



Rail Accident Investigation Branch

# Rail Accident Report



## Possession irregularity near Manor Park 19 March 2006

This investigation was carried out in accordance with:

- the Railway Safety Directive 2004/49/EC;
- the Railways and Transport Safety Act 2003; and
- the Railways (Accident Investigation and Reporting) Regulations 2005.

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# Possession irregularity near Manor Park

## 19 March 2006

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## Introduction

- 1 The sole purpose of a Rail Accident Investigation Branch (RAIB) investigation is to prevent future accidents and incidents and improve railway safety.
- 2 The RAIB does not establish blame, liability or carry out prosecutions.
- 3 Access was freely given by Network Rail and Kier Rail to their staff, data and records in connection with the investigation.
- 4 Appendices at the rear of this report contain glossaries:
  - acronyms and abbreviations are explained in appendix A; and
  - technical terms (shown in *italics* the first time they appear in the report) are explained in appendix B.
- 5 All mileages in this report are measured from the buffer stops at Liverpool Street station.
- 6 This investigation has focused on the *possession* planning process to determine when changes to the possession arrangements were made and why staff on site remained unaware of the changes. It has not sought to assess the competence or fitness of the *Controller of Site Safety* (COSS) or *Engineering Supervisor* (ES), nor the efficacy of the post-incident response by Network Rail.

## Summary of the report

- 7 At 09:23 hrs on Sunday 19 March 2006, train 1Y06, the 09:02 hrs London Liverpool Street to Ipswich service, struck two wheelbarrows as it approached Manor Park station at over 80 mph under clear signals. The staff on the track with the wheelbarrows had been able to jump clear, but two members of staff were injured.

### Immediate cause

- 8 The immediate cause of this incident was the presence of a workgroup on the track outside the limits of a possession and without any means of protection.

### Causal factors

- 9 Causal factors were:
- a. poor communication between Kier Rail staff throughout the planning period and up to the time of the incident resulting in the staff being sent to a site where the possession had been curtailed;
  - b. the COSS was not aware of the contents of the *Risk Minimisation plan* (RIMINI plan) which clearly showed the work was no longer planned to take place at the site at Manor Park;
  - c. the lack of a clear understanding between the ES and the COSS at the start of the work as to where the work group was located; and
  - d. Network Rail not making sufficiently clear to Kier Rail the extent of the changes to the possession made shortly before the final planning meeting.

### Contributory factors

- 10 The following factors were considered to be contributory:
- a. the handing of the RIMINI plan to the COSS between 30 and 45 minutes before the commencement of activities, therefore leaving very little time for him (the COSS) to read it;
  - b. the complex format of the RIMINI plan;
  - c. the lack of a briefing of the COSS by the site supervisor;
  - d. the ES and the COSS not jointly reviewing and signing form RT3199;
  - e. the planning of the *work site*, and in particular its size and the number of jobs within it;
  - f. the late identification of the changes within Kier Rail;
  - g. the lack of a clear mutual understanding of the location of the work activity between the RIMINI planner and the contract manager; and
  - h. the lack of understanding by the RIMINI planner of the contractual limits between Kier Rail and Network Construction.

## **Underlying causes**

- 11 An underlying cause is planning complex work sites to encompass multiple jobs over many miles.

## **Recommendations**

- 12 Recommendations may be found at paragraph 120. They address the following areas:
  - minimisation of work site lengths within possessions to ensure rule book compliance;
  - improvement of planning procedures within Network Rail and Kier Rail; and
  - storage of archived data.

## The Accident

### Summary of the accident

- 13 At 09:23 hrs on Sunday 19 March 2006, the driver of train 1Y06, forming the 09:02 hrs London Liverpool Street to Ipswich service, operated by 'one' Railway, approached Manor Park station at over 80 mph under clear signals. The driver saw a group of workers on the track ahead, sounded the horn and applied the emergency brake.
- 14 The staff on the track were able to jump clear, but the train struck and destroyed two wheelbarrows which had been left on the track. Two members of the group required medical attention as hospital out-patients after being struck by projectiles; one was off work for two weeks as a result. There were no injuries caused to any person on the train.
- 15 The injured staff were part of a construction team consisting of seven operatives under the supervision of a COSS. The team were undertaking brick work repairs to a line side retaining wall and had positioned wheelbarrows on the adjacent track as space was limited.
- 16 The COSS had established the *site of work* at 08:10 hrs that morning, and believed that protection was being provided by a *T3 possession* of the line. However, this protection had been withdrawn at 08:30 hrs in accordance with the published possession plan, but without the knowledge of the COSS.

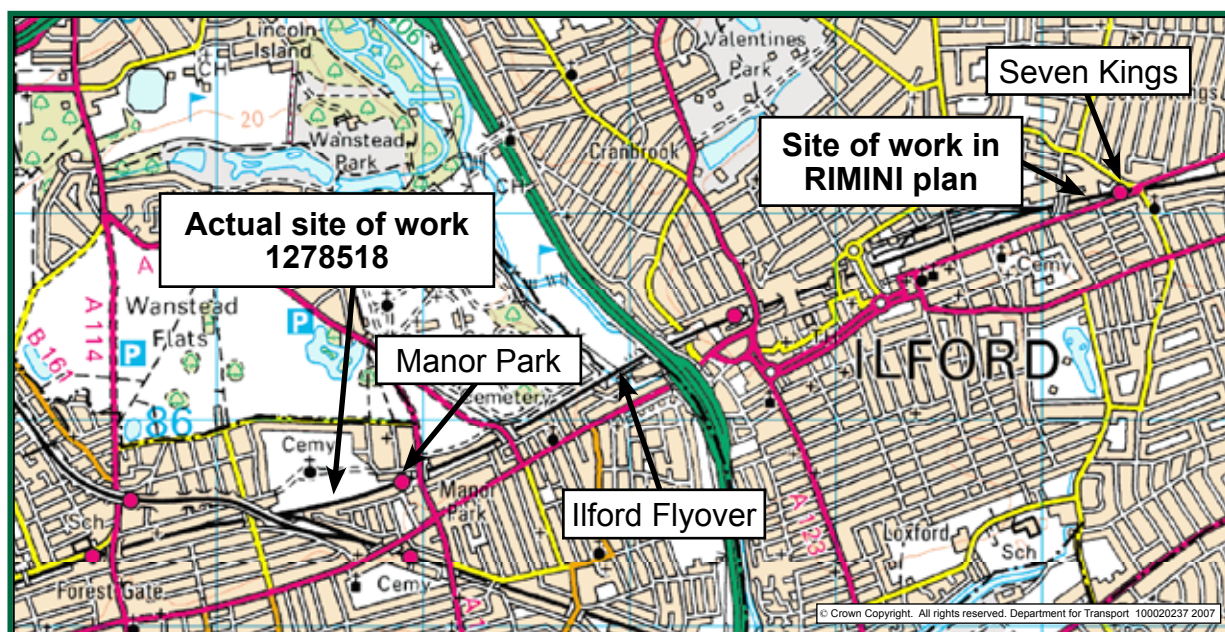


Figure 1: Extract from Ordnance Survey map showing location of incident and alternative site of work



## The parties involved

- 17 The infrastructure involved is owned by Network Rail Infrastructure Ltd (Network Rail), who were responsible for its upkeep, including maintenance and upgrade work.
- 18 Network Rail's Major Projects and Investment group (MP&I) manage a framework contract for the maintenance of structures throughout north-east London and East Anglia.
- 19 Network Rail MP&I appointed Kier Construction Ltd (trading as Kier Rail) as the East Anglia framework contractor for structures. Kier Rail, in turn, subcontracted certain works within this contract to smaller civil engineering companies. Kier Rail arranged *T3 possessions* where necessary to undertake the works and supervised the execution of the works. Kier Rail employed contract managers with overall responsibility for subcontractors, and site supervisors who worked with subcontractors on site to ensure that works were executed correctly. Kier Rail's contract managers were supported by their planning team, comprising a RIMINI planner responsible for producing documentation for use by the COSS, and a possession planner who co-ordinated the booking of possessions.
- 20 Part of Kier Rail's contract involved brickwork repairs to a lineside retaining wall near Ilford in north east London. Kier Rail had subcontracted the repair of the section of wall between Balmoral Road bridge, located between Forest Gate and Manor Park, and Ilford Station to Network Construction (GB) Ltd (Network Construction) who provided labour and their own COSS for the project. The staff on the track at Manor Park on 19 March 2006 were employed by Network Construction.
- 21 Both Kier Rail and Network Construction are experienced railway contractors. Their qualification to work on Network Rail infrastructure is demonstrated by the fact that Kier Rail holds a *Contractor's Assurance Case* and Network Construction are included in the *Link-Up* register of contractors approved by Network Rail.

## Location

- 22 The incident occurred on the approach to Manor Park station, which is situated 6 miles 19 *chains* from London Liverpool Street station on a 4-track section of the Great Eastern line which carries services from London, via Shenfield, to Southend, Colchester and Norwich (refer to Figure 2). These lines are operated as two pairs of lines, known as the *up* and *down* main lines, and the up and down electric lines. All lines are electrified by the 25 kV overhead catenary system.
- 23 The line speed on the down main line at Manor Park is 90 mph (145 km/h).
- 24 A railway flyover situated to the west of Ilford station carries the electric lines over the main lines and thereby transposes their positions. As a consequence, the lines are in a different configuration at Manor Park, west of Ilford, from that at Seven Kings (8 miles 50 chains), to the east; this means that access to the north side of the line would require possessions of different lines at those locations. The down main line is the most northerly line at Manor Park and the down electric line is the most northerly line at Seven Kings (see Figure 2).
- 25 For a distance of over 5 miles between Maryland (4 miles 39 chains) and Chadwell Heath (9 miles 79 chains), the line runs predominantly in cuttings between retaining walls on both sides of the track. The retaining structures are not continuous, but are collectively known as the blue brick retaining walls.

26 Possessions of both the main and electric lines are not normally given at the same time, other than overnight, in order to maintain a train service. Prior to the incident, possessions had normally been available on the main lines on even numbered weekends and the electric lines on the odd numbered weekends.

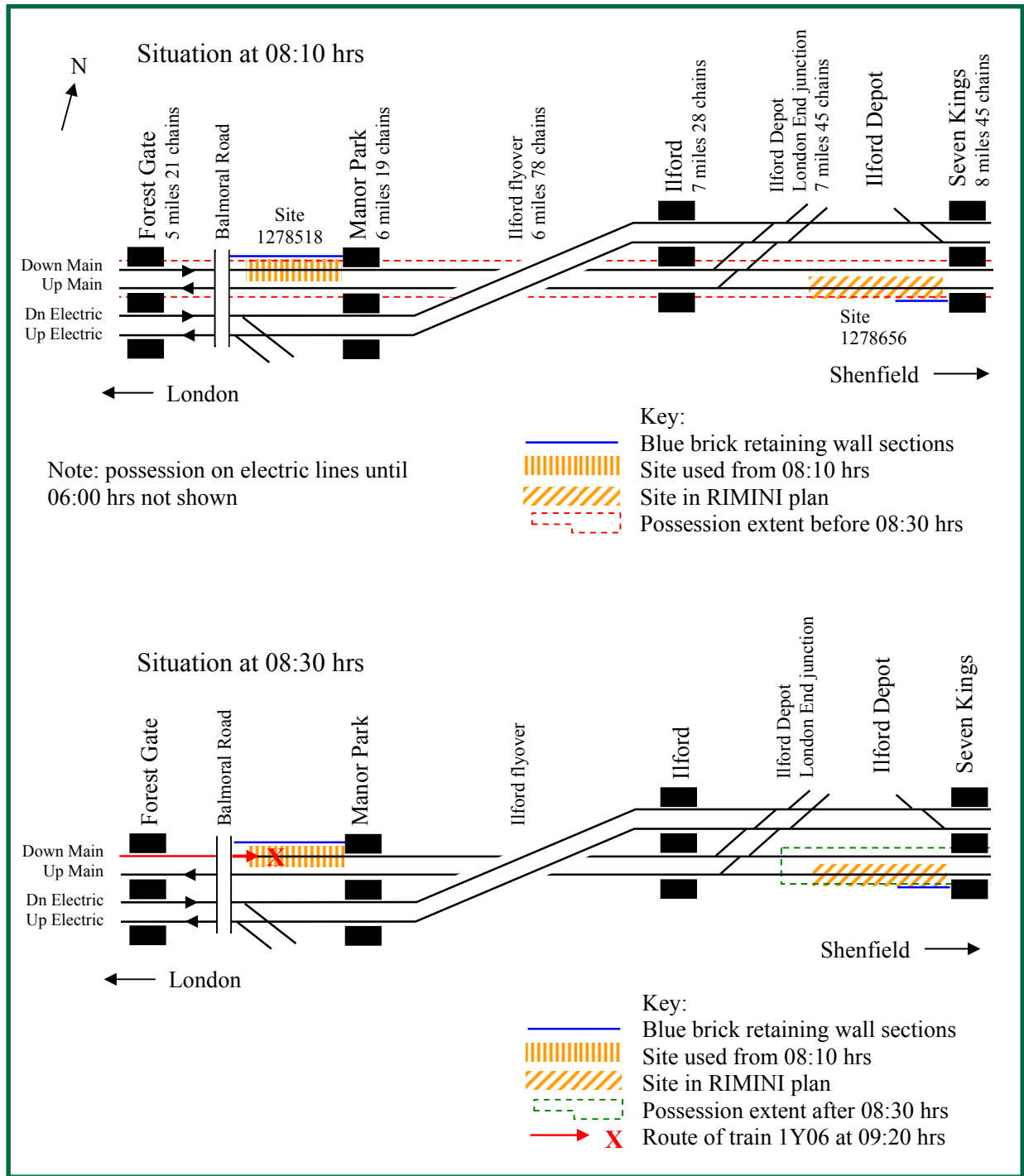


Figure 2: Simplified track layout diagram showing arrangements at 08:10 hrs and 08:30 hrs

## External circumstances

- 27 The weather on 19 March 2006 was dry and clear. There is no evidence that climatic conditions had any effect on the incident.

## Network Rail planning systems for possessions

- 28 Network Rail's possession planning process depends on a structured series of meetings held between Network Rail's Access Managers and their contractors. During 2005/06, the configuration of these meetings was changed to increase the lead time between the planning meetings and possessions. These changes included moving from a single meeting regime, held 8 weeks prior to a possession (T-8) to a regime involving meetings held 14 weeks (T-14) and 6 weeks (T-6) prior to a possession. During the transitional period, lead times were increased incrementally and this resulted in the possession arrangements for more than one week being reviewed during each planning meeting. The transitional period occurred between October 2005 and March 2006.
- 29 Network Rail record possession requirements in their centrally managed *possession planning system* (PPS). This system is designed to allow contractors to book *items of work* within the available possessions. It is used to generate the *weekly operating notice* (WON). Items of work can be booked for a specific date or on a recurring basis.
- 30 Possession documentation provided to a COSS comprises the RIMINI plan as mandated in Network Rail specification NR/SP/OHS/019. The RIMINI plan provides details of how the site of work will be protected from trains and other hazards and includes diagrams of the track layout and contact numbers to assist the COSS in performing his duties.
- 31 RIMINI plans are prepared in advance of work being carried out and NR/SP/OHS/019 requires the level of protection being provided to be justified if works are to be undertaken outside of a *safeguarded green zone*. A safeguarded green zone can only be provided by blocking all lines to traffic in accordance with section T2, T3 or T12 of the Railway Rule Book (GE/RT8000).

## Train involved

- 32 Train 1Y06 consisted of a four car Class 360 electrical multiple unit number 360119. There is no evidence that the train, or the manner in which it was driven, caused or contributed to the incident in any way, and they are not considered further.

## Events preceding the accident

- 33 The project involved repairs to the blue brick retaining walls. Network Rail gave a remit for the work to Kier Rail during 2005, after which planning of the project started. Kier Rail scoped the work during site visits in June and July 2005 and during September their contract manager identified suitable opportunities to gain access to the track west of the Ilford flyover.

- 34 On 2 August 2005 Network Rail created a possession for 19 / 20 March 2006 within the PPS. This possession, numbered P2005/688751, was listed in the *Confirmed Period Possession Plan* (CPPP).
- 35 Possession P2005/688751 was listed as lasting from 01:00 hrs Sunday 19 March until 03:30 hrs Monday 20 March. Its geographical limits included the main lines between Bow junction (2 miles 74 chains) and Shenfield junction (20 miles 22 chains). The possession made approximately 24 hours working time available on those parts of the blue brick retaining walls that were accessible from the main lines.
- 36 On the advice of Kier Rail's possession planner, the work on the walls was split into two sites, one at 6 miles 19 chains near Manor Park for the north wall, and one at 8 miles 50 chains near Seven Kings for the south wall. These sites were chosen to allow trains to run on the electric lines (see Figure 2). The Kier Rail contract manager submitted the details to their possession planner on an internal 'work site application form' in line with their internal procedures.
- 37 On 10 October, Kier Rail's possession planner used the PPS to book items of work within possession P2005/688751. In accordance with the requirements of the PPS, these items of work were initially booked with *T2 protection*, and numbered 1278518 (Manor Park), and 1278656 (Seven Kings). This established that work was to take place at those locations on the particular date, and was a preliminary step to Network Rail incorporating the work into their T3 possession when this was planned out in detail. The items of work were booked from 00:15 hrs Sunday until 05:20 hrs Monday.
- 38 The Kier Rail possession planner maintained a record of possession bookings and their status on an internally networked spreadsheet, known as the 'weekly possession register', which can be referred to by the project teams. The status of individual items of work is indicated by a colour coding, and this is updated to reflect the relevant PPS entry. The possession planner colour coded amended items green and normally made amendments on the day after the relevant planning meeting had identified and agreed them.
- 39 On 24 January 2006, the T-14 meeting was held. The meeting was actually held 8 weeks prior to possession as this was during the transition phase for possession planning lead times from T-8 to T-14, as described in paragraph 28. The allocation of items of work into work sites within T3 possessions, as referred to in paragraph 37, is routinely carried out at this meeting so as to ensure that there are no conflicting work sites or train movements; item 1278518 (Manor Park) was incorporated into a Network Rail-owned work site within T3 possession P2005/688751. Item 1278656 (Seven Kings) was not incorporated into the T3 possession at this stage for reasons unrelated to this incident.
- 40 On 26 January, the PPS record for item 1278518 was amended to reflect its incorporation into possession P2005/688751. However, the PPS screen continued to show the original times of 00:15 hrs on Sunday 19 March to 05:20 hrs on Monday 20 March which had, by then, been superseded by the possession times of 01:00 hrs on Sunday 19 March to 03:30 hrs on Monday 20 March, and this remained the case until the possession. This is a feature of the PPS and any organisation planning work in this system has to ensure there is a cross-reference to the linked possession to ascertain whether the times of a linked item remain suitable for the intended work.

- 41 On 6 February, Network Rail issued draft documents, known locally as *possession books* and *work site books*, for Week 51 to the relevant stakeholders, including Kier Rail. These documents were issued electronically in preparation for the final planning meeting, nominally 6 weeks prior to the possession (T-6 meeting), to be held the following week. The *possession book* confirmed the work sites discussed at the T-14 meeting which had been agreed and linked to a possession, whereas the work sites book contained the proposals which remained unallocated. These documents were issued to allow possession users to check their requirements and ensure that any final changes and remaining allocations were agreed at the T-6 meeting.
- 42 During early February, Kier Rail and Network Construction met with the owners of a cemetery adjacent to the north blue brick wall between Balmoral Road and Manor Park station. The purpose of the meeting was to negotiate areas to be used for the storage of materials. Agreement was reached to establish three compounds.
- 43 On 13 February, the PPS records show that Network Rail's Access Manager made ten amendments to possession P2005/688751 on 19 March. It has not been possible to establish why these changes were made or what they were, but the effect was to significantly shorten the time available for item 1278518 (Manor Park). The reduced time was from Sunday 00:30 hrs to Sunday 08:30 hrs.
- 44 On 14 February, the T-6 meeting was held with possession users bringing their copies of the possession and work site books which had been issued on 6 February and, as a result of changes made on 13 February, now partly obsolete. There are no contemporaneous records of what was discussed during this meeting as minutes are not taken and Network Rail have been unable to locate the records for this investigation. The output from the meeting was the Final Draft WON; this was created from the possession books, annotated as necessary by Network Rail's Access Manager who chaired the meeting. Kier Rail's possession planner attended this meeting, but did not become aware of the significance of possession changes to item 1278518 at Manor Park either during the meeting, or following publication of the Final Draft WON. The possession times in Kier Rail's weekly possession register spreadsheet therefore remained unchanged, although the entry was highlighted in green to show it was amended (paragraph 38). This highlighting was made to reflect a change in the availability of the electric lines and had no direct relevance to the work at Manor Park.
- 45 On 20 February, Network Rail issued the Final Draft WON. In this document, Possession P2005/688751 was shown as being shortened in duration in the Manor Park area from 27 hours to 8 hours, such that item 1278518 was no longer suitable for Kier Rail's planned work. The Seven Kings item 1278656 was also identified in this document and was unaffected by the changes which had been made on 13 February.
- 46 On 5 March, during a previously arranged T3 possession, Network Construction erected a temporary fence between the down main line and the retaining wall at the Manor Park site.
- 47 During the week commencing 6 March, Kier Rail offered Network Construction the opportunity to work in the possession at Manor Park on 19 March as shown on the weekly possession register (see paragraph 38). This was to be the first possession in a sequence to allow repairs to be undertaken to the north blue brick retaining wall.
- 48 On 10 March 2006, the Final WON was issued. This reflected the position at T-6 as no further changes had been made.

- 49 On 13 March, Kier Rail's RIMINI planner, working separately from Kier Rail's possession planner, checked the Final WON and noted that the possession times had changed, such that access at Manor Park was only available between 00:30 hrs and 08:30 hrs; he realised that this time would not permit the intended work to be undertaken as daylight was required. The RIMINI planner and contract manager had an informal discussion concerning the changed timings at Manor Park and the possibility of allocating resources to the alternative site at Seven Kings. There is no written record of this discussion, but on the basis of it, the RIMINI planner, believing that the contract manager had agreed to relocate the work to Seven Kings, proceeded to prepare documentation for the Seven Kings site, east of Ilford. The contract manager believed that work could still be undertaken at both locations.
- 50 On 14 March, 5 days before the possession, Kier Rail's RIMINI planner attended a possession planning meeting at Romford. He stated that Kier Rail would work at Seven Kings instead of Manor Park. On this basis, Kier Rail prepared the RIMINI plan and Network Rail the possession pack, for the alternative item of work 1278656 at Seven Kings. The RIMINI planner attended the meeting as the contract manager's representative, but did not give feedback following this meeting as he believed that the contract manager's requirements had been met.
- 51 During the week preceding the accident, the compounds within the Manor Park cemetery were loaded with materials and fencing between the compound and railway was removed in preparation for the weekend possession. On 15 March, a site meeting was held attended by Kier Rail, Network Construction and the appointed COSS. During this meeting, the site was marked out and access points were agreed.
- 52 At this stage the only contract between Kier Rail and Network Construction for work on the walls was for work west of Ilford. Thus the Seven Kings site was outside Network Construction's contract with Kier Rail, and not a site where work could take place.
- 53 On 16 March, Supplement 1 to the Final WON was issued. This allows late changes to be published, but in this instance, there were no relevant amendments. The possession arrangements therefore remained as established at T-6.
- 54 Kier Rail had a significant involvement in other possession works on 19 March 2006. The combined activities required the production of a total of seven RIMINI plans and required the Kier Rail site supervisor allocated to the retaining wall works to split his time between this and another nearby project.
- 55 On 17 March, following receipt of the final possession details, the RIMINI planner completed the seven RIMINI plans, one of which applied to the retaining wall works, and left them on the contract manager's desk. These were subsequently collected by the contract manager and distributed to Kier Rail site staff for issue. The RIMINI planner believed that the site supervisor would brief the COSS on the content of the document. However, Kier Rail's procedures did not require the site supervisor to make any such briefing.
- 56 The site supervisor allocated to the retaining wall works had been trained as a COSS. He would therefore have been in a position to understand much of the content of the RIMINI plan, but he was not briefed on its contents, and did not read it.

## 19 March 2006

- 57 At 07:15 hrs on 19 March 2006, Kier Rail's site supervisor handed the COSS the RIMINI plan (Project number HHR830) at the site gate at Manor Park cemetery. The site supervisor did not brief the COSS on the content of the document, which included possession details, although this was the first occasion that work had taken place at this site. On receiving this documentation, the COSS searched the document to find contact details for the Engineering Supervisor (ES).
- 58 The RIMINI plan consisted of 17 pages, and had a 32 page possession pack appended to it which included the contact details for the ES. Some of the information provided was of relevance to the possession as a whole and not specific to the site at Seven Kings. The COSS had insufficient time to read the document fully, and did not notice, as he sought the information that he did need, that the documents were for work at Seven Kings although he was at Manor Park.
- 59 When the construction team assembled, the site supervisor gave a site induction briefing. This was followed by a method statement brief and a *COSS brief*, both given by the COSS. The operatives then signed the COSS briefing record contained within the RIMINI plan; the signatures serving as confirmation that the briefing had been received and understood. At no time did anyone present realise that the RIMINI plan had been prepared for vegetation clearance work in the Seven Kings area between 8 miles 5 chains and 8 miles 50 chains, while the Manor Park site was located at 6 miles 19 chains.
- 60 At 07:30 hrs the COSS rang the number that he understood was for the ES which he found listed in the possession pack. There was no answer.
- 61 At 07:45 hrs, the COSS rang a different number and contacted the person who was to be the ES. The COSS was instructed to call back in 15-20 minutes as this person was only due to commence ES duties following a shift change at 08:00 hrs. At 08:05 hrs, the COSS spoke to the incoming ES again and, during a call lasting less than one minute, explained the nature of the work and described his location. The COSS and the ES did not reach a common understanding on the location of the *work group*. The COSS received confirmation that the line closest to the wall was closed to traffic, and the ES recorded his presence on form RT3199, the form in the rule book used to record Engineering Supervisor arrangements, by writing his name in the signature space, or in the colloquial phrase, 'signing him in'. The COSS was told he could start work and was requested to contact the ES on completion of the shift. The COSS was at, and believed he had permission to work at, Manor Park, while the ES believed he had given permission to work at Seven Kings.
- 62 At 08:00 hrs, the incoming ES became responsible for a work site consisting of 12 work groups, spread over a distance of 8 miles between Ilford and Upminster, each controlled by a separate COSS, who were all attempting to contact him at this time. The ES was also involved in ensuring that work groups were clear for the impending change in the possession limits.
- 63 The Railway Rule Book section T3 10.7 'Instructing the COSS to start work' gives instruction to the ES as follows: 'Before you start work, the COSS must sign your certificate RT 3199.' Certificate RT 3199 Part 4 requires it to be signed by the ES and noted by the COSS in respect of the authority given by the certificate. Furthermore, section 5.3 of the COSS handbook states 'before starting, sign the Engineering Supervisor's certificate, also known as RT3199, and set up a suitable safe system.' As there was no face to face meeting between the ES and the COSS the RT3199 could not have been completed in accordance with the Rule Book.

- 64 The COSS then gave approval for Network Construction staff to access the down main line from the cemetery, and at approximately 08:20 hrs, the COSS, seven operatives and the Kier Rail site supervisor accessed the track and walked to the place of work using the track itself as the access route. Again this was done without reference to the RIMINI plan, which indicated that access was from Seven Kings station. After work commenced, the Kier Rail supervisor left the track and made adjustments to road signs giving access to the site.
- 65 At 08:30 hours, possession P2005/688751 was shortened and the western limit of the possession was moved from Bow Junction (2 miles from Liverpool Street station) to Ilford Depot (7 miles 50 chains), all in accordance with the published possession plan. As a consequence, the protection provided to the work group at Manor Park was removed, and they were then working on an open high speed line without either a block or any *lookout* protection. The COSS was not aware that the changes to the possession and work site affected his work group. Repair work to the retaining wall continued.
- 66 The ES was similarly unaware that the change in possession limits had left the subcontractor's staff unprotected as he believed that the COSS and subcontractor's team were at Seven Kings in accordance with the possession documentation.

### Events during the accident

- 67 At 09:23 hrs train 1Y06 approached Manor Park at over 80 mph (129 km/h) and observed staff and equipment on the line ahead. The driver sounded the horn and applied the emergency brake. Staff were able to jump clear, leaving their wheelbarrows and materials on the track. The wheelbarrows were destroyed in the collision and several of the group were struck by flying projectiles.

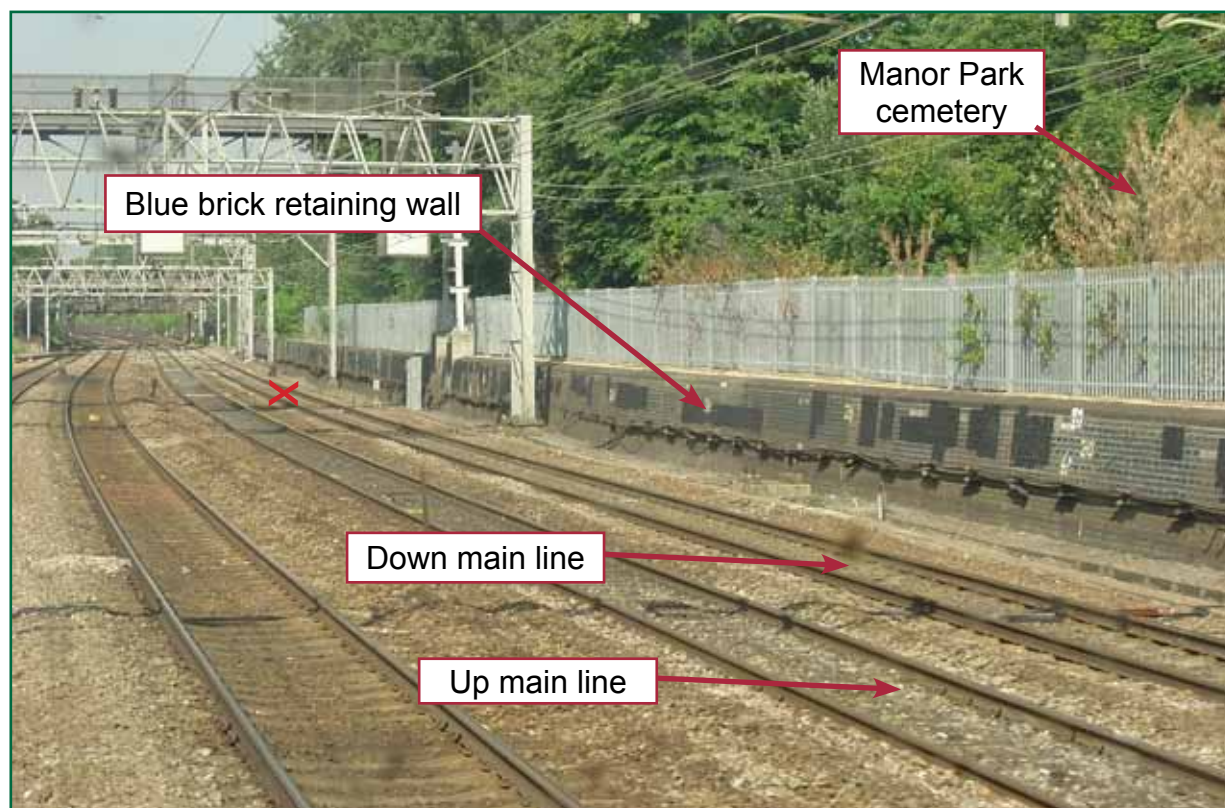


Figure 3: Photograph showing layout, viewed towards London. The incident occurred at the location marked 'X'



- 68 Train 1Y06 stopped short of Manor Park station and the driver immediately contacted the signaller, at Liverpool Street. The driver reported that the train had struck two wheelbarrows on the down main line between Forest Gate station and Manor Park station. The signaller stopped all movements on the adjacent up main line to allow the driver to examine the train. The driver found wheelbarrow parts lodged beneath the rear wheels of the leading vehicle and a major air leak in a brake pipe.
- 69 The COSS contacted the ES to advise him that a train had entered the possession and collided with their equipment. The ES queried the location of the group and on being told they were at Manor Park, informed the COSS that they were outside the possession limits.

### **Consequences of the accident**

- 70 Two members of Network Construction staff sustained minor injuries, and were conveyed to hospital. One of those affected had been struck on the abdomen by part of a wheelbarrow and was unable to work for several weeks. Work on the retaining wall was suspended.
- 71 Train 1Y06 suffered slight damage and was taken out of service following the collision. This required attendance by fitters from Ilford Maintenance Depot and led to a decision to de-train the passengers. Train services were diverted onto the Electric lines which were allowed to run normally.

### **Events following the accident**

- 72 A Network Rail *Mobile Operations Manager* (MOM) attended site at 09:40 hrs and made contact with the driver. The driver was reported as being shaken and was relieved of duty.
- 73 The 30 passengers on the train were detrained and escorted to Manor Park station by 10:30 hrs where arrangements were made for their journeys to continue.

## The Investigation

### Sources of evidence

74 Evidence has been obtained from:

- The possession management documentation, including records held within Network Rail's PPS system;
- Interview of the key staff involved in the possession planning process;
- Possession planning records held by Network Rail and Kier Rail. However, Network Rail mislaid the records for week 51, which might have explained why the possession was changed and how this change was communicated. These records were not available to the RAIB.

### Previous occurrences of a similar character

75 Possession irregularities are a frequent occurrence on the Network Rail system. The RAIB has investigated and reported on two such occurrences:

- On 11 January 2006 a gang of track workers started to remove a rail on the line just north of Thirsk station. The line was still open to traffic and the site had been established outside the engineering possession. RAIB report 15/2006 refers.
- On 14 January 2006 an engineering train made an unauthorised move out of a possession onto an open line, at Haymarket East Junction and subsequently derailed. RAIB report 03/2007 refers.

76 Appendices C and D of RAIB report 15/2006 give statistics regarding possession irregularities on the Network Rail system. There appears to have been no substantial change in the level of irregularities since this report was published.

## Analysis

### Identification of the immediate cause

- 77 The immediate cause of the incident was the presence of a work group on the track outside the limits of possession and without any means of protection.

### Identification of causal and contributory factors

#### COSS briefing

- 78 The COSS believed that the work was to take place at Manor Park. He had taken part in a preparatory site visit there, had been handed the RIMINI plan prepared by Kier Rail on arrival there, had taken part in a site briefing with his client's supervisor and had gone onto the track with the site supervisor present.
- 79 The COSS received instructions from his employer, Network Construction, and from Kier Rail's site supervisor. Both parties remained unaware of the change in the possession arrangements prior to 19 March, and preparations for the brickwork repair work had focused solely on the Manor Park site. This included negotiation for access through the Manor Park cemetery, the supply and storage of materials and basic staff welfare facilities. The COSS was aware that Network Construction were only working in this area and therefore in his mind, the possession could only occur at this site.
- 80 The most immediate defence against an unsafe system of work on the line is the RIMINI briefing, where the COSS has to explain to his work group the safe system of work that is to be carried out, and to do this from a pre-planned document. The RIMINI plan stated that the work was to be at Seven Kings, but the COSS did not appreciate that it was not for Manor Park.
- 81 That the COSS was not aware of the contents of the RIMINI plan was a causal factor of the incident.
- 82 The COSS was handed the RIMINI plan between 30 and 45 minutes before the work started. The core document was 17 pages long, and the references to Seven Kings were neither highlighted, nor included on the front cover.
- 83 The handing of the RIMINI plan to the COSS at the very last minute so that he did not have sufficient time to read it, and the format of the document, were both contributory factors to the incident.
- 84 The Kier Rail site supervisor did not brief the COSS at the start of work. However, the site supervisor was also under the impression that the planned site of work was at Manor Park, not Seven Kings.
- 85 Had the supervisor decided to give a briefing to the COSS on the work, it is more likely that he would have read the RIMINI plan. The lack of a briefing of the COSS by the site supervisor is a contributory factor.

#### The setting up of the work site

- 86 The COSS requested permission to start work within the work site. The ES granted him this permission. At no point during this conversation was it established that they were talking about different locations.

- 87 The lack of a clear understanding between the ES and the COSS at the start of the work is a causal factor to the incident.
- 88 Rule T3 and the COSS handbook require both the ES and the COSS to sign form RT3199. This form includes a space to state the location of the work site, and has to be noted by the COSS and signed by the ES. In this case the form was not signed or noted by the COSS, as the work was authorised in a telephone conversation of less than one minute's duration. A face to face meeting between the COSS and the ES would have meant that both would have seen the form, which would have clearly shown that the ES thought the work was at Seven Kings, and the COSS that it was at Manor Park, and outside the work site (and possession) limits; this would have greatly increased the likelihood of realising the misunderstanding, thus avoiding the accident.
- 89 That both the ES and the COSS did not sign form RT3199 was a contributory factor.
- 90 The reason for the ES not being able to meet the COSS and sign his forms relates to the number of COSSs, and the extent of the work site, that he was supervising. The work site, after 08:30 hrs, extended from Ilford Depot London End Junction to Upminster, a distance of 8 miles. Within this distance the ES was supervising 12 work groups. As he had just taken duty, and was involved in the reduction of the possession size, it was impossible for the ES to meet all his COSSs face to face, and he was under considerable time pressure as he allowed the shift to start. The work planned was thus such that compliance with Rule T3 10.7 was very difficult.
- 91 The planning of the work site, and in particular its size and the number of jobs within it, was a contributory factor.

#### Kier Rail

- 92 Kier Rail's possession planner attended the T-6 meeting on 14 February and subsequently received both the final draft WON and final WON. The possession planner at no time became aware of the changes made by Network Rail, and did not undertake a review of either the final draft WON or the final WON, both published and containing the changes between the T-6 meeting and the possession. The cycle of meetings and documents occurs weekly and could lead to overload due to the length and complexity of the documents, particularly during the T-8 to T-14 transition period when more than one week was being reviewed during the planning meetings (see paragraph 28).
- 93 Kier Rail's site team identified the possession using the 'weekly possession register' and offered it to Network Construction for use. The work site remained available according to this document, even though the draft WON would have shown that the possession was unsuitable for its intended use.
- 94 The Kier Rail RIMINI planner did identify the possession change and drew this to the attention of Kier Rail's contract manager. The subsequent discussion led the RIMINI planner to prepare documentation for the alternative site at Seven Kings, but did not lead to the contract manager issuing instructions to his site supervisor or subcontractor (paragraph 49).
- 95 The Kier Rail RIMINI planner was unaware of the limited scope of Network Construction's subcontract in that no works were planned east of Ilford at this time. The site at Seven Kings was therefore not a suitable alternative.
- 96 The lack of clear communication of the change in the possession arrangements within Kier Rail, resulting in neither the site supervisor or their subcontractor being aware of the changed possession limits, was a causal factor in the incident.

- 97 The late identification of the changes within Kier Rail was a likely contributory factor.
- 98 The lack of a clear mutual understanding of the position between the RIMINI planner and the contract manager after their discussion on 13 March was a contributory factor.
- 99 The lack of understanding by the RIMINI planner of the contractual limits between Kier Rail and Network Construction was a contributory factor.

#### Network Rail

- 100 Network Rail made changes to the possession on 13 February which had a material effect on Kier Rail's planned item of work at Manor Park. The change was sufficient to require Kier Rail to substantially revise their plans. At the time this change was made, Kier Rail's item of work and interest in the possession opportunity were established within the PPS system and Network Rail should have anticipated the effect on them.
- 101 That the changes to the possession were made following the issue of the possession and work site books made it incumbent on Network Rail, both as client and as controller of the infrastructure, to identify and inform all affected parties. There is no record of how this was done, or what was discussed at the T-6 meeting on 14 February, but Kier Rail did not respond to the changes until 13 March following receipt of the final WON.
- 102 Network Rail not making sufficiently clear to Kier Rail the extent of the late change to the possession was a causal factor to the incident.

### **Identification of underlying causes**

- 103 When the concept of a work site was introduced into the rule book in 1985, it was intended that each job within a possession should be a single work site, protected by its own marker boards, and that the area between work sites should be controlled by the *Person in Charge of the Possession* (PICOP). Over the years the size of work sites has gradually increased, and it is now commonplace for there to be a single work site for a possession, with the ES managing multiple jobs within the work site over many miles. The work site at Ilford on 19 March 2006 was such a work site, and as such is not uncommon. With such work sites, for the reasons explained in paragraph 90 above, it is very difficult to comply with the requirements of Rule T3 10.7.
- 104 The complexity of such work sites means that it is unlikely that the ES will have detailed knowledge of the location of each COSS, and the systems laid down in the rule book do not ensure that the sites are correctly identified unless both parties see and sign form RT3199.
- 105 The complexity of this possession which encompassed multiple jobs over many miles was an underlying cause of this incident.

### **Factors affecting the severity of consequences**

- 106 At Manor Park on the morning of 19 March 2006, all system defences to prevent an accident had failed. The quick reactions of the driver and the immediate response from those on the track was the only reason that there was not a serious outcome.

## Summary of the event chain

107 The event chain, from issue of the possession book on 6 February 2006, is shown at Figure 4.

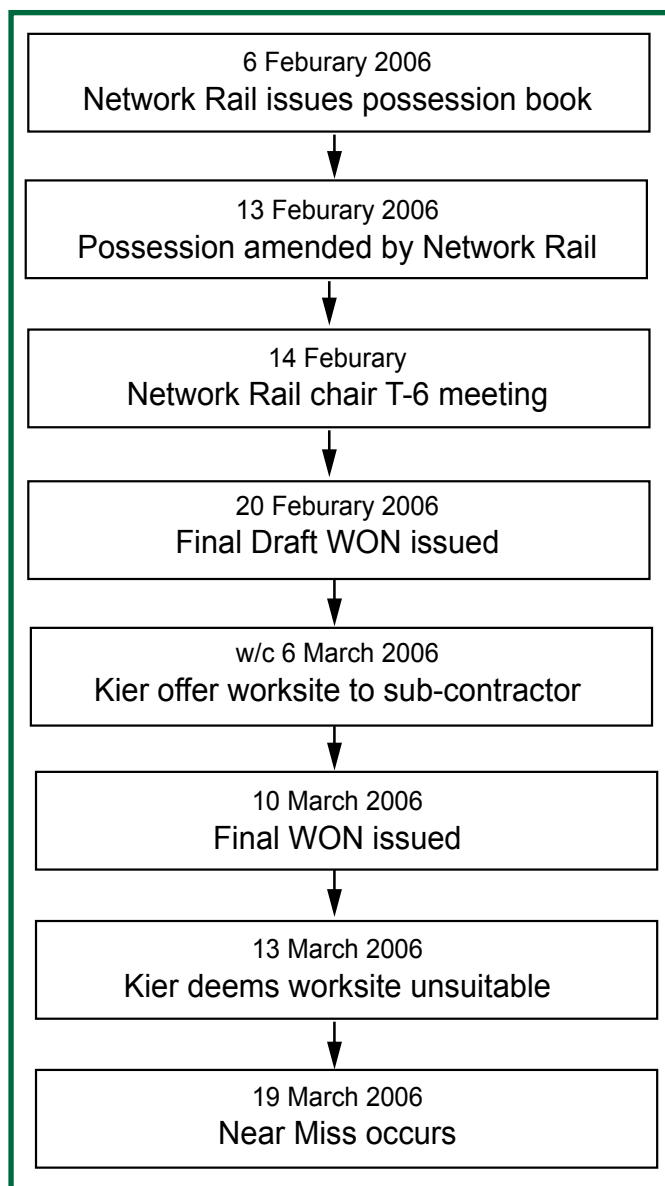


Figure 4: Diagram showing chain events and factors

## Conclusions

### Immediate cause

108 The immediate cause of this incident was the presence of a workgroup on the track outside the limits of a possession and without any means of protection.

### Causal factors

109 Causal factors were:

- a. poor communication between Kier Rail staff throughout the planning period and up to the time of the incident, resulting in the staff being sent to a work site where the possession had been curtailed (paragraph 96, **Recommendation 2b refers**);
- b. the COSS not being aware of the contents of the RIMINI plan which clearly showed the work was no longer planned to take place at the site at Manor Park (paragraph 81, **Recommendation 2e refers**);
- c. the lack of a clear understanding between the ES and the COSS at the start of the work as to where the work group was located (paragraph 87, **Recommendation 1a refers**);
- d. Network Rail not making sufficiently clear to Kier Rail the extent of the changes to the possession made shortly before the T-6 planning meeting (paragraph 102, **Recommendation 1c refers**).

### Contributory factors

110 The following factors were considered to be contributory:

- a. the handing of the RIMINI plan to the COSS between 30 and 45 minutes before the commencement of activities, therefore leaving very little time for him (the COSS) to read it (paragraph 83, **Recommendation 2d refers**);
- b. the complex format of the RIMINI plan (paragraph 83, **Recommendation 2c refers**);
- c. the lack of a briefing of the COSS by the site supervisor (paragraph 85, **Recommendation 2e refers**);
- d. the ES and the COSS not jointly reviewing and signing form RT3199 (paragraph 89, **Recommendation 1a refers**);
- e. the planning of the work site, and in particular its size and the number of jobs within it (paragraph 91, **Recommendation 1b refers**);
- f. the late identification of the changes within Kier Rail (paragraph 97, **Recommendations 2a and 2b refer**);
- g. the lack of a clear mutual understanding of the location of the work activity between the RIMINI planner and the contract manager after their discussion on 13 March (paragraph 98, **Recommendation 2a refers**); and
- h. the lack of understanding by the RIMINI planner of the contractual limits between Kier Rail and Network Construction (paragraph 95).

## **Underlying cause**

111 An underlying cause is planning complex work sites to encompass multiple jobs over many miles

## **Additional observations**

112 Within the PPS system, an item of work that is linked to a possession continues to show the times and locations originally requested by an applicant. Any changes made during the subsequent possession planning process are shown in the possession book. PPS may therefore show information that is superseded (**Recommendation 3a refers**).

113 The loss of the relevant planning documents during a Network Rail internal re-organisation has affected the ability of the RAIB to fully track all the changes involved in the planning of the work site (**Recommendation 3b refers**).

114 Rule T3.10.7, and Network Rail's COSS Handbook, requires the COSS to sign Form RT 3199. The form itself only requires the COSS to 'note' the contents. It would be clearer for all concerned if the form required a signature in line with the rule book (paragraph 119).



## **Actions reported as already taken or in progress relevant to this report**

- 115 Since the accident, Kier Rail have taken steps to identify and correct weaknesses within their possession planning and administration activities. Emphasis has been put on improving the communication chain between the RIMINI planner who prepares the possession documentation for the COSS and the COSS. The changes are intended to increase the clarity of the information presented, ensure that the COSS is briefed and allow the COSS time to review the documentation prior to the start of works.
- 116 Kier Rail have introduced:
- a. A requirement for RIMINI planners to brief the content of the RIMINI plan to site supervisors, who then brief COSSs in turn. This is supported by a question and answer form to demonstrate understanding of the document's content.
  - b. A defined 'chain of custody' for the document between RIMINI planner and site COSS involving only the site manager (if applicable) and site supervisor as intermediaries.
  - c. A RIMINI plan cover sheet showing key details of immediate relevance to the COSS. The cover sheet contains the following information, and a review and briefing record matrix:
    - i. week number and date;
    - ii. location;
    - iii. work site mileage;
    - iv. access points;
    - v. on-call manager's contact details;
    - vi. meeting point; and
    - vii. work content.
  - d. Measures to ensure that the COSS receives the RIMINI plan 24 hours prior to the start of a possession.
  - e. Restrictions on late changes of COSS of 24 hours notice preferred, and 12 hours absolute minimum.
- 117 The Kier Rail weekly possessions register now includes a print date to enable the status of work sites to be determined on hard-copy documents.
- 118 Kier Construction Ltd have pleaded guilty to charges brought by the Office of Rail Regulation under section 3.1 of the Health and Safety at Work Act 1974 for failing to ensure the safety of persons not in their employment, so far as was reasonably practicable. The charges were brought at Stratford Magistrates Court on 18 April 2007, and for their part in the process failures, Kier Construction Ltd were fined £5,000.
- 119 Form RT3199 has been redesigned by the Rail Safety and Standards Board (RSSB). Appendix A of the form requires the COSS to sign and give details of his phone number and employer, and sign the form again when work is completed. The revised form RT3199 was published in module T3 issue 2 in January 2007 and came into force on 1 June 2007.

## Recommendations

120 The following safety recommendations are made<sup>1</sup>:

### Recommendations to address causal and contributory factors

- 1 Network Rail should:
  - a. Review their possession planning principles and formulate criteria for limiting the complexity of work sites within a possession. This is to aid compliance with Rule T3 10.7 which requires that COSSs sign form RT3199 personally (paragraph 89 and 119);
  - b. Undertake a review of the risks/benefits associated with long work sites covering different items of work compared to multiple short work sites unless those items of work are less than 300 m apart<sup>2</sup> (paragraph 90); and
  - c. Review, and implement changes as necessary in, procedures to ensure that contractors are aware of major changes to planned possessions and that a record of this communication is maintained (paragraph 102).
  
- 2 Kier Rail should:
  - a. Introduce systems to ensure that any changes to planned possessions are identified by systematic review of Network Rail planning documents, and are identified to all staff involved in the planning and mobilisation of the work (paragraph 92);
  - b. Introduce formal controls over the handling of changes to possessions and work sites so that the changes can be tracked, and so that it is clear that all involved have been correctly informed (paragraph 93);
  - c. Revise their RIMINI plan design to highlight key information such as the possession and site location and times, and to remove superfluous information (paragraph 80, 116c);
  - d. Revise their document distribution system to allow COSSs sufficient time to read RIMINI plans thoroughly before they start shifts (paragraph 82, 116d); and
  - e. Revise their contract supervision systems to ensure that COSSs are appropriately briefed by their supervisors before they start work, and that the contract supervisor and the COSS have a clear understanding of the work to be carried out, its time and location (paragraph 84, 116a).

*continued*

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<sup>1</sup> Responsibilities in respect of these recommendations are set out in the Railways (Accident Investigation and Reporting) Regulations 2005 and the accompanying guidance notes, which can be found on RAIB's web site at [www.raib.gov.uk](http://www.raib.gov.uk)

<sup>2</sup> Rule Book section T3, 10.4 requires that marker boards are placed 100 m beyond the end of physical work and a 100 m gap between work site marker boards. Accordingly if two items of work are closer than 300 m, it is impossible to place marker boards in compliance with the rule book, and a single work site and ES will be necessary.

### **Recommendations to address other matters observed during the investigation**

- 3 Network Rail should:
  - a. Review the possession planning system to ensure that any changes in possessions reflect back into the planned work sites that are recorded in the system (paragraph 112); and
  - b. review the procedures for the storage of archived data, particularly any information associated with an incident which may be required to support a subsequent investigation, whether internally or by a statutory body (paragraph 113).

## Appendices

### Glossary of abbreviations and acronyms

### Appendix A

COSS	Controller of site safety
CPPP	Confirmed Period Possession Plan
ES	Engineering supervisor
PICOP	Person in charge of possession
PPS	Possession planning system
RIMINI plan	Risk Minimisation plan
RSSB	Rail Safety and Standards Board
T-14	Planning meeting held (nominally) 14 weeks prior to possession
T-8	Planning meeting held (nominally) 8 weeks prior to possession. Superseded by T-14 and T-6 meetings
T-6	Planning meeting held (nominally) 6 weeks prior to possession
WON	Weekly Operating Notice

## Glossary of terms

## Appendix B

All definitions marked with an asterisk, thus (\*), have been taken from Ellis' British Railway Engineering Encyclopaedia © Iain Ellis. [www.iainellis.com](http://www.iainellis.com)

Chain	A unit of length, being 66 feet or 22 Yards (approximately 20117 mm). There are 80 Chains in one standard Mile. Chains are the standard subdivision of Miles used in National Railway Network (NRN) Operations.*
Confirmed Period Possession Plan	A planning document created within Network Rail's possession planning system (PPS).
Contractor's Assurance Case	A document that details the Contractor's compliance with the safety requirements laid down by Network Rail (NR), and the method of compliance with other systems such as quality and environmental.
Controller of Site Safety (COSS)	A Safety Critical qualification demonstrating the holder's competency to arrange a Safe System of Work, i.e. protecting staff working on the Line from approaching Trains.*
COSS brief	(Also known as a RIMINI brief) A brief given by the COSS to all members of his work group explaining the safe system of work that protects the group from approaching trains. On conclusion of the brief all members of the work group are required to sign a form confirming that they have been briefed, and understood the brief.
Down	Heading away from London Liverpool Street.
Engineering Supervisor (ES)	The person nominated to manage the safe execution of works within an Engineering Work site. This includes arranging the Marker Boards, authorising movements of Trains in and out of the work site and managing access to the site by Controllers of Site Safety (COSS). Formerly briefly called Engineering Supervisor in Charge of Work (ESICOW). See also Person in Charge of Possession (PICOP).*
Item of work	An activity identified to be undertaken by a work group under the control of a COSS.
Link-up	The UK rail industry supplier qualification scheme, providing a single common registration, qualification and audit process for suppliers that is shared by the UK rail industry.
Lookout	A competent person whose duties are to watch for and to give an appropriate warning of approaching Trains by means of whistle, horn or warning siren.*
Mobile Operations Manager	Mobile Operation Manager. A Network Rail Operations manager who provides first line response to incident.*

Person in charge of possession (PICOP)	The competent person nominated to manage the following: <ul style="list-style-type: none"> <li>• Safe and correct establishment of the Protection for the Possession, complete with Detonators, Point Clips, Possession Limit Boards (PLB) and Signals Keyed to Danger as required.</li> <li>• Managing access to the Possession area by Engineering Supervisors (ES).</li> <li>• Managing the establishment of Engineering Work Sites within the Possession.*</li> </ul>
Possession	A period of time during which one or more Tracks are Blocked to Trains to permit work to be safely carried out On or Near the Line.*
Possession book	Document containing details of the work sites discussed at the T-14 planning meetings which have been agreed and linked to a Possession.
Possession planning system	A single system used by Network Rail for the recording of national engineering and access requirements. These requirements are captured in real time as possessions, work sites and Temporary Speed Restrictions.
Risk Minimisation plan (RIMINI plan)	<u>Risk Minimisation</u> , a standardised process for identifying and recording the safest practical Protection system for a particular activity undertaken On or Near the Line.*
Safeguarded green zone	A safe place of work On or Near the Line. Such an area can be created by Safeguarding, that is stopping all Train movements by taking some form of Possession.*
Site of Work	Physical location of work activity undertaken by a work group.
T2 protection	A standard arrangement where the working party are only permitted to work until the next Train is due to pass. This time is agreed with the Signaller prior to starting work.*
T3 possession	The rules applying to Possessions of Running Lines, also known as Absolute Possession. Under these arrangements the times and extents are agreed in advance, but The Engineer decides when the Possession is given up, not the Signaller.*
Up	Heading towards London Liverpool Street.
Weekly operating notice	A document published on a route basis, providing information about Engineering Work, Speed Restrictions, alterations to the network and other relevant information to train drivers.*
Work group	Staff within a Work Site controlled by a Controller of Site Safety (COSS).
Work Site	The area within a Possession that is managed by an Engineering Supervisor (ES).*
Work site book	Document used to link items or work/work sites to the existing Possessions book, which have been inputted into PPS since the T-14 meeting.

## **Key standards current at the time**

## **Appendix C**

Railway Rule Book module T3

GE/RT8000 – T3 (June 2003)

COSS handbook

RS/502: Issue 1 (April 2005)

Network Rail specification: Safety  
of People working on or near the line

NR/SP/OHS/019

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