

## Middleton Railway Trust Ltd.

### Framework for Risk Assessments – Revision for 2004 Operations.

This document describes the framework within which the railway created its initial (ie January 1994) risk assessment, and within which this has been updated to take account of changes in operating circumstances since then. The role of the risk assessments within the overall process of managing health and safety at the railway is described in a separate document, along with the relationship of these assessments to the other documents referred to within them, such as the operating rules and regulations.

#### Terminology

As in the rules, the term **staff** is used to denote any persons working at the railway in any capacity, whether volunteer, contractor or (possibly at some future time) employee. Other terms are used as follows:

**n hazard** denotes a situation which could endanger the safety of individuals;

**n risk** denotes the likelihood of a hazard arising; and

**n severity** denotes the extent of the damage which might result from a hazard.

It is recognised that this use of risk and severity to denote these two separate aspects is not in strict accordance with some practice for safety-critical systems (cf paragraph 5 of the Approved Code of Practice for the Management of Health and Safety at Work Regulations 1993, "Risk therefore reflects both the likelihood that harm will occur and its severity"). Nevertheless, for this purpose it is considered necessary to have a terminology that makes clear the distinction between these two aspects.

#### Scoring of Priorities

The risk assessments are not formally quantified, but in order to be able to attach priorities to situations identified within them a simple scoring scheme is used, as recommended originally by the Association of Railway Preservation Societies (cf ARPS Information Paper no 23, Risk Assessment), before it became the Heritage Railway Association. In this scheme, both the risk and the severity are given scores in the range 1 to 5, and then the scores are multiplied together to give a measure of how serious that particular hazard is. These ARPS recommendations did not, however, prescribe meanings for the various possible scores, and so the interpretations of them that have been adopted for this assessment are defined as below.

##### *Scores for Risk*

For the risk, the score reflects whether a single failure is sufficient to give rise to the hazard, or whether multiple failures are required, and it reflects the likelihood of an individual failure. In strict quantitative terms the latter ranges over several orders of magnitude, from the least likely (eg a component that exhibits no apparent defects failing under a load that is within normal engineering safety factors, which in principle ought never to happen) to the most likely (eg a slight slip of attention on the part of a human being, which can almost be guaranteed to occur at some time). Thus, the scores for risk can be interpreted roughly as follows.

1 corresponds to a situation where multiple unlikely failures would be required, so that for most practical purposes that hazard could be expected not to arise.

2 corresponds to a situation where either a single failure would be sufficient but would be extremely unlikely (such as where a person could cause the hazard by taking action that would be completely contrary to normal behaviour, and without others being in a position to check their actions), or where multiple failures would be required that are possible but not likely.

3 corresponds to a situation where either a single failure would be sufficient but would be unlikely (such as would require a person to deliberately act in breach of normal operating practice, and without others being in a position to check their actions), or where multiple failures would be required and some of them (such as normal wear and tear on components) would be likely to occur.

4 corresponds to a situation where a single failure would be sufficient, but should not occur under normal circumstances (such as would require a person to accidentally act in breach of normal operating practice, and without others being in a position to check their actions), or where multiple failures would be required and would be likely to occur.

5 corresponds to a situation where a single likely failure (such as an accidental misjudgement by a person, or the effect of normal wear and tear on a component that is subject to a lot of wear) is sufficient to cause the hazard, so that it is reasonable to assume that the hazard will occur from time to time.

##### *Scores for Severity*

For the severity, the score reflects the extent of any damage or human injury that might normally be expected to occur as a result, and in the case of human injuries it reflects whether a small or large number of people might be involved (ie 1 or 2, as against 10 or more). Thus, the scores for severity can be interpreted roughly as follows.

1 corresponds to a situation where a small number might need minor first aid treatment.

2 corresponds to a situation where a large number might need minor first aid, or a small number might need hospital treatment.

3 corresponds to a situation where a large number might need hospital treatment, or a small number might suffer injuries that were reportable but not severe.

4 corresponds to a situation where a large number might suffer reportable injuries, or a small number suffer more severe injuries or death.

5 corresponds to a situation which would be likely to result in multiple deaths or other severe injuries.

### *Overall Scores*

The effect of this scheme is that the higher the overall score, the more serious are the hazards. Given that some of the most unlikely hazards (such as an apparently sound rail fracturing under a train travelling at normal speed) would be the ones that would have the most serious consequences, an overall score of 5 or less does not necessarily denote a situation where the risks can be reduced further. Moreover, because of the approximations made in the scoring system, it does not necessarily follow that a hazard with scores of 5 for the risk and 1 for the severity is as serious as one with scores of 1 for the risk and 5 for the severity: despite the fact that they both have the same overall score, most people would probably regard the latter as more serious, even if in fact it is only potentially more serious.

Nevertheless, the overall scores do represent a broad measure of how serious a hazard is, and in particular any overall score of more than 5 does denote a situation that can be improved, since the score for either risk or severity must be greater than 1. Furthermore, any overall score of 10 or more will represent a situation where on average both risk and severity exceed 3: such a situation should be unacceptable, and improvement of it would need to be given the highest possible priority.

### **Structure of Assessment**

The updated risk assessment has followed the pattern of the initial one, in that it is structured into three parts. The original intention of this structure was to facilitate regular updating of the assessments, and the experience of conducting this revision has been that this aim was achieved. This structure is therefore as follows.

The first part consists of identifying the different hazards, since it is assumed that the basic framework of kinds of hazards which may arise is less likely to change than some of the other details. This basic structure of the hazards is arrived at by considering the various groups of people involved, and the situations in which they could be put at the railway.

The second part then attempts to give a score to each of these hazards, and where appropriate discusses how these scores are justified and indicates ways in which this score might be improved. In many cases, of course, the operating rules and regulations are framed in such a way as to try to eliminate these hazards, or at least minimise the risks associated with them or the severity of them. In developing the original assessment there was some discussion as to whether the hazards posed by the underlying situations should be considered separately from the question of whether the rules and regulations are adequate to reduce their risks to an acceptable level. The view that was taken then of this issue was that these rules and regulations had been based closely on accepted best practice for railway operations, and they had already been approved by the Railway Inspectorate, and so it was considered appropriate to take them as a fixed component of the system being assessed.

For this revision this principle still largely applies, but there have been some amendments made to the rules and regulations, and there has not been any requirement for these to be explicitly approved by the Railway Inspectorate. On the other hand, where such amendments have been made, the basis for them has been a careful consideration of the inherent risks that needed to be controlled, and the likely effectiveness of alternative possible control measures. Thus, where appropriate the adequacy of the rules and regulations to reduce such risks is discussed in this part of the assessment. As part of this, attention has to be paid to the fact that not all situations can be covered by the rules and regulations, and so where necessary this second part also considers how far they apply, and the possibility that an infringement of them could occur, and it examines what effect these factors might have on the risks and the severity.

Finally, the third part consists of a summary and conclusions, identifying groups of hazards which appear from the scores to be significant. On the basis of this, it will also identify those aspects which appear to have the highest priority for future work aimed at further reducing risks.

A. J. Cowling, 22<sup>nd</sup> June, 2004.