

RESTRAIL

REduction of Suicides and Trespasses on RAILway property

Collaborative project

**Evaluation of measures, recommendations and
guidelines for further implementation**

Pilot test #6

Mid-platform fencing – U.NOT

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List of Beneficiaries			
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1	Union Internationale des chemins de fer	UIC	FR
2	Teknologian Tutkimuskeskus VTT	VTT	FI
3	Trafikverket - TRV	TrV	SE
4	Institut français des sciences et technologies des transports, de l'aménagement et des réseaux	IFSTTAR	FR
5	MTRS3 Solutions and Services LTD	MTR	IL
6	Fundación CIDAUT, Fundación para la investigación y Desarrollo en Transporte y Energia	CIDAUT	ES
7	Helmholtz Zentrum München Deutsches Forschungszentrum für Gesundheit und Umwelt (GmbH)	HMGU	DE
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Acronym	Meaning
ADIF	ADministrador de Infraestructuras Ferroviarias
ERA	European Rail Agency
BTP	British Transport Police
CAEX	CAPital Expenditure
CBT	Computer Based Training
CCTV	Close-Circuit TeleVision
CN	Canadian National
DOW	Description Of Work
FFCCTV	Forward Facing Closed-Circuit TeleVision
GDL	German Drivers Leasing
HMTreasury	Her Majesty's Treasury
IM	Infrastructure Manager
IP	Important Point
IT	Information Technology
NPV	Net Present Value
OPEX	OPeration Expenditures
OTDR	On Train Data Recorder
PIER	Program in Interdisciplinary Education Research
2RProtect	Rail and Road Protect
RAILPOL	European Network of RAILway POLice Forces
RSSB	Rail Safety and Standards Board
RU	Railway Undertaking
SMIS	Safety Management Information System
SPSS	Statistical Package for the Social Sciences
STS	SysTemS
SWOV	Institute for Road Safety Research
TCRP	Transit Cooperative Research Programme
VAS	Visual Analogue Scale
VPC	Values of Preventing a Casualty
VT	Value of Time
CBA	Cost Benefit Analysis
CEA	Cost Effectiveness Analysis

1.1 Mid-platform fencing – U.NOT

1.1.1 Overview of the piloted measure

Mid-platform fencing (fencing along the centre line of island platforms) prevents access to fast lines where trains are not scheduled to stop. The measure therefore only targets those who choose fast lines and non-stopping trains for the purpose of suicide. There are situations where passengers will need access to trains on the fast lines (to get on / off trains at peak times or for unscheduled stops), therefore it is necessary to include closable (sometimes lockable) gates along the length of the platform, in the design of the fence. This type of fencing has been implemented at a number of stations in GB by Network Rail. In addition, this measure is often supplemented by the provision of additional fencing to restrict access to fast lines at the stations, either at lone platforms that are used rarely by stopping trains or at the platform end ramps.

This field test focused on three pilot areas in GB around London, including 51 stations (20 on the Western route, 23 on the London North West route and 8 on the Sussex route). Access has been restricted through mid-platform fencing at 23 of these stations as part of recent programmes of suicide prevention. Access to fast lines is restricted to some degree at 17 additional stations (the different types of restrictions will be described in this report). There are no restrictions on access to fast lines at 11 stations. There are a wide range of factors that can influence the numbers of incidents at these stations. This pilot test therefore aimed to collect evidence about the potential outcomes from implementation of measures to restrict access to the fast lines. Of equal importance to the evaluation, detailed, descriptive evidence has been collected on the implementation of the fencing at stations.

1.1.2 Methodology to evaluate the piloted measure

The evaluation addressed the following questions:

- Does installing mid platform fencing lead to a reduction in suicides on the rail network?
- How has the programme been introduced and implemented at the target locations (e.g. including progress with implementation of the programme, variations in levels of implementation, whether it has been implemented as it was intended)?
- Does installing mid platform fencing lead to other positive or negative operational impacts on the railway (e.g. a reduction in disruption caused by rail suicides on the rail network; impacts on passenger flows or movements on the platform, passenger satisfaction of the platform environment)? Are there any intended and unintended outcomes and any unexpected benefits or problems?
- Does the intervention work in relation to specific situations or contexts, or for certain groups of individuals (e.g. age, gender)? Does it work for some rather than others? Does it reach the target group?
- Are there changes in numbers of incidents? If so, can these be attributed to the intervention or are there other factors (including other interventions) that could have influenced the outcomes?
- Which factors contributed to the success (or not) of the programme?
- What obstacles have been identified and how have these been overcome?
- Is there anything that could have been done to improve installation?

A logic map, given in full in **Figure 1.1-1**, has been created following the guidance of Hills (2010), to help with structuring the collection and analysis of data for this evaluation. The map clarifies the overall objectives of the mid-platform fencing intervention and the context in which the intervention is implemented. Important steps that are thought to be needed to realise the objectives of reducing suicides on fast lines and unauthorised access to these fast lines are outlined. These steps are described as a series of inputs, outputs, outcomes and impacts, as defined and explained by Hills (2010).

The logic map covers a wide range of issues and highlights the opportunities for the collection of the data that are needed to establish links that are implied within the logic of the diagram. Each of the components of the map has been coded (A1-D3), to enable cross-referencing with more detailed tables of data and explanatory information.

This type of logic map has been valuable in setting out the different aspects of the rail environment and the organisational and individual factors that are important in understanding how mid-platform fencing can contribute to the reduction of the problem of rail suicide. The map is a useful resource that can be used to identify gaps or opportunities to enhance aspects of the evaluation (e.g. refining the analysis by using the logic within the mapping to prescribe new searches for data to establish how fencing may impact on the prevention of rail suicide and trespass).

The evaluation focused on the collection and analysis of three types of data:

- Statistical data on incidents;
- Descriptive data on stations and the details (dates and types) of different fencing interventions (including descriptive data on the process of implementing the intervention);
- Information on stakeholder perceptions of the intervention from interviews and other relevant sources (e.g. analysis of content from an on-line rail forum).

A detailed account of the method for collecting and analysing the different data for the evaluation has been given in the RESTRAIL D5.1 (Kallberg, Plaza, Silla, García et al, 2014). The following sections contain an overview of the main data types that have been used within this evaluation and the general details of the methods of data collection and analysis.

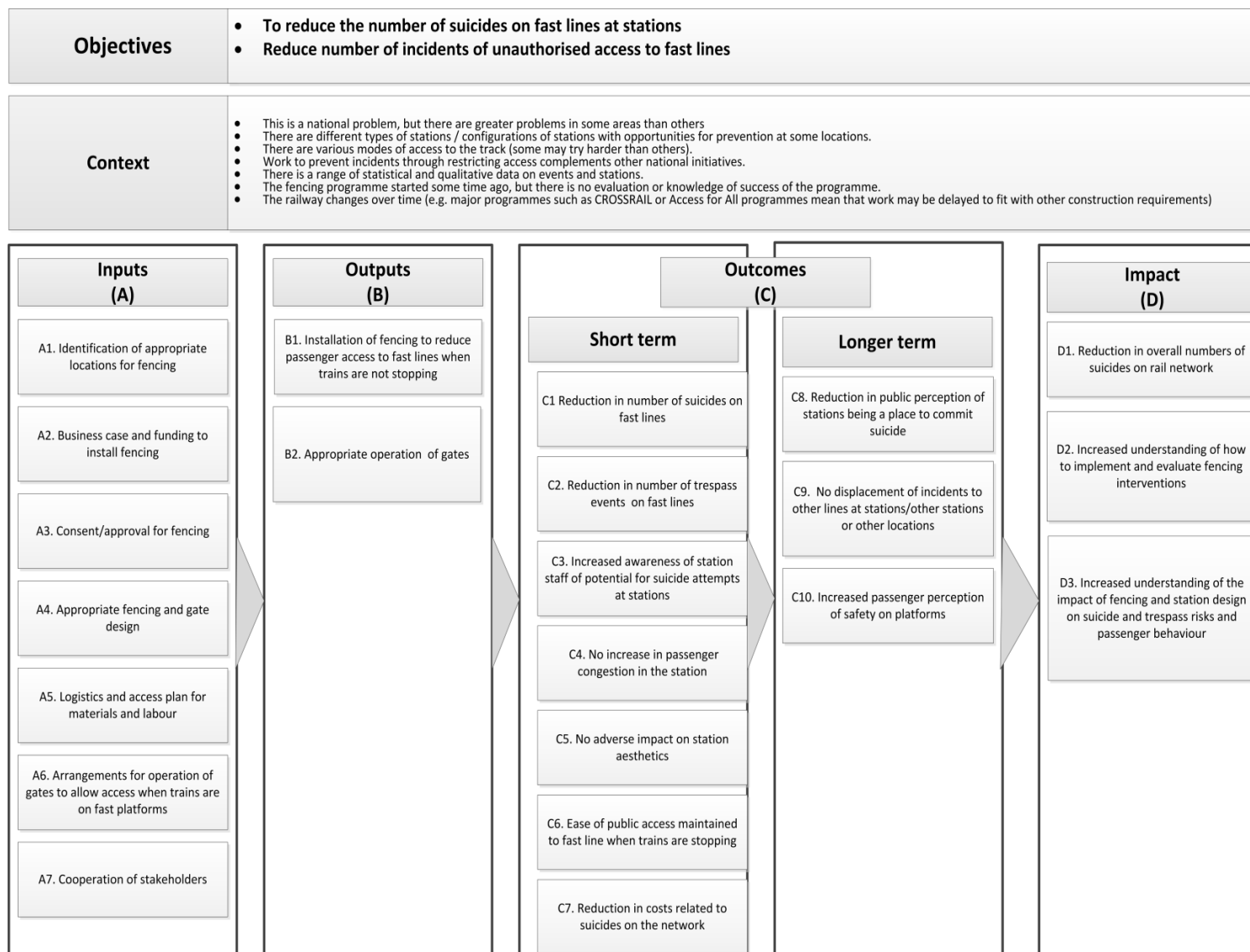


Figure 1.1-1: Logic map for the evaluation

Statistical data on incidents (results are reported in section 4.6.4.1, below)

It was intended that the evaluation would attempt to produce preliminary estimates of the effect of restricting access to fast lines through mid-platform and associated fencing. It was acknowledged at the outset that it would be difficult to demonstrate significant changes in the numbers of fatalities over the course of the monitoring period, because of the relatively small numbers of incidents and the likely variability in the incidents at any particular location. The period of monitoring after the implementation of the fencing was also short, ranging from the introduction of fencing within the last year for many stations, to as many as 5 years ago for two stations. There were also stations within the pilot areas where access has been restricted to fast lines for many years, due to the design and configuration of the station. For example, there are some pre-existing fences between fast and slow lines. In some locations fast and slow lines are separated by distance or in others the configuration of the station buildings may restrict access to the fast lines. It was therefore possible to look in more detail at the different characteristics of these stations to see how the restriction of access to fast lines, over a longer period of time, could influence the numbers of incidents on fast and slow lines at these locations.

The analysis of the potential impact of the restriction of access to fast lines used data on incidents over a period of approximately 20 years from the industry safety management system (SMIS). This was supplemented by incident data that were held by staff in each of the pilot test routes (e.g. event review forms and performance review reports were available for some recent incidents). This type of evidence was used to clarify the specific locations of incidents (especially the line on which the incident occurred) and other details of the event.

This analysis therefore covered the periods before and after the provision of fencing and any other interventions at many of these stations. These data have been reviewed, classified and analysed to produce descriptive statistics for a range of variables that are relevant to the type of event, location and circumstances associated with the event. These include mean values across the three routes, upper and lower limits to show the range for each data type across the three areas in the pilot test areas).

Descriptive data on stations and the details of different fencing interventions (results are reported in section 4.6.4.2, below)

It was important to consider that there are a range of local circumstances and other preventative measures in place that could impact on the numbers of incidents at stations. Detailed descriptive evidence was therefore collected about the stations in the trial areas and the implementation of the fencing (including the layouts and configurations of stations, other preventative measures at the stations, the extent to which the fencing has been implemented in each of the three railway routes, descriptions of the process of implementing the fencing, and factors affecting implementation of the fencing).

Data were collected from the following:

- reports and documents (design documents, plans, consultancy, period end summaries etc.);
- consultation with route based staff / programme staff at each of the pilots.

The evidence was collated to produce text based descriptions for each station. Summaries were produced and included within tables to enable comparisons on the following categories of information:

- Incident history (dates, locations / lines, descriptive details of incidents where available)
- Preventative measures – fencing (including mid-platform fencing, dates of implementation and other fencing or the means of restricting access to the fast lines)
- Preventative measures – other (summarised in text, and in a tabular format to enable comparisons)
- Descriptions of layouts and configurations of platforms / lines
- Station characteristics / station operation (staffing, opening times, management of stations, other operational aspects such as passenger movement)
- Local area / socioeconomic details (provided for a small sample of stations by local staff and from reports from British Transport Police for several stations)
- Train services (including numbers of stopping and non-stopping trains, summarised within tables)
- Footfall, passenger numbers.

Descriptive content and diagrams from rail industry documents were used to produce simplified schematic diagrams. These were produced to illustrate important features of the configuration of stations (platforms and line descriptions), as well as the types of restrictions to access to fast lines that have been introduced in the recent fencing programmes (or other restrictions as a result of the historic design and construction of the station and infrastructure).

Descriptive data on the implementation of the fencing interventions (results are reported in section 4.6.4.3, below)

Descriptive data have been collected on the process of implementing the mid-platform fencing (results are reported in Section 4.6.4.3, below). This was largely based on the information that was provided by representatives from one of the routes (Western), but also included review of some programme documentation from the other two routes (LNW, Sussex). This included the following:

- review of content from design documents, architectural plans and consultancy reports;
- review of monthly reports (period end summaries) on progress with different phases of the work at stations;
- consultation with route based staff / programme staff;
- interviews with a small sample of staff involved in the development and implementation of the mid-platform fencing programmes.

Analyses have been conducted to identify important elements of the implementation process and to record relevant timings (the start and end points of different phases of the process, where the content of reports would allow this) for the progress of the work across the 10 stations where mid-platform fencing has been installed within this route. A summary diagram, plotting the progress with different phases of the programme has been prepared from the data from this route.

Linking data on incidents at or near stations to details of the restriction of access (the results of this analysis are reported in section 4.6.4.4, below)

Data on fatality incidents (collated in work that has been reported in 4.6.4.1) were combined with information on interventions at stations (section 4.6.4.2). Tables were constructed to display the fatality incidents on each line at a station by year (from 1994-2014). The dates of fencing interventions were also recorded within these tables.

Collecting data on what people think of the mid-platform fencing intervention (results are reported in section 4.6.4.5, below).

Data on the perception of stakeholders have been collected by two methods:

- interviews with route based staff from Network Rail and train operating companies (programme management and operational staff) at each of the pilot areas;
- collection and analyses of content from an on-line rail forum.

An overview of the questions that have been used in the interviews has been given in the methodology deliverable (Kallberg, Plaza, Silla, García et al, 2014).

The RailUK Discussion Forum (<http://www.railforums.co.uk>) allows people with common interests to debate and share certain information, questions and opinions. Several discussion threads on “suicide” and “fencing” were identified, also covering topics such as yellow cross-hatched lines on platform edges and Samaritans’ posters. For this study, discussion threads related directly to the installation of mid-platform fencing over the past 24 months were reviewed. No demographic information is available about the forum membership, though it is obvious from reading these discussions that a large proportion are employed in rail related positions including train drivers, station staff and management or are regular commuters and/or rail enthusiasts.

Content from the interviews and the rail forum have been analysed using theme based analysis to identify a range of issues in the design, implementation and use of the fencing.

Drawing together findings from all parts of the evaluation

The theory based approach (Hills and Junge, 2010; HM Treasury, 2011) has been used to draw together finding from different parts of the analysis, to understand whether the intervention has worked, why it has worked and under what circumstances it has worked. This is reported in section 4.6.4.6.

1.1.3 Reported costs for measure

Reported costs for this measure implemented are given in **Table 1.1-1**.

Table 1.1-1: Costs associated to Mid-platform fencing at stations for the prevention of rail suicide

Cost	Nature	value
Mid-platform fencing (fencing including design, fitting, provision of access gate)	Fencing	£400-450 / m
fencing if electronic locking is provided		up to £10000 /m
platform end fencing, gates and floor grids		£5000-10000 /platform
signs		£25 / each
poster frames		£433 / each
CCTV to monitor vulnerable locations		£7400
LNW route	10 stations (40% materials; 60% labour)	£1000000 (1 280 902 €)
Sussex route	5 stations (40% materials; 60% labour)	£362500 (464 327 €)

(Sept 2014) 1 livre britannique (GBP) = 1.2809017548354 euro (EUR)

1.1.4 Evaluation results

The results from analysis of different data types from the evaluation study are summarised in separate sub-sections, below.

4.6.4.1. Descriptive statistics on incidents (including comparisons across routes)

The analysis of data on incidents in the vicinity of each station on the three pilot areas has been important in determining the history and nature of incidents (e.g. when and where incidents have occurred in the past). This has produced useful baseline information that can be used for the investigation of the potential for reduction of incidents after an intervention. The findings can be

used to understand the characteristics of each of the areas that have been included in the pilot tests, including judgements on how far it is possible to generalise with the findings to the wider population of stations in GB (or more widely in Europe).

The analysis has produced statistics on the following:

- Numbers of different types of incidents (e.g. suicide, trespass fatality, attempted suicide), in various locations (e.g. such as stations, whether incidents are at or outside stations, the line of incident, access points),
- Time of the event (day, month, year, time of day, classification of lighting conditions such as daylight or dark, whether peak or off-peak),
- Individual data (sex, age, mental health, social or other problems)
- Other data types (whether there are witnesses to the event, delay time and costs – where available)
- Issues at particular locations (examples of patterns of incidents at specific stations, notable incidents)
- Immediate and pre-cursor behaviours of people involved in incidents.

There were a range of different incident types (e.g. suicide, accidental fatality, attempted suicide). All fatalities, except those that have been given a clear accident classification (and which are likely to be of a different nature to rail suicide events), were selected for further study in this part of the project. The analysis therefore included open verdicts, narrative verdicts and a very small number of cases in which the cause is not known. This investigation is focusing on understanding as much as possible about the potential for preventive suicides. Whilst a small number of these fatalities have not been classified as suicides officially, there are aspects of the events (e.g. similar prior behaviours and similar modes of access to the railway) that are relevant to understanding how to improve the prevention of rail suicide related events, even if there has not been a clear determination of the intention to commit suicide in these situations.

It was clear that there were some differences in recording of data by route. For example, the numbers of attempted suicide events were much higher on one route than the other two routes. This is likely to be explained by differences in recording practices, rather than differences in the number of incidents of this type. Therefore, attempted suicide incidents are not analysed in this current evaluation. A more complete analysis of attempted suicide events will be carried out in the near future when we will receive more reliable data from the British Transport Police on these non-fatality events. This analysis will not be reported in the deliverable for RESTRAIL, but will be used to update results of the mid-platform fencing evaluation on the RESTRAIL toolbox, which will be maintained after the completion of the project.

The analysis has demonstrated that there are high numbers of incidents at stations (and particularly at fast lines at stations) within these pilot areas. The proportion of incidents at stations is much higher than the proportion nationally (approximately 40% nationally). Very few events occurred at crossings, which have been closed some years ago on these lines, because of the speed and frequency of traffic in these areas close to London. A small proportion of the events involved jumps from bridges onto the track. These findings demonstrate the relevance of applying a station based preventative measure in these areas. Nevertheless, there are still an appreciable number of incidents on slower lines (22-43%). The analysis (section 4.6.3.4) considers the question of whether the introduction of fast line fencing, might make the other slower lines more attractive to people as a place for suicide (i.e. a displacement effect).

The analysis has produced preliminary classifications of some of the mental health and social problems that have been reported in the incident databases. These types of problems are only recorded in a small proportion of events in the database. For example, mental health history is only

mentioned in the databases for one fifth to one quarter of those involved in events. It is not known if this reflects the true proportion of people experiencing these problems in this population, or whether this is indicative of lack of knowledge or limitations of recording of mental health history of those involved. The analysis is reliant on the data that have been available. If a fact is not recorded in the databases (also relevant to data on whether there were witnesses to the event, if access was from the platform end, train type) it is unlikely to be included in findings.

A high degree of effort was needed to classify the line of the incident as there was no specific field in existing databases. This was crucial information for understanding the likely impact of mid-platform fencing, which is designed to prevent access from fast line platforms. Details of the line on which incidents occurred were usually recorded within a text field, but it was sometimes necessary to identify this from the recorded details of headcode of the train (if these were available). There were a small number of incidents where it was not possible to determine the line on which the incident occurred, particularly with the older data, where fewer details were available.

There was often a lack of descriptive data in the narrative fields in the incident database, such as on behaviours of people in the period leading up to the events or the point of access to the railway. During this analysis, it was evident that people often crossed over one or more lines in incidents at certain stations where access to fast lines is restricted. However, this was not always explicit within the text and needed to be inferred from knowledge of the location of the point of impact and knowledge of the configuration of the station and local infrastructure (i.e. the type of information that is compiled in Section 4.6.4.2, below). In spite of the gaps in the descriptive data, the current analysis has been successful in collating enough detail on behaviours leading up to events, identifying much common behaviour, but also a number of anomalous behaviours). This descriptive detail on the events was used to extend earlier classifications of this kind (e.g. on the jumping, lying and wandering prior to suicide events).

It is possible to make comparisons with national data (national SMIS data) (e.g. see numbers of event at stations above) and international data. Findings on some other data types are broadly consistent with other national and European findings (as reported in the RESTRAIL deliverable in Work package 1, for example for time of day, peak / off peak). More detailed analysis could be carried out in future work.

4.6.4.2. Descriptions of stations and preventative measures

The collection and analysis of descriptive information from stations has been necessary to understand the circumstances at the different stations, within and across each of the three pilot test areas. This has been important in developing an in-depth understanding of some of the less well known differences between the configurations of lines and platforms at stations, preventative measures and local circumstances across each of the stations. All of these could influence the numbers of incidents at stations. Aspects of these have been used in determining the potential impacts of the restriction of access to fast lines on the reduction of suicide incidents (Section 4.6.4.4).

This section of the report therefore contains general explanatory text which summarises the data that have been collected across the stations and pilot areas, based in observations, photographs, and discussions with route based staff and detail from various reports and industry documents.

Information on the location of incidents in the vicinity of stations (especially on which line incidents occur) is important in understanding the potential impact of the mid-platform fencing initiative. The description of the mid-platform fencing measures includes details of when and where the fencing was fitted. This also includes specific characteristics of the location that might have had an impact on the decision to fit fencing and the design and implementation of the fencing measures.

Schematic diagrams have been produced to show where access to fast lines has been restricted. An extract from the schematic diagrams for one of the routes is shown in **Figure 1.1-2**. This illustrates how access is restricted from the up main and down line (UM/DM) at four of the stations (numbers 3-6). The fencing is shown by a thick black line across the blue shaded platforms and the green lines shows at which line access has been restricted. Mid-platform fencing has been fitted to the shared, island platform at three of these stations as part of the current fencing programme (stations 4-6). One of the stations (3) has had access to fast lines restricted for many years because of an existing chain link fence. At two of these stations there is no down main platform.

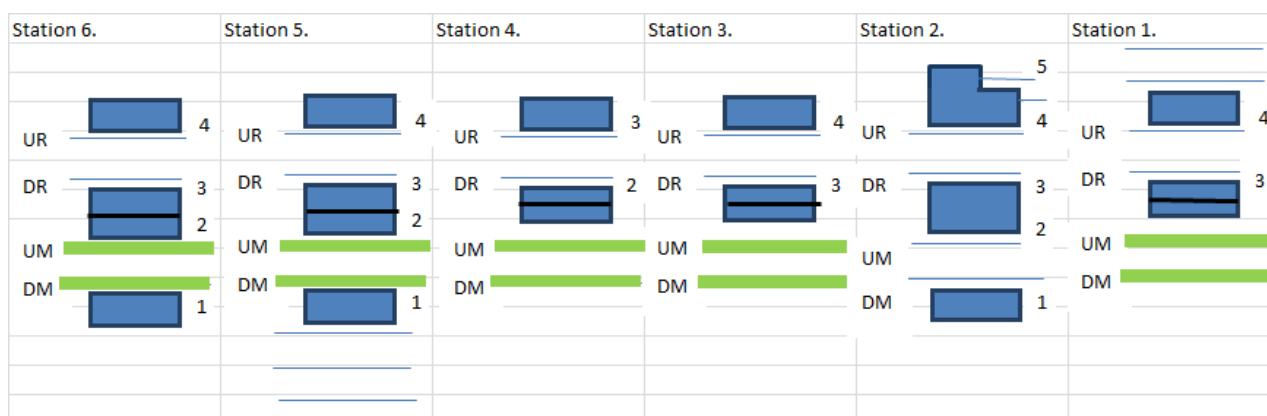


Figure 1.1-2: Extract from the schematic diagram showing the configuration and restriction of access at 5 stations on the Western route

There are no fencing restrictions at one of the stations (station 2). There has been a relatively high number of suicides incidents at fast lines at this station, but the layout of the platform and buildings and staircases on the platform mean that the introduction of fencing could introduce problems with passenger flow on the station.

Other parts of the schematic diagrams (not shown) help to illustrate other station configurations. These include fast lines that are separated by distance (only) from the facing platform. Under these circumstances a person could access the fast line by jumping from the platform onto the slow line and walking across to the slow line.

There is quite a lot of variation in the type of information that has been available on other types of preventative measures that are in operation at the stations in the pilot areas. The extract in **Table 1.1-2** shows how information has been collated on a number of different measures that are used on one of the three pilot areas (London North West).

The **Table 1.1-2** enables comparison across the stations and a simple colour scheme has been used to classify the extent to which these different interventions have been implemented at the stations (green highlighting good progress with implementation, amber showing some progress and red highlighting no or little progress).

Similar comparative tables have been prepared from data from the other two pilot areas, though in these tables there were greater numbers of gaps in the content, indicating gaps in knowledge of the interventions that have been implemented. Where information has been available it has often been lacking important details (e.g. of the time that end-platform fencing was fitted, dates when signs were fitted or the specific locations where those who attended prevention training worked). Even where the date of implementation of a measure can be found (e.g. dates of training, dates when posters are fitted) the longevity of these measures cannot be assured (staff can leave a work location, posters can be removed).

Table 1.1-2: Extract from a table collating progress with the implementation of a range of other preventative measures

Station	Contact with local NHS mental health unit:	Contact with Samaritans local branch:	Samaritans posters displayed:	Samaritans signs erected:	Samaritans 'dealing with suicidal contacts' courses:	Samaritans phone installed:	Platform end fencing:
1. LNW1	Not known	Not known	Not known	Not known	Not known	No	Not known
2. LNW2	No	No	None	None	None	No	None
3. LNW3	No	No	None	None	None	No	None
4. LNW4	No	No	None	None	None	No	None
5. LNW5	Completed	Completed (Harrow)	Completed (8)	Completed (12)	LUL: 4 station staff attended (Team Leaders)	Completed	Completed
6. LNW6	No	No	None	None	None	No	None
7. LNW7	No	No	None	None	None	No	None

Summary details of staff training (managing suicidal contacts, trauma support training) were available for the Western route. This detailed the numbers of staff booked on courses and the numbers attending 10 courses that have been scheduled (e.g. 106 people booked and 72 attended the managing suicidal contacts course between June 2013 and March 2014 – approximately 7 staff per month). However, it is difficult to get a precise understanding of the proportion of staff at specific locations that are trained. Additional statistics have been provided by the Samaritans for the numbers of staff trained at locations in the pilot test areas. They have reported having trained over 5,000 staff on the Managing Suicidal Contacts course and over 1,000 staff on the Trauma Support Training course, with both courses often receiving excellent evaluations on the value of the courses. However, records of training often do not record details of the home base (e.g. station) of the member of staff. Therefore, it is very difficult to say how many people at each of the stations on the pilot areas have received training which would help in preventive railway suicide. Bearing in mind the above limitation, data have been provided for the Managing Suicidal Contacts course (the most relevant for prevention) for six of the stations on Western (48 people trained over 4 years – 34 of these at one station), two stations on London North West ((54 people trained over 4 years – 47 of these from one station) and four of the stations on Sussex (55 people trained over four years – 31 of these at one station). It would therefore seem that much of the training has been carried out at the larger stations within these routes.

The comparison of data on the different preventative measures is important to give an overview of the range of interventions that could also be exerting an influence on the numbers of suicide and trespass related incidents at the stations in the pilot areas. The document search and consultation with stakeholders in the three pilot routes has taken the first steps in collating the details of the different types of measures that may be contributing to the prevention of incidents at these locations. However, at this point in time it has not been possible for almost all of these measures to describe with any confidence the dates at which these interventions have been implemented. A descriptive detail in the category of socio-economic was provided for a small selection of stations on the Western route. Descriptive and statistical socio-economic data are also available within reports that have been prepared on 27 priority locations by the British Transport Police (see below). Socio-economic data have not been collected for many of the stations in this evaluation.

There are other industry documents that are good sources of descriptive data on stations in the pilot area. The British Transport Police have produced reports on 27 priority locations, which have been selected as a result of having had recent incidents (two or more in the most recent financial year) and where the subsequent delay after an incident is above average (above 1329 minutes). Four of the stations on the pilot area on the Western route are in the list of priority locations.

A similar type of inspection and report has been produced by local staff from the route, working in conjunction with BTP and the Samaritans for three more stations on the pilot route on Western. These reports include lists of recommendations for preventative actions.

The analyses of industry documents have highlighted a number of issues (linked to the design and operation of stations) that are relevant for the prevention of rail suicide and trespass, with illustration of some of these in the photographs in **Figure 1.1-3**.



Figure 1.1-3: Easy access to the line from platform ends. Places to hide behind solid buildings

General conclusions

The analysis of the descriptive data on the stations has drawn together information from a disparate range of sources, to produce concise descriptions of the characteristics and arrangements at a wide range of stations (e.g. on the configurations of stations, different types of restrictions to access and other interventions), which might influence the numbers of suicide and trespass related incidents. This has enabled a detailed examination of the issues arising at any particular station, as well as opportunities to derive lessons from consideration of groups of similar stations. There are a number of issues that are common to several stations. There are also a number of issues that have emerged at specific stations (though these might not be unique and may be relevant also at other stations).

Tables have been used with good effect to summarise and compare the types of data that have been collected across the range of stations (including other interventions, beyond the mid-platform fencing programme). These have demonstrated where there is thought to be good progress in implementing a range of suicide prevention measures, as well as locations where there has been little known prevention work so far.

There are important gaps in the data to support this type of comparison of the data (e.g. a lack of information on when measures were implemented, lack of knowledge of whether measures have been implemented at any particular station). Nevertheless, the comparative tables are a usual starting point for discussions within the industry on what is known about the range of measures

that could be in operation at each site and prompt discussion on what is desirable in relation to these and other preventative measures.

4.6.4.3. Description of the design and implementation of the mid-platform fencing initiative, plus associated preventative measures

The collection and analysis of data on the implementation of the mid-platform fencing initiative has been carried out in order to clarify the process steps that are necessary for the implementation of this type of preventative measure. Progress with the programme has been assessed. This analysis produced a range of data types. These include: the different stages in the process for design and implementation; progress with the implementation of work in the programme; issues arising with design and implementation; and the costs of implementing the programme.

1. Stages in the process for design and implementation

All works on station fencing of this type are subject to the detailed design and approval of the fencing. Examples of planning documentation have been provided by staff on each of the routes. Overall, these contain the following types of information:

- Detailed plans and photographs of the platforms and line of fencing, measurements and dimensions, fully annotated to explain the extent of the works, including precautions when working around the existing structure and fabric of the railway platform.
- Specification of the fencing (e.g. height, design features (e.g. blunt top), construction, and foundations and fixings, details of gates, opening and locking mechanisms, and associated works (hatching, removal of station furniture).
- Method of operation of the fencing – (whether gates are left open at night if the stations not manned, signs for passengers for location and operation of the gates operation.
- Locations of platform end fencing and gates.
- Investigation of the potential effects of the proposed fencing on passenger flow at the station in normal and emergency situations.
- The type of detail that is needed when applying for a permission for a Deviation from Railway Group Standards (e.g. when the introduction of fencing to divide a platform may result in a platform width of less than the minimum 3 metre width along the entire length or part of the station.

Detailed evidence on the implementation of the fencing from one of the pilot areas has been collected from industry documentation.

The extract in **Figure 1.1-4** shows the implementation of the fencing in 6 stations on this route.

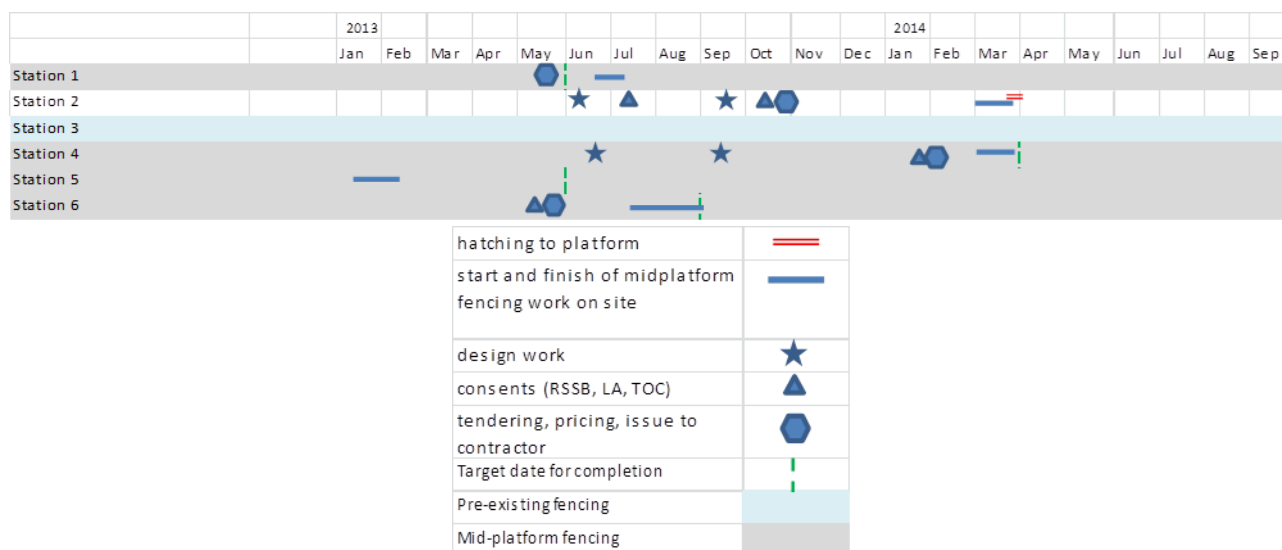


Figure 1.1-4: Extract showing the timing of different stages of the mid-platform fencing intervention at 6 stations on one of the pilot test areas

Mid-platform fencing has been fitted at four of the stations (1, 4, 5, 6 – highlighted in grey in Figure 4). At stations 1, 5 and 6 the fencing had been fitted before or just prior to the start of the monitoring period. No information on the preliminary steps in the process was documented in the reports that were reviewed. At station 4, it is possible to see the timing of two stages of design work and the timing of an application for consent to fit the fencing at a station with architectural features of importance. At station 2 after an early application for consent from the RSSB and initial design work there was a judgement that there would be problems with passenger flow at the station. A further stage of design work was used to produce revised plans for the work. Work was issued to a contractor by October 2013, but this work was not carried out until after the winter period in March 2014. This revised work schedule did not include mid-platform fencing, but replacement of an existing timber fence on a part of the station. Station 3 has a pre-existing fence.

Whilst details of all of the phases of the work have not been readily available (e.g. it is not known when early discussions were started; the design process has not been looked at in any detail; precise timings of some phases of work at various stations were not recorded), this analysis has been useful in providing an overview of the process of designing, planning and executing the fencing work. In particular, this has been effective in clarifying the following:

- the order of work at a site and sequencing of work across multiple sites
- the different phases of work and different types of work
- the time needed for work at a site and the relative timings of different phases of the work, including periods of delay and the reasons for delay and
- the need for repeated stages of work (e.g. multiple consents, re-planning).

2. Progress with implementation of the programme

Table 1.1-3 provides a summary of the extent to which the mid-platform fencing programme has been implemented within the three pilot areas. The mid-platform fencing has been completed at almost all stations where it was planned. Work has been delayed in two locations because of other construction work.

Table 1.1-3: Extent of implementation of the mid-platform fencing intervention in each of the three pilot areas

Classification of type of restrictions	No. of stations (LNW)	No. of stations (Western)	No. of stations (Sussex)
Stations on the pilot route	23	20	8
Stations with mid-platform fencing <i>completed</i> as part of the suicide prevention programme	6	10	6
Stations with mid-platform fencing <i>not yet completed</i> as part of the suicide prevention programme	2	0	0
Stations with other restrictions to access to the fast lines <ul style="list-style-type: none"> - Previous separation by reason of the design of the station - Other fencing (including partial fencing) - Separation of fast lines from platforms by distance only 	12	6	0
Stations with no restrictions to fast lines	5	4	2

3. Issues arising with design and implementation

Information has been collected on problems that have been encountered in the design and implementation of the fencing. As an example, several problems were encountered at one of the stations on the Western route. It was reported that contractors experienced difficulties with access to bring large fencing panels and gates through the station and across a foot bridge, especially during the working day at a busy station. This problem was overcome by revising delivery arrangements to bring about a week's worth of panels to the site at night. An alternative solution was used at other stations where a possession was used to supply all materials to the site in bulk by rail. The contractors also experienced difficulties with the hard floor tiles at this station, which were much harder to excavate for the fitting of fence posts than the tarmac surfaces at other stations. It was also explained that it was easier to fit the fencing in some locations than others (e.g. where there are simpler, straighter lines, fewer station signs, planters and buildings was easier, compared with the more difficult Hayes and Harlington).

Across the range of stations in the pilot areas, a number of issues in the fitting and use of the mid-platform fencing at stations have been identified. **Table 1.1-4** gives a summary of the issues that affect the decision to fit mid-platform fencing at a station and the progress with the implementation of the fencing at selected stations.

Table 1.1-4: Factors influencing the design and implementation of the programme

Issue	Commentary
Approvals	To ensure compliance with railway safety standards (e.g. sufficient platform widths) – via RSSB
	Listed building consent is needed in circumstances where station buildings may be of particular architectural interest
	Agreement with stakeholders – over safety on platforms, pedestrian flow, dependent on passenger counts
Delay in the process of implementation	Work at a station may be dependent on the completion of other work at a station (e.g. demolition and re-building of footbridges, fitting of lifts and staircases, as part of station enhancement and “access for all” programmes)
	Work may be delayed by delays in work at other sites (e.g. where the same contractors are carrying out the work)
	Failure to get appropriate contractor to tender for the work, with need to re-issue a tender
	New contractors and new methods of working may introduce some delay at a station
	Difficulties with access for materials (resolved at some stations with the delivery of materials in bulk to a platform based compound in a possession)
	Problems due to local circumstances (e.g. hard floor tiles (e.g. Figure 5a) which are difficult to excavate, compared with tarmac surface, working around station structures, architecture and equipment)
	Consultation with stakeholders on the best line for the fencing (Figure 5b)
	Time for approval of method statements from contractors
	Weather related delays
	Delays in work over holiday periods

4. Costs

Example costs have been provided by staff from two of the pilot test areas. A unit cost of mid-platform fencing can be assumed to be in the region of £400-450 per metre of fencing, inclusive of design, fitting and provision of access gates. Details of other costs are also available (e.g. for fencing to close off access at other disused lone platforms (unit cost of fencing per metre, up to £10000 if electronic locking is provided); for platform end fencing, gates and floor grids (£5000-10000 per platform); signs (£25), poster frames (£433), CCTV to monitor vulnerable locations (£7400).

General conclusions

Generally, there has been good progress in the implementation of the fencing and work has been completed at most of the targeted stations. Fencing is awaiting completion at several stations, pending completion of other construction work.

It is not possible to fit mid-platform fencing (or full mid-platform at fencing) at some locations. In some circumstances partial mid-platform fencing has been fitted where there is a gap in the fence at a point at which the platform is too narrow, and at the ends of platforms.

There are many similarities in the different programmes (e.g. the designs and specifications seem to be very similar and all programmes have been subject to similar processes for planning, design and implementation – note that these types of comparisons have not been a major part of this evaluation). There have been some minor differences in the approach to fitting of fences across the three different routes (such as in how the programmes are described e.g. suicide prevention or fatality prevention, some use of partial restrictions on one of the routes in some locations). Each of the programmes started at different times. The fencing in Sussex was the first work of this kind and started at two stations, followed by four more stations approximately four years later. There is evidence of learning and improvements in dealing with problems that are encountered on each of the routes (e.g. regarding delivery of materials, designs of gates and types of closure mechanisms), though less evidence of learning across the routes, until recently. It has been suggested that work that is in progress on a fourth route (London North East) has benefited from exploring the lessons that have been learned in these earlier programmes.

Overall, this part of the evaluation has been useful in collecting first descriptions of the current status of the interventions to restrict access to the fast lines on many stations in these (i.e. determining how there is a mix of pre-existing restrictions, completed fencing, just completed fencing and fencing awaiting completion). This is important to establish in this type of real world research. Valuable feedback has been collected from staff involved in the work from each of the routes (see section 4.6.4.5).

4.6.4.4. Analysis of incidents at or near stations, in conjunction with details of the restriction of access

In order to consider the potential effect of the mid-platform fencing on the numbers of suicide and trespass related incidents at stations, data on fatality incidents have been analysed in conjunction with details of the restriction of access. **Table 1.1-5** shows an extract from the analysis of the location and timing of incidents at 6 stations on the Western route.

Table 1.1-5: Extract showing fatality incidents on different lines at stations, by year, including details of the dates of restriction of access to fast lines at stations

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Grand Total
W	0	1	0	2	7	5	9	7	5	4	6	7	10	8	9	10	14	11	10	3		128
Station 1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	0	0		4
Down main	pre-1994	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0			2
Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0			1
Up Main	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	11 July 13		1
Station 2	0	0	0	0	2	1	4	1	1	0	1	1	0	1	1	2	1	1	2	0		19
Down main	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	0	0	0		3
Not known	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Not known	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0		1
Up Main	0	0	0	0	1	1	2	1	1	0	0	1	0	1	0	1	1	1	2	0	1	14
Up relief	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0		1
Station 3	0	0	0	0	2	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0		5
Down relief	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Not known	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Up Main	pre-1994	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		2
Up relief	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0		1
Station 4	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	0	0	2		6
Down main	pre-1994	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0		3
Up Main	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1 25 Mar		2
Up relief	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
Station 5	0	0	0	0	0	0	0	1	0	2	0	2	3	0	1	1	1	5	1	0		17
Down main	0	0	0	0	0	0	0	0	0	1	0	1	Estima	0	0	1	0	0	0	0		3
Not known	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Up Main	0	0	0	0	0	0	0	1	0	1	0	0	3	0	1	0	1	5	1	14 Feb	1	13
Station 6	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	2	0	1	4	0		10
Down main	0	0	0	0	0	0	0	0	0	0	0	0	Estima	0	0	1	0	0	4	0		5
Other	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		1
Up Main	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	26 Aug 13		4

The columns in **Table 1.1-5** show the years in which incidents occurred on different lines at each station. The dates at which fencing interventions were provided are also highlighted (in yellow), though the dates of some of these interventions is uncertain (e.g. when access to the down fast

main platforms at station 5 and station 6 were closed off was thought to be between 2006 and 2008).

It is possible to see from this table how fatality events were distributed in the period prior to the introduction of fencing and (in some cases) on the different lines at the station after the introduction of fencing. For example, fatality incidents occurred periodically in the prior to the implementation of fencing at station 6 on the up main and then there have been no more incidents since August 2013. It is also possible to see that an incident occurred on one of the slower lines at station 4 after fitting of fencing that was intended to protect the fast lines at station (highlighted in red font). It is possible to look in greater detail at the circumstances surrounding this small number of events to determine the explanations for how people could have got access to the lines (e.g. how the configuration of the lines, platforms and fencing at the stations could allow access).

A summary of some conclusions and questions arising from an initial review of this type of table is given below.

- Incidents can occur in spite of fencing. This can be explained by people crossing from other lines to get access to the fast lines, getting access from outside of the station, getting access at the station ends.
- Some recent incidents on slow lines have occurred where there has been an engineering possession on fast lines and so faster, non-stopping trains are passing stations on the slower lines. The labelling of incidents on lines (fast, slow) can be misleading in some circumstances and cause problems for analysis and interpreting the results (i.e. there are various circumstances in which there are non-stopping trains on slow lines – more detailed analysis is needed with respect to stopping patterns).
- There might be displacement to other lines at stations, but it is difficult to say this after a short period of observation after the fitting of fences.
- There could also be some displacement to other stations, though again this needs more investigation.
- There has been a suggestion that incidents on the slow lines are more likely to occur at some stations where there are higher numbers of non-stopping trains on a slow / relief line.
- Partial fences may be ineffective in some cases.
- It is not always clear whether some fatalities were before or after restriction of access (especially for down fast / main lines), because details of access restrictions are not always known.
- It is not always clear from which platform access was achieved, though the industry is getting better at this using CCTV and better reports from drivers and others.

A number of preliminary analyses were carried out in an attempt to estimate of the effect of mid-platform fencing, as well as other restrictions to access to fast lines.

Table 1.1-6 shows the numbers of incidents per month on fast lines and slow lines at each station, before and after different types of fencing interventions or other restrictions to access (red highlighting has been used to identify situations where the number of incidents per month is 0.1 or above and amber highlighting where the number of incidents per month is between 0.01 and less than 0.1). As some the restrictions have been longstanding (linked to the original design and configuration of the railway) it has not been possible to show before and after data for all types of intervention. **Table 1.1-7** shows these results for the four different classes of restriction of access; mid-platform fencing, some other restrictions to access, separation from fast lines by distance only, no restrictions to access to fast lines).

The monthly rate on fast lines is quite low in many locations. For example, a monthly rate below 0.01 (typically 0.004-0.008) equates to around 0.05 fatalities per year. This rises to a higher order of magnitude in some locations (e.g. a monthly rate of 0.012-0.077), between 0.14 and 0.924 fatalities per year. The highest monthly rates (0.11 and 0.25) would indicate an expectation of 1.32 to 3 fatalities per year at these stations. (It is important to note that that these rates are influenced by recent events occurring, shortly after the introduction of the fencing and might result in inflated estimates. The rate of incidents should be monitored over a longer period of time.)

There has been only one fatality incident on the fast lines after fitting full mid-platform fencing (i.e. includes restricting access to the shared platform and other lone platforms from which people can access the fast lines – there were some incidents in the time period when only one of the fast line platforms was restricted and people could cross over lines to another fast line). Whilst this is not a desirable outcome, the monthly frequency of fatalities at this station has lowered in the period after the fitting of the fencing.

Mid-platform fencing has been fitted at 22 stations and there has been a general reduction in the numbers of incidents on fast lines across all of these stations (mean = 0.019 per station per month, s.d. = 0.015, max = 0.06, min = 0.004, median = 0.015). Larger effects are evident where there have been a greater number of incidents at a station.

Table 1.1-6: Numbers of incidents on fast lines and slow lines at each station

Route and station	Type of intervention	Year	Fast line incidents before (/month)	Fast line incidents after (/month)	Slow line incidents before (/month)	Slow line incidents after (/month)
LNW						
LNW station 1	Some restriction	2008	0.006	0.000	0.012	0.041
LNW station 2	Some restriction	1990		0.008		0.004
LNW station 3	Separation by distance	1990		0.008		0.004
LNW station 4	Some restriction	1990		0.008		0.008
LNW station 5	Mpf and other	2011	0.061	0.000	0.014	0.031
LNW station 6	Some restriction	1990		0.000		0.004
LNW station 7	Some restriction	1990		0.004		0.008
LNW station 8	Separation by distance	1990		0.004		0.000
LNW station 9	Some restriction	2011	0.005	0.000	0.023	0.000
LNW station 10	No restrictions	1990		0.008		0.008
LNW station 11	Some restriction	2013	0.017	0.077	0.000	0.000
LNW station 12	Mpf and other	2013	0.004	0.000	0.004	0.000
LNW station 13	Some restriction	2011	0.005	0.054	0.014	0.027
LNW station 14	Some restriction	2012	0.027	0.000	0.005	0.000
LNW station 15	Mpf and other	2014	0.004	0.000	0.004	0.000
LNW station 16	Some restriction	2014	0.008	0.000	0.000	0.000
LNW station 17	Mpf and other	2014	0.012	0.000	0.004	0.000
LNW station 18	Mpf and other	2013	0.017	0.000	0.004	0.111
LNW station 19	No restrictions	1990		0.036		0.008
LNW station 20	Mpf and other	2013	0.021	0.000	0.004	0.000
LNW station 21	No restrictions	1990		0.000		0.008
LNW station 22	No restrictions	1990		0.000		0.012
LNW station 23	No restrictions	1990		0.012		0.008
Sussex						
S station 1	Mpf and other	2012	0.027	0.000	0.005	0.000
S station 2	Mpf and other	2012	0.009	0.000	0.009	0.000
S station 3	Mpf and other	2012	0.023	0.000	0.000	0.000
S station 4	Mpf and other	2012	0.005	0.000	0.000	0.000
S station 5	No restrictions	1990		0.016		0.012
S station 6	No restrictions	1990		0.016		0.012
S station 7	Mpf and other	2008	0.023	0.000	0.000	0.014
S station 8	Mpf and other	2008	0.052	0.000	0.006	0.000
Western						
W station 1	Mpf and other	2013	0.017	0.000	0.004	0.000
W station 2	No restrictions	1990		0.073		0.012
W station 3	Some restriction	1990		0.008		0.012
W station 4	Mpf and other	2014	0.021	0.000	0.004	0.250
W station 5	Mpf and other	2013	0.070	0.059	0.004	0.000
W station 6	Mpf and other	2013	0.038	0.000	0.091	0.000
W station 7	Mpf and other	2013	0.013	0.000	0.004	0.077
W station 8	Mpf and other	2013	0.025	0.000	0.000	0.000
W station 9	Mpf and other	2014	0.013	0.000	0.000	0.000
W station 10	No restrictions	1990		0.032		0.008
W station 11	Separation by distance	1990		0.012		0.016
W station 12	Mpf and other	2013	0.013	0.000	0.004	0.000
W station 13	Some restriction	2009	0.022	0.049	0.016	0.000
W station 14	Some restriction	2014	0.017	0.200	0.004	0.000
W station 15	No restrictions	1990		0.008		0.004
W station 16	Mpf and other	2014	0.004	0.000	0.004	0.000
W station 17	Some restriction	1990		0.000		0.000
W station 18	Mpf and other	2013	0.008	0.000	0.000	0.000
W station 19	Some restriction	1990		0.028		0.000
W station 20	No restrictions	1990		0.004		0.000

Table 1.1-7: Numbers of incidents at stations with different types of restrictions to access

Route	Group of restrictions	No. of stations	Mean number of Fast line incidents per month <i>before</i> the intervention (across the stations with the intervention type)	Mean number of Fast line incidents per month <i>after</i> the intervention (across the stations with the intervention type)	Mean number of slow line incidents per month <i>before</i> the intervention (across the stations with the intervention type)	Mean number of slow line incidents per month <i>after</i> the intervention (across the stations with the intervention type)
All routes	1- Mpf and other	22	0.022	0.003	0.008	0.022
	2- Some restriction	15		0.029		0.007
	3- Separation by distance	3		0.008		0.008
	4- No restrictions	11		0.019		0.008

Incidents have occurred on fast lines after other types of restrictions to access (including partial fencing, other pre-existing fencing or separation of fast lines from the platforms). **Table 1.1-6** shows that there are quite high monthly rates at various stations where there are pre-existing restrictions (e.g. LNW station13) and at one of the stations where the fast lines are separated only by distance from the platform (see W station11).

It is possible that these results reflect the potential success of the mid-platform fencing programme in preventive access to the fast lines at platforms. These are encouraging findings, but it is too early in the period of monitoring to be making strong endorsements of the effect of the fencing. It is also likely that other preventative measures have exerted some influence on the apparent reduction on numbers of incidents. These stations have often been selected for inclusion in the fencing programme because of a number of recent incidents. As a result, other preventative measures would also be implemented (e.g. training of staff, improved warning signs, additional security, and platform end fencing).

It is also possible that the increases in the monthly rate of incidents on fast lines at various stations where there have been partial interventions indicate that these may not really be controlling the problem.

The change in numbers of incidents has been different on slow lines (mean = -0.014, s.d. = 0.06, max = 0.09, min = -0.25, median = 0.004). At five of the 22 stations where mid-platform fencing has been fitted there has been a slight increase in incidents (as high as an increase of 3 per year, but more typically less than 0.2 per year (it is important to be cautious when making these interpretations because of the effect of recent incidents inflating the rate of incidents).

Figure 1.1-5 shows how the numbers of incidents on fast lines reduces at all stations (x axis). Some of these were quite large (for example, W station5, LNW station5, S station8, W station6) and these might reflect the fact that there were high number at incidents at these locations, with particular social or other issues impacting on some of these locations.

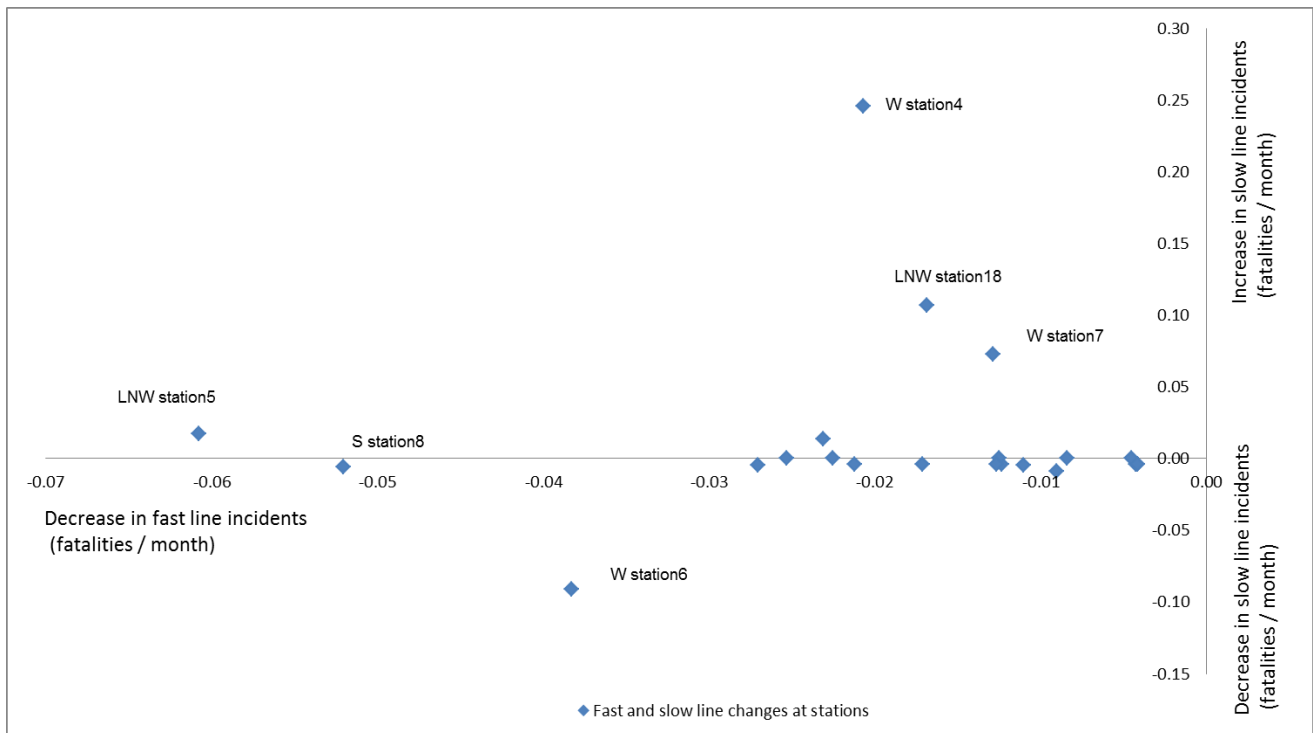


Figure 1.1-5 : Changes in the numbers of incidents per month at fast and slow lines, by station

A reduction of 0.06 events per month is equivalent to a reduction of 0.72 fatalities per year on fast lines). A decrease of 0.05 is 0.6 events per year on fast lines and a decrease of 0-0.025 is up to 0.3 events reduced on fast lines per year.

The data from LNW station5 suggest that the intervention is working on the fast lines, with a minor increase in incidents on the slow lines. The mid-platform fencing seems to be working well at S station8 and W station6.

Figure 1.1-5 shows that there were small reductions (or no change) at the majority of stations on slow lines (y axis). The grouping of these stations might suggest that these are the results that might be expected at most locations. There were three notable exceptions (W station4, LNW station18, W station8), where the numbers of incidents at slow lines increased (potentially indicating a current problem, and where events may have shifted to the slow lines).

There is need for caution in this interpretation as the high rate in one of the incidents has been derived from a single incident on the slow line, since the fencing at W station4, within the year of the intervention. These data suggest that there may be no change or a small reduction (less than 0.02 incidents per year) in many cases where fences are fitted, but there may be circumstances where there is an increase in incidents on slow lines. The effect of this will need to be monitored over a longer period of time.

Figure 1.1-6 shows the changes in numbers of incidents at locations where there have been some partial restrictions. In these cases the interventions have not been as successful in reducing the monthly rate of incidents. Four stations show increases in the monthly rate of incidents on fast lines (W station14 – no restriction on the down main – equivalent to increase of 2.2 fatalities per year; LNW station11 - partial fence; LNW station13 – partial restriction and unsecured gate; W station13 – no restriction on the Up Main). Two stations show an increase in the number of incidents on slow lines (LNW station1 – access to fast lines has been restricted; LNW station13).

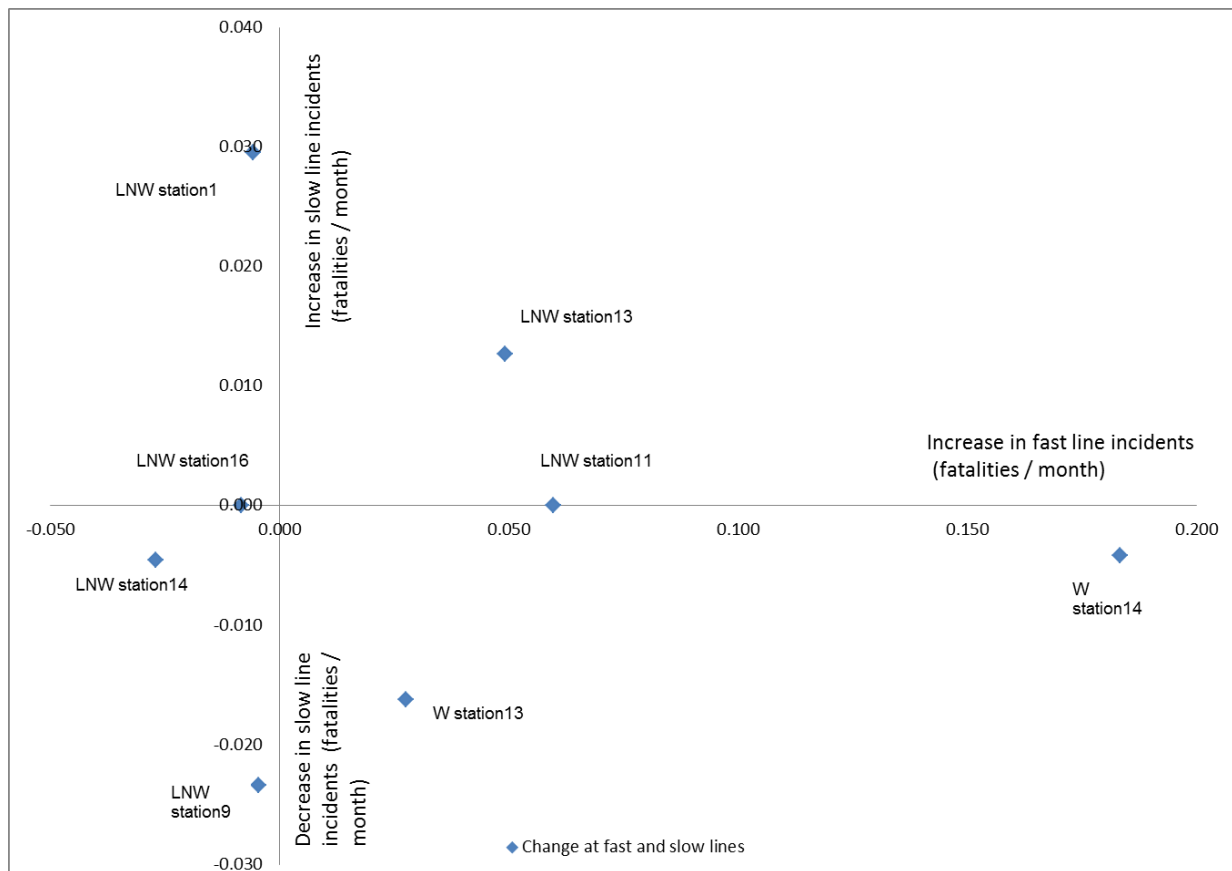


Figure 1.1-6: Changes in the numbers of incidents per month at fast and slow lines, by station

The **Figure 1.1-7** shows that the nett effect of the implementation of fencing (i.e. taking account of positive and negative changes on fast and slow lines). There have been increases in the numbers of incidents at three stations where mid-platform fencing has been fitted and five stations where there are more limited restrictions of access to fast lines (the limitations in the method of calculating this are discussed below). There have been decreases in incidents at all other stations where mid-platform fencing has been fitted, in one case by as much as 1.5 fatalities per year.

It is too early to comment on whether there may be an increase in incidents on other (slow) lines at these stations, as a result of the fencing intervention. However, the early data show a nett reduction of fatality incidents when incidents from fast and slow lines at these stations are combined. This is approximately 0.06 fatalities per station per year (1.32 fatalities across the 22 stations where mid-platform fencing has been fitted). This is a pessimistic estimate, because of the impact of the recent incidents which can inflate the estimate. The incidents at these locations need to be monitored over a longer period of time.

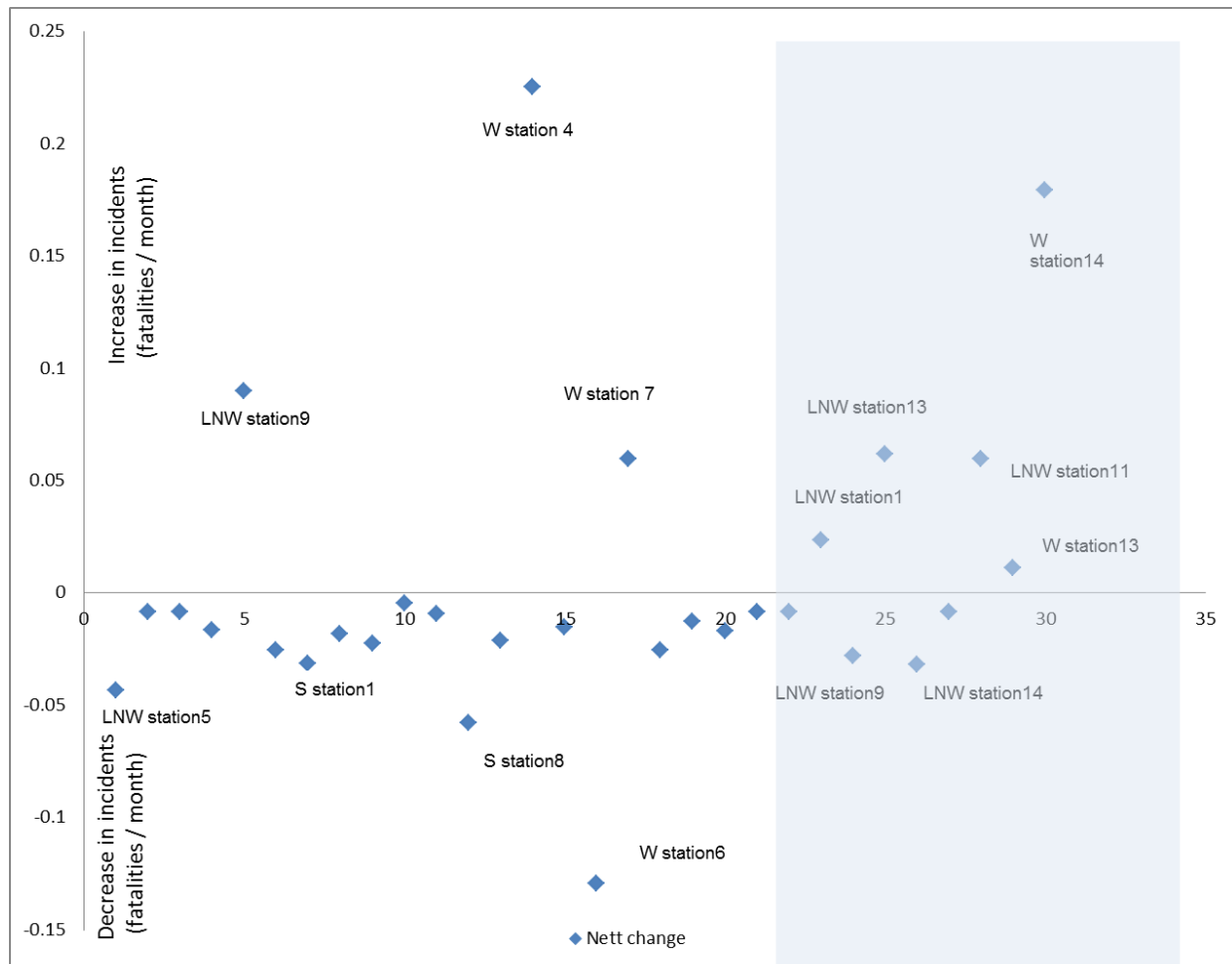


Figure 1.1-7: Changes in incidents per year on all lines, by station

This is a preliminary analysis of the potential effect of the fencing in these pilot areas. A simple metric (number of incidents per station per month) has been used to compare the incidents before and after the fencing intervention. This metric has some limitations. The change in incidents at fast lines is dependent on the numbers of incidents per month prior to the intervention. The fencing (and other interventions) often reduces the number of incidents on fast lines to zero, regardless of how high the numbers of incidents at stations. The monitoring period is quite short, but at the two stations where fencing was implemented in 2008 there have still been no incidents on fast lines at these stations. The change in incidents at slow lines is influenced by the short monitoring period and a small number of incidents can imply that there is a high yearly frequency. This will need to be monitored over a longer time period.

There have been no attempts to make comparisons between similar stations for intervention / no intervention groups in this field study. There are practical reasons why some stations have no fencing and this influences the analysis (it is hard to find similar stations in the areas with no fencing). Further analyses are in progress to examine the potential influence of a range of factors on the numbers of incidents (year of event, individual factors, station type). More detailed analyses of the potential impacts of the platform fencing will also be explored, using other data types (e.g. delay / trespass, pre-suicidal behaviour and interventions data from the BTP).

Conclusions

This analysis has therefore analysed data on the following:

- Numbers of incidents at each of the locations (stations and lines and in relation to restrictions) over time
- How there are different types of access restrictions to fast lines (mid-platform fencing, other fences, due to the configuration of track and stations, by distance), with different levels of security. These have been provided at various time periods (historical, recently as part of the fencing programmes). Explanations can be offered as to why there are incidents on some lines after restrictions have been put in place.
- Differences in numbers of accidents before and after restrictions

4.6.4.5. Perceptions of the fencing initiative

Part of the evaluation has included the collection and analysis of feedback from a range of stakeholders to collect their perceptions on the mid-platform fencing programme. This has been carried out with the intention of providing an additional source of data on the potential effectiveness of the fencing, the experiences of users on the operation of the fencing, and their perceptions of the process for implementing the fencing.

Interviews have been carried out with five staff to date (several additional interviews have been scheduled and findings from these interviews will be incorporated into a later draft of this report).

The analysis of content from the RailUK Discussion forum is a second source of data on the perceptions of stakeholders. The RailUK Discussion Forum (<http://www.railforums.co.uk>) was launched on-line in 2005. There are currently 21,710 members. The most users ever online were 1950 on 7th February 2013 at 19:57. On 18/6/2014 at 16:11 (when the data reported below was collected) there were 104 members on line (and 528 guests).

Although contributors to such forums can in no way be considered as a representative sample of public opinion, posts in forums can be a rich source of qualitative data. The anonymity of forum members can be advantageous from a research point of view as the data collected can represent the real views of the contributors and the on-line environment can allow them to be uninhibited by social-norms, obligations and taboos. However, the nature of anonymous discussion forums means that researchers cannot be sure about the identity of contributors.

The following conclusions have been derived from these interviews and the analysis of the content from the rail forum:

More positive aspects

- There are very positive reactions to the fences (the design, the choice of locations, the construction, the aesthetics, they are robust).
- The interviewees spoke positively about the potential effectiveness of the fences – they can be a deterrent and can give staff enough time to react to a person who is at risk. They can be the most effective way of preventing incidents, though this depends on the configuration of the station. There are thought to be few if any incidents occurring with access over the fences at the stations where they have been fitted. Contributors to the rail forum also commented on their perception of the effectiveness of the fencing in preventing incidents (for example, acting as a physical barrier, causing people to stop and think, making it easier for staff to see people in places that they should not be).
- The fencing can help with other aspects of station safety and security – for example, people can feel safer on platforms, the fencing helps manage movements of people and prevents them going to places where they should not be.

- The fencing operates well with other measures (e.g. where access is controlled by platform staff at some stations).
- There were very few problems with implementation of the programme. Some consideration is needed for the method of delivering materials to the site (taking account of presence of passengers and need to move fencing and gates on staircases and along narrow subways and footbridges). Work can be labour intensive (digging out surfaced and removing waste), requiring usual arrangements for safe construction work.
- The fencing is good value for money, but this may not be the right question to consider. They are worthwhile if they save a single life.
- There have been very few complaints about the fences from passengers.

Less positive aspects:

- Whilst the fencing is thought to be effective, it is important to not underestimate the scale of the work that is needed. The work should to be set up like a proper project and a wide range of stakeholders must be consulted. The programme needs to include other restriction of access (e.g. platform ends). There needs to be good negotiation and arrangements between stakeholders, to maximise the amount of work that can be achieved with a given amount of money. It might be perceived to be expensive, but there will be payback. Therefore, it has been suggested that this should only be used where there are likely to be problems
- The reason for putting in the fences is not always clear to members of the forum (e.g. some thought it was to demarcate different areas of responsibility at the station).
- Some contributors to the forum were sceptical about the likely success of the fencing.
- Fences are not suitable for all locations – they have to be used in the right locations. Some locations can be too narrow to be divided (e.g. Battersea). Some stations don't have fast non-stopping trains. Trains can enter some stations very slowly. Some stations do not have island platforms. Fencing could be fitted to prevent crossing from slow to fast lines in some circumstances, but this could also introduce new risks (e.g. inspection staff may be in more confined spaces and unable to move to a place of safety when trains are approaching; signal sighting issues)
- Gates can be left open. Automated systems to open and close gates can be expensive.
- It can be a problem if trains come into a platform and station staff have not been informed – there may not be staff available to help with opening and closing of gates. Some confusion about how the gates will be opened has been evident in comments on the rail forum (who would open the gates, would the gates be too heavy for passengers to operate? – some were even unaware that there were gates in the fencing).
- More work needs to be done on the design of the locking mechanisms of gates, in conjunction with other platforming arrangements, to enable ease of opening of the gates when trains stop on the fast line platform that is being protected. Whether the gates should be locked or not and options for improving the closure mechanism have been discussed on the rail forum.
- There are circumstances where a partial fence is needed (e.g. if the platform width is not sufficient to fully divide the shared platform). Additional arrangements for protection of the weakness in the fencing is needed (e.g. monitored CCTV, staffing arrangements).

- CCTV can be used successfully in the prevention of rail suicide, but this is often fitted for security of people on platforms, so CCTV coverage may not be good at some platforms where trains are not scheduled to stop.
- There can be problems of crowding on the slow shared platform if there are train delays at peak times.
- There can be quite a few non-stopping trains on slow lines on some parts of the routes.
- It is hard to say if there could be a problem of moving the incidents to other lines or stations.
- More work may be needed to secure other access points around stations. For example, there are unlocked gates at platform ends and fencing cannot extend to the end of the platform to ensure no train collision. Fencing may need to be of non-conducting material to eliminate touch potential on third rail areas. Care is needed in siting signs at platform ends so as not to restrict sighting of signals and signal number plates. Better security is needed at bridges.
- Some contributors to the rail forum complained that the fences increased the lengths of walking routes to platforms or prevented access to toilets on some platforms.

The data from interviews and analysis of the rail forum content provide valuable insights into the opinions and perceptions of the fencing from a variety of rail staff and members of the public. Rail staff involved in the development of the programmes and other staff involved in managing stations with gates spoke very favourably about the fencing. The people contributing to the discussion threads on the forum had more mixed views. There was evidence of the robust exchange of opinions and efforts to inform others about a number of relevant issues (e.g. the effectiveness of the training some staff had received from the Samaritans and comments about how it had really helped them to understand possible pre-suicide behaviours). Some of those who were initially sceptical about the fencing seemed to appreciate the value of this type of barrier once they were aware of the reasons for the fencing. Some contributors were adamant that those at risk of suicides would be determined to carry out the attempt no matter what barriers were placed in their way and were not convinced of the effectiveness of the fences at reducing suicides. This might suggest that fencing programmes should be accompanied by information campaigns to advise commuters and rail staff why they are being installed.

4.6.4.6. Analysis and interpretation of all data, linked to the main evaluation questions

The collection and analysis of data for this evaluation has focused on two main questions:

- Does installing mid platform fencing lead to a reduction in suicides on the rail network?
- How has the programme been introduced and implemented in the target locations (for example, including progress with implementation of the programme, variations in levels of implementation, whether it has been implemented as it was intended)?

The structure for the evaluation has been outlined in the logic map in **Figure 1.1-1**. **Table 1.1-8** gives an overview of the sources and content of data that have been used to understand more about the different components of the logic map. This table also includes a preliminary assessment of the following, in relation to these data:

- the extent to which relevant data have been available;
- the quality of the data;
- any areas on which it has been possible to derive conclusions
- suggestions for further data collection and analysis.

- The evaluation of outcomes in this report has been based around the analysis of fatality data. Other data types are available, but have not been considered in detail to date (for example, delay from trespass; data in attempted suicide and interventions, held by the BTP). It is likely that there would need to be considerable manipulation of the delay and trespass data to use this for the purpose of evaluation of the fencing at a station level (for example, these data are aggregated by delivery unit or large geographical areas, rather than the specific stations that have been investigated in this study).

Table 1.1-8: Overview and assessment of evidence that has been used in the evaluation, linked to the structure of the logic map

Component from the logic map	Source of information and content	Assessment – coverage, quality, conclusions, future work
A1. Identification of appropriate locations for fencing	Based on station risk assessments, previous incident statistics, design / configuration of the station, passenger flow	Programme staff and station staff have reported that the fences have been put in at the correct locations.
A2. Business case and funding to install fencing	Acceptable because of high delay costs associated with a single incident	
A3. Consent / approval for fencing	Required from various bodies (RSSB, local authorities, stakeholders)	Fencing has been subject to full design at each station. This has included applications for approval for deviations from railway group standards, for local planning permission (e.g. listed buildings) and to ensure there will be no adverse effects on passenger movements. Examples have been explained in this report.
A4. Appropriate fencing and gate design	Detailed design documentation required for all stations. Learning throughout the programme and revision (e.g. type of gate, type of closure mechanism)	Several examples have been discussed. This is an issue that still needs some improvements, according to stakeholder interviews.
A5. Logistics and access plan for materials and labour	Formal method statements. Need to avoid conflicts with passengers and train service. Difficulties handling materials in confined environments. Learning throughout the programme and delivery arrangements by rail in a possession in some circumstances.	There has been some evidence of learning within routes, though wider dissemination of this type of information may help to reduce problems in new programmes.
A6. Arrangements for operation of gates to allow access when trains are on fast platforms	Needs planning of suitable arrangements. There can be weaknesses in protection where stations are manned and gates can be left open for a variety of reasons.	This is an issue that still needs some improvements, according to stakeholder interviews.
A7. Cooperation of stakeholders	Multiple stakeholders involved (e.g. Network Rail, train operating company)	This has not been examined in any depth in this evaluation
B1. Installation of fencing to reduce passenger access to fast lines when trains are not stopping	Descriptive evidence of the types of restrictions and the process of installing the fences.	Summaries of evidence have been presented in this report.
B2. Appropriate operation of gates	Arrangements that have been planned (A6) need to be put in place. There are examples of problems of open gates.	This is an issue that still needs some improvements, according to stakeholder interviews.

Component from the logic map	Source of information and content	Assessment – coverage, quality, conclusions, future work
C1. Reduction in number of suicides on fast lines	Analysis of statistical data. Perceptions of stakeholders.	Results from a preliminary analysis have been presented, though more in-depth analysis is needed (preferably incorporating data over a longer period of monitoring and including additional explanatory variables and data from additional locations where fencing has been fitted). Feedback has been collected from a small number of stakeholders.
C2. Reduction in number of trespass events on fast lines	Analysis of statistical data, though there are issues relating to the format and aggregation of data	The data types have been examined. There will be need for manipulation of the data to understand any changes in trespass at a station level. Revised approaches to analysis will be considered.
C3. Increased awareness of station staff of potential for suicide attempts at stations	Analysis of numbers of interventions by staff. Perceptions of stakeholders.	The analysis of statistics on interventions has not yet been considered, but will be carried out in future work using data from BTP. Information from a small sample of stakeholders are indicative of a positive attitude of staff. A wider survey would be needed to draw conclusions on staff awareness in stations where fencing has been fitted.
C4. No increase in passenger congestion in the stations	Perceptions of stakeholders	Programme staff and station staff have reported that there are no major problems of congestion. It is likely that any minor problems (also raised on the rail forum) can be managed if staff are available at stations.
C5. No adverse impacts on station aesthetics	Perceptions of stakeholders	Programme staff and station staff have commented favourably on the appearance of the fences.
C6. Ease of public access maintained to fast line when trains are stopping	Perceptions of stakeholders	This is an issue that still needs some improvements, according to stakeholder interviews and comments on the rail forum.
C7. Reduction in costs related to suicides on the network	Data in SMIS database, but limited data collected for recent incidents.	This has not been examined in any depth in this evaluation
C8. Reduction in public perception of stations being a place to commit suicide		There were no plans in this study to use interviews with the public because of limited scope of the evaluation
C9. No displacement of incidents to other lines at stations / other stations or other locations	Some preliminary indication through analysis of statistical data. Perceptions of stakeholders.	This will need monitoring over a longer period of time.
C10. Increased passenger perception of safety on platforms	Perceptions of stakeholders	No relevant data found within Passenger Focus survey. Some anecdotal reports of stakeholders suggest that people feel safe on platforms that are protected when very fast trains pass by.
D1. Reduction in the overall numbers of suicides on rail network	Preliminary indication through numbers of events on each of the pilot areas.	This has not been examined at this stage of the evaluation.

Component from the logic map	Source of information and content	Assessment – coverage, quality, conclusions, future work
D2. Increased understanding of how to implement and evaluate fencing interventions	Descriptive data on the fencing intervention and implementation of the fencing programme. Testing of methodology for collection and analysis of data in this pilot study.	Detailed data have been collected across a good range of stations. This pilot study has made good progress with developing of a robust approach to evaluation and understanding the issues associated with the collection of a broad range of data types that inform on the likely success of the fencing initiative.
D3. Increased understanding of the impact of fencing and station design on suicide and trespass risks and passenger behaviour	Analysis of incidents and statistics, incorporating relevant station and other contextual variables. Descriptive evidence of other preventative measures.	Preliminary work to understand the potential contribution of the fencing programme to the reduction of incidents at a number of specific locations.

CBA for Mid-Platform fencing

For this measure, we used the data for two routes (LNW and Sussex) with three types of stations for which accidents data were available: stations with Mid-platform fencing, stations with other restriction means (e.g. by distance) and stations with no restriction to access. Costs were provided for each route. Regarding effectiveness, a table gives a summary of frequencies per year for incidents before and after when the measure was implemented. There are clear limitations related to these data (see the discussion in the presentation of evaluation data, previous sections of the deliverable) in addition to the fact that (as real field data) stations implementations were distributed across different years which somehow challenges the combinations of before and after differences. Nevertheless, as a first exercise in the context of RESTRAIL, we propose to calculate a CEA using costs on the one hand and a rough estimation of effectiveness combining the provided data as follows. Effectiveness is calculated as the gain per year after implementing Mid-platform fencing. Concretely, it is the sum of average incidents values after plus before for all stations where the mid-platform fences were implemented.

In a second step, we also examine the other cases since they can be potential indicators of both the main tendencies for the potential displacement of incidents towards non protected access to fast lines. Results and assumptions are provided in **Table 1.1-9** for each line and both combined.

Table 1.1-9: CEA of Pilot test 6: “Mid-platform fencing”

Cost [C]	£1362500 = 1 745 228,641 euro ¹
Cost for LNW Line	£1000 000 = 1 280 901,755 euro
Cost for Sussex Line	£362500 = 464 326,886 euro
Data	
Average of incidents per type of line (slow or fast) and per station for LNW line	
Average of incidents per type of line (slow or fast) and per station for Sussex line	
Effectiveness measures [E]	
Number of prevented incidents for both lines in stations equipped with Mid-platform fencing per year	3,43
Idem for LNW line only	1,72
Idem for Sussex line only	1,70
Assumptions	<p>The impact is quite similar whatever the year of implementation, given that data from a long period are used</p> <p>For CEA, we don't consider potential displacements of suicidal events towards other places, e.g. stations with no restriction or slow lines; this would not be the case for CBA.</p>
CEA [E/C]	
Both Lines	0,00000196536
LNW	0,00000134280
Sussex	0,00000366121
CBA CBA for both lines (same formula as CEA with E² monetized)	2,517432118

The analysis of data collected on stations with no or other types of restriction than Mid-platform fencing, which cannot directly be used as such, suggests however that there could be an increase in the number of events in the same time, as well as an increasing number of events related to slow lines. This point should be further analysed with more control on data. An attempted CBA is then proposed, using the effectiveness value multiplied with a Value of Statistical Life of 1280901,755 €³. Bearing in mind the limits of the current calculation, the results can be interpreted in the following way: implementing mid-platform fences yield a return of 2.5 times the investment in one year.

A mini CBA could be ultimately calculated provided that an estimation of the following parameters could be obtained or corresponding assumptions made:

¹ Using conversion rate: 1 £ = 1.2809017548354 euros

³ Conversion of VSL = £1000000.

- distribution of injuries and death related to suicide and suicide attempts;
- cost per minute of delay, per network unavailability, per traffic disruption; and
- accurate estimate of potential displacements towards other sites

1.1.5 Applicability of results to different circumstances

The analysis of various data types suggests the potential value of this type of fencing, though it is only possible in particular circumstances (see section 4.6.6. below for discussion on the need for certain configurations of lines and arrangements for access and opening of the gates in a variety of circumstances). The measure also needs high standards of security / restriction of access at other parts of the station (e.g. lone platforms, platform ends, other fencing to prevent crossing of lines to fast lines).

The fencing is not high (1.4m) and is not intended for those who are determined to go to great lengths to find access to the railway. Staff have commented on how the fencing is at the right height to prevent access, without it becoming too obtrusive and "looking like a prison". This type of fencing might therefore be effective as a deterrent to those at stations where behaviours are impulsive (as is thought to be the case in many suicide incidents).

1.1.6 Discussion

There have been no previous studies of mid-platform fencing. This type of intervention is different to other platform screening intervention studies.

This was a field study, and as would be expected, there were a complex range of circumstances that could impact on the outcome of the intervention. The study included 51 stations, across three of the operations routes in GB. Mid-platform fencing restrictions were provided at 22 of these stations and other restrictions to access to fast lines were identified at 18 of the stations.

The stations in this pilot study are representative of fast, mainline stations and therefore do not represent the circumstances at all other parts of the rail network (see the descriptive statistics on incidents and the differences with national statistics, section 4.6.3.1).

Results on the potential impact of the fencing on the numbers of suicide incidents need to be interpreted with some caution. There seems to be a positive effect of the mid-platform fencing and a range of potential effect sizes have been identified across the stations in the pilot. However, this is a very simple metric for the potential effect size and this does not take account of the other factors that can affect incident rates over time. Where there has been a larger reduction in incidents (per station/year) there may be a selection bias which has inflated the effect size (particular issues may have contributed to high numbers of incidents at particular station). The fencing may have contributed to the reduction of the numbers of incidents, but this is unlikely to have been the only contributing factor (intervention). Smaller effects of the intervention can be explained by the fact that there have not been high numbers of incidents at a station, historically. Furthermore, the monitoring period (post-intervention) has been short and there is need for collection and analysis of statistics over a longer period of time.

Detailed data have been collected on stations and the implementation of the fencing intervention at stations. This is needed to understand the range of design related factors that can influence the numbers of incidents (especially the configurations of lines and platforms). Several lessons have been learned by the organisations involved and these can help to contribute to better design and the ease of implementation of future programmes.

People generally seem to like the fencing (there are some dissenting voices, demonstrating the need for communication around the purpose of the fencing and potential effects of the programme). People think that the fences work in preventing incidents (e.g. acting as a deterrent,

or giving time for people to intervene). The fences are thought to have been put in the right location (it is important to note that they are not suitable everywhere). The fences are thought to have other benefits, such as in increasing perceptions of safety while on platforms and in preventing unsociable behaviour and access to places where people should not be. The fences are also described as looking nice.

There are thought to be few negative effects of the fencing. There are perhaps some issues with crowding, though station managers have found that these can be managed, even when there are large crowds at football matches. One difficult area is in maintaining the integrity of the fencing by ensuring that the access gates are closed. There are circumstances in which the gates need to be opened to allow access to trains and to allow people off trains in a range of circumstances. This situation is easier to manage where there are staff at a station, but much harder to control where a station is not staffed.

There is a need for better data in the future. This includes better data from investigations of incidents (more details on events, the lines of incidents, points of access) and also data on the dates and locations of all preventative measures (to help with interpretation of the likely effectiveness of interventions).

Mid-platform fencing has a role to play alongside other preventative measures. It is likely to be very effective when used in the right locations, but it can't be used everywhere.

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