Department for Infrastructure
An Roinn Bonneagair
Depairtment fur Infrastructure
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Common Safety Indicators

Assessment of achievement of safety targets for 2023

February 2025

Rail Safety Authority

Contents

1. Introduction

Safety targets are set to ensure a minimum level of safety is achieved.

The assessment of achievement of safety targets is undertaken using a common set of railway safety data, the Common Safety Indicators (CSIs). CSIs help assess whether railway systems comply with safety targets and facilitate the monitoring of railway safety performance. CSIs include but are not limited to:

- Significant accidents
- Fatalities and serious injuries
- Accident precursors
- Suicides

This report assesses safety performance of Northern Ireland's (NI) railway and the achievement of safety targets for the calendar year 2023. This uses CSI data to assess the level of safety associated with six risk categories:

- Passengers
- Employees
- Level crossing users
- Others
- Trespassers
- Whole society (collective risk to all categories of persons above)

This assessment must be carried out annually by the Department for Infrastructure's Rail Safety Authority (RSA), in accordance with Regulation 18A of the Railways (Safety Management) Regulations (Northern Ireland) 2006 (the '2006 Regulations') as amended, taking into account the five most recent reporting years (2019 to 2023).

Prior to the UK leaving the European Union (EU), this assessment was conducted by the European Union Agency for Railways (ERA), who are responsible for assessing safety performance for EU Member States. Data for the whole of the UK was provided to the ERA by the Office of Rail and Road (ORR), with data for NI provided to ORR by Northern Ireland Railways (NIR). Now that the UK has left the EU, domestic legislation has been amended to reflect that Great Britain (GB) and NI need to produce their own assessment of achievement of CSIs. ORR's assessment for the GB Railway in 2023

was published in January 2025 and ERA's latest assessment was published in October 2024.

The report is formatted to reflect the approach adopted by ORR, as well as ERA, for comparative purposes.

A set of data tables accompanying this report are published on the Department's website. Key definitions are in **Annex A** of this report.

2. Method for assessing achievement of safety targets data

Data

This assessment is conducted annually and takes into consideration CSI data for the five most recent reporting years. Therefore, the current assessment covers the calendar years 2019 to 2023.

The data that underpins this assessment is supplied to the RSA by NIR and is available on the Department's website. Data since 2006 are published by the ERA which covers the years in which the assessment for the UK was conducted by the ERA.

Assessment process

The procedure for assessing the achievement of safety targets is applied to six risk categories (see **Annex B** for additional information on each category):

- Passengers
- Employees
- Level crossing users
- Others
- Trespassers
- Whole society

There is a National Reference Value (NRV) and Common Safety Target (CST) associated with each of the risk categories (see Annex B). These values and the process for assessing the achievement of them are set out in the 2006 Regulations.

Assessment of achievement of National Reference Values

The procedure for assessing the achievement of NRVs consists of four steps. These are depicted in the flowchart below (see Figure 2.1), where positive and negative decisional arrows correspond respectively to a 'pass' or 'fail' at each stage. The outcome of the assessment sees each of the risk categories classified as having:

a) acceptable safety performance;
b) possible deterioration of safety performance; or

c) probable deterioration of safety performance.

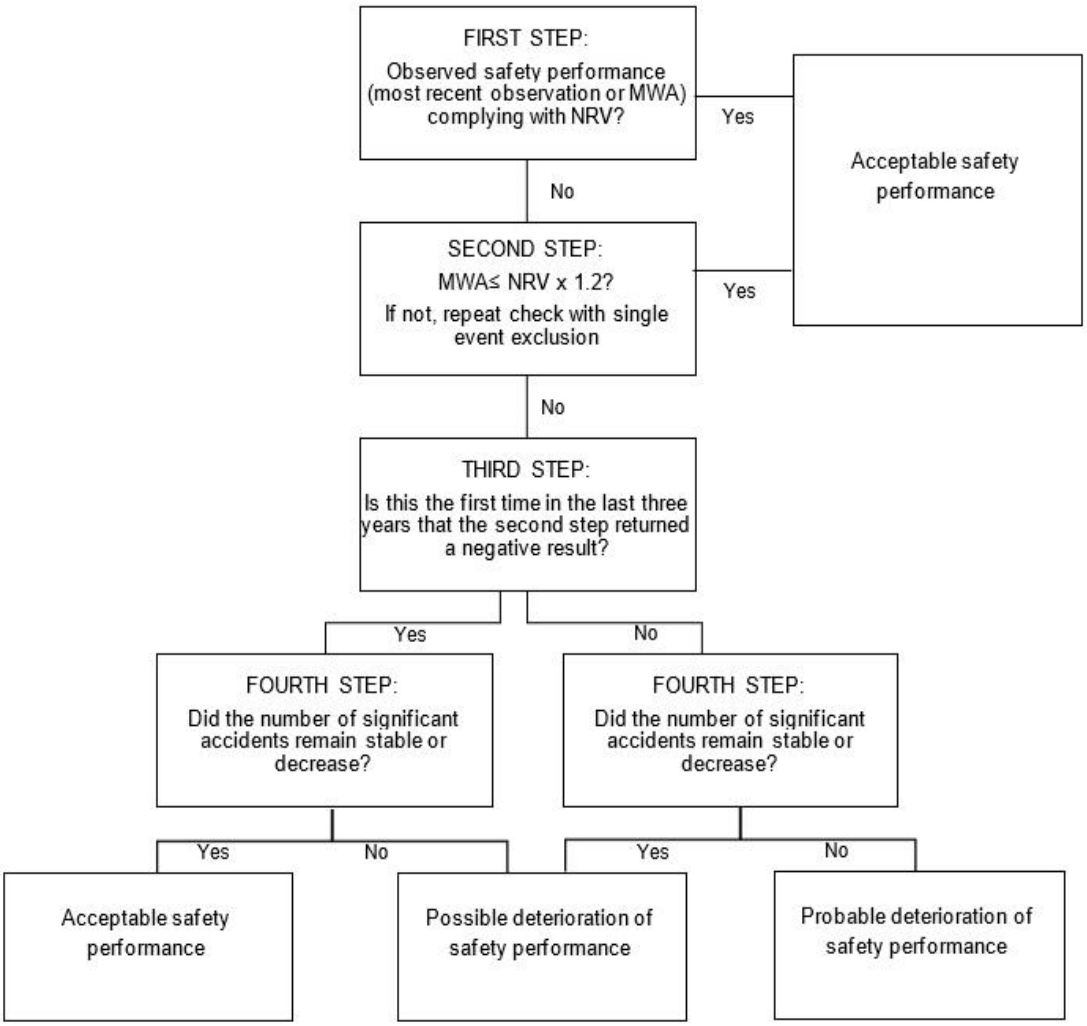
The **first step** of the assessment involves verifying whether the observed safety performance for each risk category complies with the NRV. Observed safety performance must be expressed in terms of the most recent observation (OBS) and the moving weighted average (MWA) for the five most recent reporting years. If one or both of these values does not exceed the NRV, safety performance is considered acceptable. If the most recent observation and the MWA both exceed the NRV, then the procedure must continue to the second step of the assessment.

The **second step** involves evaluating whether the MWA exceeds the NRV plus a 20% tolerance range. If this is not satisfied, the single highest consequence accident (in terms of fatalities and weighted serious injuries (FWSI)) in the five most recent reporting years is identified. If this single accident is more severe, in terms of consequence, than the most severe single accident included in the data used for setting the NRV, it is excluded from the calculations. The MWA is then recalculated to assess whether it lies within the abovementioned tolerance range. If this is the case, safety performance is considered acceptable. If not, the procedure must continue with the third step.

The **third step** must verify whether this is the first time in the last three years that the second assessment step did not return evidence of acceptable safety performance. If this is the case, the outcome of the third step can be classified as passed. However, the procedure continues to the fourth step of the assessment, regardless of the outcome at the third step.

The **fourth step** must verify whether the number of significant accidents per train-kilometre has remained stable or decreased relative to previous years. This depends on whether there was a statistically significant increase in the number of relevant significant accidents per train-kilometre. This is evaluated using an upper Poisson tolerance bound which determines the acceptable variability based on the number of accidents that occurred in the Member States of the EU. If the number of significant accidents per train-kilometre does not exceed the tolerance bound, it is assumed that there has not been a statistically significant increase, and the outcome of the assessment is classified as passed.

Figure 2.1 Decision flowchart for assessing achievement of NRVs



Assessment of achievement of Common Safety Targets

In addition to assessing compliance with NRVs, achievement of CSTs must also be assessed. For each risk category for which the NRV is equal to or lower than the corresponding CST, the achievement of the NRV automatically implies the achievement of the CST. For each category for which the NRV is higher than the corresponding CST, the CST represents the maximum tolerable level of risk to which it refers. For NI, the NRV is less than the corresponding CST for each of the risk categories, therefore achievement of CSTs mirrors the achievement of NRVs.

3. Results of the assessment

Results

At the first step of the assessment process, all six risk categories complied with the NRVs. This indicates that there is acceptable safety performance for passengers, level crossing users, others, trespassers and whole society. This indicates that there is acceptable safety performance for passengers, level crossing users, others, employees, trespassers and whole society.

Table 3.1 Assessment results

All values in this table are multiplied by 10 to the power of negative nine. This means the values are divided by 10 nine times.

Risk category and scaling basis	First step assessment results					Second step assessment results		
	Annual Observation (OBS) (2022)	MWA (2018 to 2022)	NRV	OBS ≦ NRV	MWA ≦ NRV	NRV*1.2	MWA ≦ NRV*1.2	MWA ≦ NRV*1.2 with most serious incident removed
Passengers (passenger train-km)	0.00	0.00	2.73	Yes	Yes	3.28	Yes	Yes
Passengers (passenger-km)	0.00	0.00	0.028	Yes	Yes	0.03	Yes	Yes
Employees (train-km)	0.00	12	5.17	Yes	No	6.20	No	Yes
Level crossing users * (train-km)	0.00	0.00	23.5	Yes	Yes	28.20	Yes	Yes
Others (train-km)	0.00	15.67	7.00	Yes	No	8.40	No	Yes
Trespassers (train-km)	16.72	5.44	84.5	Yes	Yes	101.40	Yes	Yes
Societal risk (train-km)	16.72	37.08	120	Yes	Yes	144.00	Yes	Yes

***** Under the legislation, there is no NRV for level crossing users with the scaling base of (train-km per year x number of level crossings)/track-km. Therefore, this has not been assessed and is excluded from Table 3.1.

At the **first step of the assessment**, the ‘employees’ category did show acceptable safety performance for annual observation, but the MWA did not show acceptable safety performance. This is the result of one injury incident in 2019 – 2021 inclusive, however, there has been no injury incidents since.

The ‘others’ category did show acceptable safety performance for annual observation, but the MWA did not show acceptable safety performance. This is the result of one fatal incident in 2022.

While the ‘employees’ and ‘others’ risk categories showed the MWA exceeding the NRV, the observed data for 2023 did not exceed the NRV. As such, the ‘employees’ and ‘others’ risk categories can be assessed as having achieved acceptable safety performance, however, this demonstrates that even a single incident on the NI network can affect the assessment of safety performance.

4. Further analysis

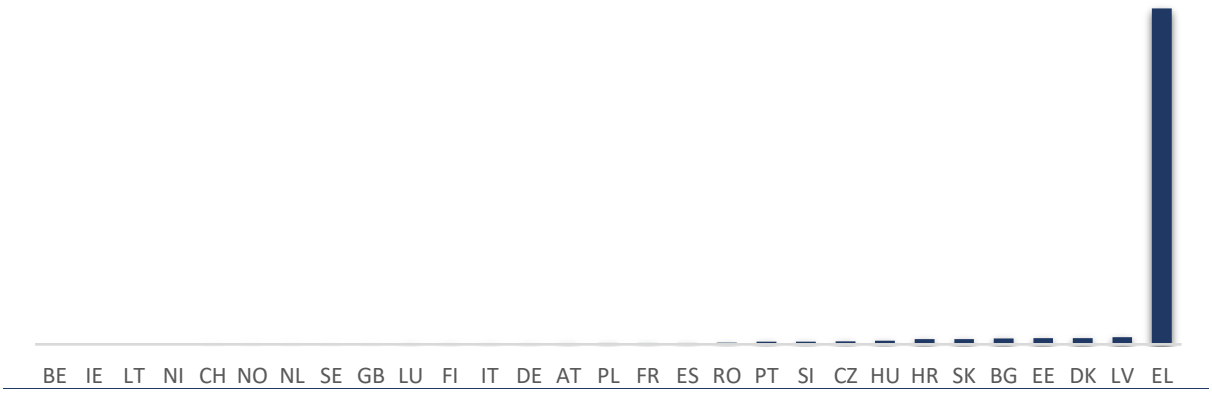
Comparisons with Ireland, Great Britain and other European countries

The rail industry measures safety performance and risk using the FWSI measure. This measures the consequences of significant accidents by combining the number of fatalities and serious injuries.

Using the most recent data published by the ERA and ORR, the average number of FWSI in NI was compared against Ireland, GB and other European countries for each of the six risk categories. Data on CSIs since 2006 is available from the ERA website.

For **passenger safety risk**, NI ranked joint 1st (both per passenger train-km and passenger-km) along with Ireland, this compares favourably with GB ranked 9th and other European countries (see Annex A for a list of country codes).

Figure 4.1 Passenger safety risk (FWSI for passengers per passenger train-km) by European country, 2019 to 2023 average



In February 2023, a significant accident in Greece (EL) resulted in 57 fatalities. This means the number of fatalities and weighted serious injuries is substantially higher than other European countries. Figures 4.1 & 4.3 have been reproduced below with Greece excluded to enable differences between other European countries to be observed.

Again, for **passenger safety risk** excluding Greece, NI ranked joint 1st (both per passenger train-km and passenger-km) along with Ireland, this compares favourably with GB ranked 9th and other European countries.

Figure 4.2 Passenger safety risk (FWSI for passengers per passenger train-km) by European country excluding Greece, 2019 to 2023 average

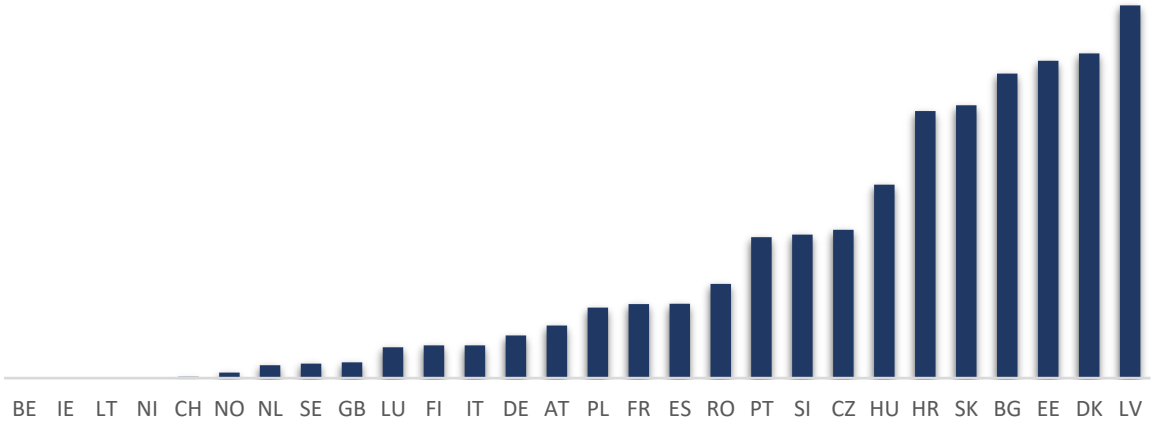


Figure 4.3 Passenger safety risk (FWSI for passengers per passenger-km) by European country, 2019 to 2023 average

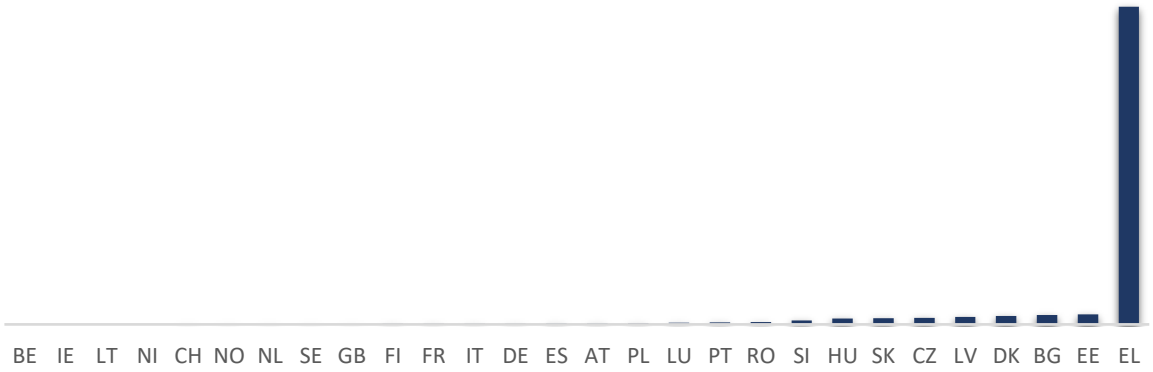
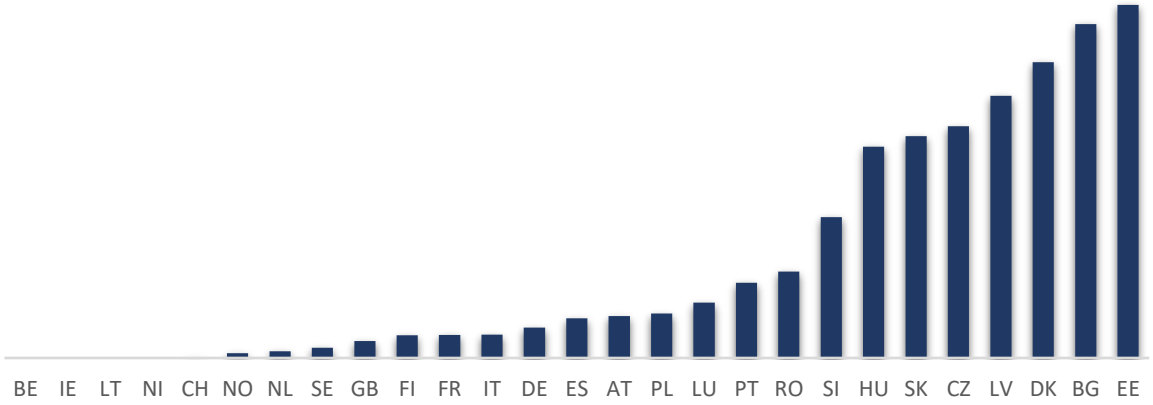
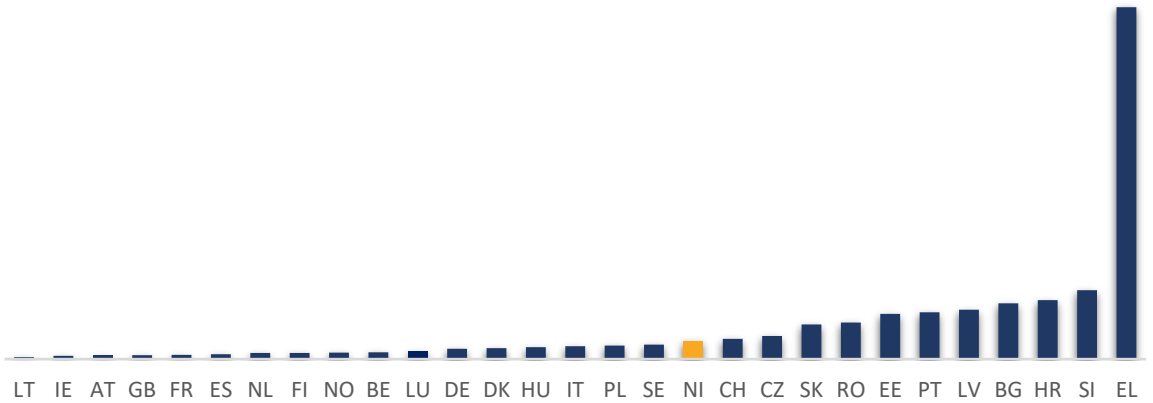


Figure 4.4 Passenger safety risk (FWSI for passengers per passenger-km) by European country excluding Greece, 2019 to 2023 average



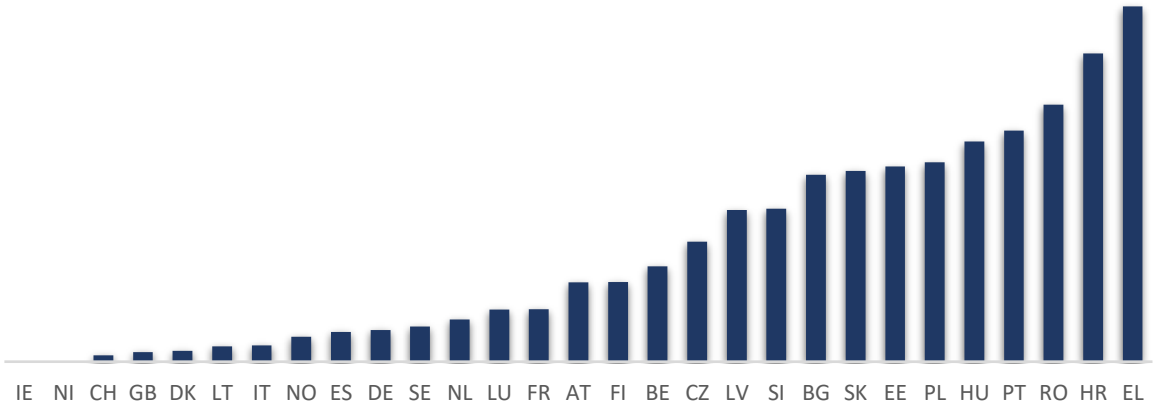
For **employee safety risk**, NI is ranked 18th compared with Ireland ranked 2nd, GB ranked 4th and other European countries. It should be noted that the figures for NI across 2019-2023 include three incidents where Translink employees were injured with zero fatalities compared with two injuries and zero fatalities in Ireland and one injury and seven fatalities in GB over the same period. Given the comparatively small size of the NI rail network in comparison to other countries, and the measurement of incidents per train-km, any incident has the potential to have a larger effect on the NI figures when compared to other countries with similar numbers of incidents but considerably larger rail networks. This is despite the overall low numbers of incidents which occur on the NI network and zero incidents in 2022 & 2023.

Figure 4.5 Employee safety risk (FWSI for employees per train-km) by European country, 2019 to 2023 average



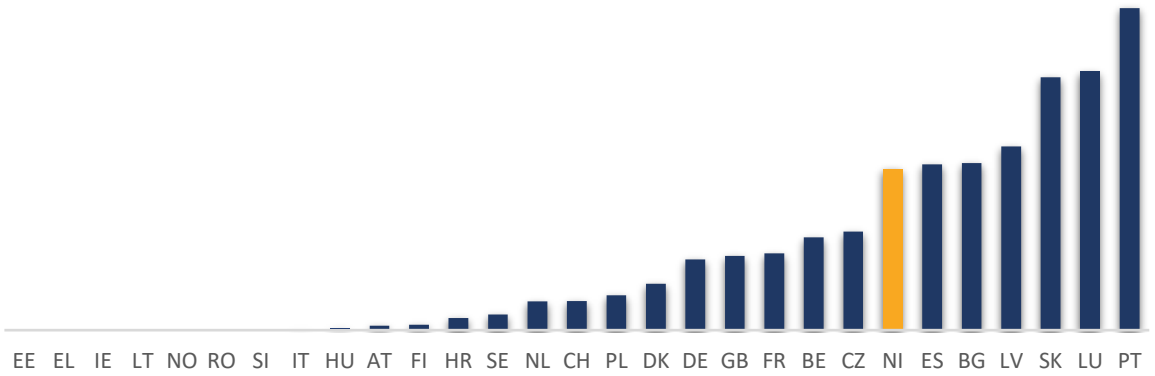
For **level crossing user safety risk**, NI is ranked joint 1st along with Ireland compared with GB ranked 4th and other European countries.

Figure 4.6 Level crossing user safety risk (FWSI for level crossing users per train-km) by European country, 2019 to 2023 average



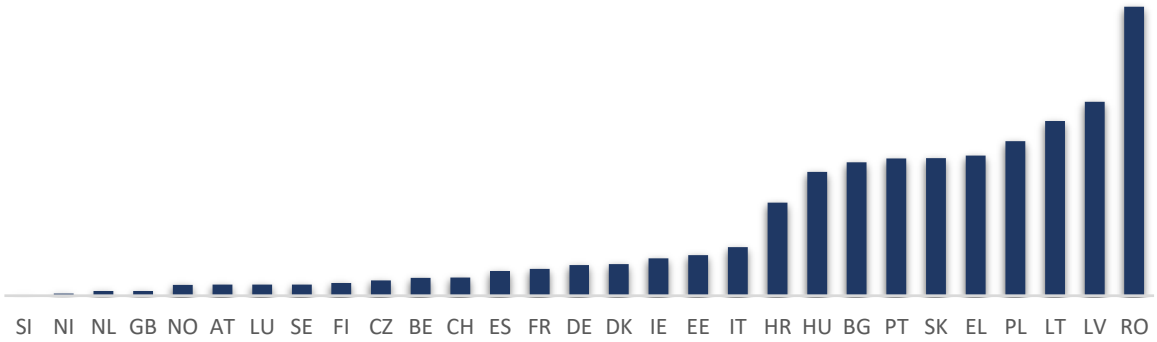
For **risk to others**, NI is ranked 23rd compared with joint 1st for Ireland and 19th for GB. As highlighted previously, the relatively small size of the NI network and the measurement against train-km means that even a very small number of incidents results in NI comparing less favourably to Ireland and some other European countries.

Figure 4.7 Other safety risk (FWSI for others per train-km) by European country, 2019 to 2023 average



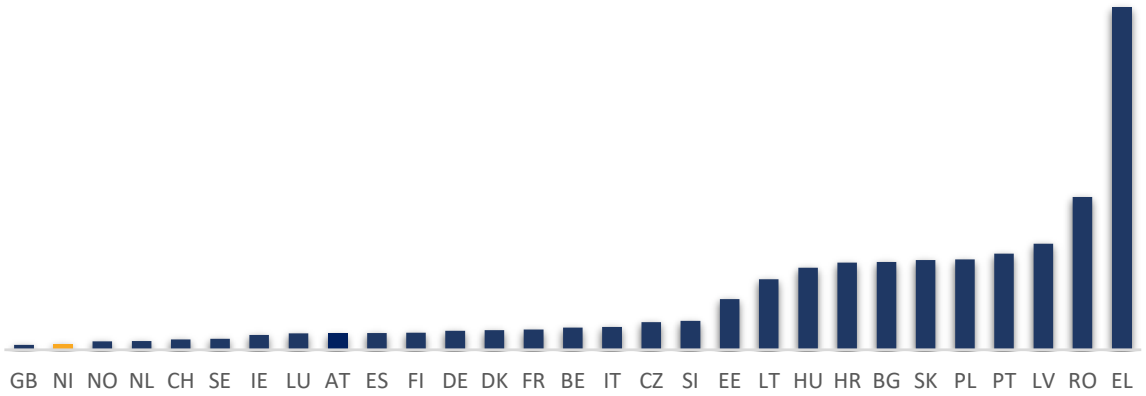
For **trespasser safety risk**, NI is ranked 1st compared with Ireland ranked 17th, GB ranked 4th and other European countries.

Figure 4.8 Trespasser safety risk (FWSI for trespassers per train-km) by European country, 2019 to 2023 average



For **whole society safety risk**, NI is ranked 2nd compared to Ireland ranked 7th, GB ranked 1st and other European countries. This means the average number of FWSI across each of the five risk categories combined is lower than Ireland and any other European country for which there is available data and just behind GB.

Figure 4.9 Whole society safety risk (FWSI for whole society per train-km) by European country, 2019 to 2023 average



5. Conclusions

The results of the assessment for 2023 indicate acceptable safety performance for NI's railway in each of the six risk categories.

Analysing data published for Ireland, GB and other European countries, NI also performs well in terms of the average number of FWSI over the most recent five years.

NI has the 2nd lowest average number of FWSI for whole society (all risk categories combined). NI also ranks favourably compared to Ireland, GB and to other European countries in terms of passenger safety, level crossing user safety and trespasser safety.

Annex A: Definitions

The following terms have been commonly used in our assessment. Unless otherwise stated please refer to the 2006 Regulations for full details.

- The **annual observation (OBS)** is the safety performance in the single most recent reported year.

- **Common Safety Indicators (CSIs)** are a set of rail safety data used to assess whether railway systems comply with safety targets and facilitate the monitoring of railway safety performance.

- A **Common Safety Target (CST)** means the minimum safety level that must be reached by the mainline railway systems, expressed in the risk categories as defined in paragraph 2 of Schedule 7 to the 2006 Regulations.

- **The Directive** means Directive 2004/49/EC of the European Parliament and of the Council on safety on the Community's railways as amended.

- **Fatalities and weighted serious injuries (FWSI)** means a measure of the consequences of significant accidents combining fatalities and serious injuries, where 1 serious injury is considered statistically equivalent to 0.1 fatalities.

- **National Reference Value (NRV)** means a reference measure indicating the maximum tolerable level for a railway risk category.

- **Risk category** means one of the railway risk categories specified under Article 7(4)(a) and (b) of the Directive. These six railway risk categories are:
    - **Passengers** (as defined by the ERA) means all persons, excluding members of train crew, who make a trip by rail, including passengers trying to embark or disembark from a moving train.
    - **Employees** (staff or employees including the staff of contractors) means any persons whose employment is in connection with a railway and is at work at the moment of the accident; it includes the crew of the train and persons handling rolling stock and infrastructure installations.

- **Level crossing users** means all persons using a level crossing to cross a railway line by any means of transportation or by foot.
- **Others** means all persons who are not passengers, staff or employees including the staff of contractors, level crossing users or unauthorised persons on railway premises.
- **Trespassers (unauthorised persons on the railway premises)** means any persons present on railway premises where such presence is forbidden (trespassing), with the exception of level crossing users.
- **Whole society** means the collective risk to all categories of persons listed under Article 7(4)(a) of the Directive.

- **Moving weighted average (MWA)** is the average safety performance over the five most recent reporting years. Further information on how this is calculated is outlined in the 2006 Regulations.

- **Accident precursor** means an incident that occurs in the causal chain of train accidents and can be used to indicate the risk of accidents happening.

- **Passenger-kilometre (km)** means the unit of measure representing the transport of one passenger by rail over a distance of one kilometre.

- **Passenger train-kilometre (km)** means the unit of measure representing the movement of a passenger train over one kilometre.

- **Train-kilometre (km)** means the unit of measure representing the movement of a train over one kilometre; the distance used is the distance actually run, if available, otherwise the standard network distance between the origin and destination must be used.

- **Track-kilometre (km)** means the length measured in kilometres of the railway network where each track of a multiple track railway is to be counted.

Country codes

- Austria (AT)
- Belgium (BE)
- Bulgaria (BG)
- Croatia (HR)
- Czechia (CZ)
- Denmark (DK)
- Estonia (EE)
- Finland (FI)
- France (FR)
- Germany (DE)
- Great Britain (GB)
- Greece (EL)
- Hungary (HU)
- Ireland (IE)
- Italy (IT)
- Latvia (LV)
- Lithuania (LT)
- Luxembourg (LU)
- Netherlands (NL)
- Northern Ireland (NI)
- Norway (NO)
- Poland (PL)
- Portugal (PT)
- Romania (RO)
- Slovakia (SK)
- Slovenia (SI)
- Spain (ES)
- Sweden (SE)
- Switzerland (CH)

Annex B: National Reference Values and Common Safety Targets

Measurement units for NRVs and CSTs

The following table sets out the measurement units for NRVs and CSTs used for this assessment.

Table B.1 Measurement units and scaling bases for each risk category

Risk category	Measurement units	Scaling base
Passengers	1.1 Number of passenger FWSI per year arising from significant accidents/Number of passenger train-km per year	Passenger train-km per year
	1.2 Number of passenger FWSI per year arising from significant accidents/Number of passenger-km per year	Passenger-km per year
Employees	2. Number of employee FWSI per year arising from significant accidents/Number of train-km per year	Train-km per year
Level crossing users	3.1 Number of level crossing user FWSI per year arising from significant accidents/Number of train-km per year	Train-km per year
	3.2 Number of level crossing user FWSI per year arising from significant accidents/[(Number of train-km per year x Number of level crossings)/track-km)] per year	(Train-km per year x Number of level crossings)/track-km
Others	4. Yearly number of FWSI to persons belonging to the category 'others' arising from significant accidents/Number of train-km per year	Train-km per year
Trespassers (unauthorised persons on railway premises)	5. Number of FWSI to unauthorised persons on railway premises per year arising from significant accidents/Number of train-km per year	Train-km per year
Whole society	6. Total number of FWSI per year arising from significant accidents/Number of train-km per year	Train-km per year

Values for NRVs and CSTs

The following table sets out the values of the NRVs and CSTs. These are from the 2006 Regulations. There are two NRVs and CSTs for the passenger risk category. This is because it is calculated twice using different scaling bases (passenger train-kilometres and passenger-kilometres).

Table B.2 NRV and CST for each risk category

Risk category and scaling base	NRV (*10^{-9})	CST (*10^{-6})	NRV ≤ CST
Passengers (Passenger train-km)	2.73	0.17	Yes
Passengers (Passenger-km)	0.028	0.00165	Yes
Employees (train-km)	5.17	0.0779	Yes
Level crossing users (train-km)	23.5	0.710	Yes
Others (train-km)	7.00	0.0145	Yes
Trespassers (train-km)	84.5	2.05	Yes
Whole society (train-km)	120.0	2.59	Yes

The NRV is less than or equal to the corresponding CST for each of the risk categories. Therefore, the achievement of the NRV automatically implies achievement of the CST.