

Spreadsheet version of Hazard Log

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Spreadsheet version of Hazard Log

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1 Introduction

1.1 Background

A Managed Motorway Hazard Log Application (MM-HLA) has been developed to provide an auditable record of the safety management of hazards associated with Managed Motorway schemes. The Application system is a fully interactive, 'one stop shop' for data, allowing users to attach documents and notes to hazards, and link hazards to incidents, tasks, requirements and notes. It also provides an intelligent index and includes a scoring system for recording the relative risk associated with each hazard.

The Hazard Log Application is provided in the form of a database. This database is initially pre-populated with 'core' data. It is expected that the vast majority (if not all) hazards and risks associated with a Managed Motorway scheme are covered by this 'core' data. (This 'core' data has evolved from hazard analysis that has been undertaken on existing Managed Motorway Schemes.) Therefore, this 'core' data is considered to be a foundation that can be built upon to cover the particular circumstances of each scheme.

The MM-HLA is designed for major schemes where it is important to maintain an auditable record of the key decisions that have been made.

In order to support the safety assessment of small to medium sized schemes, a "spreadsheet" based version of it has been produced. This includes the main elements of the Hazard Analysis, but without the full auditing capabilities of the MM-HLA. Therefore, more effort is required to ensure that key decisions are auditable. This document described this "spreadsheet" version.

2 Features

The spreadsheet version of the application contains the following worksheets:

- Hazard log
- Risk Scores
- Before to After
- Change in Risk – All Hazards
- Incidents vs Stats19
- Incidents before to After
- Sheet 1
- Index values

These are described in the following sections.

2.1 Hazard log Worksheet

This worksheet has information contained under the following column headings:

- Hazard
- Incident
- Cause
- Applies to Scheme
- Event/State
- Frequency/Likelihood
- Probability/Rate
- Severity
- Notes: Reason for Score
- Road User Group
- Class

Each is explained in the following sub-sections.

2.1.1 Hazard

A hazard is a potentially harmful situation which (in the Managed Motorways scenario) poses a threat to road users, road workers or third parties. It can be either a 'State' hazard or an 'Event' hazard, depending on certain criteria explained later in this document.

2.1.2 Incident

An incident is a manifestation or result of a hazard or hazards. For example, the Incident 'I25¹ – Vehicles collide while changing or merging lanes' could occur as a result of a large number of different hazards, such as Hazard 'H102 – Undertaking' or Hazard 'H25 - Excessive lane merging required when lanes are closed'. The link between a 'hazard' or 'hazards' and an 'incident' or number of 'incidents' is pivotal to how the Hazard Log works.

Tip: to see this more clearly click on the down-arrow next to the "Incident" column heading and select 'I25 – Vehicles collide while changing or merging lanes', from the dropdown list (See Figure 2.1).

¹ Each Incident, Hazard and Cause is given a reference number in the spreadsheets, I1, H67, C450 etc.

| | A | B | C |
|---|----------------------------------|---|--------------|
| 1 | | | |
| 2 | Hazard | Incident | Cause |
| 3 | H1 - Abnormal loads - escortable | <ul style="list-style-type: none"> I10 - Serious illness of I11 - Underlying Caus I12 - Vehicle collides v I13 - Vehicle collides v I14 - Vehicle crushed I15 - Vehicle hits debr I16 - Vehicle hits debr I17 - Vehicle hits pede I18 - Vehicles collide in I19 - Vehicles collide c I2 - Contributory Ever I20 - Vehicles collide c I21 - Vehicles collide c I22 - Vehicles collide c I23 - Vehicles collide c I24 - Vehicles collide c I25 - Vehicles collide v I3 - Delay in attending I4 - Incident caused b I5 - Incident in or arou | |

Figure 2.1: Incidents dropdown list

You should now be able to see which Hazards are associated with that incident. When you finish viewing this, Select “All” from the drop-down list so that all Hazards, Incidents and Causes are displayed.

2.1.3 Cause

A cause is essentially a ‘reason’ why a hazard (and by implication an incident) occurs. These can be either (direct) Causes or sub-Causes. For example, Hazard ‘H125 - Vehicle stopped on LBS1 as LBS1 opens’ can occur due to wide number of different causes. A direct cause of Hazard ‘H125’ is Cause ‘C234 - Operator does not detect stopped vehicle during opening sequence’ which in turn has the sub-cause ‘C351 -Degraded picture quality’. C234 is a parent of C351.

2.1.4 Applies to Scheme

There are two possible selections under this item:

- Both – this indicates that the Hazard is present both before and after the implementation of a (Managed Motorways) scheme
- MM – this indicates that the Hazard is as a consequence of the introduction of a Managed Motorways scheme and is not present before the scheme is implemented.

2.1.5 Event / State

Each Hazard is described as either an Event or a State.

- An Event is a hazard which occurs momentarily, e.g. a vehicle carries out a high-risk lane change. Usually it is not meaningful to talk of how long such a hazard exists for.
- A State hazard is one which is present for a period of time e.g. vehicle stopped on hard shoulder – the longer it is present, the greater the likelihood of an incident occurring. Such hazards will have a measurable duration and can persist for long periods.

It is important to distinguish between these two types of hazards as the risk scores are evaluated slightly differently depending on the choice. Care should be taken in comparing the risk associated with Events and States. They are not directly comparable.

2.1.6 Frequency/ Likelihood; Probability/Rate; Severity

These columns contain the parameters that are used to determine the relatively 'Hazard risk score' associated with each hazard.

One of the principal activities to be carried out within the Hazard Log is to calculate the 'Hazard Risk Score' for each Hazard¹, both 'before' and 'after' the scheme is implemented. These Hazard Risk Scores provide a mechanism for:

- Determining which hazards have the highest risk associated with them
- Determining how 'safe' the scheme is likely to be when appropriate mitigations have been put in place.

In order to calculate the individual Hazard Risk Score it is necessary to collect key information about the scheme and use this information appropriately.

Event Hazard (See Section 2.1.5) risk scores are evaluated by adding together a score for each of the following three parameters:

- The frequency at which the hazard is expected to occur (Hazard Frequency)
- The probability that the hazard causes an incident (Hazard Probability)
- The severity of the incident (Hazard Severity)

¹ Some hazards do not require a score. This is made clear in supporting documentation.

State Hazard (See Section 2.1.5) risk scores are evaluated by adding together a score for each of the following three parameters:

- The likelihood that the hazardous state is present (Hazard Likelihood)
- The rate at which incidents occur if the hazardous state is present (Hazard Rate)
- The severity of the incident, which is the same as for event hazards (Hazard Severity)

Therefore, Risk scores for both Event and State Hazards consist of three parameters as shown in Figure 2.2. The individual scores for the three parameters are then added together to give an overall Risk Score for that hazard. The risk 'score' is based on a logarithmic scale which is explained further below.

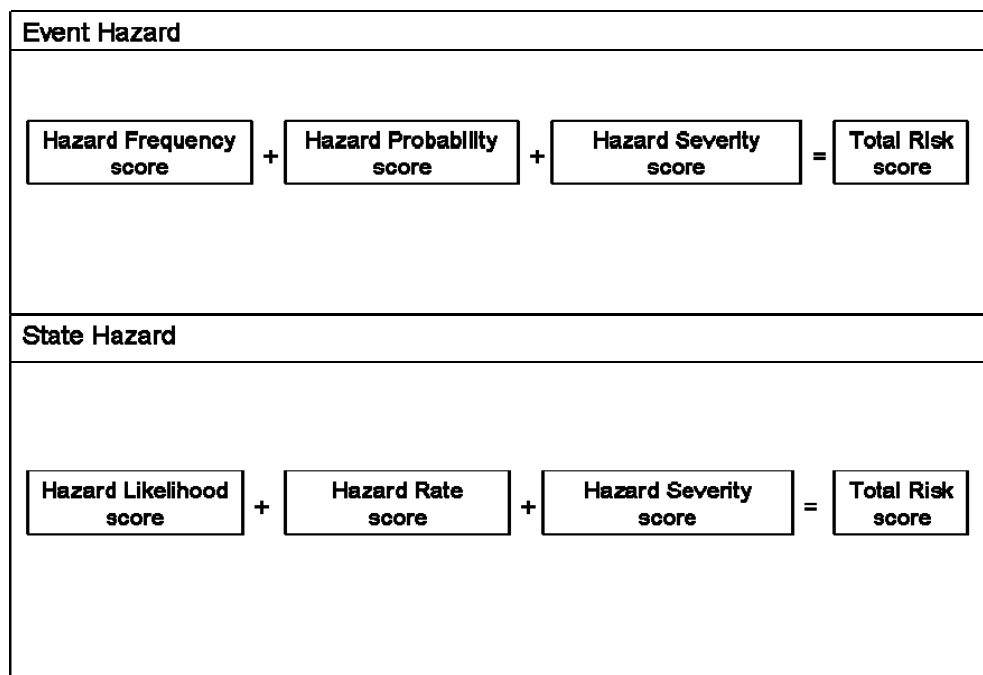


Figure 2-2: Hazard Scoring Parameters

The values that are actually entered into the database for these parameters are known as an 'Index Value'. This can be explained by looking at the Frequency and Likelihood parameters.

The index values used for an Event Hazard Frequency are shown in Table 2.1 below.

| Frequency Classification | Nominal Value: Occurrences/year/mile | Occurrences/year/entire project ¹ | Frequency of occurrence | Index Value |
|--------------------------|--------------------------------------|--|-------------------------|-------------|
| Very frequent | 1,000 | | | 6.0 |
| | 316 | | | 5.5 |
| Frequent | 100 | | | 5.0 |
| | 31.6 | | | 4.5 |
| Probable | 10 | | | 4.0 |
| | 3.16 | | | 3.5 |
| Occasional | 1 | | | 3.0 |
| | 0.316 | | | 2.5 |
| Remote | 0.1 | | | 2.0 |
| | 0.0316 | | | 1.5 |
| Improbable | 0.01 | | | 1.0 |
| | 0.00316 | | | 0.5 |
| Incredible | 0.001 | | | 0.0 |

Table 2-1: Frequency classifications and Index Values

So if an Event Hazard is expected to occur 100 times a year on a mile of motorway (of the scheme), the value that is entered in the database is 5.0. However, if it occurs 10 times a year an Index Value of 4.0 is used.

This 'logarithmic' scale of scoring is used in order to cover the necessary range of values and then present them in a manageable form. An increase of 1 in a score therefore represents a factor of 10 increase in the risk.

Therefore if an Event Hazard has the following Index Values for each of its parameters;

- Hazard Frequency Index Value = 5.0,
- Hazard Probability Index Value = 1.0
- Hazard Severity Index Value = 1.0

Its overall Score is E7.0

¹ This document assumes that the analysis undertaken covers the entire project. However, there may be instances where it would be justified to undertake the analysis of part of a scheme, e.g. where a particular safety challenge has been identified. In this case, the occurrences/year/entire project would be replaced with occurrences/year/section (where the section is the length of the scheme over which the safety challenge applies),

It is often useful to complete the “Occurrences/year/entire project” and “Frequency of occurrence” in the above table, based on the length of scheme being considered, with the “Occurrences/year/entire project” being the product of the “Occurrences per year per mile” and the scheme length, and “Frequency of occurrence” being the inverse (i.e. 1 divided by the value of “Occurrences/year/ entire project”, remembering to use the right units e.g. per year, per day, per hour etc.). Having such numbers available has been found to be helpful when evaluating the frequencies of Event hazards.

The index values used for a State Hazard likelihood are shown in Table 2.2 below.

| Likelihood Classification | Interpretation | Nominal value per mile of motorway | Expected number of occurrences present on scheme | Index Value |
|---------------------------|---|------------------------------------|--|-------------|
| Very frequent | At least 1 occurrence present at anyone time per motorway mile. | 1 | | 6.0 |
| | Present 115 days per year per motorway mile | 0.316 | | 5.5 |
| Frequent | Present 36.5 days per year per motorway mile | 0.1 | | 5.0 |
| | Present 115 days per year per motorway mile | 0.0316 | | 4.5 |
| Probable | Present 3.65 days per year per motorway mile | 0.01 | | 4.0 |
| | Present 1.15 days per year per motorway mile | 0.00316 | | 3.5 |
| Occasional | Present 9 hours per year per motorway mile | 0.001 | | 3.0 |
| | Present 3 hours per year per motorway mile | 0.000316 | | 2.5 |
| Remote | Present 50 minutes per year per motorway mile | 0.0001 | | 2.0 |
| | Present 15 minutes per year per motorway mile | 0.0000316 | | 1.5 |
| Improbable | Present 5 minutes per year per motorway mile | 0.00001 | | 1.0 |
| | Present 90 seconds per year per motorway mile | 0.0000031 | | 0.5 |
| Incredible | Present 30 seconds per year per motorway mile | 0.000001 | | 0 |

Table 2-2: Example of Likelihood Classification of State Hazards and Index values.

State hazards require the table to be completed in the same manner as for Events. “Expected number of occurrences present on scheme” is again the product of the length of scheme in question and “Nominal value per mile of motorway”. Typical entries will include ‘x occurrences present at any one time’ and ‘present for x days per year’, where ‘x’ is calculated each time.

To give an example, if a scheme has a length of 10 miles then the value to enter for an ‘occasional’ hazard will be $10 \times 0.001 = 0.01$ occurrences on the scheme at any one time. To calculate how many days of the year this event is likely to be present, this result is multiplied by the number of days in the year, i.e. $0.01 \times 365 = 3.65$, or about 3.65 days. The entry for “Expected number of occurrences present on scheme” would therefore read ‘Present for approximately 3.65 days per year’.

If a State Hazard has the following Index Values for each of its parameters;

- Hazard Likelihood Index Value = 4.0
- Hazard Rate Index Value = 1.0
- Hazard Severity Index Value = 2.0

Its overall Score is S7.0.

The values used in the Application for Event Hazard Probability and State Hazard Rate are presented in Table 2.3 below.

| Probability that an Event/ Rate at which a State causes collisions | | | |
|--|---|-------|---------------------------------|
| Classification | Events | Value | States |
| | If this hazard occurs then: | | This hazard, if present, will: |
| Certain | A collision is certain | 4 | Definitely causes a collision |
| Probable | A collision is probable | 3 | Frequently causes a collision |
| Occasional | A collision will occasionally happen | 2 | Occasionally causes a collision |
| Remote | There is a remote chance of a collision | 1 | Infrequently causes a collision |
| Improbable | A collision is improbable | 0 | Rarely causes a collision |

Table 2-3: Event Probability /State Rate Index Values

The values used in the Application for Hazard Severity are presented in Table 2-4 below. These values are used for both Event and State Hazards.

| Severity Classification | Interpretation | Person outside of vehicle | Stationary Vehicle | Motorcycle | Car | Large Vehicle (LHV, HGV, Bus) | Index Value |
|-------------------------|---|---------------------------|--------------------|----------------|----------------------------------|----------------------------------|-------------|
| Severe | The proportion of collisions that are fatal is expected to be higher than average by at least a factor of 10 | Involved | Involved | Involved | Speed differential approx 60 mph | Speed differential approx 50 mph | 2.0 |
| Higher than average | The proportion of fatal collisions is expected to be higher than average by a factor between 3 and 10 | No involvement | No involvement | No involvement | Speed differential approx 50 mph | Speed differential approx 40 mph | 1.5 |
| Average | The distribution of collisions (i.e. ratio of damage-only to fatal) is expected to be similar to the motorway average | No involvement | No involvement | No involvement | Speed differential approx 40 mph | Speed differential approx 30 mph | 1.0 |
| Lower than average | The proportion of fatal collisions is expected to be lower than average by a factor between 3 and 10 | No involvement | No involvement | No involvement | Speed differential approx 30 mph | Speed differential approx 20 mph | 0.5 |
| Minor | The proportion of collisions that are fatal is expected to be lower than average by at least a factor of 10 | No involvement | No involvement | No involvement | Speed differential < 20 mph | Speed differential < 10 mph | 0.0 |

Table 2-4: Index values used for Hazard Severity

Note:

- For hazards that apply “Both” ‘before’ and ‘after’ the scheme is implemented, the parameter values refer to the before situation.
- For hazards that apply after an “MM” scheme is implemented the parameters values refer to the situation ‘after’ the scheme has been implemented.

“Both” and “MM” refer to the selections under the “Applies to Scheme” column (See Section 2.1.4)

2.1.7 Notes: Reason for Score

The reasoning behind the individual parameter scores is entered here.

2.1.8 Road User Group

Indicates which Road User Group the Hazard applies to.

2.1.9 Class

Indicates which Class of Hazard the Hazard applies to.

2.2 Risk Scores Worksheet

This worksheet contains a number of features that are described below.

2.2.1 Transferred Data from Hazard Log

The columns shown in Figure 2.3 (overleaf) are taken directly, and automatically, from the Hazard Log worksheet. The ‘Risk Score’ is the sum of the hazard score parameters as described in the previous section and is generated automatically.

| | | Before In | | | | | |
|--------|---|--|----------------|------|------|-----|------------|
| | | Proposed | | | | | |
| Hazard | Description | MM only or applies to both MM and base | State or Event | Freq | Prob | Sev | Risk score |
| H1 | Abnormal loads - escortable | Both | Event | 3 | 1 | 1 | 5 |
| H2 | Abnormal loads - notifiable | Both | Event | 5 | 1 | 1 | 7 |
| H3 | Aborting or pausing LBS1 sequence half way | MM | Event | 0 | 1 | 2 | 3 |
| H4 | Blanking of one gantry when LBS1 open to traffic indicates sudden local closure of LBS1 | MM | State | 0 | 0 | 0 | 0 |
| H5 | Closing sequence overtakes vehicles in LBS1, requiring them to move out of LBS1 unnecessarily | MM | Event | 0 | 0 | 0.5 | 0.5 |
| H6 | Collision with workers doing maintenance from ERAs - verge | Both | State | 4 | 0 | 2 | 6 |

Figure 2-3: Information transferred from Hazard Log Worksheet

2.2.2 Review and Endorsement

The columns shown in Figure 2.4 allow the user to record whether or not the hazard scores have been reviewed and endorsed. This information is not automatically entered. The user must enter the data manually.

| Implementation | | | | | | Relative to |
|-----------------|------|------|-----|-------------------|---------------------------------------|-------------|
| Endorsed | | | | | | |
| Internal Review | Freq | Prob | Sev | Risk Score Before | Increase in Risk relative to baseline | |
| 5 Yes | 3 | 1 | 1 | 5 | -0.2 | |
| 7 Yes | 5 | 1 | 1 | 7 | -0.2 | |
| 3 Yes | | | | 0 | | |
| 0 Yes | | | | 0 | | |
| 0.5 Yes | | | | 0 | | |

Figure 2.4: Reviewed and Endorsed Scores

In the “Increase in Risk relative to Baseline” column the user enters a value for how the ‘before’ scheme hazard risk will change once the scheme is implemented. (Note: There is no entry in this column if the hazard is a ‘new’ hazard that did not exist before the scheme was implemented)

Despite the use of numbers the risk score is at best **semi-quantitative** and does not provide an absolute measure of risk, even approximately. The methodology is designed to place each hazard into one of a number of bands, so that it can clearly be seen which hazards are considered to present the greatest risk.

This approach also facilitates the calculation of risk changes that a project brings about, thus enabling an assessment to be made as to whether a project has achieved its safety objective. In order to complete such an assessment, each (existing) hazard must be reviewed and the impact that the project has on its score considered. By adding together the impact of all such risk changes, the overall change in risk that the project brings is calculated.

This 'before and after' analysis requires that the change to a given hazard, as a result of implementing a project, is quantified to some degree. The smallest risk change so far provided in this risk assessment method is 0.1, which, given the logarithmic scale being used, represents a factor of approximately 20% (See Table 2.5).

| Change in risk score (logarithmic) | Absolute change in risk |
|------------------------------------|---|
| 0.5 | 216% increase in risk |
| 0.4 | 150% increase in risk |
| 0.3 | 100% increase in risk (i.e. doubling of risk) |
| 0.2 | 60% increase in risk |
| 0.1 | 25% increase in risk |
| 0.0 | No change in risk |
| -0.1 | 20% decrease in risk |
| -0.2 | 35% decrease in risk |
| -0.3 | 50% decrease in risk (i.e. risk is halved) |
| -0.4 | 60% decrease in risk |
| -0.5 | 70% decrease in risk |

Table 2.5: Measuring before and after risk changes

Using the changes in risk scores listed in Table 2.5 a hazard's before and after scores can be assessed. It is normal to assess the initial hazard score as being the before situation (the existing situation), and then to consider the change to the hazard score that the scheme brings. Therefore if a hazard is assessed as an E08 before the scheme is implemented, and the assessment concludes that there will be an increase in risk of 25% following implementation, the after score is E08.1 (E08 + 0.1 as 0.1 is the index value that corresponds to a 25% increase in risk). By assessing each hazard in turn in the way described above, the before and after risk scores can be calculated and compared.

However, it should be noted that calculation of a change in risk score is only applicable to Hazards that can occur before and are applicable after scheme implementation.

2.2.3 Hazard Score Applicable to Scheme

In the columns shown in Figure 2.5, the Risk Score after scheme implementation is displayed (automatically calculated from the ‘before’ risk score added to the “Increase in Risk relative to Baseline”). The user can also manually enter the justification for the change in risk.

| Risk After Score | Reason for change in Risk |
|------------------|---|
| 4.8 | Better signaling warning other drivers. Also more lanes available to avoid load |
| 6.8 | Better signaling warning other drivers. Also more lanes available to avoid load |
| 0 | #N/A |
| 0 | #N/A |
| 0 | #N/A |
| 5.8 | Information will be provided to drivers via signs and signals to inform them of maintenance work. However the risk might increase slightly because the decrease in HS width might puts the maintenance workers closer to the live/running lane. However this situation should not arise as the next lane should also be closed to protect workers |

Figure 2.5: After Risk Score and Reason for Change in Risk

2.2.4 Related Incidents and STATS-19

As shown in Figure 2.6, there are two columns towards the end of the worksheet which contain data that is used in charts that are automatically generated from the data (See Sections 2.5 and 2.6).

“Related Incident” is the incident that is most likely to result from the hazard in question. (Note: In some cases a hazard can result in a number of incidents. However, for the purposes of the analysis only one is used, which is considered to be the most likely to result from the hazard.) For example, An Abnormal load is most likely to lead to irregular or non-optimal traffic flow,

| | |
|--|----------|
| Related Incident | Stats-19 |
| I6 - Irregular or non-optimal traffic flow | |
| I6 - Irregular or non-optimal traffic flow | |
| I21 - Vehicles collide on hard shoulder (LBS1) while opening | |
| I25 - Vehicles collide while changing or merging lanes | 24 |
| I24 - Vehicles collide on the hard shoulder (LBS1) while closing | |
| I13 - Vehicle collides with maintenance site / vehicle | 1 |

Figure 2.6: Related Incident and STATS-19

STATS-19 is short-hand for recorded and verified personal injury accident data. (STATS-19 is the form used by the Police in the UK to record these data.) Here the user can record how existing personal injury accidents relate to the various Incident types. In the example above, a user has identified that in the before situation at the location of the proposed scheme, 24% of accidents involve Vehicles colliding while changing or merging while 1% involves vehicles colliding with a maintenance site/vehicle. These data are site specific and must be manually entered by the user. Only one entry is required in the spreadsheet for each relevant incident type.

2.2.5 State to Event Ratio and Cut off Percentage

As shown in Figure 2.7 there are a number of values at the top of the worksheet that can be changed by the user. These affect the overall hazard score for the scheme and how the data is displayed in the various charts described later.

| | | | | |
|-----------------------------------|-------|-------|--------------------|-----|
| State to Event Ratio | State | Event | Cut off percentage | 1.5 |
| | 8 | 8 | | |
| Hazard assessments summary | | | | |

Figure 2.7: Related Incident and STATS-19

As noted in Section 2.1.5 Care should be taken in comparing the risk associated with Events and States, as they are not directly comparable. To overcome this, it is often useful to change the relative weighting between State and Event hazard so that the sensitivity of the result can be gauged. If through testing various combinations the scheme can still be shown to be reaching its safety objective, it can be concluded that the result is robust.

“State to Event Ratio” allows a user to vary the weighting that is given to States and Events in the analysis. As shown in Figure 2.7, A State with score ‘8’ (ie. S08) is equal in weight to an Event of score ‘8’ (E08). By inference an S07 = E07, S06 = S06. States and Events have equal weighting.

If the value under State (in the yellow box) is changed to ‘9’ it implies that an S09 = E08. This actually means that Event hazards are given 10 times more weight than States of the same score. If the value for STATE is ‘8’ and Event is ‘9’ it means that 10 times more weighting is given to State Hazards.

By varying these values it is possible to carry out a sensitivity analysis on the results. This can be recorded in the cells shown in Figure 2.8.

| | | | | |
|------------------------------|------------|------------|------|---------------------------------|
| Total | 5019796182 | 3727533214 | | |
| Change in Risk | | -26 % | | |
| Change in Risk S08 = E09 | | | -31% | Note: Not updated automatically |
| Change in Risk States=Events | | | -26% | Note: Not updated automatically |
| Change in Risk S09 = E08 | | | -23% | Note: Not updated automatically |

Figure 2.8: Recording sensitivity analysis results

The upper-most ‘Change in Risk’ cell is automatically updated and shows the overall change in risk for the scheme before to after. In this case the change is 26% which means that the ‘after’ risk is 74% of the ‘before’ risk.

The lower cells are used to record the results of different weightings applied to States and Events. These need to be entered manually by the user. In this example, in all three cases there is expected to be a reduction in risk.

“Cut off percentage” is used in the charts that are described in the sections below. Each Hazard represents a certain amount of the scheme risk. In order to make the sub-sequent charts easier to read, all hazards that have a risk less than the “Cut off percentage” are amalgamated into an item called “All other Hazards”. By varying the “Cut off percentage” it is possible to identify more easily the hazards that represent the greater proportion of the scheme risk.

2.3 Before to After Worksheet

As shown in Figure 2.9, this shows the overall scheme risk “Before Implementation” of the scheme and “After Implementation”. Note that there is an “All other Hazards” item as described in the previous section.

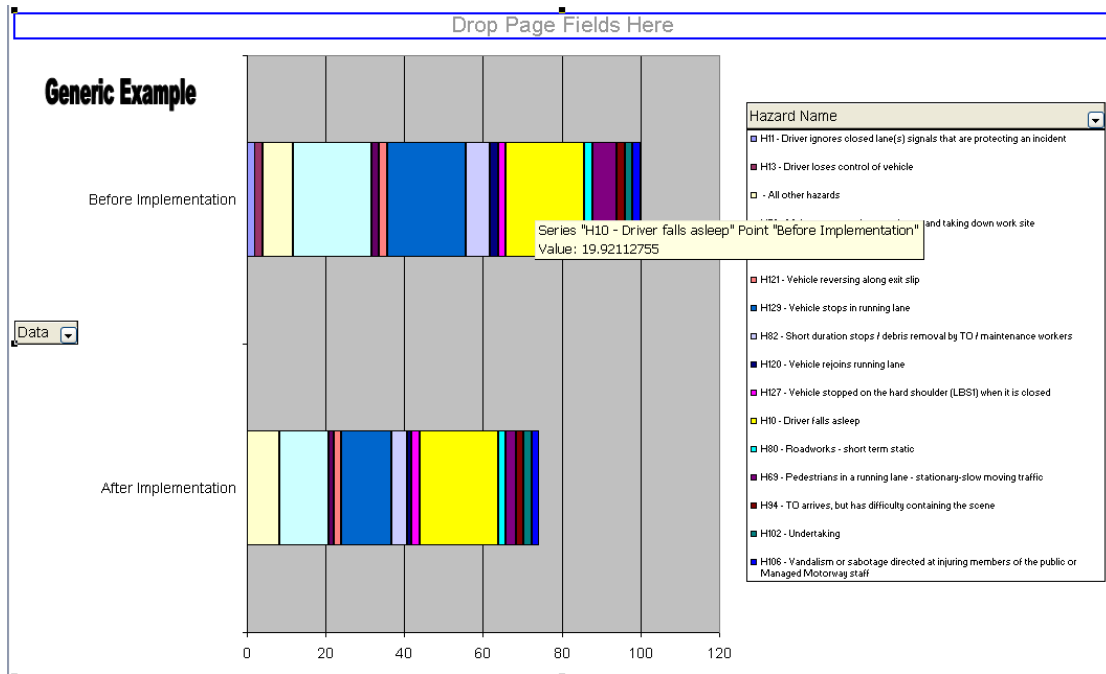


Figure 2.9: Hazard Risk before and after implementation

2.4 Change in Risk – All Hazards Worksheet

As shown in Figure 2.10, this displays the relative change in risk for individual hazards as a consequence of the scheme. The ones with the greatest negative score have had their risk reduced the most as a consequence of the scheme.

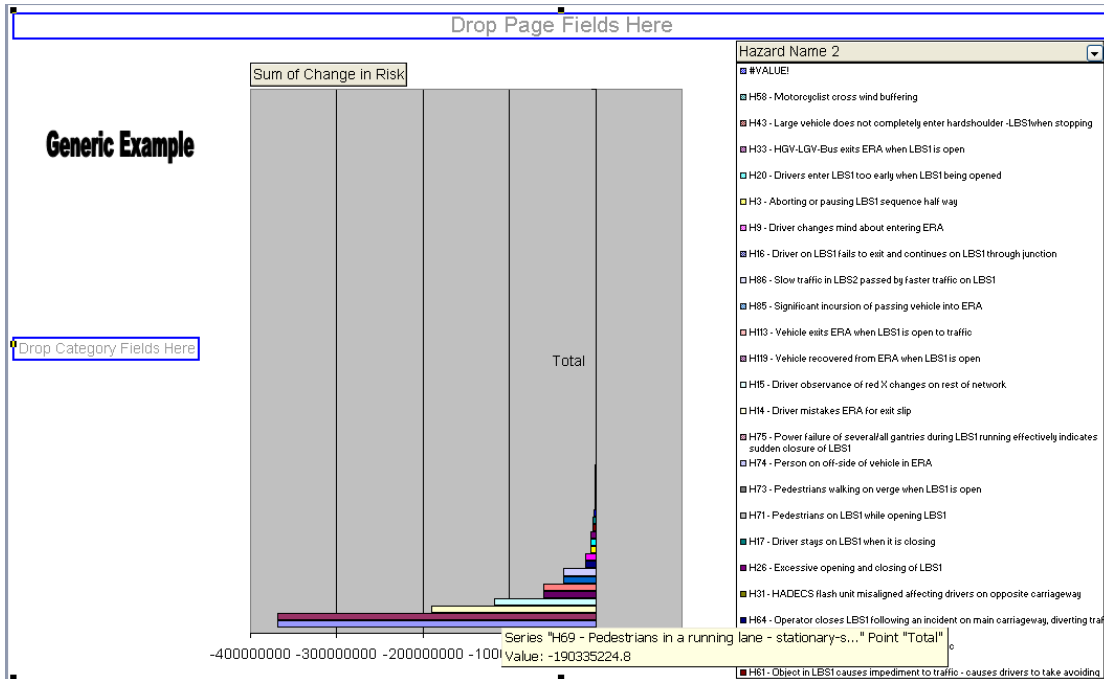


Figure 2.10: Risk Score changes for individual hazards

2.5 Incidents vs Stats19 Worksheet

As shown in Figure 2.11, this worksheet shows two pieces of information:

- The “Before Implementation” distribution with regard to incident types
- The “Stats-19 Data” distribution with regard to incident types

The data in this worksheet is used to check whether the distribution of risk in the ‘before’ situation broadly follows the distribution of risk recorded in the personal injury accident data. Ideally, both distributions should look similar.

(Note: the usefulness of this chart and its significance is still being determined. Refinements in this area will be made)

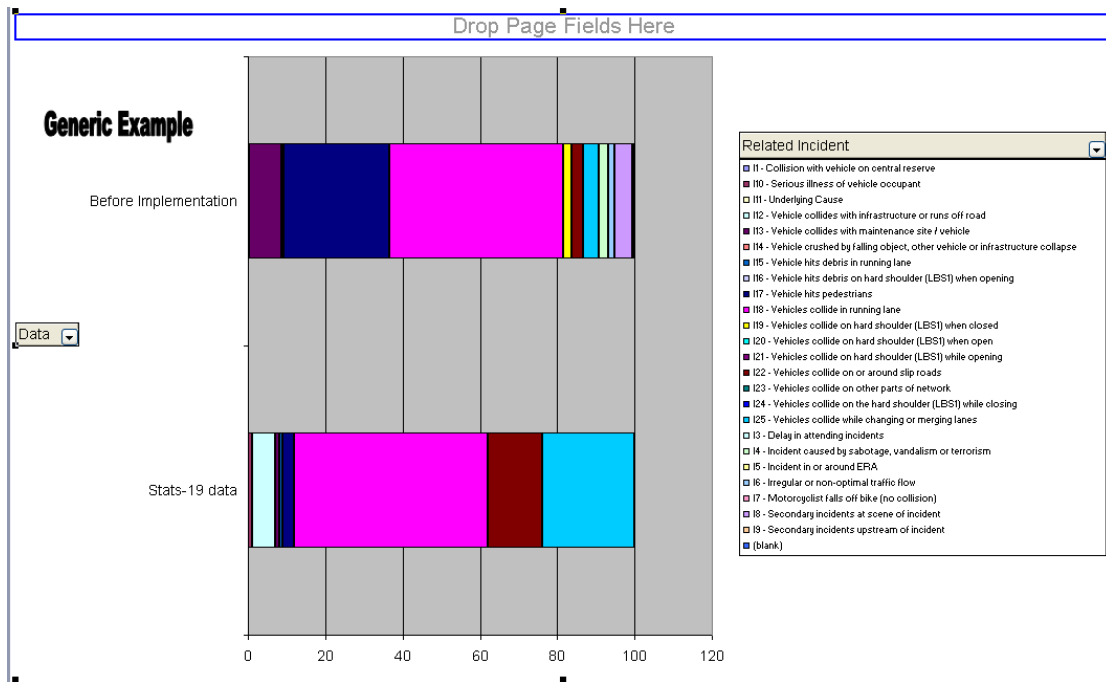


Figure 2.11: Incidents and STATS-19

2.6 Incidents before to After Worksheet

As shown in Figure 2.12, this shows the overall scheme risk “Before Implementation” of the scheme and “After Implementation” with respect to the Incident types.

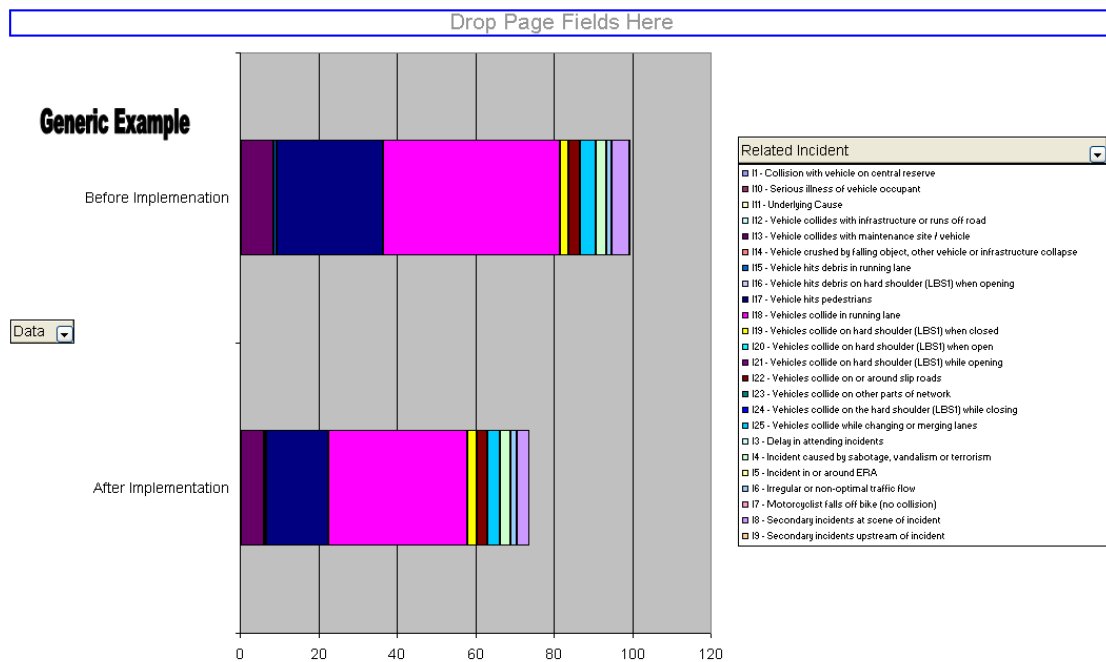


Figure 2.12: Incidents and STATS-19

2.7 Sheet 1 Worksheet

This contains the pivot tables that are used to create the charts.

2.8 Index values Worksheet

Contains tables that describe what the hazard risk score parameter values correspond to. They are the same tables as those presented in Section 2.1.8. These are useful for reference purposes.