Rail Accident Investigation Branch

Investigating fatigue:

Collision Between Freight Trains at Loversall Carr Junction, Doncaster

05.07.2022

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19 Nov 2025

Summary of the Accident – Loversall Carr Junction, Doncaster, Tuesday 5th July at 06:21 hrs

- Freightliner 4E82 (00:36 Felixstowe – Tinsley) with 29 wagons was standing at signal D207, awaiting acceptance into Decoy Yard. Signal in rear is **D197**
- 231 metres from D197 to rear of 4E82. Overlap is 183 metres
- GBRF **4E11** travelling from Felixstowe to Masborough (via ECML) loaded with a rake of 35 wagons [FEA(13)/FIA(1)/FWA(21)]
- 4E11 leaves the ECML on a steady cautionary (Y) aspect and feather at D191 onto the Down Slow / Up West Slow
- **4E11 has SPAD of D197. 4E11 collided with the rear of 4E82 at 28mph**
- No injuries. Damage/derailment to a number 4E11 & 4E82 wagons. Considerable damage to 4E11 loco, 4E82 cargo containers and track. 4E82 narrowly avoiding second SPAD at D207. Route closed for 26 days for recovery and track repair work (reopened 31/07/22)

SPAD and collision

Signals

PRIOR SIGNALS, all **Green** from Peterborough

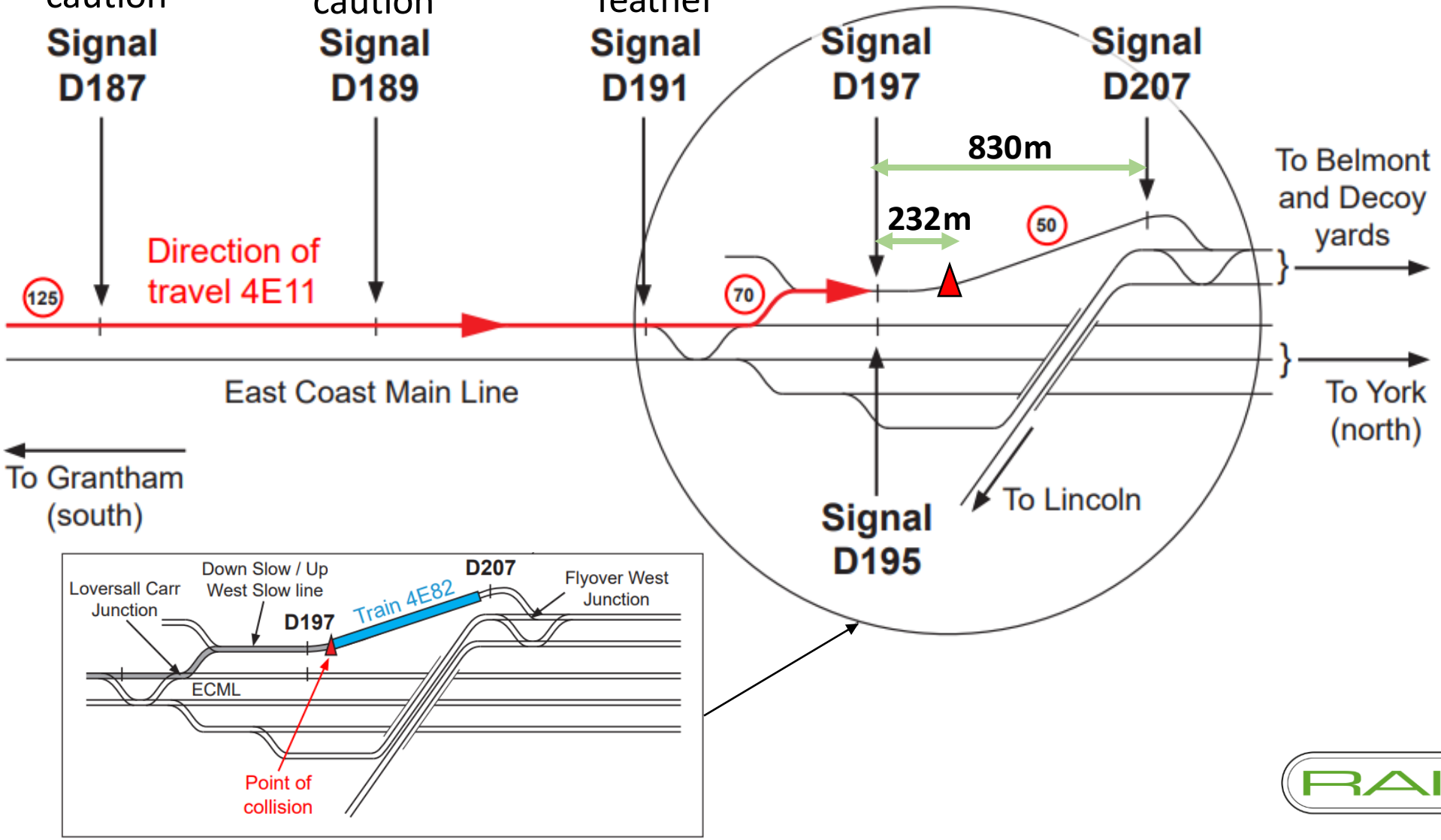
D187
4E11 = double flashing caution

D189
4E11 = single flashing caution

D191
4E11 Steady (Y) caution & feather

D197
4E11 Cat A SPAD

D207
4E82 final position



What caused the SPAD of D197?

- Approach speed to D197 was too fast
  - GBRf requires trains to be 10mph when the train passes over the AWS – 4E11 was doing 54mph when it passed the AWS for D197
  - GBRf were unable to provide any comparative OTDRs of trains that had been stopped at D197. The speed profile of 4E11 on the date of the incident is within the average figures of the comparative OTDR data with D197 at Y/YY/G
  - The speed 4E11 was driven does not match a driver cognisant of D197 being at red
- Brake application on seeing D197 at red and red tail light of 4E82
  - Varying levels of automatic brake application on seeing D197 at red but not emergency brake

Why was the train going too fast to stop?

- Expectation of D197
  - It is rare for D197 to be at red, however, regardless of expectations the train should be driven to the signals
- The driver lost awareness
  - The driver lost awareness of the driving task, regaining awareness in time to see D197 at red and the red tail lights of 4E82

  - Distraction
  - Fatigue

Fatigue – shift patterns & hours worked

- Base roster
- Actual worked roster
- Rest days worked
- Consideration of commute

- At the time of the accident = over a period of six shifts the driver had worked 57 hours and was rostered for a further three shifts

	Shift number	Date	Shift start time	Shift end time	Shift duration	Cumulative hours worked
Completed shifts	1	Wed 29 June 2022	03:05	12:33	09 hrs 28 mins	09 hrs 28 mins
	2	Thu 30 June 2022	03:05	12:33	09 hrs 28 mins	18 hrs 56 mins
	3	Fri 01 July 2022	03:05	12:33	09 hrs 28 mins	28 hrs 24 mins
	4	Sat 02 July 2022	01:30	10:55	09 hrs 25 mins	37 hrs 49 mins
	5*	Sun 03 July 2022	11:01	21:00	09 hrs 59 mins	47 hrs 48 mins
Accident (06:21 05/07/22)	**6***	**Mon 04 July 2022**	**20:09**	07:59	11 hrs 55 mins	59 hrs 43 mins
Rostered shifts not worked due to accident	7	Tue 05 July 2022	19:30	07:30	12 hrs	71 hrs 43 mins
	8	Wed 06 July 2022	19:30	07:30	12 hrs	83 hrs 43 mins
	9	Thu 07 July 2022	19:30	07:30	12 hrs	95 hrs 43 mins

* Rest day worked

ORR Fatigue Risk Factors

- Set of 25 factors in relation to shift work that have been identified as negatively impacting on fatigue presented in six categories:
  1. time of day factors such as night shifts (working between 00:00 to 05:00), early shifts (starting 05:00 to 07:00) or very early shifts (starting before 05:00)
  2. duty length factors (length of shift in relation to time of day started)
  3. recovery time factors (rest between block of consecutive shifts in relation to nights, early starts)
  4. intervals between duties factors (rest in 24 hour period)
  5. cumulative fatigue factors (number of consecutive shifts, how the shifts rotate, and hours worked in a 7-day period)
  6. circadian phase shift (body-clock adjustment) factors (how shifts rotate and moving from one type to another).

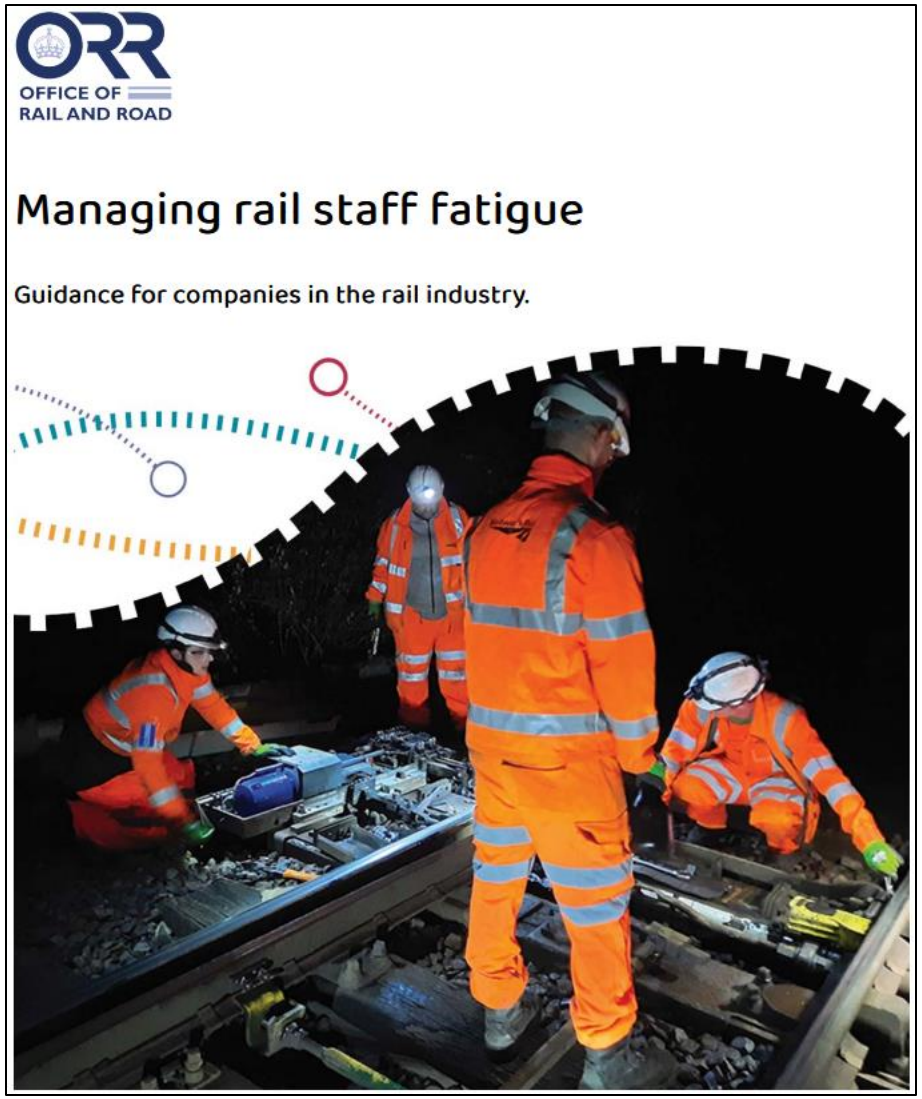
Roster Review based on Fatigue Risk Factors

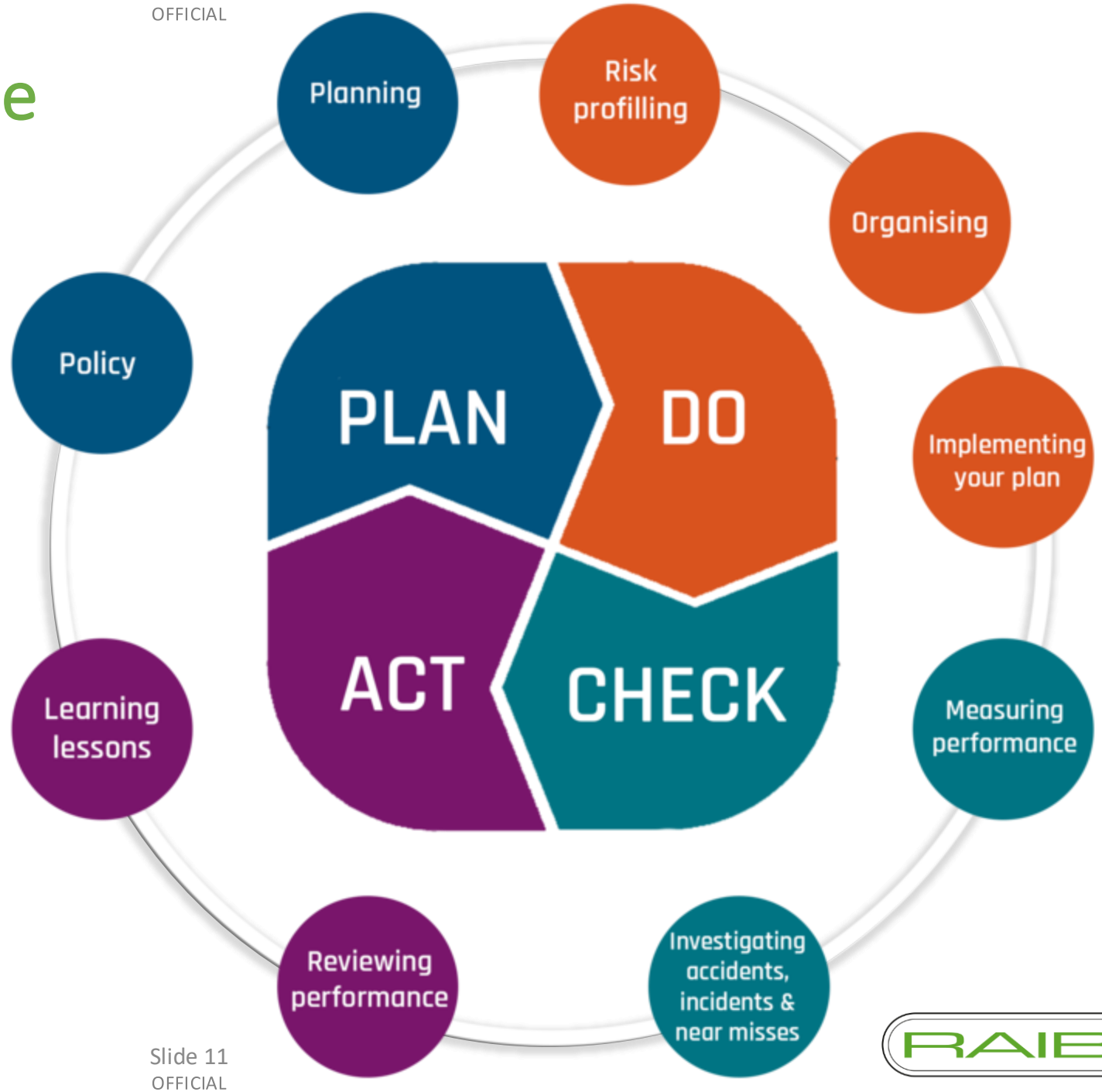
- 12 of the 25 fatigue factors were present between the start of the driver's first shift on 29 June and the time of the accident on 5 July
- Multiple fatigue factors also coincided during the shift when the accident took place. These included:
  - a long night shift
  - a first night shift (following a day shift on 3 July)
  - successive shift start times varying by more than two hours from the previous day
  - working more than 55 hours in a 7-day period
- A further 3 fatigue factors would have been triggered if the accident had not occurred and the driver had completed their roster of three more subsequent night shifts, making a total of nine consecutive shifts and 95 hours 34 minutes worked since the driver's last rest day

Fatigue Risk Management System

- ROGS 2006 Regulations 5 and 6 = all operators and dutyholders are required to have in place arrangements for managing safety risks and monitoring the performance of their safety system
- Safety Management Systems (SMS)
- Fatigue Risk Management System (FRMS)
  - Integrated with the organisation's wider SMS alongside the company's other risk control procedures
  - Extension of existing processes for managing safety
  - Should be designed to fit own operation – size, complexity, and degree of fatigue risk, with substantial involvement and input from staff
    - E.g. shift work, significant overtime, safety critical work = risks from fatigue could be relatively high = more rigorous controls and a comprehensive FRMS

Managing rail staff fatigue (ORR, 2024)





Rest and quality of rest

- Before shift
  - Holidays
  - Rest days
  - Time between shifts
- During shift
  - Rest taken within rostered period

Sunday 03 July = (their 5th consecutive shift)
Worked a 9 hours and 59 minutes shift 21:00 finished work
One-hour commute
Going to sleep soon after arriving home
Full nights sleep – not the best quality

Monday 4 July = (accident shift)
09:00 got up
Day of low energy chores and TV
No sleep (unable to take the usual couple of hours sleep due to work being undertaken in their house)
19:00 departed for Doncaster
20:00 sign on to start shift having been awake for approximately 11 hours

Rest and quality of rest

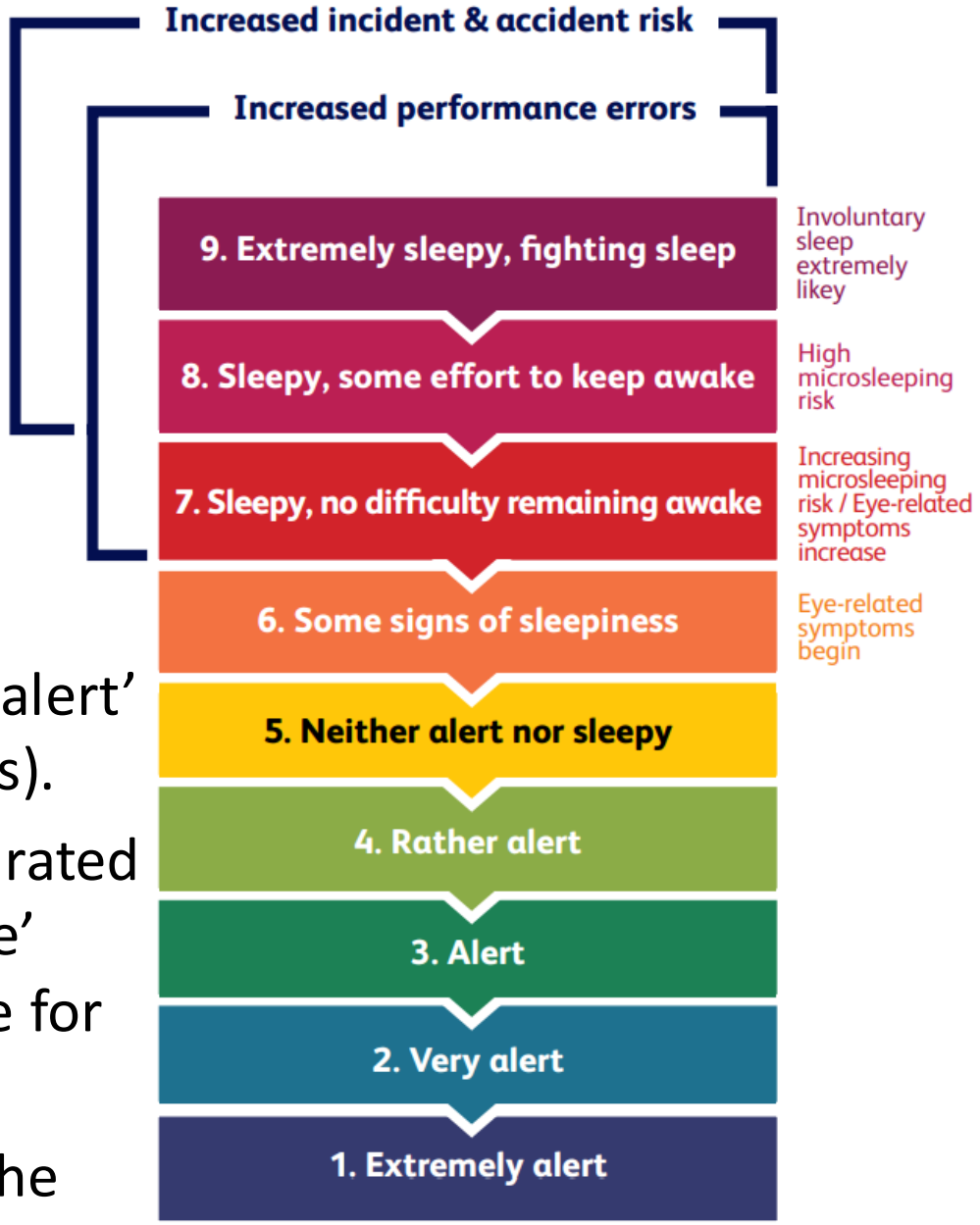
- Quality of rest
  - Sleep
  - Distractions and disturbances
  - Medical condition
- Medication
  - Purpose - help people sleep or stay awake
  - Side affects – drowsiness, focus, response times

Following guidance in GO/GN 3655, GBRf arranged for the driver to have a medical assessment for sleep disorders after the accident.
Driver received a diagnosis of severe Obstructive Sleep Apnea (OSA)

Declaring fatigue

- Knowledge and awareness of fatigue
- System in place for declaring too fatigued to safely work (pre shift, signing on, during shift)
- Culture where people feel psychologically safe to declare fatigue

- 20:09 hrs sign on = The driver reported feeling ‘very alert’ (KSS scale 2) (having been awake for around 11 hours).
- 05:00 hrs departing from Peterborough = The driver rated themselves as ‘sleepy, but some effort to keep awake’ (KSS scale 8). At this point the driver had been awake for around 20 hours.
- When train 4E11 passed the signal D197 at danger, the driver had been awake for more than 21 hours.



Nine-point Karolinska Sleepiness Scale (KSS)

Fatigue in accidents

- In 2019 RSSB published the results of research into fatigue as a causal factor by reviewing 246 investigation reports into high-risk rail incidents
- 21% of the reports identified fatigue as a factor
- Managing work hours alone will not adequately address fatigue
- ORR's triangulation approach

Thank you