1. Purpose of paper

1.1 This paper is part of the Strategic Board Agenda considering the modelled safety risk for the industry. The paper considers passenger risk and safety trends; and some of the ways in which the sources of passenger risk are being tackled.

1.2 The paper provides a brief overview of the key points. Appendices 1 and 2 then provide a more detailed analysis on overall trends and the risk in context. Appendix 3 contains analysis on passenger slips, trips and falls in stations. Finally, Appendix 4 provides a ‘snapshot view’ of some of the ways in which sources of passenger risk are being tackled.

2. Key trends and issues in passenger risk

2.1 The level of passenger harm recorded for 2011/12 was 41.4 FWI (including four fatalities), which is below the ten-year average of 43.1 FWI (8.2 fatalities). The level between April and August this year has been 9% lower than for the same period in 2011/12. There have been no fatalities in this period compared to one in the same period last year.

2.2 The HLOS target for passenger safety is a 3% reduction in risk during Control Period 4 (CP4). The trend in passenger risk to the end of March 2012 is consistent with the requirement of the HLOS target, having achieved a 2.9% reduction to date.

2.3 The UK has amongst the lowest passenger risk\(^1\) of all of the 25 member states of the EU on the basis of recently published National Reference Values (NRVs).

2.4 During 2011/12, there was a 17% decrease from 40.1 to 33.3\(^2\) in the train accident risk to passengers as measured by the Precursor Indicator Model (PIM). Between March 2012 and June 2012, the passenger indicator increased to 39.6; most of this increase was due to a 30% increase in the indicator from infrastructure failures which are the largest contributor to train accident risk to passengers. Further analysis of each indicator within the PIM can be found in the paper on train accident risk.

\(^1\) Only accidents relating to railway vehicles in motion are included; the ERA definition of a passenger used for this comparison differs from that used for the UK.

\(^2\) At the baseline date of September 2006, the passenger PIM indicator stood at 45.2 (with the overall indicator set at the baseline of 100).
3. Overview of key activities the industry is undertaking to address the risk

Station safety

3.1 The Station Safety Improvement Programme (SSIP) is an OFG sponsored initiative; the purpose of the work is to raise awareness of the safety issues that exist at stations on the GB National Railway Network and to promote good practice amongst the station operator community.

3.2 The first stage of the SSIP lasted for one year and is now complete. At the explicit request of the RSSB members on OFG a package of further work is being assembled and will be presented to the November OFG meeting.

3.3 The outputs have been placed on www.opsweb.co.uk for easy access. These include a station safety management plan (adopted by Network Rail at Leeds) and indicators of non-technical skills for train despatch (being adopted at Birmingham New Street).

3.4 Network Rail has placed specific focus on addressing slips, trips and falls at its major stations. An article covering work undertaken at Euston station was included in the first issue of Right Track magazine. Passenger behaviour around escalators was monitored revealing that luggage was a particular problem. To combat this, signage to the lifts was improved and the escalators were switched off outside the morning and evening peak times, thereby encouraging passengers to use the lifts. These actions contributed to a reduction in the number of accidents to zero in the seven months that followed. Around 20 accidents would be expected to occur over this period of time.

3.5 The platform-train interface (PTI) is still an area of concern as accidents in this area account for the largest proportion (40%) of passenger fatality risk. RAIB has investigated three such incidents in the last 12 months – Brentwood, Liverpool James Street and Kings Cross. The investigation reports into the Brentford and Kings Cross accidents have been released. The publishing of the report into the Liverpool James Street accident is to be delayed until after the trial of the train guard.

3.6 The investigation into a passenger falling between the train and platform at Brentwood focused on the actions of the driver and passenger, National Express East Anglia’s risk assessment, driver training and competence assessment processes; and Network Rail’s duty to work with train operators to assess the suitability of platform based dispatch equipment at unmanned stations.

3.7 The investigation into a passenger being trapped in the doors and pulled along the platform at Kings Cross focused on the actions of the train dispatcher and the passenger, the design of the Class 365 train door seal and the actions of the driver following the activation of the passenger communication alarm.
3.8 A Thameslink initiative under consideration by Infrastructure Standards Committee is to develop a standard for a ‘level’ platform. This would have limited application (such as Heathrow Express), but it is important there is only one, common, standard for such platforms. As use of a level platform would also restrict the rolling stock type able to use the route, it must not be seen as a panacea for accidents at the PTI.

**Secure Stations and Safer Parking**

3.9 Secure Stations is a scheme for rewarding station operators, through accreditation by the British Transport Police, for managing security and demonstrating to customers their desire to reduce crime. Safer Parking is a similar scheme, managed by the British Parking Association on behalf of the Association of Chief Police Officers.

3.10 In August 2012, RSSB published the research project T954: *Evaluating measures to improve personal security and the value of their benefits*, was presented to the DIT Public Transport Crime Liaison Group, chaired by Norman Baker, Transport Minister in October 2012. The project evaluated the two schemes and reported the following findings:

- Secure Station accreditation is associated with lower levels of theft from a person (24% lower than stations without accreditation), criminal damage (35% lower) and vehicle crime (36% lower). Safer Parking accreditation only brings additional benefit when combined with Secure Station accreditation. In addition to reducing actual crime incidents, the perceptions of crime risk are improved when the schemes are in place.

- Secure Stations in particular has a significant positive effect on rail demand (7% increase in season ticket holders, 1% increase in non-season ticket holders, compared to stations without accreditation). This increase implies increased revenue to train operating companies from increased patronage.

3.11 The work also quantifies reduction in rates of specific crime types due to specific interventions (for example, the presence of self-service ticket machines being associated with 61% fewer incidences of commercial theft, relative to the absence of such machines). The results have been embedded in a planning tool which can calculate the economic impact of changes made to a particular station based on information entered by the user. This will support the station operator’s case for investment in crime prevention measures at specific locations, and will also allow them to target interventions more effectively towards the crime challenges at those locations.

3.12 There are significant benefits for the Industry and the Department for Transport in taking forward the recommendations from this research.

3.13 The research reports are available on the RSSB website.
Uncontrolled detraining

3.14 There were a number of cases of uncontrolled detraining in 2011/12, involving passengers on stranded and delayed trains, who either forced the doors open or used the emergency release handles to open the doors and alight onto the track. In such cases once the passenger has alighted from the train, they are categorised as trespassers in the statistics. Although there were no fatalities, one of the cases led to a major injury when a person suffered burns after coming into contact with the conductor rail near South Croydon on 4 June 2011. There was a further case on 5 May 2012, when two passengers (one of whom suffered minor injuries) alighted from a train after the passenger communication alarm was activated.

3.15 In May 2012, RAIB published an investigation into an incident between St Pancras and Kentish Town stations on 26 May 2011. The incident involved a train that was stranded for nearly three hours, during which time a number of passengers alighted the train. The investigation found that not all options for evacuating passengers had been considered or briefed to the relevant staff. There had also been very little communication with passengers during the incident because the public address system had failed. Recommendations focused on the process for emergency preparedness, the development of a set of principles for dealing with stranded trains and ensuring safety lessons are captured, tracked and shared.

3.16 ATOC and Network Rail have produced a good practice guide on the planning for and implementing arrangements to meet the needs of passengers in the event of the train in which they are travelling becoming stranded.

4. Reporting scope

4.1 When an injury occurs on NRMI, the exact characteristics of the event determine how it is categorised for reports and analysis purposes. RSSB has had a dialogue in the past year with Network Rail as to the categorisation of some events, including whether the injury that occurred is within industry’s reporting scope at all. Examples of such events include the fatality that occurred outside a station following a verbal assault starting inside that station, and a fatality of a person jumping from railway infrastructure to a public road while engaged in fare evasion. Work is underway to review the reporting scope and ensure it is coherent and consistent. Any changes in classification may lead to the need for reclassifying events currently in SMIS.

5. Recommendations

5.1 The board is invited to:

- **CONSIDER and DISCUSS** the key points identified in this paper.
- **CONFIRM** that they are content that they have reviewed and considered the significant items of passenger safety risk that impact on the industry and are satisfied with the overall arrangements to control the risk.
Appendix 1. Passenger risk profile and trends

Based on SRMv7\(^3\) the risk to passengers on NRMI is 52.0 FWI per year, or 37% of the total FWI risk of 140.9. The rest of the total risk is to members of the public (44%) and the workforce (19%). The passenger fatality risk is 10.4 fatalities per year of the total fatality risk of 70.7 with members of the public at 55.9 and workforce at 4.4 fatalities per year.

The top three contributors to passenger risk are slips, trips and falls, incidents at the PTI, and assault and abuse.

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\(^3\) The SRM which is now at version 7 has been used extensively by the industry since 2001. The development of the SRM is governed by the cross industry SRM Practitioners Working Group which reports to the Safety Policy Group. The SRM has been subject to four external peer reviews over its life. The majority of the data used in the SRM is derived from the Safety Management Information System (SMIS). The data in SMIS is subject to the RSSB/industry data quality health check programme.
Chart 2 shows that the level of harm recorded for 2011/12 was lower than the previous year and below the average for the last ten years. There were four fatalities, which is the lowest number of passenger fatalities recorded in the period.

So far in the year 2012/13, the overall level of harm has been 9% lower than for the same period in 2011/12, however harm from slips trips and falls increased by 3%. There have been no fatalities in this period compared to one in the same period last year.

Chart 2. Trends in passenger harm
Appendix 2. SSP trajectories, HLOS Target and European benchmarking

1. SSP trajectories

The 2009-2014 SSP defines three trajectories that are related to passenger risk from individual accidents. Performance against the trajectories is measured by comparing SRMv6.5 risk estimates (March 2009), SRMv7 risk estimates (March 2011) and the interim methodology for 2011/12. Details on the assessment methodology can be found in the ASPR 2011/12. The progress against the trajectory related to slips, trips and falls in stations satisfies the trajectory range, although the risk at the end of 2011/12 is higher than at the start of CP4. Progress satisfies the SSP trajectory for boarding and alighting accidents, but does not satisfy the trajectory for other platform-edge accidents.

2. Passenger HLOS Target in the context of SSP Trajectories

The High Level Output Specification (HLOS) target for passenger safety is a 3% reduction in risk during Control Period 4.

Because the target covers a wide range of risks in one measure, there is value in examining the contribution from various risk areas – see Chart 3. It can be seen from the chart that the trend in passenger risk to the end of March 2012 is consistent with the requirement of the HLOS target. Progress in train accidents is assessed in the interim measure by examining the PIM. For the other risk contributors, the risk is categorised according to the trajectories set out in the 2009-14 Strategic Safety Plan.

Chart 3. Progress against HLOS target for passenger risk (FWI per billion passenger km)
3. European benchmarking

The European Railway Agency (ERA) assesses the safety performance of European railways against a set of Common Safety Targets (CSTs) and state-specific National Reference Values (NRVs).

Chart 4. Passenger and workforce fatality rates on European Union railways 2007-2010

- Passenger and workforce fatality rates in the UK were well below the EU average over the four-year period 2007-2010. The ERA uses data from a rolling four-year period to assess performance against the NRVs and CSTs.
- The countries with similar rates to the UK include the Netherlands and Scandinavian countries.
- In general, countries in northern and western parts of Europe have safer railways than those further south and east.
- A single multiple fatality accident can have a significant effect on the accident rate, especially for smaller countries such as Belgium, where 18 people were killed in the crash between two commuter services at Halle, near Brussels, in February 2010.
- Table 1 shows that the UK ranks highly among the 25 EU countries across all NRVs.

<table>
<thead>
<tr>
<th>NRV Category</th>
<th>NRV Number</th>
<th>NRV rank in EU 25</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passengers</td>
<td>NRV 1.1</td>
<td>1</td>
</tr>
<tr>
<td>Employees</td>
<td>NRV 1.2</td>
<td>1</td>
</tr>
<tr>
<td>Level crossing users</td>
<td>NRV 3.1</td>
<td>1</td>
</tr>
<tr>
<td>Others</td>
<td>NRV 4</td>
<td>n/a</td>
</tr>
<tr>
<td>Unauthorised persons</td>
<td>NRV 5</td>
<td>5</td>
</tr>
<tr>
<td>Whole society</td>
<td>NRV 6</td>
<td>2</td>
</tr>
</tbody>
</table>
Appendix 3. Passenger slips, trips and falls in stations

Of the 52.0 FWI per year faced by passengers on the railway, around 40.0 FWI (78%) is due to injuries to individual passengers in stations. A small amount of the train accident risk to passengers also occurs in stations such as buffer-stop collisions, and other train accidents that cause harm in stations. This arises from events such as at Potters Bar in 2002.

Chart 2 in Appendix 1 shows that slips, trips and falls make up the largest proportion (58%) of risk in stations, with 23.4 FWI per year. Harm from slips, trips and falls has increased since 2009/10 and was slightly higher in the first five months of 2012/13 than the same period in the previous year.

Over the last five years, the greatest proportion of harm from slips, trips and falls in stations occurred on stairs, with platforms being the next most common location. There was an increase in harm from accidents occurring on stairs in 2011/12. The research project T992 Safer stairs in public places is in progress and would apply 'lessons learned' to the management of premises, to reduce the number and severity of accidents on stairs and, in consequence, reduce compensation and legal costs.

The overall level of harm on escalators is lower than stairs and platforms, however it is higher than expected when the low number of escalators in use on the railway network is considered. In four out of the past five years, falls on escalators led to the death of a passenger. In all cases, the person was elderly. The following pages contain more detailed analysis on passenger slips, trips and falls on stairs and escalators.
Slips, trips and falls on stairs and escalators

Passenger characteristics can be analysed to better understand slips, trips and falls on stairs and escalators.

Profile of passengers involved in slips, trips and falls

All of the passengers involved in fatal accidents on escalators since 2002/03 have been elderly. The chart below analyses the age profile of all passenger slip, trip and fall injuries occurring on stairs, escalators and all other locations.

![Chart 5. Age profile of passenger slips, trips and falls by location 2002/03-2011/12](image)

- The proportion of slip, trip and fall injuries on escalators involving older passengers is much higher than on stairs, which show a similar profile to all other locations. Seventy-one percent of slip, trip and fall injuries on escalators involve passengers over the age of 50, 35% involve those over 70. On stairs or at other locations, the corresponding proportions are lower, at around 40% and 15%.

- Considering the relatively low number of passengers over the age of 70 that travel on trains, the proportion of slip, trip and fall injuries on escalators is even more skewed towards the elderly.

- There is also a difference in the proportions of males and females being injured on stairs and escalators. Generally on stairs, as with other locations, more females are injured; on escalators the proportions are more equal.

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4 As there is known to be a difference in reporting levels between men and women, only Class 1 minor injuries were analysed. When looking at the age profile, there was little difference between Class 1 minor injuries and all injuries.
Causes of slips, trips and falls

The profile of causes of slips, trips and falls differs depending on where the event has occurred.

- The cause of the majority of slips, trips and falls on stairs and escalators are not specified. In most of these cases, the passenger has stated that they ‘missed their footing’ or ‘lost their balance’. This type of injury is especially common amongst the elderly.

- Where the cause of the event has been specified, the profile is different between stairs and escalators. The principal specified causes for accidents on stairs in order of frequency are running, being intoxicated, and the surface of the stairs being contaminated. Contamination includes rain water and drink spillages, for example.

- This contrasts with the principal specified causes of accidents on escalators, where a much smaller proportion of accidents are caused by running and surface contamination (as generally passengers stand on escalators, which are normally sheltered from the weather), and a larger proportion of accidents caused by intoxication, objects (such as luggage), and ill health.

- At other locations, there is a much smaller proportion of unspecified causes of slips, trips and falls. Surface contamination has caused 24% of the accidents at locations other than stairs and escalators. There is a more even spread of other specified causes such as running, intoxication, objects, ill health and uneven surfaces.

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Chart 7. Causes of slips, trips and falls on stairs and escalators 2002/03-2011/12

<table>
<thead>
<tr>
<th>Cause</th>
<th>stairs (8995 injuries)</th>
<th>escalators (5097 injuries)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other/unspecified cause</td>
<td>58%</td>
<td>58%</td>
</tr>
<tr>
<td>Ice/snow</td>
<td>16%</td>
<td>7%</td>
</tr>
<tr>
<td>Object</td>
<td>7%</td>
<td>3%</td>
</tr>
<tr>
<td>Overcrowding</td>
<td>11%</td>
<td>19%</td>
</tr>
<tr>
<td>Running</td>
<td>4%</td>
<td>5%</td>
</tr>
<tr>
<td>Surface contamination</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Uneven surface</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Intoxication</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Ill health</td>
<td>1%</td>
<td></td>
</tr>
</tbody>
</table>

Chart 8. Causes of slips, trips and falls at all other locations 2002/03-2011/12 (13,205 injuries)

<table>
<thead>
<tr>
<th>Cause</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other/unspecified cause</td>
<td>26%</td>
</tr>
<tr>
<td>Ice/snow</td>
<td>4%</td>
</tr>
<tr>
<td>Object</td>
<td>8%</td>
</tr>
<tr>
<td>Overcrowding</td>
<td>13%</td>
</tr>
<tr>
<td>Running</td>
<td>10%</td>
</tr>
<tr>
<td>Surface contamination</td>
<td>24%</td>
</tr>
<tr>
<td>Uneven surface</td>
<td>10%</td>
</tr>
<tr>
<td>Intoxication</td>
<td>5%</td>
</tr>
<tr>
<td>Ill health</td>
<td>10%</td>
</tr>
</tbody>
</table>
Appendix 4. Detailed breakdown of risk to the passenger risk and ‘snapshot view’ of some of the ways in which sources of passenger risk are being tackled.

### Risk from

#### Type of event

<table>
<thead>
<tr>
<th>Event</th>
<th>Failures</th>
<th>FWI</th>
</tr>
</thead>
<tbody>
<tr>
<td>In stations</td>
<td>Burns; Manual handling; Slips, trips and falls; Platform train interface accidents</td>
<td>5.15</td>
</tr>
<tr>
<td></td>
<td>Falls from platform or in platform areas</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Falls from falls on to/from trains/road vehicles</td>
<td>0.65</td>
</tr>
<tr>
<td></td>
<td>Falling objects from platform or in platform areas</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Track worker</td>
<td>1.18</td>
</tr>
<tr>
<td></td>
<td>Part of vehicle</td>
<td>0.25</td>
</tr>
<tr>
<td></td>
<td>Parts of vehicles</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>Signal equipment</td>
<td>0.01</td>
</tr>
<tr>
<td></td>
<td>Station staff</td>
<td>0.94</td>
</tr>
<tr>
<td></td>
<td>Trains</td>
<td>0.84</td>
</tr>
<tr>
<td></td>
<td>Train crew</td>
<td>0.24</td>
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</table>

#### Failures

- Burns; Manual handling; Slips, trips and falls, Platform train interface accidents
- Falls from platform or in platform areas
- Falls from falls on to/from trains/road vehicles
- Falling objects from platform or in platform areas
- Track worker
- Part of vehicle
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- Part of vehicle
- Parts of vehicles
- Signal equipment
- Station staff
- Trains
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