- Australian Roads Research Board (ARRB) – Road Safety Risk Manager (RSRM).
- Various MS Excel<sup>®</sup> spreadsheet-based records.

The first three of these systems are discussed on page 18 of the DDPP report; the two spreadsheet solutions reviewed are discussed on page 15 of the same report.

### 6.2 A spreadsheet solution

An MS Excel<sup>®</sup> spreadsheet that can be used as a hazard register and deficiency database is included with this booklet. Use of the spreadsheet is described below. It has been designed so that the data can be imported easily into RAMM, from the spreadsheet, when RAMM has DDPP capability.

---

<sup>6</sup> Eg, MS Access<sup>®</sup> or Open Office Base

# 7 Prioritisation

So far discussion has focused on the collection and recording of data, however, the DDPP report states '*... a safety deficiency database is comprised of two key parts – a deficiency database and a prioritisation process.*'

Prioritisation is the process of allocating time, finance and other resources to competing tasks so that the more important tasks are undertaken first. Therefore, the need to establish what the important aspects of projects are is intrinsic to prioritisation. A key prioritisation method for safety prioritisation is risk, which is the product of the likelihood and consequence of an event.

## 7.1 Prioritisation methods

### 7.1.1 Risk

Risk is a measure of exposure to the consequences of an adverse event where the risk is calculated by multiplying the probability or likelihood of each deficiency by its severity or consequence. The priority of the deficiency is determined based on the final risk value. There are a number of subsets to risk-based prioritisation including risk reduction, where the reduction in risk generated by possible solutions is compared, and risk reduction per unit of expenditure. The application of risk in this deficiency database is described more fully in Appendix A.

As it is focused on both the probability of an event and its consequences, risk addresses some of the concerns expressed about other prioritisation methods. It does not require an event to occur before something is done about it or require monetarisation of the consequences of an event. Risk management procedure, (as outlined in NZS AS/NZS 4360:2004 *Risk Management*, SNZ HB 436:2004 *Risk Management Guidelines - Companion to AS/NZS 4360:2004* and SNZ HB 4360:2000 *Risk Management for Local Government*) are flexible and can use engineering judgement as their basis.

Being developed from an examination of the likelihood and consequences of events, risk analysis provides a good fit with the seriousness and urgency criteria in the NZTA's current approach to prioritising projects.

Adoption of a risk-based approach to the prioritisation of roading projects answers the perennial question 'Does someone have to be killed first?' with an emphatic negative.

Risk is discussed in more detail in Part 8 (page 9) – it is the key prioritisation method used in the spreadsheet.

### 7.1.2 Benefit cost ratio

In essence, benefit cost ratio is a type of risk calculation, in which likely future costs, calculated from historical costs per event, are extrapolated to future benefits and then compared with the costs currently imposed on society by the present situation. The reductions in the costs to society are the benefits of the project. These benefits are then compared with the net cost of the project (total costs less current costs) to provide a system for ranking the relative merits of expenditure.

Because of its use as a primary tool for rationing roading funds, calculation of benefit cost ratio for roading projects in NZ has become a highly regimented and strictly defined process. These factors limit the flexibility of benefit cost ratio as a prioritisation tool for most RCAs and especially for prioritising projects where there are potential rather than actual problems. Benefit cost ratio in

these circumstances can be difficult to apply to situations where the consequences of something cannot be monetarised readily.

### **7.1.3 First year rate of return (FYRR)**

As the name suggests, this is the calculation of the net return on the investment in the roading improvement in the first year of its life. FYRR is thus a very limited tool, looking only at monetarised benefits in the very short term.

### **7.1.4 Weighted multiple criteria**

A number of criteria are established and allocated individual weightings. Each site or project is scored using these criteria, producing a final score. The priority of the deficiency is determined based on the final score, which can be translated into high, medium or low. The criteria selected are often based on the key factors that the RCA feels are critical to determine the value of its expenditure.

Sometimes known as multi-criteria analysis (MCA), this type of analysis and prioritisation is used extensively and frequently by most local authorities, even though they may not glorify their processes with such a grand title. Essentially MCA is the term used to classify any method of prioritising, assessing or ranking projects that considers more than one factor. Some examples of MCA are:

- The processes used by Dunedin City, North Shore City and Central Otago District Councils described in the DDPP report (p15 ff).
- Development of the National Land Transport Programme by NZTA assessing projects against:
  - adopted strategies
  - effectiveness and economic efficiency
- Allocation of priority for seal extension using traffic volume and effects on crops and people.

Some multi-criteria analyses are used to deliberately skew priority in favour of one sector or type of user. Provided this is done openly and democratically, it presents few problems. However, one of the traps with MCA is that it is easy to unintentionally double-count some factors. For example, if a methodology ranks projects by including a factor for school children and another for vulnerable road users, care needs to be taken to ensure that the school children are not inappropriately counted in both categories. Generally, simpler MCAs with fewer criteria are easier to manage in this respect.

Regardless of the approach followed to prioritise the deficiencies identified, the objective of the prioritisation system is to provide the RCA with a tool to determine how best to manage deficiencies on its roads by being able to determine the intervention most suited to the circumstance.

Multi-criteria analysis is discussed further in section 9 on page 12.

## **8 Risks**

As discussed previously, risk is a measure of the exposure to the consequences of an event. It has two components:

- Likelihood (or probability) of the event occurring.
- The consequences of the event.

Risk is normally measured in one of two ways:

- Quantitative (eg monetary/financial), or
- Qualitative (relative/judgement).

## 8.1 Quantitative

This method is relatively precise and applies knowledge of:

- the statistical probability of the event occurring, and
- the consequences of that event in monetary terms.

For example:

- the probability of an event occurring is once in 50 years (ie 0.02 in any year)
- its consequence might be \$25,000,000.

$$\begin{aligned} \text{Risk} &= \text{probability} \times \text{consequence} \\ &= \$25,000,000 \times 0.02 \\ &= \$500,000 \end{aligned}$$

*The risk exposure is therefore \$500,000 per year*

Often the calculated risk is placed into a band that is given a descriptive name, such as low, moderate, high or extreme.

The evaluation risk matrix on page 60 of the DDPP report is another example of quantitative risk assessment. It uses a three-dimensional approach to the calculation by introducing the concept of crash exposure. This approach can be useful during consideration of historical crashes but has limitations when used for the management of potential problems.

## 8.2 Qualitative

When risk management systems are being developed, it is unusual to have enough statistical data to calculate the quantitative exposure or probability. There are also many consequences for which it is difficult to calculate a monetary benefit. An example of the latter is adverse publicity. Qualitative risk assessment overcomes these difficulties by assigning scores for likelihood and consequence based on corporate-wide guidelines. AS/NZS 4360:2004 *Risk management* and its associated document (SNZ HB 4360:2000 *Risk management for local government*) provide more information.

SNZ HB 4360 suggests that the term 'likelihood' be used instead of 'probability' during quantitative risk assessments. This workbook follows that practice.

Most RCAs use qualitative risk management techniques. Examples of the matrices used in the assessment of crash risk appear below. When establishing these tables it is important to consider the network on which they will be applied. For example:

If network volumes are low and there are low numbers of fatal crashes it would be unhelpful to have, as a 'major' consequence, 'multiple' fatal crashes in any one year'

The following tables are examples of such risk criteria, they are the ones used in the DDPP spreadsheet. Many other examples exist.

**Table 1 Example likelihood table**

Likelihood	
Meaning	Description
Rare	No crashes recorded or no crashes in the last 10 years or likely in the next 10
Unlikely	There have been crashes in the last 10 years but not in the last 5. A crash may occur in the next 10 years
Possible	Crashes occur more than 1–5 times in past 5 years. 1–5 crashes possible in next 5 years
Likely	Crashes occur more than 1–2 times per annum. Several crashes likely in the next year
Almost certain	Crashes occur more than 3 times per annum. Frequent crashes (>3) likely each year

**Table 2 Example consequence table**

Consequence	
Meaning	Description
Insignificant	Not likely to cause serious injury. No external health or safety impact
Minor	Could cause serious injury. Minor external safety impact on small number of people
Significant	Could possibly cause a fatality. Serious external safety impact on small number or minor impact on large number of people
Major	Likely to cause a fatality or several fatalities, extensive injuries or significant external safety impacts
Severe	Will cause multiple fatalities. Widespread external safety impacts

The total risk is calculated from these likelihoods and consequences by entering their values in a third matrix, the risk matrix:

**Table 3 Example risk matrix**

Likelihood	Consequence				
	Insignificant	Minor	Significant	Major	Severe
Highly unlikely	Low	Low	Low	Moderate	High
Unlikely	Low	Low	Moderate	High	High
Possible	Low	Moderate	Moderate	High	Extreme
Likely	Moderate	Moderate	High	Extreme	Extreme
Very likely	Moderate	High	High	Extreme	Extreme

Assessment of risk for a qualitative system is personnel dependent, ie two different people are quite likely to rate the same situation differently. There are a number of techniques that are commonly used to get around this problem:

- The risk assessments are done by a small team eg three people.
- The same person does all the assessments, with time provided for replacement personnel to develop an understanding of how the assessments were developed.

- Rigid assessment criteria are developed, applied and audited.

The first of these methods, the team approach, is arguably the most flexible, adaptable and easiest to use. Such a team could comprise, for example, the council's road safety team including the network consultant and the maintenance contractor.

### 8.3 A note of caution

Although the quantitative and qualitative methods of assessing risk appear to produce compatible measures of risk, they do not. For example;

- The risk exposure of \$500,000 per year, calculated in the example on page 10, might have a rating of 'moderate'.
- Another problem capable of causing several minor-injury crashes in the next year could be assessed as being 'Likely' with 'Insignificant' consequences giving a 'Moderate' rating, using the likelihood and consequence tables above. This also produces a 'Moderate' risk.
- Although both are rated 'Moderate' they are not they same.
- The quantitative analysis is a far more accurate assessment or measure of risk than an assessed, qualitative, rating.
- A lot depends on the confidence held in the accuracy of the base data. Any system that mixes these methods should be avoided unless there are similar levels of confidence in the data or risk-management experts are involved. NZS 4360 suggests that qualitative analysis is adequate for most local-authority needs.

## 9 Multi-criteria analysis

Multi-criteria analysis (MCA) is commonly used by many local authorities. Often different MCAs are used to prioritise different types of works. For example, the MCA applied to footpath extensions will be different from that applied to rural seal extension. Figure 2 on page 14 is an example of an MCA used for prioritisation of minor works. It was developed by the Taupo District Council. (The criteria are those that the council considered best reflected its needs and circumstances).

The spreadsheet included with this booklet also uses MCA as an aid to prioritisation. The overall ranking of projects produced by the spreadsheet is made up by the ranking of each project in terms of its risk reduction, risk reduction per unit of expenditure and the cost of the treatment per vehicle-year; each of these factors is also given a weighting.

## 10 A suggested approach

Figure 3, on page 15, is a flow chart illustrating the Database compilation and Prioritisation processes.

Given the issues, goals and objectives around safety management systems and roading legislation, the most appropriate methods for prioritising projects addressing road safety deficiencies are those based on, or including, risk.

The risk assessment stages of the analysis can be carried out either as stand-alone assessments or as part of a multi-criteria analysis. The flow chart shows both types of analysis.



The flow chart also allows projects over \$150,000 to be prioritised by a different process. This is related to the NLTP programme cut-off for minor works and is included because improvement projects submitted for inclusion in the National Land Transport Programme are prioritised under the criteria detailed in the Land Transport Management Act, using multi-criteria analysis.

The accompanying spreadsheet calculates risk, risk reduction, risk reduction per unit of expenditure and current costs, and a weighted ranking factor based on the first three of these criteria. Its results can be incorporated into a multi-criteria analysis with little difficulty.

## **11 Future developments**

AECOM Ltd has developed the Deficiency Database and Prioritisation Process based on it ultimately being used to extend RAMM's functionality to include a hazard register and deficiency database. Discussions have occurred between The NZTA and C/JN Technologies, developers of RAMM, and the RIMS group who have influence over development of RAMM's capabilities.

C/JN Technologies have agreed to the development of a module within the RAMM software which will incorporate the Deficiency Database and Prioritisation Process. It will include the facility to transfer data (in the Excel spreadsheet format of the database) into RAMM. This work is due for completion following the current roll out of RAMM (ROMAN II) in Western Australia.

The accompanying spreadsheet is designed to allow its data to be readily imported into RAMM at a later date.

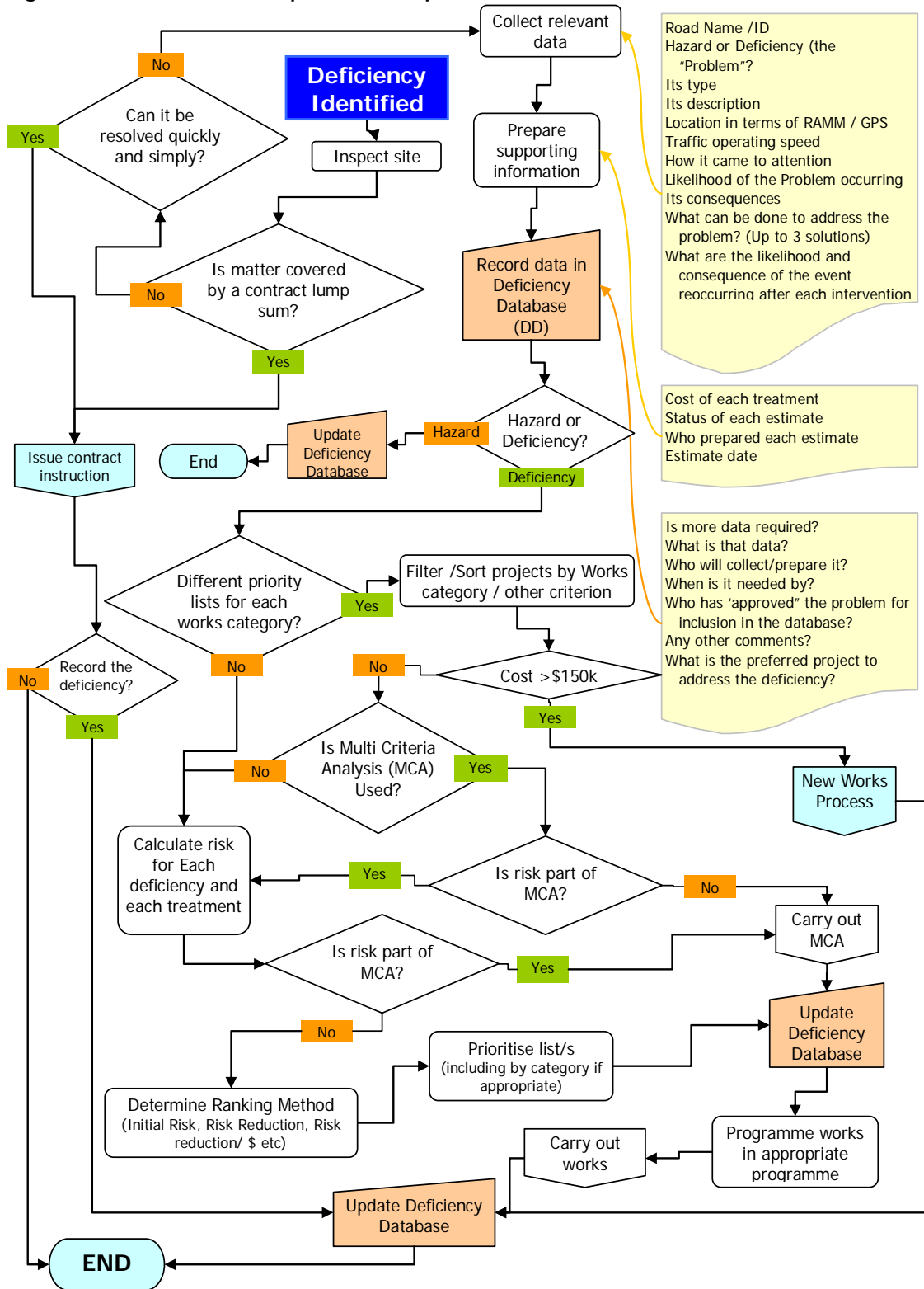
Figure 2 Taupo District's minor (safety) works MCA analysis

**Minor Safety Projects - A method of Prioritisation**

	1	2	3	4	5	Weighting, %
<b>Area of benefit/Affected parties</b>	<10 households in street	>10 households in street or <5 houses within 100m	5 ≤ houses within 100m <10 sporting complex, parking, minor shopping complex	≥10 houses within 100m	School, hospital or other large community facility, CBD area	10%
<b>Exposure</b>	<500vpd	≥500vpd & <1000vpd	≥1000vpd & <2500vpd	≥2500vpd & <5000vpd	≥5000vpd	10%
<b>Crash history (5yr history)</b>	No crashes	≤ 2 non-injury crashes	3-5 non injury crashes	≤ 2 injury crashes or 5-10 non-injury crashes	≥ 3 injury crashes or >10 non-injury crashes	10%
<b>Vulnerable user crashes (5yr history)</b>	No crashes	-	1 pedestrian/cyclist crash	2 pedestrian/cyclist crash	≥ 3 pedestrian/cyclist crash	5%
<b>Road classification</b>	Local road	Collector road	Secondary Arterial	Primary Arterial	Strategic Route	10%
<b>Vulnerable road users (VRU)</b>	None	Some VRU observed or anecdotal	Small shopping centre <10 shops or sports complex	Large shopping centre	School, retirement village, community facility	10%
<b>Public concerns</b>	Low/None	-	Medium	-	High (e.g. petition)	10%
<b>Requests from other agencies</b>	None	1 organisation	2 organisations	3 organisations	≥ 4 organisations	10%
<b>Observed issues *</b>	1 issue	2 issues	3 issues	4 issues	≥ 5 issues	10%
<b>Posted speed</b>	≤40km/hr	50km/hr	60km/hr	70-80km/hr	100km/hr	10%
<b>Estimated cost</b>	≤ \$150,000 & > \$100,000	≤ \$100,000 & > \$60,000	≤ \$60,000 & > \$40,000	≤ \$40,000 & > \$20,000	≤ \$20,000	5%
						<b>100%</b>

\* = traffic, speed, pedestrians, marking/signage, road surface, etc....

Figure 3 Data collection and prioritisation processes



Road Name / ID  
 Hazard or Deficiency (the "Problem")  
 Its type  
 Its description  
 Location in terms of RAMM / GPS  
 Traffic operating speed  
 How it came to attention  
 Likelihood of the Problem occurring  
 Its consequences  
 What can be done to address the problem? (Up to 3 solutions)  
 What are the likelihood and consequence of the event reoccurring after each intervention

Cost of each treatment  
 Status of each estimate  
 Who prepared each estimate  
 Estimate date

Is more data required?  
 What is that data?  
 Who will collect/prepare it?  
 When is it needed by?  
 Who has "approved" the problem for inclusion in the database?  
 Any other comments?  
 What is the preferred project to address the deficiency?

This page is intentionally blank.

# Appendix A. A spreadsheet solution

The Excel® spreadsheet enclosed with this course book is a hazard register and deficiency database that follows the processes discussed above.

## Contents of this appendix

<b>A.1</b>	<b>Before you start</b> .....	<b>18</b>
A.1.1	Opening the spreadsheet	18
A.1.2	User identity	19
<b>A.2</b>	<b>Overview</b> .....	<b>19</b>
A.2.1.1	Duplicate sites	22
A.2.1.2	Filtered columns	23
<b>A.3</b>	<b>Data about deficiencies</b> .....	<b>23</b>
A.3.1.1	Initial filters	23
A.3.2	Data input	24
A.3.3	Data validation	25
A.3.4	Step 1 – Collect relevant data	25
A.3.4.1	Data entry pull-downs	27
A.3.5	Step 2 – Prepare supporting information	27
A.3.5.1	Subset 1 – Crash and risk data	27
A.3.5.2	Subset 2 – Data about the data	29
A.3.6	Step 3 – Treatment options and treatments	30
A.3.6.1	Treatment options	30
A.3.6.2	Step 4 – Treatments table	31
A.3.6.3	Duplicate treatment options	33
A.3.6.4	Treatment costs	34
<b>A.4</b>	<b>Step 5 – Prioritisation</b> .....	<b>35</b>
A.4.1	Major works	35
A.4.2	Other works	36
A.4.3	Selecting a treatment option	36
A.4.3.1	Treatment-recommendation process	37
A.4.3.2	Reasons for change	37
A.4.4	Data about the chosen option	38
A.4.4.1	Updated chosen cost	38
A.4.4.2	Risk reduction	39
A.4.4.3	Risk reduction/\$k	39
A.4.4.4	Cost/vehicle over 1 year	39
A.4.5	Recommended ranking	39
A.4.6	Changing weightings	39
A.4.7	Changing ranking/priority	39
<b>A.5</b>	<b>Step 6 next actions</b> .....	<b>41</b>
<b>A.6</b>	<b>Step 7 – Completion of the process</b> .....	<b>41</b>

## A.1 Before you start

You will need to copy the RAMM Road Names Table or RAMM Carriageway Table from RAMM to the **RoadNamesTable** tab on the spreadsheet before you start adding data. If the Carriageway Table is used you will get duplicate road names in your pull-down lists so the Road Names Table is recommended.

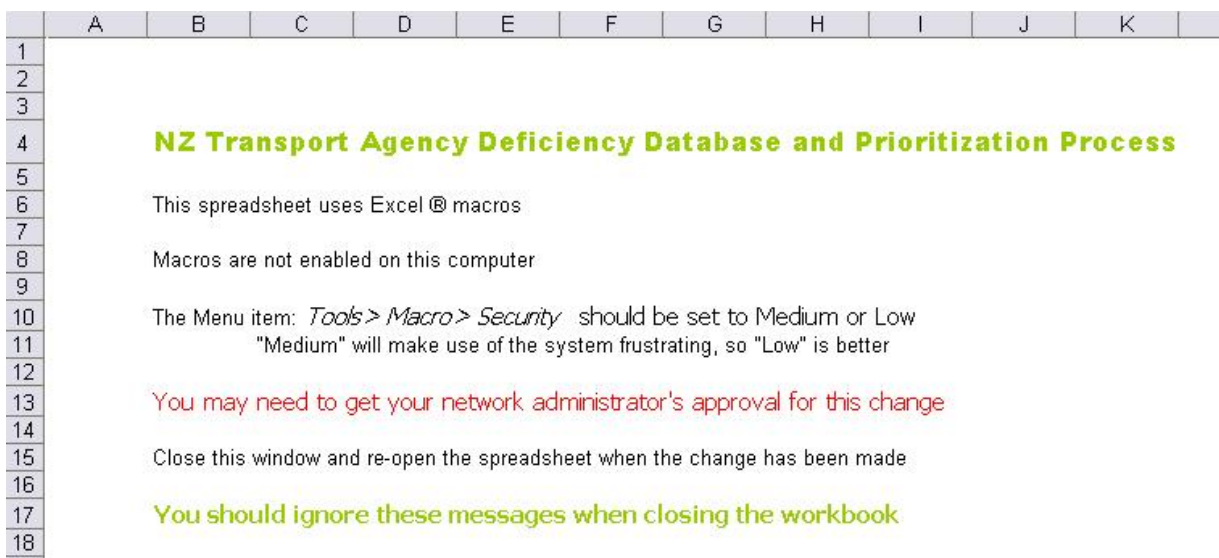
The spreadsheet contains many macros. You may wish to go to **Tools > Options > Security** and click on **Macro Security** (lower right of option box) and select **Low** to stop the prompts asking for permission to run the macros, or if your security is set too high to allow them to run. Users on networks may need to seek approval from their network administrator to do this.

### A.1.1 Spreadsheet formats

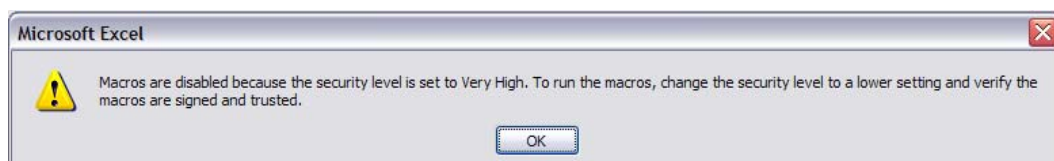
The spreadsheet database is available in Microsoft Excel® XP/2003 and Excel 2007 formats (i.e. .xls and .xlsm). Both version look and perform the same way.

### A.1.2 Opening the spreadsheet

The spreadsheet is opened from Microsoft Explorer, Start> Documents or from within Excel, in the usual manner. If the Excel macro security permissions on the computer you are using are insufficient you will see a screen like this:



The following system message will also appear:

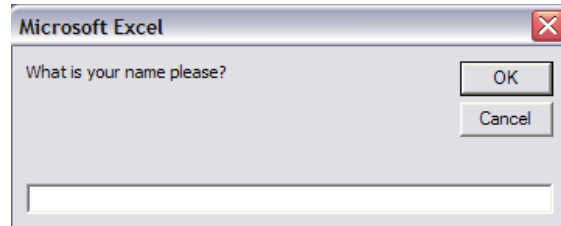


### A.1.3 User identity

Version 2 introduces to the database an element of semi-automatic recording of the identity of people altering. To do this it requires confirmation of the user's identity. When macros have permission to run the spreadsheet will open with a prompt asking the user to confirm, or otherwise, their identity. The name that appears in the dialogue box is the name of the person logged onto that computer.

If the details are correct and the Yes button is pressed the workbook opens at the DD\_Main spreadsheet; this is the main sheet of the database.

If the details are incorrect and the No button is pressed the following dialogue appears:



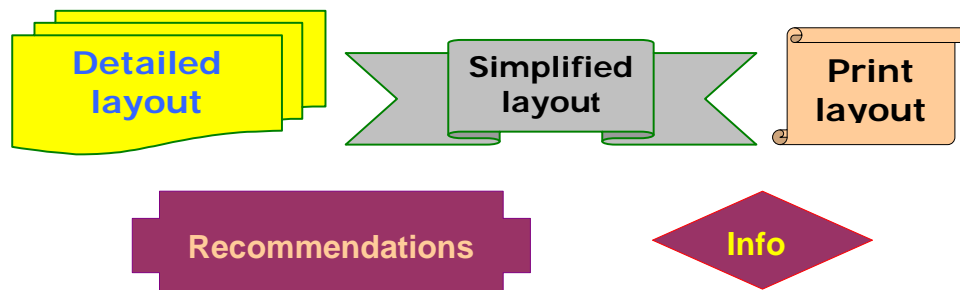
This dialogue box will keep appearing until a name is entered, after which the workbook will open at the DD\_Main spreadsheet.

## A.2 Overview

When the spreadsheet is opened, the deficiency database is found under the first spreadsheet tab, labelled **DD\_Main**. A view similar to that shown below is available.

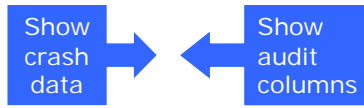
The spreadsheet has a number of views. The spreadsheet opens in the Simplified layout view that hides a number of columns and limits inputs to one treatment per site. While this view may be suitable for initial setup and smaller networks, the Detailed Layout view allows the full capabilities of the system to be used and more comprehensive data to be recorded. There is also a Print layout view that hides all but the most critical columns, and that can be fitted across a single landscape A3 page.

The views are selected using the icons which appear in row 7 (columns J to N) of the spreadsheet and illustrated below. Each icon shown in the top row, below, is greyed out when that view is in use and the view being displayed appears in the box with the red border in cells B8 to E8.

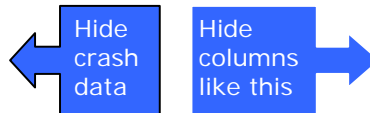


The Recommendations icon takes the user to the recommendations section of DD\_Main, and the Info icon to the 'Info' [Information] tab, which contains important information and helpful hints. Some of the information that appears in the Info sheet previously appeared at the top of the DD\_Main sheet. There is an 'Info' button on each sheet. To return from the Info tab select the tab representing the sheet on which you were working.

There is a further set of icons that allow particular data to be displayed, regardless of the view displayed. There are:



The first of these displays the columns allowing crash data to be recorded and the second displays a number of columns across the spreadsheet that record data such as details of the person recording the information, who is responsible for collecting additional data, who changed existing data. The corresponding **Hide** icons are:



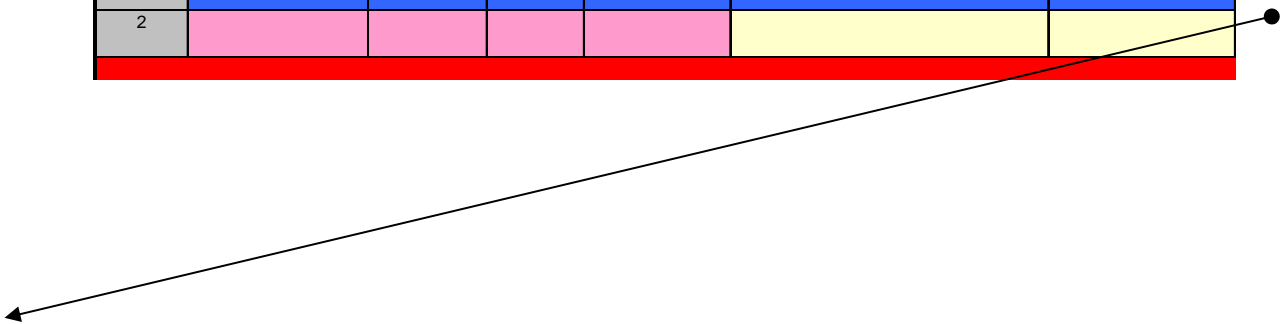
There are three other navigation icons that appear throughout the spreadsheet. In the Print View some of these may be superimposed on each other, they will 'return to their proper positions' when the Detailed or Simplified layouts are selected. No Icons should print when the Print Layout is selected.



The first of these is used only in **DD\_Main**, and takes the cursor back to the first column of the current row. The second appears only in the other tabs and returns the user to **DD\_Main**. The third is an example of a number of hyperlinks in **DD\_Main** that take the user to the table indicated.

Figure 4 Database screen – first vie

This Defieicency		This Defieicency		This Defieicency		
This Defieicency	Road Name	Hazard or Safety Deficiency?	Treatable?	Deficiency Type	Narative description of the problem	Short description of its location
D						
2						





The illustration above is of the first section of the database, which is used for recording the deficiency. Other sections will be covered later. The spreadsheet displays have been broken in to segments for these views.

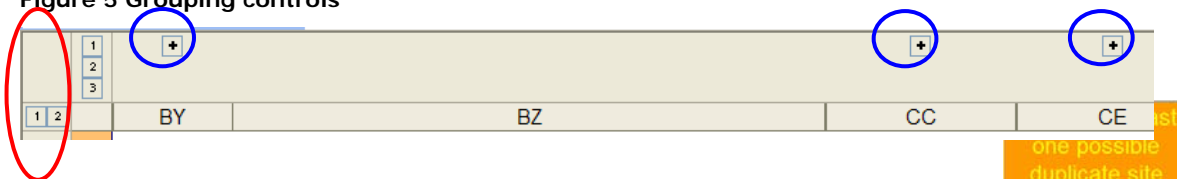
These illustrations demonstrate a number of conventions and features of the spreadsheet:

- Data **must** be entered in the pink fields. If there is no data in a pink field after the road name has been detailed errors will occur and the spreadsheet will not display the ranking of previous entries correctly. When data has been entered, the cell backgrounds turn white.
- Data **should** be entered in the yellow fields. When data has been entered, the cell backgrounds turn white.
- The grey cells contain data that is calculated from your inputs. Do not enter anything in these cells. They remain grey at all times.
- The thick red line indicates the bottom of the sheet; **DO NOT enter** data below it. Data entered below the red line will not be processed; it may be lost and will prevent correct operation of the macros in the spreadsheet.
- The orange cells contain an **alert**, warning of a potential issue of circumstance. In addition, there are some cells that produce **warnings**. Warnings have a red background and yellow text.

Other colours are used in other parts of the spreadsheet. These will be discussed as they are encountered. A full list of colours and their meanings is in at the Info tab of the workbook.

Many fields in the database are calculated or derived from existing data, the fields containing more basic information used to derive the other values is initially hidden. It can be displayed by clicking the + signs at the top, or side, of the spreadsheet highlighted by the blue rings in the following illustration:

Figure 5 Grouping controls



When activated, the + signs turn into - signs and the columns it controls are indicated by a horizontal or vertical line and are dots. Alternatively, all the

hideable columns can be hidden by clicking the 1 in the boxes at the top left of the spreadsheet, illustrated here by the red ring.

To hide the columns again, either click the - box or the 2 box.

### A.2.1.1 Duplicate sites

The spreadsheet allows duplicate sites to be entered and evaluated. However, it alerts the user to the presence of these sites so that unintended duplication can be avoided.

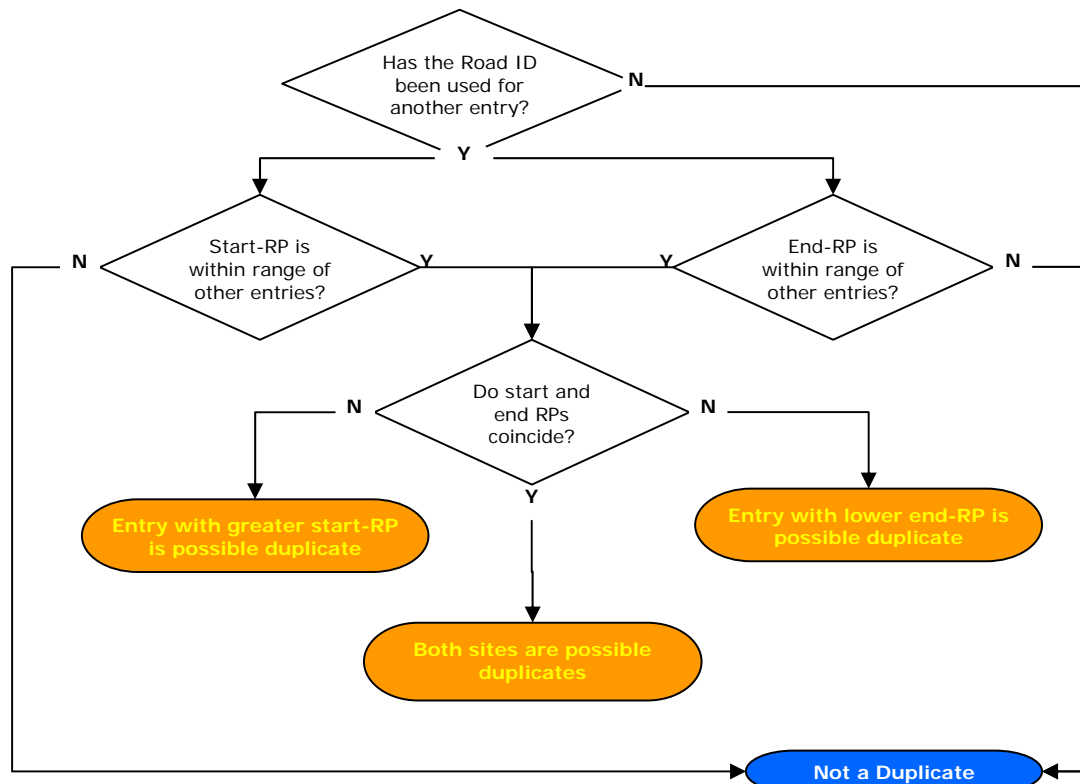
The warning illustrated in Figure 4 above, and enlarged on the right, is new in version 2. The spreadsheet examines all previous entries to determine whether data for this site has already been recorded. The logic is shown in figure 6.

**Figure 6 Duplicate-site logic**

A consequence of this logic is that the 'new' entry might not be flagged as a duplicate although a previous entry is. This occurs when the 'new' entry has a lower start-RP and a higher end-RP than the existing site. To help identify these sites the warning of a duplicate is given in two locations, in the same row as the duplicate entry and above the 'Duplicate Site?' column. The auto-filter dropdown can be used to find all the potentially duplicated sites.

If a site marked as a duplicate is an intended entry then, to avoid repetition of the warning and masking of warnings of unwanted duplicates then the formula in column O of each wanted flagged duplicate row should be deleted. This will suppress the warning in cell P8 if there are no other duplicates.

**Figure 7 Grouping controls**



### A.2.1.2 Filtered columns

In Excel 2003 and Excel XP it can be difficult to find a column that contains an active auto-filter, should you wish to turn it off or adjust it. This is especially so when the workbook has been saved with a filter active then re-opened some time later.

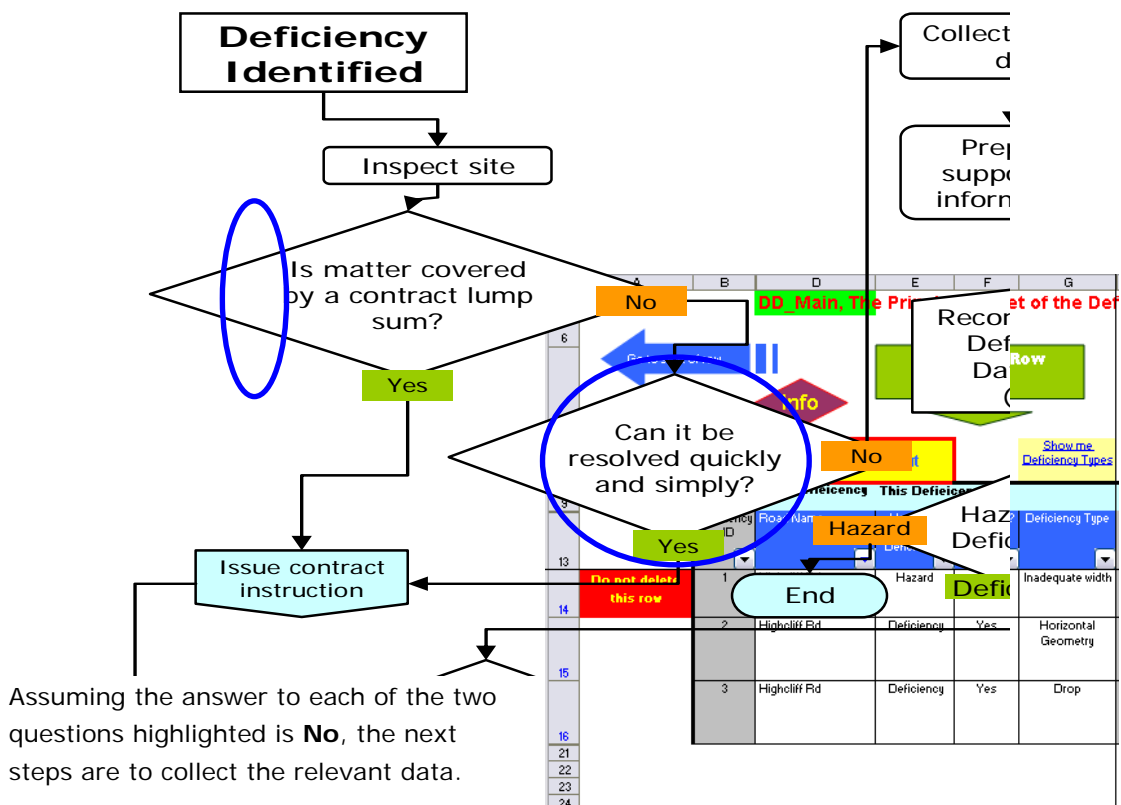
From version 2.1 the Deficiency database provides an additional indicator for filtered columns, supplementing the standard change in colour of the down-arrow that activated the filter. This indicator is a bright green cell in row 1 of the worksheet. In the adjacent illustration the data is filtered on Road Name. The green cell can be seen as can the blue border-text text for rows 14, 15 and 16, another Excel indication that an auto filter is applied.

## A.3 Data about deficiencies

### A.3.1.1 Initial filters

The first part of the data entry process involves the boxes in the following diagram, which is an extract of the flow diagram, Figure 3 on page 21.

Figure 8 Initial Filtering



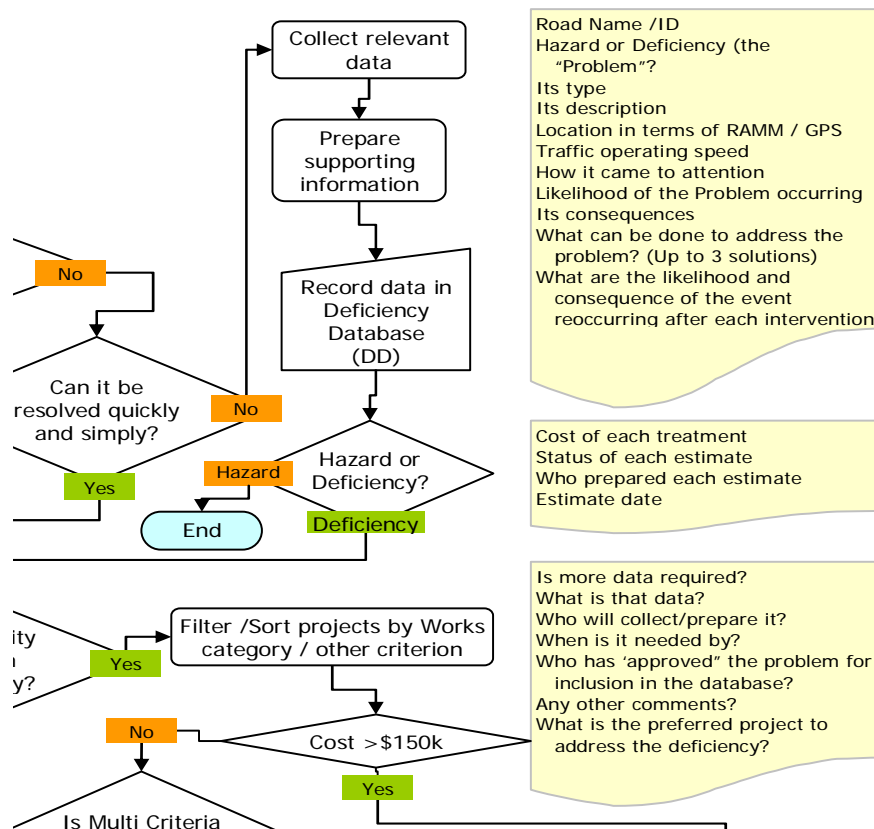
This collection follows the process outlined on the following page.

### A.3.2 Data input

The following information is required; the same list appears on the flow chart (Figure 9 below):

- Road name/ID
- Hazard or deficiency (the problem)
- Whether it is treatable
- Its type
- Its description
- Location in terms of RAMM/GPS
- Traffic operating speed
- Current traffic volume
- How it came to attention <sup>7</sup>
- Likelihood of the problem occurring
- Its consequences.

**Figure 9 Data collection**



Later, the following information will also be required:

<sup>7</sup> Throughout this text an asterisk (\*) indicates fields not displayed in the simplified view.

- What can be done to address the problem? (Up to 3 solutions) <sup>8</sup>
- What are the likelihood and consequence of the event reoccurring after each intervention.

### A.3.3 Data validation

The spreadsheet contains a number of data validation checks to ensure that it is correct and that critical data is accurate. For example:

- only one of two values can be entered into the **Hazard or Deficiency** field; either 'Hazard' or 'Deficiency'
- only 'Yes' or 'No' can be entered into the **Treatable** field. If an attempt is made to identify a hazard as treatable or a deficiency as not treatable then the error shows in red:

Hazard or Safety Deficiency?	Treatable?
Hazard	Yes

Other fields only allow specific values to be entered; these will be discussed as they are encountered in the text.

### A.3.4 Step 1 – Collect relevant data

As outlined in the body of the workbook, data is collected in the field and in the office. The process should start in the field.

An example of data collected on site, before consideration of possible solutions, is shown

This Deficiency		This Deficiency		This Deficiency	
Road Name	Hazard or Safety Deficiency?	Treatable?	Deficiency Type	Deficiency Description	Narative description of the problem
Tangimoana Road	Deficiency	Yes	Narrow Bridge	Bridge significantly less than target width for either single lane or two-way bridges, as applicable	Narrow bridge (2.5lanes between concrete wing walls) in dip and shortly before / after bend with restricted visibility

below. The data is being viewed as a Detailed Layout:

This Deficiency					This Deficiency			
Short description of its location	RAMM RP Start	RAMM RP End	"Side of the Road" (RAMM)	Duplicate Site?	Traffic operating Speed	Who / What first identified the site?	Dficy_Type	Dficy_Treatable
600 w of Campbells Rd	600	610	Centre		90	CAS Analysis	Is this a Hazard or Safety Deficiency?	Is it treatable?
							Hazard	Yes

The Deficiency ID field is not shown in this view. It is generated automatically by the spreadsheet when each new row is created.

Information shown in the grey cells is brought through automatically from other tabs in the workbook. This capability requires the following data to be input into **DD\_Main**:

Field	Tab	Data required
-------	-----	---------------

<sup>8</sup> Only one treatment in the simplified view

Field	Tab	Data required
RAMM RD ID (normally hidden)*	RoadNamesTable	<p>RAMM Road Names Table</p> <p>Headings in Row 6, data starts in Row 7, column D</p> <p>Columns C and D must be Road ID and RAMM Name respectively. The other columns are not used by this application</p> <p>When the road name is input into the database, the Rd ID is automatically populated. If the RAMM ID shows as #NA the Road name is either spelt incorrectly (watch for how you have used abbreviations for Street and Road etc and for spaces), or the road name is not in your RAMM database. To avoid this problem use the pull-down to populate the sheet.</p>
Deficiency Description	Deficiency_Types	<p>Deficiency_Types Table</p> <p>Data to suit the RCA's circumstances; The fields are:</p> <p>Type ID (consecutive 1 to 'n')</p> <p>Short Name: The description that will appear in the Type of Deficiency field in the main spreadsheet and that can be used for sorting/filtering the database</p> <p>Whether this describes a Hazard or a Deficiency</p> <p>A short description of the problem</p> <p>The points made about spelling and punctuation for Road Names apply here, and in all other cases where similar actions are performed.</p> <p>The Deficiency Description is automatically populated using the Deficiency Type field as the key.</p>
Who/what first identified the problem *	Source_of_Info	<p>The sources from which initial identification is obtained; data to suit the RCA's circumstances. The fields are:</p> <p>ID: Consecutive number</p> <p>DfcySrce_Describe: A short description of the source that will appear in the 'Source description' field in the main spreadsheet and that can be used for sorting/filtering the database</p>

- Entering the data should be straightforward. Data can be entered either by typing or by using the pull-downs. The pull-downs can be a little tedious when entering road names, and sometimes when entering treatments, but otherwise should present few concerns.

- It may be helpful to have a printout of the **Deficiency Types** and **Source of Info** data at hand until you get used to the terms.

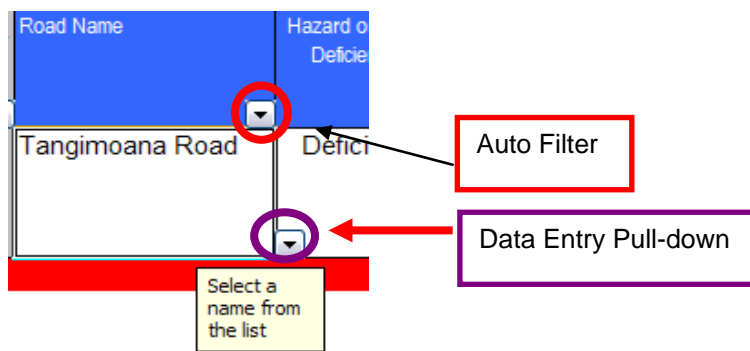
The data under these two tabs in the Training spreadsheet are examples only and can be customised as required by the user.

When this step is complete, the basic data required for recording this single deficiency database has been entered and the process may be stopped if required.

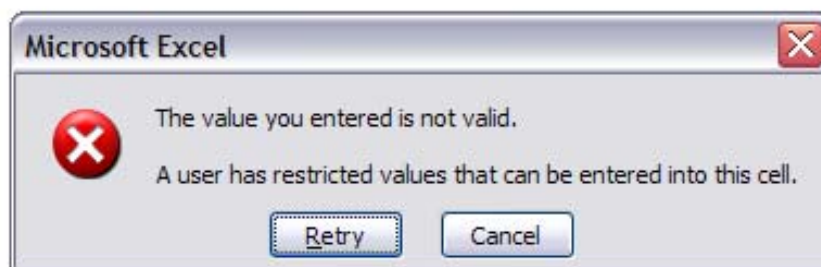
#### A.3.4.1 Data entry pull-downs

When the values that can be entered in particular cells are restricted to particular values an 'in cell drop down' is provided to assist with the data entry. In addition, if a non-permitted value is entered an error message will occur.

In the first of the following two illustrations the drop down is highlighted. This illustration also shows an 'Auto filter' button that looks like a drop down. No damage can occur by activating the one you do not wish to use. Auto filters will be discussed further later.



The second illustration shows the error message that occurs when an incorrect value is entered into any of these fields.



### A.3.5 Step 2 – Prepare supporting information

This step collects the data that assists in prioritising the treatments that will eventually be chosen to address the deficiencies in the database.

#### A.3.5.1 Subset 1 – Crash and risk data

AADT is included here as it unlikely that it will be available in the field.

Current Traffic Volume	Crashes Recorded Since:	Total Fatal Crashes	Total Serious Crashes	Total Minor Crashes	Total Non-injury Crashes	Total All Crashes	Crash Rate
239	1/01/1996	1				1	9.572E-07

The crash data is for information only – the spreadsheet currently does not process this data beyond completing the **Total All Crashes** and **Crash Rate** fields. It may be hidden or displayed using the icons. Usually only one of these icons will be visible at any time.

Continuing the dataset used above the first subset of the required supporting information is related to current risk and could look like this, in the detailed view, with :



Likelihood of a crash now	Likelihood Description	Consequence of that crash now	Consequence Description
Almost Certain	Crashes occur more than 3 times per annum. Frequent crashes (>3) likely each year	Severe	Will cause multiple fatalities. Widespread safety impacts

Risk	Risk Description
2048	Extreme

Information in the grey cells is brought through from other tabs in the workbook; it requires the following data:

Field	Data
Current traffic volume	AADT data is obtained from the RAMM Traffic Count Table or the Road Names Table. Use the count, rather than the estimate, wherever it is available. This field is currently 'information' and is not part of any calculation.



Field	Data
Likelihood of a crash now	<p>This is the Likelihood of the event/crash happening. Values are restricted to those used in the likelihood tab.</p> <p>This table is pre-populated, and while amendment is possible, it should only be done with extreme caution.</p> <p>The value assigned to each likelihood under the likelihood tab cannot be changed. These values are 'powers of 2' (eg <math>2^5 = 32</math>); this system has been chosen as it exhibits a uniform change in percentage between successive values.</p> <p>For example, the percentage changes from <math>2^3</math> (8) to <math>2^4</math> (16) to <math>2^5</math> (32) are 100% and 100% compared with 33% and 25% in a more conventional range of 3 to 4 to 5.</p>
Consequence of a crash now	<p>This is the consequence of the event/crash happening. Values are restricted to those used in the consequence tab.</p> <p>This table is pre-populated, and while amendment is possible it should only be done with extreme caution. As with the likelihood tab, the descriptions can be changed but the assigned values cannot.</p> <p>The values assigned to major and severe consequences are <math>2^5</math> and <math>2^6</math> respectively, which are higher than the expected values of <math>2^4</math> and <math>2^5</math>. This has been done to make the decision matrix conform to the pattern shown in the course workbook and to provide a greater weighting towards events with very significant consequences.</p>

Other data displayed is calculated from that entered as follows:

Field	Tab	Data
Total risk	Risk	The total calculated value of the risk (likelihood x consequence).
Risk description	Risk	The description assigned to this value of risk.

### A.3.5.2 Subset 2 – Data about the data

Continuing the dataset used above, the second subset of the required supporting information is related to information about the data and its completeness. An example is:

This Deficiency		This Deficiency			
Is more data required?	Who is responsible for collecting it?	What is that data?	When is it required by?	Who approved that deficiency is entered in to the database.	Links to other data
Yes	GJS	Update costs	ASAP	MG	

This Deficiency		This Deficiency
Any additional comments	Who recorded the deficiency in the first place	When was it recorded?
	PP	1 Jun 07

The fields should be self-explanatory. There are no particular formats or data rules for this information. They can be hidden or displayed using the icons.

The second box shows the 'Who recorded' field populated with the data gathered when the workbook was opened (see paragraph A.1.3). In this case, the user answered 'No' to the first prompt and then gave his name in answer to the second. If the answer to the first box was 'Yes' then only the user-name appears here.

This is another logical termination point in the data entry process as there is now a fairly complete record of the deficiency. However, the data is little more than a list and is of limited value as there are no answers to the questions 'So what?' and 'What is to be done about this problem?'

### A.3.6 Step 3 – Treatment options and treatments

#### A.3.6.1 Treatment options

For the data to be useful, treatment options need to be considered and a realistic treatment selected.

Treatments are realistic potential solutions to each problem. The spreadsheet allows for up to three possible treatments/solutions to each problem to be recorded for each site. It is important to remember at this stage that you are NOT yet trying to distinguish between these solutions, or select which one you wish to pursue.

The data that appears in the **DD\_Main** spreadsheet is in two parts – the first identifies the treatment itself. Continuing the example used previously, the data for **Treatment Option 1** looks like this: up to three treatments can be included for each site. The simplified view only

Treatment Option 1		Treatment Option 1		Treatment Option 1			Treatment Option 1		
Treatment Option 1 Nickname	Treatment Option 1 Name	Work category for this option	Work Category Name	Estimated cost of Treatment Option 1	Links to Estimate Data	Status of this cost? Its accuracy?	Estimate prepared by?	Estimate Date	Who is to develop the estimates further?
Safety Rail Low	Install guardrail / wire-rope barrier above moderate to low drop. Risk after treatment: 80% Reduction. Cost ; \$100,000	341	Minor Improvements	\$100,000					

allows one treatment for each site to be entered.

Each treatment option has a different coloured header.

The Treatment Option Nickname and Work Category fields have restricted values and pull-downs will appear when those fields are selected.

In most cases an estimate and estimate date must be provided, ie the cells will be pink if there is no data in them. The exception is when the selected option is to accept the risk. In the illustration above an estimate amount has been entered but the estimate date has not; the pink shading in the estimate date field indicates that it is essential data.

The 'Link to Estimate Data' field is new to version 2. It allows the user to insert a hyperlink to data held elsewhere. For help on inserting hyperlinks in Excel see Help or your local guru.

The 'Who prepared the Estimate' field is not automatically populated. It is provided for future information.

Information in the grey cells is brought through from the **Treatments Tab** in the workbook using the **Treatment Option Nickname** key. The data has been established in a separate table (tab) as there will be many cases where there are similar treatments for different sites and organising the data this way can significantly reduce the data input requirements.

### A.3.6.2 Step 4 – Treatments table

The treatments table only needs to be accessed when the desired treatment is not already detailed. Treatments may be used for multiple sites or set up specifically for one site or problem.

When first opened, the **Treatments Tab** shows the following data across the screen.

Treatment ID Number	Description of Treatment	Nick Name or short Name	Rather than calculating a new risk below, enter risk reduction for generic projects
1	Accept risk, do nothing, continue to monitor and maintain current measures	Accept	0%

Likelihood of a crash after the treatment is completed	Likelihood Description	Consequence of a crash after the treatment is completed	Consequence Description	The calculated Risk after the treatment	Description of this Risk

The first 64 rows of the table, shaded pink, have been populated with the latest (March 2007) risk data from ARRB<sup>9</sup>. This pre-populated data should be sufficient for most generic or small projects. While this data is editable by users, it is suggested that it be left as is until new information is promulgated. The next nine rows in the training spreadsheet are example data and may be deleted.

When adding new data in this table or any other one where there is a green **Add a New Row** icon, click the green icon.



For other projects, or if other circumstances require customised risk data, the expected likelihood and consequence of a crash after completion of the improvement should be recorded in the same manner as those for the present situation were.

The conventions used in this table are similar to those encountered so far except for the tan coloured cells.

<sup>9</sup> ARRB *Road safety risk reporter* number 6, March 2007.

Rather than calculating a new risk below, enter risk reduction for generic projects	Likelihood of a crash after the treatment is completed	Likelihood Description	Consequence of a crash after the treatment is completed

These cells contain mutually exclusive data, ie risk is either reduced or the risk after the treatment is calculated – both sets of data cannot exist together. Once data is entered into one of these cells, the others then change to the format for 'required' or 'excluded' data.

For other projects, or if other matters dictate, the expected likelihood and consequence of a crash after completion of the improvements should be recorded in the same manner as those for the present situation were.

Explanations of the data are:

Field	Data
Treatment nickname	A short, unique, meaningful nickname for that treatment. This nickname is the key to the completion of much of the automatic data in DD_Main.
Option name/ treatment description	A short description of the treatment. Option name in DD_Main is treatment description in the treatment table
Risk reduction	<p>Either the risk reduction is included here as a percentage, or the values for likelihood and consequence are detailed later.</p> <p>Note: the value is risk reduction. The risk after the work will therefore be:</p> $\text{RiskBefore} * (1 - \text{RiskReduction})$
Likelihood after	<p>This is the likelihood of the event/crash happening. Values are restricted to those used under the likelihood tab.</p> <p>This table is pre-populated, and while amendment is possible, it should only be done with extreme caution.</p> <p>The value assigned to each likelihood under the likelihood tab cannot be changed. These values are 'powers of 2' (eg 25 = 32); this system has been chosen as it exhibits a uniform change in percentage between successive values (eg from 8 (23) to 16 (24) to 25 (32) is 100% and 100% compared with 3 to 4 to 5, in a more conventional range, which is 33% and 25%.</p>

Field	Data
Consequence after	<p>This is the consequence of the event/crash happening. Values are restricted to those used under the consequence table.</p> <p>This table is pre-populated, and while amendment is possible, it should only be done with extreme caution. As with the likelihood tab, the descriptions can be changed but the assigned values cannot.</p> <p>The values assigned to major and severe consequences are 25 and 26 respectively, which are higher than the expected values of 24 and 25. This has been done to make the decision matrix conform to the pattern shown in the course workbook and to provide a greater weighting towards events with very significant consequences.</p>
Risk after	The calculated risk will appear here, and its description will appear in the next field. If a risk reduction has been detailed these cells will be marked as unavailable.

Once more, information in grey cells is calculated automatically, either being brought through from other tabs in the workbook, or in the case of the treatment ID being calculated from the previous value. These processes require the following data:

### A.3.6.3 Duplicate treatment options

In the Detailed View up to three treatment options may be entered for each site. All the treatment options for any one site, ie in any row of the database, must be different from each other, but they may be the same as those for other sites/in other rows.

**Duplicate Treatment for at least one deficiency**

[Show me the Treatment Table](#)

Treatment Option 2		
Treatment Option 2 Nickname	Treatment Option 2 ID	Treatment Option 2 Name
Signs	2	Erect appropriate signs Risk after treatment: 10% reduction Cost: \$300
Safety Rail High	Already Used	This treatment has already been used for this deficiency

The bottom row in this figure shows the warning that is displayed when a duplicate treatment option is entered, and above it, in the white and grey cells, an acceptable entry.

There must be no duplicate treatment options for the spreadsheet to perform correctly. If there are two similar options for a site, eg installing signs for \$1,000 or installing more sophisticated signs for \$10,000, one of them must be described differently, or at least have a different ID and nickname. This may require adding a specific new treatment to the treatment table (see section A.3.6.2 on page 31).

#### A.3.6.4 Treatment costs

Treatment cost data is not included under the **Treatment Tab** as it can change for each project even when the treatment is generic. The treatment cost data section of **DD\_Main**, continuing the same series of data, looks like this for each treatment:

Treatment Option 1		Treatment Option 1			
Estimated cost of Treatment Option 1	Links to Estimate Data	Status of this cost? Its accuracy?	Estimate prepared by?	Estimate Date	Who is to develop the estimates further?
\$100,000		Budgetary	GJS	18 Dec 06	IK

The 'Links to Estimate Data' field is described in paragraph A.3.6.1. Note that the estimate Date field is no-longer pink as it contains data

The cells required for the **Treatment Names** have already been described. The key value is the **Nickname**, which must be spelled the same way as it is in the treatments tab.

The cells required for each treatment are as follows:

Field	Data
Treatment option nickname	The nickname for this treatment, which must be spelled the same way as it is in the treatments tab – use the pull-down.
Work category	The Work Category ID (from the work category tab). The local or NZTA work category covering this work. The work categories can be edited by users. Numbers 1 to 99 inclusive are available for local works categories; NZTA categories have been pre-populated.
Estimated cost	The estimated cost of the project. Note This can/should be updated as the project develops
Status of cost	The status of the estimate. This field can take the following values: guess, budgetary, preliminary design, final design, and tendered price. These names can be changed by altering cells A85 to A89 of DD_Main
Estimate prepared by	Who prepared the estimate? There are no restrictions on the data that can be entered into this field.
Estimate date	The date the estimate was prepared. The date must be later than 1 Jan 2000 and cannot be later than the date the data is being entered.

Field	Data
Who is to develop the estimates further	The person who is responsible for developing the estimate further. This field allows filtering for workload.

This is another logical termination point. The database has been populated, risks identified, possible realistic treatments for each option have been costed and data to allow their ranking has been included.

## A.4 Step 5 – Prioritisation

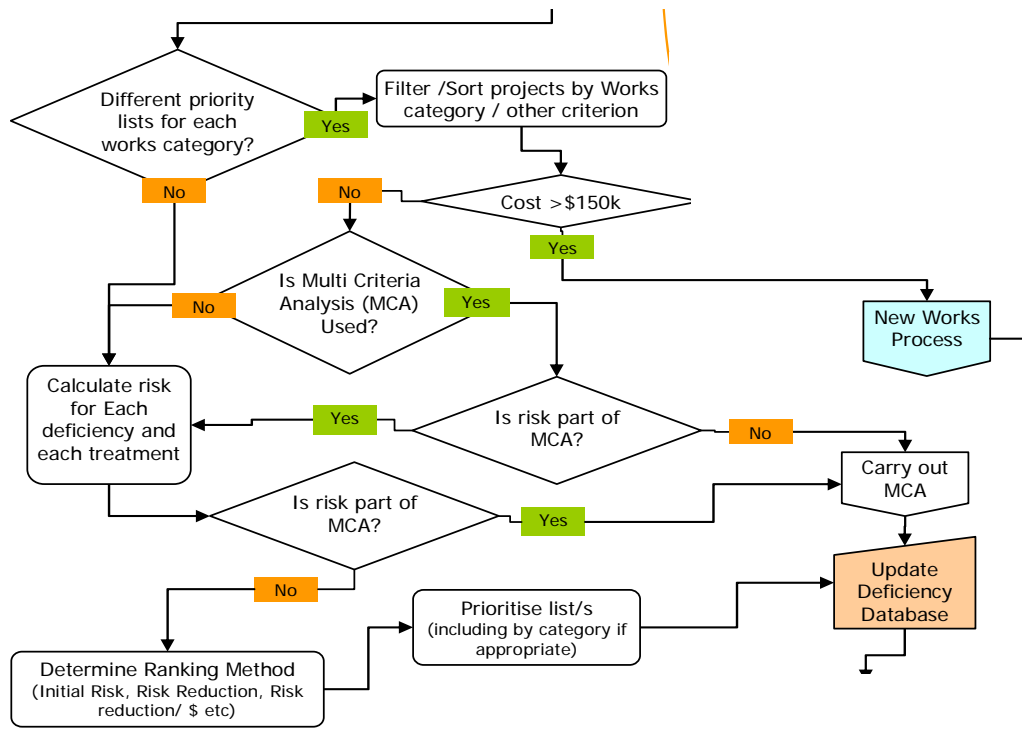
All the data needed for the deficiency database has now been collected and recorded by the processes described above. This now leads to the decision-making and prioritisation section of the flow chart.

The first step in this part of the process is to decide how the works to address the deficiencies will be prioritised. A number of separate lists are may required eg major works, minor works and unsubsidised works are often prioritised separately.

When separate lists are required, it is suggested that the processes outlined below are followed and the relevant filters applied to the final prioritised list, generating a prioritised list for the chosen work category.

### A.4.1 Major works

Following the processes outlined in the diagram, when separate lists are required, this leads to a decision being required for major works (> \$150,000). The diagram shows a separate process for these works, which in addition to meeting the RCAs' requirements, must also satisfy those of the NZTA. However, RCAs are free to internally prioritise their works programmes following the other branch of the process outlined in the diagram but in doing so must accept that projects allocated a high priority that way may not meet all the NZTA's funding criteria.



### A.4.2 Other works

Many RCAs use some form of multi-criteria analysis (MCA) for some of their works. For example, determination of seal extension priority on the basis of traffic volume and distance from the nearest seal is a simple set of multi-criteria. Different sets of criteria are often used for different types of works. The flow diagram allows for MCAs that do not include risk. However, it is strongly recommended that the prioritisation of works required to address road network safety deficiencies includes consideration of risk.

The data entered into the deficiency database has allowed the risk associated with each deficiency to be calculated along with the post-construction risks for each treatment.

### A.4.3 Selecting a treatment option

The first step in this part of the process is to select the preferred treatment for each deficiency. Only one of the treatment options identified for a site may be selected. The database suggests a best solution, using the process outlined below, in the green cell and the adopted solution is selected by including its details in the tan cell.

These cells depart from the standard colours seen so far. The Green cells contain data about the recommended option to treat the site/problem. The tan cells are those in which data input is required.

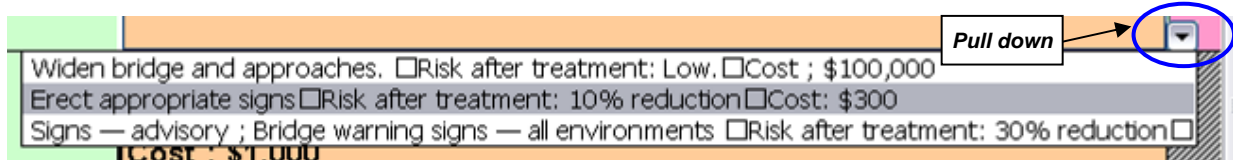
The field that requires data is the tan coloured cell **Chosen option for treating this site** as

Recommended Treatment	Chosen Option
Recommended option based on your weightings. (All other factors being equal the project with the lowest post-construction risk is recommended)	Chosen Option for treating this site
<b>Signs — advisory ; Bridge warning signs — all environments</b> <b>Risk after treatment: 30% reduction</b> <b>Cost: \$500</b>	<b>Signs — advisory ; Bridge warning signs — all environments</b> <b>Risk after treatment: 30% reduction</b> <b>Cost: \$500</b>



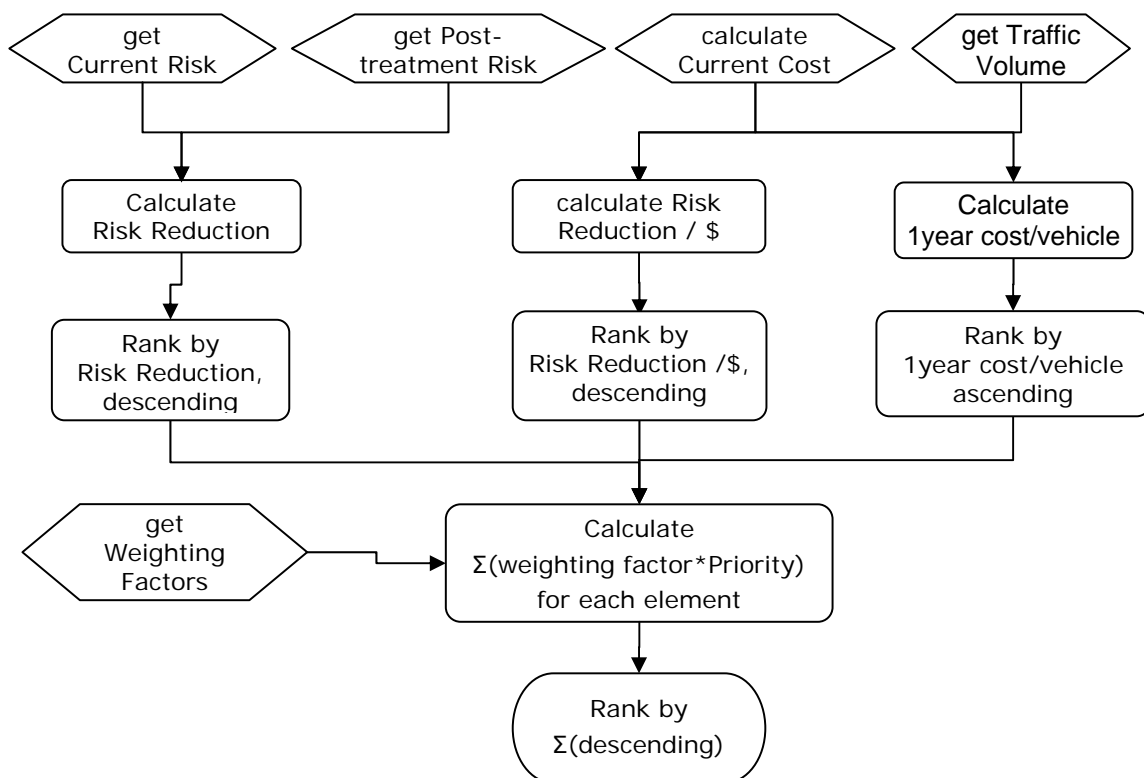
shown above. It and the green cell are automatically populated with the recommended option but the values in the green cell do not change after a choice is made. The default option in the tan field is the **Recommended Option**. This field looks up the treatments entered to address this deficiency and calculates a recommended priority based on the logic outlined below.

Because the spreadsheet requires a precise match between the data in this field and that in the 'Recommended Option' field the selected option should be entered by using the pull-down tab, indicated. The pull-down tab lists the three available treatments together with a summary of the post-construction risk data and the cost for each available treatment as illustrated below.



#### A.4.3.1 Treatment-recommendation process

The process followed when calculating the recommended option is shown in the flowchart. In summary, the ranking of each treatment in terms of its risk reduction, risk reduction per thousand dollars and cost of the treatment divided by the number of vehicles travelling the road in 1 year. These rankings are then weighted, see section A.4.5 Recommended ranking



(page 39), and the weighted rankings summed to give an intermediate score which is in turn ranked across the selected treatments. The option with the best ranking is recommended.

#### A.4.3.2 Reasons for change

If you select an option other than the one recommended the cell next to the chosen option will turn pink, 'requesting' a reason for the decision. This data is not used by the spreadsheet but is recorded to assist future users of the data. The reason should be meaningful and

understandable by someone coming back to the data a year or more in the future, but there are no restrictions on what may be written. The following illustration shows one row where the recommended option has been selected and another where it has not and a reason is required.

Recommended Treatment	Chosen Option	
Recommended option based on your weightings. (All other factors being equal the project with the lowest post-construction risk is recommended)	Chosen Option for treating this site	Reason for Changing the Recommendation
Signs — advisory ; Advisory speed signs — all environments Risk after treatment: 25% reduction Cost: \$500	Signs — advisory ; Advisory speed signs — all environments Risk after treatment: 25% reduction Cost: \$500	
Erect appropriate signs Risk after treatment: 10% reduction Cost: \$500	Install guardrail / wire-rope barrier above steep high drop. Risk after treatment: 80% Reduction. Cost ; \$160,000	

#### A.4.4 Data about the chosen option

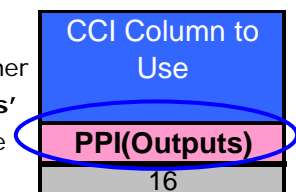
Chosen Option		Chosen Option				
Nickname of Chosen Solution	Updated Chosen Cost	Risk Reduction	Risk Reduction (# / \$k)	Cost / vehicle over 1 year	Work Cat of Choice	Work Category of Chosen Option
Signs	<b>\$330</b>	<b>6.4</b>	<b>19.394</b>	<b>\$0.004</b>	323	323, New Roads and Structures

This group of cells provides updated information about the chosen option, its recommended ranking in the list of all sites (rows) in the database and the factors that affect its prioritisation.

##### A.4.4.1 Updated chosen cost

This cell contains estimated cost of the chosen treatment updated to today's dollar value, allowing all costs to be compared on the same basis. It requires that the **CCI tab** be updated with the latest values – if this is not done, the update will only be to the latest Construction cost index (CCI) recorded. CCI data since 31 March 2003 is included in the sample spreadsheet. If earlier dates are required, they can be supplied on request through the NZTA (data back to September 1946 is available).

The default index value used for this update is the *Producers price index (construction) outputs* published by the Department of Statistics. Any other index included in the **CCI Tab** can be used. This is done on the '**LookUps**' **tab** by changing the value of the pink cell G21, illustrated here, using the pull-down. **Note:**



- There are blank lines between each value in the pull-down list so it is necessary to scroll through it to see all values
- The names of the NZTA Indices, eg NZTA Construction Index, are abbreviated by omitting the words 'NZTA'.

The number in the grey cell, G22, is the number of the column of the CCI table containing the relevant data. It is populated automatically.

#### A.4.4.2 Risk reduction

This cell details the absolute risk reduction for the chosen option by comparing the risk now with the calculated risk after the treatment. It works on either the reduction detailed for the treatment or the specific post-crash risk calculated for it.

#### A.4.4.3 Risk reduction/\$k

This is another way of looking at the effectiveness of the intervention. The risk reduction is divided by the current cost of the project, in thousands of dollars.

#### A.4.4.4 Cost/vehicle over 1 year

This field was included to provide an indicator of financial efficiency. It is calculated by dividing the current cost of the project by the annual traffic volume, calculated from the input AADT. It can be considered as the nominal toll that would be required to recover the cost of the project in one year. It could, perhaps, be more accurately titled the *1-year-cost/vehicle*

### A.4.5 Recommended ranking

Chosen Option			Chosen Option		
Recommended Overall Ranking	Move to be Rank:	Stated Reason for Change	Change made by	Allocated Ranking	Reason for Change
2				3	As a consequence of other changes

The recommended ranking is the result of a two-step ranking process for each project, taken across the entire list of projects. The process followed is the same as that for producing a recommended treatment (see paragraph A.4.3.1) but using the data from each chosen treatment. In outline:

- Firstly, each chosen option is ranked against all others by each of the three factors discussed in paragraphs A.4.4.2 to A.4.4.4. The first two factors are ranked with the highest reduction as 1 and the cost/vehicle-year factor with the lowest cost as 1.
- These three rankings are then combined into an overall ranking which is cumulative rank is calculated as follows:

$$\begin{aligned}
 & \textit{weighted Rank by risk reduction} \\
 & + \textit{weighted rank by risk reduction \#/\$} \\
 & + \textit{weighted rank by cost/vehicle-year}
 \end{aligned}$$

Each weightings factor is initially set at 1, giving each factor equal weight but they can be changed as required. Chosen options that are to "Accept risk, do nothing ..." are not given a recommended priority.

#### A.4.6 Changing weightings

Weightings are detailed under the **LookUps** tab, in cells E17 to G17. The weights can be set to any positive number by the user; there are no other rules these numbers. The weightings are applied to all sites. They cannot be tailored to individual sites.

Weighting Factors		
Risk Reduction	Risk Reduction (# / \$k)	Cost / vehicle over 1 year
1	1	1

#### A.4.7 Changing ranking/priority

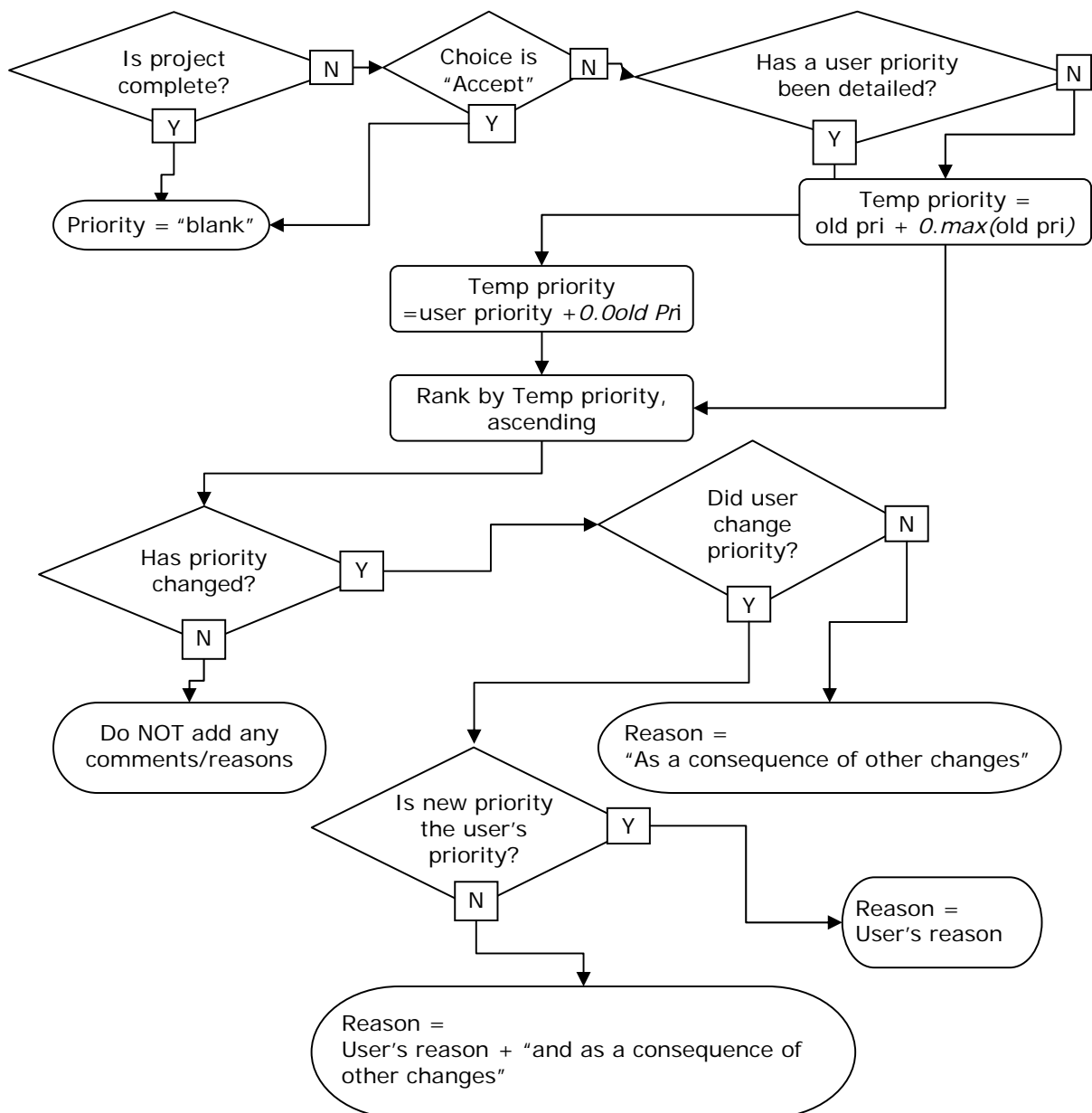
The recommended ranking can be changed by typing the desired new number in the **Move to be Rank** column. Chosen options that are to "Accept risk, do nothing ..." cannot be allocated a priority. Changing a priority will also change the ranking of any projects with a priority

between the original a new priorities and note all such changes as 'consequential'. For example:

if the ranking of an item is changed from, 5 to 2, the projects previously ranked 2, 3 and 4 will now be 3, 4 and 5 respectively (1 and 6 etc will be unchanged) and their **Reasons for Change** will read 'as a consequence of other changes'.

A reason for changing the ranking should always be given, so that the logic for the change can be understood and preserved by others.

If more than one item is allocated the same new ranking eg two items allocated number 4, the one with the highest recommended overall ranking will be placed first. The process followed in re-ranking projects and annotating the changes in priority is described below.



## A.5 Step 6 next actions

Chosen Option		
Action to be taken	Earliest Available Programme Year	Year work is programmed
	2009	

The 'Action to be Taken' cell is intended for relevant notes about the future of the project. The grey cell 'Earliest Available Programme Year' is provided to assist those developing interventions and forward programmes. It is calculated as follows:

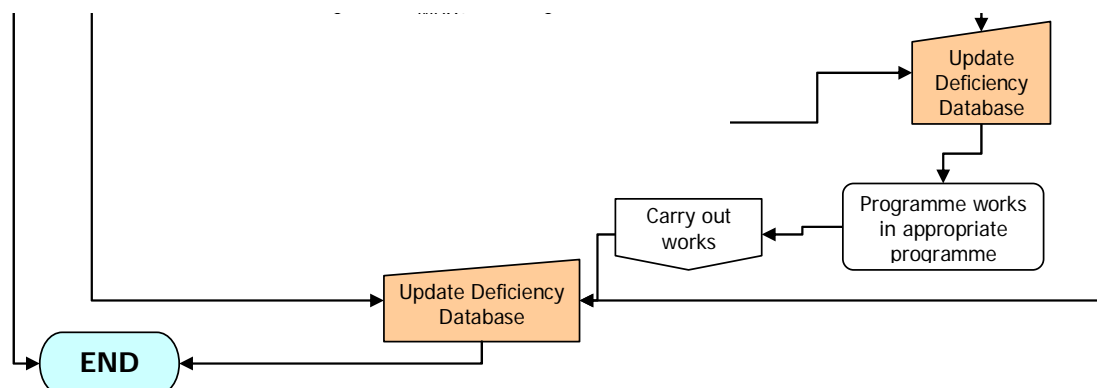
- The earliest available year in any circumstance is the next calendar year. This can be over-written, but the over-written date will not be reflected in the dates for lower-priority projects. A consequence of this is projects that showed an earliest available year of, say, 2008 in December 2007 will show this as 2009 on and after 1 Jan 2008.
- The earliest possible year for each project is determined by the programmed start date or earliest available start date of the next highest project in the same work category. No 'lead time' is added between projects and there is no budgetary or other sophistication. Thus, if the highest-ranking project in a particular work category is given a date of 2010 all other projects in that category will have an earliest date of 2010.

As the 'Earliest Available Programme Year' cells are shaded grey the chosen/adopted start years should be detailed in the adjacent cell, 'Year work is programmed'. In Version 1 of the spreadsheet The **Programmed Year** field was formatted to take text and it was suggested that the data be entered in the form 2010/11. In Version 2, this field is formatted as a date field and valid dates must be entered for the earliest available year to be calculated. If an error value is shown in any Earliest Programme Year cell the first step should be to check that there are no invalid '**Year work is programmed**' dates.

## A.6 Step 7 – Completion of the process

Although the process is seemingly complete, there are still some steps left in the process. Not all the steps may occur at the same time and it may be many years before the completion of the works can be recorded.

These steps follow the process outlined below.



This requires completion of the following fields:

Completion		Completion		Changes	
Is work complete? Deficiency resolved?	When was the work completed?	What was the final Cost	Who entered the record of completion	Who last changed any data?	When was it changed?

The first of these cells has two possible values, 'Yes' or 'No'. If the value is 'No' the balance of the 'Completion' cells are not available, if 'Yes' they are available.

Recording a project as complete also removes its priority and it is no longer ranked against other projects. This will result in the absolute priorities of all projects with a lower priority changing.

### CAUTION!

Assigned ("**Move to be Rank**") priorities do not change automatically when a project is marked as complete.

It is therefore suggested that projects be marked complete one at a time and that the assigned priorities be reviewed/adjusted after each recording of a project's completion.

The **When was the work completed?** and **When was it changed?** fields are date fields in which data should be entered in any valid Excel date format, eg 25/4/07, 25/04/2007, 25 March 2007 etc).

# Appendix B. Updating the database

Contents of this appendix

<b>B.1</b>	<b>Updating cost indices</b> .....	<b>43</b>
B.1.1	Availability	43
B.1.2	Installing the update	43
<b>B.2</b>	<b>Updating the spreadsheet itself</b> .....	<b>44</b>
B.2.1	Before you start	44
B.2.2	Error messages	44
B.2.3	Step 1:	46
B.2.4	Step 2:	46
B.2.5	Step 3:	46
B.2.6	After updating:	46
B.2.6.1	In v2.0 and above	46
B.2.6.2	In v2.0.1 and above	47
B.2.6.3	In v2.1.0 and above	47
B.2.6.4	In v3.0 and above	47
B.2.7	Running the update	47

## B.1 Updating cost indices

The cost indices used in calculating current costs are listed at the “CCI” Tab in the Deficiency Database workbook.

The index values may be updated by had or by running the updater routine published periodically by the NZTA as a macro-enabled spreadsheet. The spreadsheet is named as indicated in the following example:

DDPP-CCI-Updater-v1-2-20090630.xls

Where

- v1-2 is the version number, which is subject to change as modifications are made to the software in the updater
- 20090630 is the effective date of the update in the format yyyymmdd

### B.1.1 Availability

The CCI updater is published on the NZTA Web site at <http://www.landtransport.govt.nz/roads/sms/deficiency-database-course.html>. A link to the required file appears in the text below the heading “Construction Cost Index Updater”.

### B.1.2 Installing the update

To install the updater you need the file from the source listed above and your deficiency database.

- Close all other copies of Excel ®
- Click on the “Start.” Icon

- The updater will run
- In you deficiency database check in the CCI table to see the new data and under the “Change Log” tab to see that the update is recorded.
- Installing the new CCIs changes the current cost of all costed projects. This may affect allocated priorities and result in some re-ranking. The priorities allocated by the user using the “Change to” functionality will not change. Users should check that the updated priorities are appropriate.
- The updater will not run if the latest CCI data in the database has the same date or a more recent date than that in the updater. It will advise the user of this.

## B.2 Updating the spreadsheet itself

### B.2.1 Before you start

To update either the training or user configurations of the spreadsheet from version 2.0 or later<sup>10</sup> to the latest version the following are needed:

- The spreadsheet to be upgraded
- The latest updater spreadsheet this is available from the NZTA’s website at <http://www.landtransport.govt.nz/roads/sms/deficiency-database-course.html>. A link to the required file appears in the text below the heading “DDPP Updates”

The updater is named as indicated in the following example:

DDPP\_PatchTo\_v3\_0.xls

Updaters are tested and work on .xlsm databases from version 2.1.0 inclusive. They should work on earlier version 2 databases without any problems. If there are any difficulties please contact the DDPP support person, George JasonSmith at [george.jasonsmith@aecom.com](mailto:george.jasonsmith@aecom.com)

If you do not have a populated “User” file, or if you have not made changes to the “Training” file that you want to keep, use the latest version of the file, which is the one on the NZTA website.

If you have been using the Training File as your database treat it for the User file in the balance of these instructions, it will upgrade successfully without loss of data.

The updater has been tested, and runs successfully, on and over, networks. However, when running on remote servers, it may take some time to save files. A difficulty has been found on networks with very high security that employ non-Microsoft software that controls Excel’s access to network drives. If you are having difficulty running the update and you have this type of software on your network consult you network administrator. Alternatively, try transferring all the files to your “C” drive or another local drive (even a flash drive), and running it from there.

### B.2.2 Error messages

The updater will not run if Macro Security is set too high. If this is the case, the spreadsheet looks like this when opened:

---

<sup>10</sup> There is an updater available for version 1.0, but there are believed to be no remaining v1 databases in use. If the updater is required contact George JasonSmith at AECOM Ltd +64 (3) 363 8500



	A	B	C	D	E	F	G	H	I	J	K
1											
2											
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											
13											
14											
15											
16											
17											
18											

**NZ Transport Agency Deficiency Database and Prioritization Process**

This spreadsheet uses Excel @ macros

Macros are not enabled on this computer

The Menu item: *Tools> Macro> Security* should be set to Medium or Low  
 "Medium" will make use of the system frustrating, so "Low" is better

You may need to get your network administrator's approval for this change

Close this window and re-open the spreadsheet when the change has been made

You should ignore these messages when closing the workbook

There is another error message that may be encountered. If the update stops partway through with a message that your system is not configured to allow the update to continue:

*Your system is not yet configured to run this update.*

*To address this issue do the following, you may require permission or assistance from your network administrator:*

*a. In the Excel menu:*

*go to Tools>Macro>Security and then click the "Trusted Publishers" or "Trusted Sources" tab.*

*in that tab activate / check the "Trust all access to Visual Basic Project" box*

*b. In the Excel menu:*

*go to Tools>Macro>Visual Basic Editor*

*in the Visual Basic Editor menu:*

*go to Tools>References*

*scroll through the list (it is usually in alphabetical order) to find the following items and activate them:*

*Microsoft Visual Basic Extensibility*

*Microsoft Visual Basic for Application Extensibility 5.3*

*Microsoft VB Script Regular Expressions 1.0*

*Microsoft VB Script Regular Expressions 5.5*

- You **MUST** exit the warning screen by clicking on the 'OK' button before attempting to retrieve the file with the remediation instructions. The whole updater programme will close; restart it when you are ready.

- The remediation instructions are only prepared when they are needed. When prepared they are to be found in the directory/folder the updater was opened from. The file is called DDPP\_fix\_VBA.xls. Alternatively, the same information is in the file called ReadMe\_DDPP.txt, which should be in the same directory as this updater. It is repeated below for convenience.

### **B.2.3 Step 1:**

Close Word, Access, PowerPoint and all other MS Office applications (except Excel)

### **B.2.4 Step 2:**

Close all Excel files except this one and your User file/deficiency database

### **B.2.5 Step 3:**

Note that

- There are a number of dialogue boxes that require answering as the update runs. They will require your attention. These give you information on some of the critical stages of the update. Including details of the back-up file created by the updater before any changes are made and of any significant changes to the functionality of the database.
- Some of your Excel settings are changed by the process but are restored on completion of the update
- The update can only run once on each file, unless no procedures were activated (see the Change\_Log)
- The update process saves your file twice:
- On commencement it saves it, in the same directory as it was opened/last saved in, as Backup\_yymmdd\_original name.xls, where yymmdd are the current year month and date in two-digit numerical format, eg 1 Dec 2007 is 07121.
- The updated working copy of the database is saved, in the directory or folder from which it was opened with its original filename. The filename is NOT changed but the file properties are updated to include the latest version and build numbers. This is the file you should use from here on. The other is for recovery purposes. You may re-name any of these files as you wish.

### **B.2.6 After updating:**

#### **B.2.6.1 In v2.0 and above**

- **User Identity.** In versions 2.0 and later you will always be asked to confirm your name when you open the database. This detail will be used to populate some of the data fields automatically.

- **Duplicate sites and treatments.**

**THIS IS VERY IMPORTANT!** After upgrading, check your database for potential duplicate sites and other highlighted problems/errors using the "Detailed Layout" functionality. Duplicated treatments for a single deficiency will now produce errors. These problems are highlighted in the database. You should check the spreadsheet from left to right

After you check for the duplicates close the updated sheet before you make any additions. If you wish to add new data re-open it immediately if you wish. This has to be done to ensure the full functionality of the update is available.

The final screen of the update contains reminders to this effect.

- **Closing the database or updater.** When you close your working database, you will now normally see a "strange" sheet in the background. This is the check sheet that displays if macros are not enabled on the computer. You may ignore it when closing. Just hit save (if that is what you want to do).

#### **B.2.6.2 In v2.0.1 and above**

- **Duplicate sites and treatments.** Duplicate sites can be "accepted", which removes the alert shading in that row. Duplicate treatments cannot be accepted and must be fixed, ie changed or deleted.

#### **B.2.6.3 In v2.1.0 and above**

- **Treatment table.** Formatting in Treatment Table has been improved to make it clear when all essential data is not entered
- **All tables.** New functionality has been added to make it easier to determine what columns have auto-filter applied to them. When an auto filter is activated each column containing an active filter has its **row 1** shaded bright green.

#### **B.2.6.4 In v3.0 and above**

- **Auto-filter.** Auto-filters in all worksheets are cleared so that they show all data. They can be re-set after the update as required. This was necessary to ensure that all database cells are updated.
- **Project prioritisation.**


The prioritization process has changed slightly in v3.0, it no-longer uses "Risk Reduction %" but "Risk Reduction". This provides greater differentiation between similar works on different sites

This change will affect all recommended priorities and will result in altered priorities on already-recorded projects but it will **not** affect any priorities the user may have allocated.

#### **NOTE:**

Users are strongly advised to review all allocated priorities for consistency and compatibility with their objectives and for any changes that may influence forthcoming projects or works.

### **B.2.7 Running the update**

To run the update simply click on the Start button, but make sure that your cursor has first changed to a pointing finger, . If it has not, click away from the button and then scroll over it again until the change occurs.

This page is intentionally blank.

# Appendix C. Change Log

Contents of this appendix

<b>C.1</b>	<b>Change-log v2.1.0 to v 3.0 (Sep 2009)</b> .....	<b>49</b>
<b>C.2</b>	<b>Change-log v2.0.1 to v2.1.0 (May 2009)</b> .....	<b>50</b>
<b>C.3</b>	<b>Change-log v2.0 to v2.0.1 (June 2008)</b> .....	<b>50</b>
<b>C.4</b>	<b>Change Log V1.1 to v 2</b> .....	<b>51</b>

As part of the upgrade, a Change Log is added as another sheet in the Deficiency Database. Its tab is on the extreme right of the list of worksheet tabs.

The change log contains two types of entry, the first details the upgrades that ran on the database and those that did not run; this data is provided for trouble-shooting. The other details the changes that have been made from the previous version, which is as follows:

## C.1 Change-log v3.0 to v 3.1 (Feb 2010)

- 1 Fixed issue where the worksheet was saving on exit after the user had answered "Do not save"
- 2 Deficiencies with a chosen option of "Accept" are no-longer ranked. Previously they were ranked and confused the listing.

## C.2 Change-log v2.1.0 to v 3.0 (Nov 2009)

- 1 Fixed an error in the ranking logic that was picking up and incorrect column thus permitting duplicate priorities
- 2 Fixed the error in the formula in column CM that causes the option "accept" to produce an error when entered against treatments 2 or 3
- 3 Partially fixed a problem caused when the top row of the database (DD\_Main) is deleted by a user. It places a warning in the row and adjusts "offset" formulae to reduce the chance of a problem.
- 4 Fixed an issue with project prioritization that produced an error in preventing any deficiency being prioritised if there is no treatment against one row
- 5 The prompt to save when exiting the DDPP now works properly, allowing you to save or otherwise the changes you have made. Previously they were saved regardless - due to a quirk of Excel which has now been "worked around".
- 6 The prioritization process has changed slightly, it no-longer uses "Risk Reduction %" but "Risk Reduction". This provides greater differentiation between similar works on different sites and will result in altered priorities on already-recorded projects.
7. The macro that carries out the highlighting of the cell in row 1 of a filtered column has been moved to its own module to simplify further updates.

8. Conditional formatting in Treatment Option columns of the main spreadsheet altered to conform to the database's conventions.

### **C.3 Change-log v2.0.1 to v2.1.0 (May 2009)**

- 1 Change Log updated
- 2 Corrected display of incorrect name when user identified as other than the log-in name
- 3 Fixed gap in grey shading in column F of the Deficiency Table
- 4 Allocated named range for default crash date start to the correct cell in the Lookups tab
- 5 Fixed macro that adds new rows to DD\_Main to include the default crash start date
- 6 Removed data validation check being incorrectly applied to the "Link to Estimate" cells for Treatment Option 1 in DD\_Main
- 7 Add hyperlink to "Show Default Crash Date" icon
- 8 Fixed incorrect link imported on "Recommendations" icon when opened from CD etc
- 9 Fixed "Ref#" error in conditional formatting formulae in cols AL to AN
- 10 Formatting in Treatment Table improved to make it clear when all essential data is not entered
- 11 New functionality added to make it easier to determine what columns have auto-filter applied to them.
- 12 Setting for "options" such as auto calc now all contained in the "User ..." module.

### **C.4 Change-log v2.0 to v2.0.1 (June 2008)**

*V2.0.1 was a patch needed to solve a problem faced by users who had Excel 2000 rather than 2003 as well as other minor issues.*

- 1 Change log updated
- 2 Errors in the title of the columns containing data about "Work Cat of Choice", "Work Category of Chosen Option", "Recommended Overall Ranking" corrected and the columns re-arranged to a more user-friendly order.
- 3 The cells for Treatment 2 Estimate Date now display correctly (pink) when a data entry is required.
- 4 Likelihood Description for "This Deficiency" is now shown by default in detailed view
- 5 Cells in the treatment table that were pink are now grey to conform with the conventions used elsewhere in the workbook.
- 6 New detail added to the Info sheet detailing the earliest useable estimate date.
- 7 The "Year Work is Programmed" column (DH) formerly only gave a warning when a too-early start date is first entered. It now also displays orange backgrounds if the earliest start is later changed to a later date than the currently programmed one.

- 8 All instances of the formula "=today()" in all the estimate date columns are now converted to fixed dates, the current displayed date is used. Presence of the formula caused auto-update of dates which is not what is required.
- 9 It is now possible to "flag" possible duplicates as acceptable, thus clearing the warnings and allowing them to work when a "real" duplicates are encountered
- 10 Formatting in the "Record" altered sheet to allow update data to be entered efficiently and displayed correctly.
- 11 Changes made to some of the permanent VBA scripts to resolve compatibility problems encountered when adding rows to the main sheet under Excel 2000.

## C.5 Change Log V1.1 to v 2

- 1 Interface now consistently identifies required fields as pink.
- 2 Potentially Duplicate Sites produce and alert. Duplicate sites are permitted.
- 3 Duplicate treatments for an individual deficiency produce a warning and "break" the calculations. Removing the duplication restores the calculation
- 4 Drop-down boxes now working consistently
- 5 Behaviour of 'Cost/vehicle over 1 year' data is no-longer erratic when weightings are changed
- 6 Non-negative weightings for ranking prioritization factors have been blocked
- 7 Data collection sheets produced and are available separately
- 8 In the Deficiency Types Table a copy of type ID is now automatically created in Column F "Copy of DfcyType\_ID"
- 9 The 'Take me to the start of the row' button now available in the 'Treatments' table
- 10 The 'green', Chosen Option, cells of DD\_Main now details of the chosen option's work category
- 11 An Information sheet has been provided. It contains Tips and Hints but is not a proper "Help" file.
- 12 This change log is included
- 13 Programmed Year and Completed fields now interact appropriately and automatic formatting has been adjusted
- 14 Earliest Available Programme Year added, and a warning is given if this is before a higher priority project's dates.
- 15 Auto-filter added to the treatments table, using Excel functionality
- 16 Lookup values that can be changed by users are now all in the "Lookups" Table.
- 17 Some Data validation lists are included in the validations themselves, where customisation is not appropriate
- 18 The "Treatable" column is now visible in the Simplified layout, resolving a problem that could occur with contradictory data
- 19 All data validation now working correctly
- 20 "Drag and Drop" copying is disabled in the spreadsheet but your settings are restored on exit
- 21 Made obvious those fields in the Likelihood and consequence tables can be changed to suit local risk management definitions

- 22 Work Category can now be sorted and then restored to its original order
- 23 When a project is marked as completed it is no longer prioritised
- 24 When a deficiency has been actioned/remedied the cells columns D to G for that entry are greyed and struck-through
- 25 It is more obvious in the "Option Choice" area of the spreadsheet which projects are complete
- 26 A 'Links to other data' column has been provided next to each estimate column
- 27 Speed of Print Layout improved significantly. Feedback is given in the status bar. Reverting to other layouts also sped up significantly
- 28 Automated population of 'Who entered this deficiency' data, but not of "Who changed" data
- 29 Provided a 'Go to the recommendations' box, similar in functionality to the 'Take me to the start of the row' arrow
- 30 Spreadsheet checks for availability of macro permissions on loading.
- 31 A box has been provided to record the reasons why you did not go with the recommended option
- 32 The Print layout now provides for a title to be printed on each page. The First Time you use it you will need to put in a title of your choice. The title can be changed as you wish, at any time.

Following discussion with, and decisions from, Land Transport NZ, the following requested enhancements have not been included in this update. Synopses of Land Transport NZ's reasons are included, in *italics*.

- a. The 'Treatments' table should include columns for source of information and confidence/reliability

*An un-necessary complication at this stage*

- b. Include a Column with 'Social Cost of Crashes' and use for prioritization.

*An un-necessary complication at this stage; it would be very generic and require population of crash data for each site*

- c. Hazards are recorded but how they are to be managed is not.

*Land Transport NZ is happy with the current situation*

- d. Could the Transit NZ Risk matrix also be included?

*Land Transport NZ is happy with the current matrix. Will reconsider this before the next update*

- e. People in appointments change with time, can a list of 'authorised names' be included as a lookup to allow tracking of these?

*An un-necessary complication at this stage*

- f. Extend automatic population of 'who did this' type data to editing of existing data



*Reconsider for next update*

- g. Can RAMM traffic count and crash-data tables be included so that this data can be populated automatically?

*No, this is an "interim" system; leave for RAMM. Quite complex to do in a spreadsheet*

The following requested change was not included. The reason is *italicised*.

It would be helpful if a data field could be selected on one of the 'lookup tables' and automatically added to the correct cell in DD\_Main

*It is very complicated to do this. Excel copying functionality is a simpler and as effective method to use. This functionality is explained in the "Info" sheet*

## Appendix D. Attachments

CD containing:

- Training spreadsheet
- Useable spreadsheet
- Example data-collection pick-up sheets (Word® format – able to be edited)
- PDF version of this booklet
- Workshop-presentation handout (PDF)
- Copy of the Land Transport NZ *Deficiency database prioritisation process report*, November 2005
- Example MCA analysis tables