



STATE COMMISSION ON RAILWAY ACCIDENT INVESTIGATION
Ministry of the Interior and Administration

REPORT No. PKBWK 03/2024

**on the investigation of a railway accident
that occurred on 19 May 2023 at 09:51 hrs
on the Komorów – Podkowa Leśna Główna route,
track no. 1, Category D level crossing, at km 18.805
of railway line no. 47 Warszawa Śródmieście WKD – Grodzisk Mazowiecki Radońska
the area of the infrastructure manager Warszawska Kolej Dojazdowa sp. z o. o.**

Warsaw, 1 February 2024

<https://www.gov.pl/web/mswia/panstwowa-komisja-badania-wypadkow-kolejowych>

Pursuant to Article 28f (3) of the Act of 28 March 2003 on rail transport, the Commission's investigation determines neither guilt nor liability.

This Report has been prepared under *Commission Implementing Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be used for railway accidents and incidents investigation report (OJ L 132 of 27 April 2020)*

I. SUMMARY	4
PHOTOGRAPH 2 - EFFECTS OF THE OCCURRENCE (SOURCE: DOCUMENTATION OF THE RAILWAY COMMISSION)	6
II. THE INVESTIGATION AND ITS CONTEXT	7
1. The decision to establish an investigation.....	7
2. The motivation to the decision to establish an investigation.....	7
3. The scope and limits of the investigation including a justification thereof, as well as an explanation of any delay that are considered a risk or other impact to the conduct of the investigation or its conclusions.....	7
4. An aggregated description of the technical capabilities and the functions in the team of investigators.	7
5. A description of the communication and consultation process established with persons or entities involved in the occurrence during the investigation and in relation to the information provided	7
6. A description of the level of cooperation offered by the entities involved	8
7. A description of the investigation methods and techniques as well as analysis methods applied to establish the facts and findings referred to in the report	8
8. A description of the difficulties and specific challenges encountered during the investigation	9
9. Any interaction with the judicial authorities	9
10. Other information relevant in the context of the investigation	9
III. DESCRIPTION OF THE OCCURRENCE	10
1. The occurrence and background information	10
1.1. The description of the occurrence type	10
1.2. The date, exact time and location of the occurrence	10
1.3. The description of the occurrence site, including weather and geographical conditions at the moment of the occurrence and if any works were carried out at or in the vicinity of the site.....	10
1.4. Deaths, injuries and material damage	13
1.5. The description of other consequences, including the impact of the occurrence in the regular operations of the actors involved.....	13
1.6. The identification of the persons, their functions, and entities involved, including possible interfaces to contractors and/or other relevant parties.....	14
1.7. The description and identifiers of train(s) and their composition including the rolling stock involved and their registration numbers.....	14
1.8. A description of the relevant parts of the infrastructure and signalling system – track type, switch, interlocking, signal, train protection systems	14
1.9. Other information relevant for the purpose of the description of the occurrence and background information	16
2. The factual description of the events	16
2.1. The proximate chain of events leading up to the occurrence, including actions taken by persons involved, the functioning of rolling stock and technical installations, the functioning of the operating system.	16
2.2. The chain of events from the occurrence until the end of the actions of the rescue services, including measures taken to protect and safeguard the site of the occurrence, the efforts of the rescue and emergency services	19
IV. ANALYSIS OF THE OCCURRENCE	20
1. Roles and responsibilities.....	20
1.1. Railway undertaking(s) or infrastructure manager(s)	20
1.2. The entities in charge of maintenance, the maintenance workshops, or any other maintenance suppliers	21
1.3. Manufacturers of rolling stock or other suppliers of rail products	21
1.4. National safety authorities or the European Union Agency for Railways	21
1.5. Notified bodies, designated bodies or risk assessment bodies	22
1.6. Certification bodies of entities in charge of maintenance mentioned under Point 1.2	22
1.7. Any other person or entity relevant to the occurrence, documented or not in one of the relevant safety management systems or referred to in a register or relevant legal framework	22
2. Rolling stock and technical installations	22

3. Human factors	26
3.1. Human and individual characteristics	26
3.2. Job factors	26
3.3. Organisational factors and assignments	26
3.4. Environmental factors	27
3.5. Any other factors relevant for the purpose of the investigation	29
4. Feedback and control mechanisms, including risk and safety management as well as monitoring processes ...	29
5. Previous occurrences of a similar character	30
V. CONCLUSIONS	33
1. A summary of the analysis and conclusions with regard to the causes of the occurrence	33
2. Measures taken since the occurrence	34
3. Additional comments	34
VI. SAFETY RECOMMENDATIONS	35
List of figures	
Figure 1 - A drawing of the accident (author: PKBWK)	12
Figure 2 - A chart of driving parameters of train no. 347 (developed by PKBWK)	24
Figure 3- A chart of driving parameters of train no. 347 (developed by PKBWK)	25

List of photographs

Photograph 1 - Effects of the occurrence (source: documentation of the railway commission)	6
Photograph 2 - Effects of the occurrence (source: documentation of the railway commission)	6
Photograph 3 - A general view of the occurrence site (source: Google Earth)	10
Photograph 4 - Visibility from 5 m from the left side of the level crossing to the right - situation as during the accident (source: PKBWK documentation)	11
Photograph 5 A view of the damage to the rail vehicle after the accident (source: documentation made by the railway commission)	13
Photograph 6 - A view of the foreground at around 2 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)	17
Photograph 7 - A view of the foreground at around 1.5 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)	17
Photograph 8 - A view of the foreground at around 1 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)	18
Photograph 9 - A view of the foreground at around 0.7 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)	18
Photograph 10 - A view of the foreground at the moment of the accident recorded by the rail vehicle's camera (source: the railway commission)	18
Photograph 11 - A view of the foreground after the train stopped following the collision (source: the railway commission)	19
Photograph 12 –Visibility of the level crossing from 60 m (source: PKBWK own material)	28
Photograph 13 – Visibility of the level crossing from 40 m (source: PKBWK own material)	28
Photograph 14– Visibility of the level crossing from 30 m (source: PKBWK own material)	29

I. SUMMARY

Type of occurrence: Accident.

Description: An occurrence at a Category D road-railway crossing (hereinafter referred to as "level crossing" in accordance with the Road Traffic Act) in which a Toyota Corolla passenger car entered the level crossing from its left side directly in front of the head of an oncoming train operated by carrier Warszawska Kolej Dojazdowa sp. z o. o. (hereinafter referred to as "WKD"), which caused a collision with the oncoming rail vehicle.

Date of the occurrence: 19 May 2023, 09:51 hrs.

Place of the occurrence: A level crossing located on the Komorów – Podkowa Leśna Główna route at km 18.805 of railway line no. 47 Warszawa Śródmieście WKD – Grodzisk Mazowiecki Radońska owned by infrastructure manager Warszawska Kolej Dojazdowa Sp. z o. o., level crossing ID number 047 018 805, geographical location 52⁰08'37,1"N, 20⁰48'21,3"E.

Consequences of the occurrence: No person was injured in the occurrence. There was damage to the Toyota Corolla passenger car and EN97-005 electric multiple unit.

Causal factor: Entry of the passenger car to the level crossing directly before passenger train no. 347 travelling from Warszawa Śródmieście WKD to Podkowa Leśna Główna on track no. 1.
(means any action, omission, event or condition, or a combination thereof that if corrected, eliminated, or avoided would have prevented the occurrence, in all likelihood)

Contributing factors:
(means any action, omission, event or condition that affects an occurrence by increasing its likelihood, accelerating the effect in time or increasing the severity of the consequences, but the elimination of which would not have prevented the occurrence)

- 1) Failure to maintain special caution by the driver of the Toyota Corolla passenger car while approaching to and driving through the level crossing.
- 2) Failure of the Toyota Corolla passenger car to stop before the level crossing in connection with the "Stop" sign.
- 3) No reaction of the car driver to the "Caution" signal given by the driver of the train approaching the level crossing.
- 4) Hindered observation of the head of the train approaching the level crossing by the driver of the passenger car due to the location of apparatus cabinets in the vicinity of track no. 2 and the location of road signs at a road near track no. no 2 (F6-a board), which limited the visibility of the train head from the distance of 5 m from the outermost rail.

Systemic factors: None found.

Recommendations and their addressees: The following recommendations were issued during the investigation to enhance the safety:

1. Introduce no left turn after passing the level crossing from left to right from the county road to the municipal road running in parallel with track no. 2 of line 47 WKD (addressee: the manager of the county road – the County Governor's Office in Pruszków).
2. Ensure visibility of road signs, in particular: A-10, G1-a, G1-b, G1-c, B-20 and G-4 from both sides of the approach roads, and introduce mechanisms to ensure on-going supervision in the future of removing the vegetation to ensure good visibility of those signs (addressee: the manager of the county road - the County Governor's Office in Pruszków).

3. Adjust the settings of the mirrors so that they ensure visibility of the head of trains approaching the level crossing (addressee: the manager of the county road - the County Governor's Office in Pruszków).
4. Adjust – move the apparatus cabinets to ensure visibility of the head of train approaching the level crossing (addressee: the infrastructure manager – WKD Sp. z o. o.).
5. Install speed bumps on both sides of the level crossing to limit the speed of cars approaching the level crossing (addressee: the manager of the county road - the County Governor's Office in Pruszków).
6. Move the obligatory stop lines P-12 on both sides of the level crossing so that they are no longer located as today in the axis of intersections with the roads running parallel with the railway line (addressee: the manager of the county road - the County Governor's Office in Pruszków).
7. Install additional devices at the level crossing to record transgressions committed by road vehicle drivers where the B-20 sign is placed, and install light panels with the message "Caution. Train" to inform road vehicle drivers about the level crossing (addressee: the infrastructure manager – WKD Sp. z o. o.)).
8. Considering the exposure factor, the manager of the railway line shall take action to re-classify the level crossing from Category D to a higher category "C" (*it is not possible to install Cat. B devices due to terrain limitations*) and to install additional devices to warn/record transgressions of road vehicle drivers when signals are given by roadside signalling devices (addressee: the infrastructure manager - WKD Sp. z o.o.).

Recommendations arising from the investigation:

- 1) The infrastructure manager Warszawska Kolej Dojazdowa Sp. z o. o. and the County Governor's Office in Pruszków shall implement the recommendations issued during the investigation and set forth in Section V.2 of this Report.
- 2) The manager of the county road - the County Governor's Office in Pruszków shall ensure supervision and control mechanisms for the appropriate visibility of the level crossing from the road, and of the road signs informing about the level crossing, including actions to ensure regular removal of vegetation that obstructs the visibility of the road signs.
- 3) The infrastructure manager - Warszawska Kolej Dojazdowa Sp. z o. o. shall re-analyse the risk of accidents at level crossings and, where necessary, shall take measures to mitigate the risk.



Photograph 1 - Effects of the occurrence (source: documentation of the railway commission)



Photograph 2 - Effects of the occurrence (source: documentation of the railway commission)

II. THE INVESTIGATION AND ITS CONTEXT

1. The decision to establish an investigation

The Chairman of the State Commission on Rail Accident Investigation (hereinafter referred to as "PKBWK" or "the Commission") Mr Tadeusz Ryś issued Decision no. PKBWK.590.6.2023 of 30 May 2023 on establishing an investigation to clarify the causes and circumstances of an accident at a Category D level crossing at km 18.805 of railway line no. 47 owned by the infrastructure manager WKD. Considering the provisions of Article 28e(4) of the Act of 28 March 2003 on rail transport (consolidated text: Journal of Laws of 2023, item 602, as amended), hereinafter referred to as the "Rail Transport Act", the occurrence was reported within the prescribed deadline to the European Union Railway Agency and registered in its database under number PL-10416.

2. The motivation to the decision to establish an investigation

Based on an analysis of the circumstances, considering the nature of the occurrence, which under slightly different conditions would have been a serious accident, and considering that it forms a series of accidents concerning the system as a whole, the Chairman of PKBWK decided to establish an investigation to be conducted by the Commission's Investigation Team pursuant to Article 28e(3)(2) of the Rail Transport Act.

3. The scope and limits of the investigation including a justification thereof, as well as an explanation of any delay that are considered a risk or other impact to the conduct of the investigation or its conclusions

The investigation into the causes of the occurrence was conducted under Article 28h(1) of the Rail Transport Act and, in accordance with the provisions of Article 28f(3) does not determine guilt or liability. There were no limits during the investigation that would have a negative impact on its course.

4. An aggregated description of the technical capabilities and the functions in the team of investigators.

The Chairman of the Commission nominated a three-person Investigation Team from among the standing members of the Commission, equipping it with qualifications and competencies regarding the investigation concerned.

5. A description of the communication and consultation process established with persons or entities involved in the occurrence during the investigation and in relation to the information provided

Under Article 28h(2)(5) of the Rail Transport Act, the Chairman of PKBWK obliged one person from the railway commission representing WKD to cooperate with the Investigation Team (Letter no. PKBWK.590.6.1.2023 of 30 May 2023).

Pursuant to the aforementioned letter, the chairman of the railway commission transferred formally the accumulated documentation to the head of the Investigation Team at the registered office of WKD on 1 June 2023.

In a letter no. PKBWK.590.6.4.2023 of 20 June 2023, the Chairman of PKBWK requested the President of the Management Board of WKD to make available documents necessary for the investigation carried out by the Commission's Investigation Team. The infrastructure manager WKD submitted all materials necessary for the investigation.

6. A description of the level of cooperation offered by the entities involved

Cooperation with representatives of the entities linked with the circumstances of the occurrence, i.e. the infrastructure manager and the road manager, which took place during the investigation into the causes and circumstances of the occurrence did not give rise to any objections on the part of the Investigation Team.

7. A description of the investigation methods and techniques as well as analysis methods applied to establish the facts and findings referred to in the report

Throughout the process aimed at investigating the causes and circumstances of the occurrence, the Investigation Team considered the provisions of national rules, internal rules of the infrastructure manager and the technical documentation. Furthermore, the Investigation Team relied on their own knowledge and experience, as well as on the documentation gathered by the Investigation Team and the railway commission. Within the investigation, the Investigation Team carried out *inter alia* the following activities:

- an inspection of the occurrence site, including an inspection of the level crossing, approach roads, railway line,
- preparation of photo and video documentation,
- an analysis of the documentation submitted by the railway carrier, rail infrastructure manager and road manager,
- an analysis of data from the rail vehicle's event data recorder and foreground image recorder (EN97-005 electric multiple unit),
- an analysis of the causal factors with the "5 Why's" method,
- meetings with the infrastructure manager, road manager and Police.

Below is a list of selected legal acts, rules and internal instructions used during the investigation:

European Union rules:

- 1) Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (OJ L 119, 04.05.2016, p. 1, as amended).
- 2) Commission Implementing Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed for railway accident and incident investigation reports (OJ L 132, 27.04.2020).
- 3) Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety (OJ L 138, 26.05.2016, p. 102, as amended).

National rules:

- 1) Act of 28 March 2003 on rail transport (consolidated text: Journal of Laws of 2023, item 602, as amended).
- 2) Act of 7 July 1994 on the Construction Law (consolidated text: Journal of Laws of 2023, Item 682, as amended).
- 3) Act of 20 June 1997 on the Road Traffic Law (consolidated text: Journal of Laws of 2023, item 1047, as amended).
- 4) Act of 10 May 2018 on the protection of personal data (Journal of Laws, item 1000).
- 5) Act of 21 March 1985 on public roads (consolidated text: Journal of Laws of 2023, item 645, as amended).

- 6) Regulation of the Minister of Infrastructure and Development of 20 October 2015 on the technical conditions to be met by crossings of railway lines and sidings with roads, and on their positioning (Journal of Laws of 2015, item 1744, as amended).
- 7) Regulation of the Minister of Infrastructure of 11 January 2021 on personnel employed on positions related directly to the conduct and safety of rail traffic and to driving of specific types of rail vehicles (Journal of Laws of 2021, item 101, as amended).
- 8) Regulation of the Minister of Infrastructure of 18 July 2005 on general conditions for rail traffic operation and signalling (consolidated text: Journal of Laws of 2015, item 360, as amended).
- 9) Regulation of the Ministers of Infrastructure and of the Interior and Administration of 31 October 2019 on road signs and signals (consolidated text: Journal of Laws of 2019, item 2310, as amended).
- 10) Regulation of the Minister of Transport and Maritime Economy of 2 March 1999 on the technical conditions to be met by public roads and on their positioning (consolidated text: Journal of Laws of 2016, item 124, as amended).

Internal instructions in place at the infrastructure manager and carrier - Warszawska Kolej Dojazdowa sp. z o. o. (selected)

- 1) WKD T-1 Instruction for drivers of trains or electrical/diesel traction vehicles on WKD lines,
- 2) WKD T-4 Instruction on maintenance of WKD standard-gauge rail vehicles,
- 3) WKD T-7 Instruction on operation and maintenance in operation of brakes in WKD rail vehicles,
- 4) WKD T-8 Occupational health and safety instruction for traction teams on electrical and diesel traction vehicles,
- 5) WKD R-1 Instruction on operating train traffic,
- 6) WKD R-2 Instruction on handling serious accidents, accidents and incidents in rail transport on WKD lines,
- 7) WKD R-5 Instruction on operating radio communication devices on WKD railway lines,
- 8) WKD A-1 Instruction on signalling on WKD lines,
- 9) WKD D-1 Technical Conditions for maintenance of surfaces on WKD railway lines,
- 10) WKD D-6 Instruction on surveillance of railway lines.

8. A description of the difficulties and specific challenges encountered during the investigation

Members of the Investigation Team attempted to contact the driver of the passenger car involved in the occurrence to interview the driver. A letter was sent by PKBWK to the driver's address of residence with a request for an interview by the Investigation Team, but it was not effectively served upon the person concerned. It was therefore impossible to interview the driver.

The Investigation Team did not encounter any other difficulties or problems that could affect the course, timeliness or conclusions of the investigation.

9. Any interaction with the judicial authorities

The chairman of PKBWK sent letter no. PKBWK.590.6.3.2023 of 6 June 2023 to the County Police Headquarters in Pruszków to obtain access to documents related to establishing the circumstances and causes of the occurrence. The documents were made available to the extent specified in the said letter.

10. Other information relevant in the context of the investigation

No other relevant information.

III. DESCRIPTION OF THE OCCURRENCE

1. The occurrence and background information

1.1. The description of the occurrence type

An accident at a Category D level crossing formed by a junction of a double-track electrified railway line no. 47 managed by WKD with a county road, i.e. Pruszkowska Street, in the town of Granica, managed by the County Governor's Office in Pruszków.

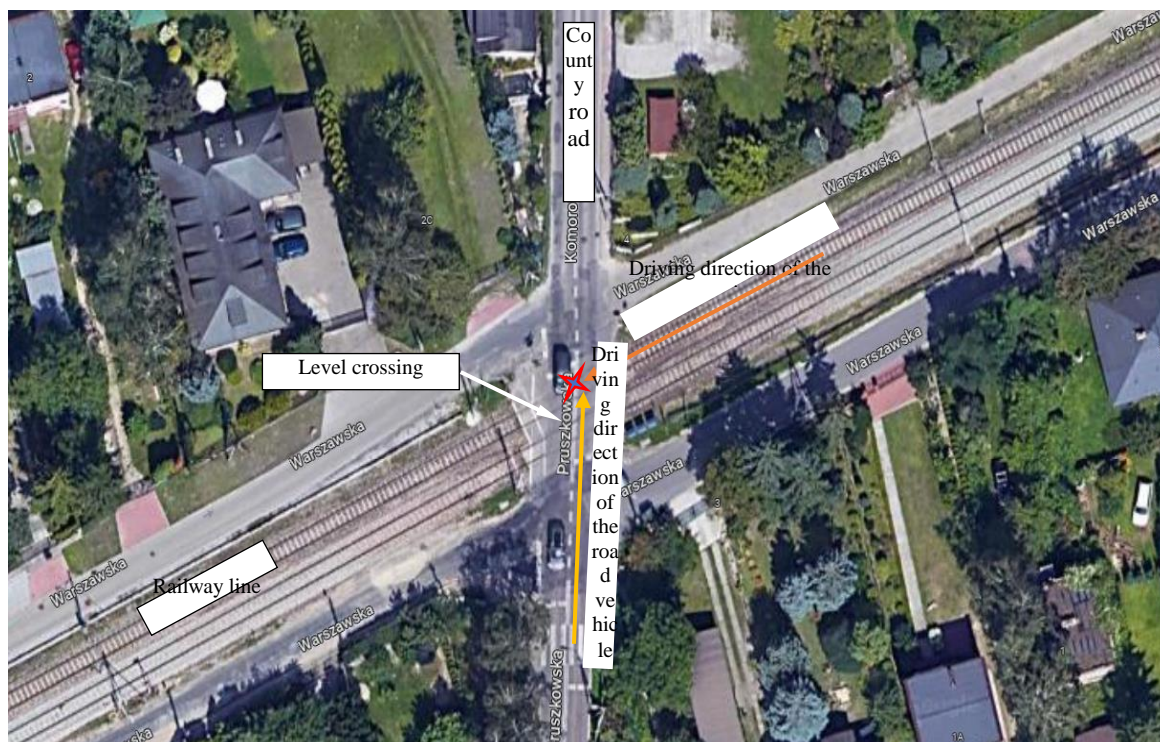
A Toyota Corolla passenger car drove before oncoming passenger train no. 347 from the left side in the driving direction of the train (from track no. 2), as a result of which the train ran into the car. The car was hit by the "a" coupler of the electric multiple unit on the rear right door and hung on the coupler, which penetrated into the cabin of the car. The car was pushed in such a jammed position for around 3 m at the speed of the train which ranged from 3 km/h to 0 km/h. After the accident, the head of the train stopped at the level crossing 2 m away from its axis, i.e. at km 18.807.

Passenger train no. 347, led by electric multiple unit EN97-005, operated on the Warszawa Śródmieście WKD - Podkowa Leśna Główna by WKD, a carrier providing carriage of persons.

1.2. The date, exact time and location of the occurrence

The occurrence took place on 19 May 2023 at 09:51 hrs at a Cat. D level crossing, on track no. 1, located on the Komorów – Podkowa Leśna Główna route, at km 18.805 of railway line no. 47 Warszawa Śródmieście – Grodzisk Mazowiecki Radońska, in the town of Granica.

1.3. The description of the occurrence site, including weather and geographical conditions at the moment of the occurrence and if any works were carried out at or in the vicinity of the site



Photograph 3 - A general view of the occurrence site (source: Google Earth)

The Cat. D level crossing on which the occurrence took place is located in the section of county road

no. 3107W Komorów – Pruszków managed by the County Governor's Office in Pruszków, and forms a level junction with double-track electrified railway line no. 47 managed by Warszawska Kolej Dojazdowa Sp. z o. o.

The level crossing is built of bitumen surface. The width of the approach roads on the level crossing is 7.5 m. As shown in the level crossing data sheet, the permitted speed of road vehicles on the road in the area of the level crossing is 50 km/h. The county road crosses the railway track at a 75° angle. The area where the road crosses the railway line is located in an urban area. County road no. 3107W is marked with warning signs A-10 on both sides and indication posts G-1a, G-1b, G-1c on the right side. Before the level crossing, on both sides of the approach road, 2.4 m from the outermost rail, there are signs B-20 "Stop" and a warning board with the message "Railroad crossing, beware of trains", G-4 "St. Andrew's Cross" and G-2.

On the left side of the level crossing, from the driving direction of the car, the visibility of the head of trains from 5 m to the right (from the driving direction of the train) was hindered by apparatus cabinets positioned along track no. 2 and road signs positioned at Warszawska Street.

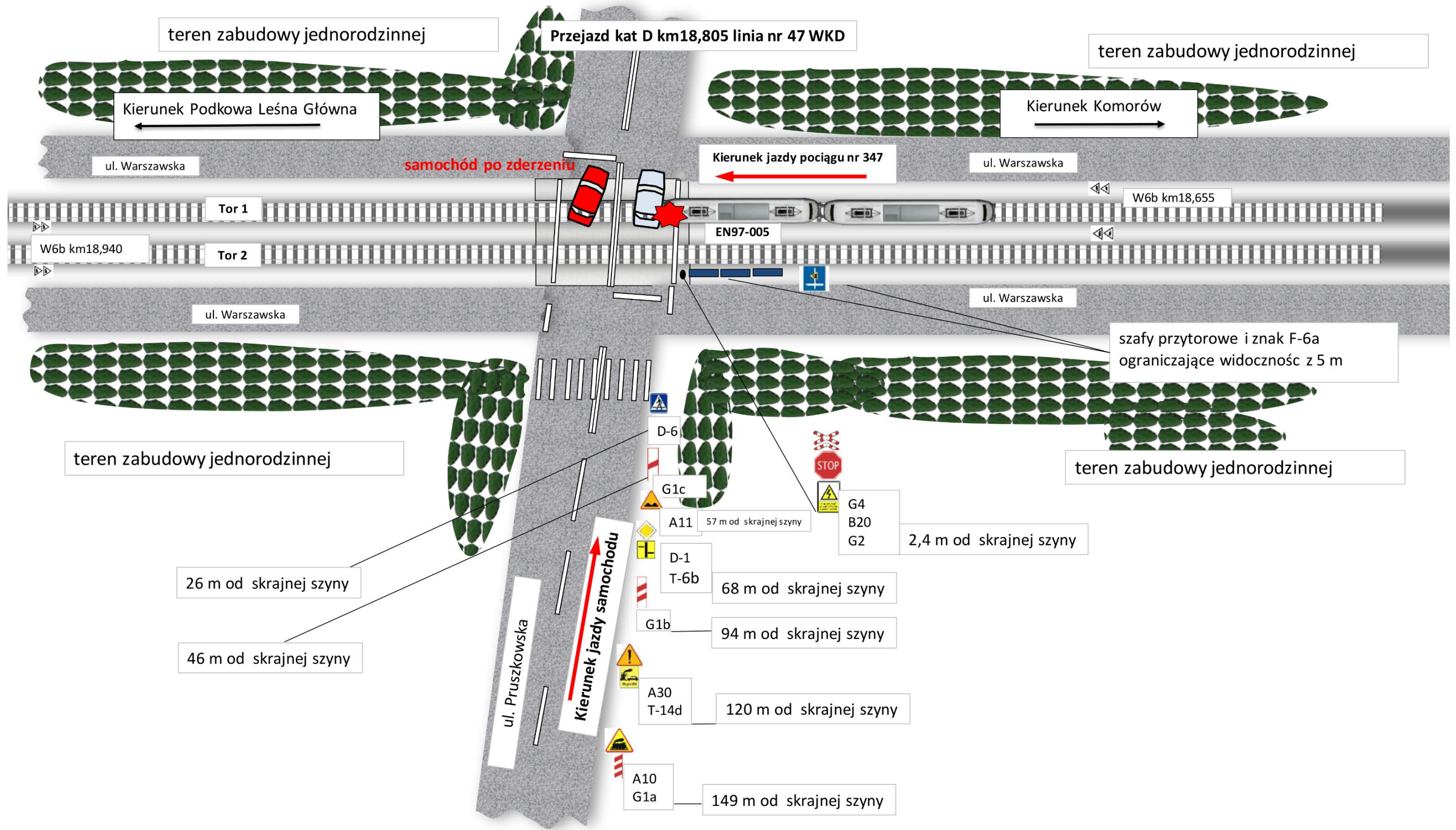


Photograph 4 - Visibility from 5 m from the left side of the level crossing to the right - situation as during the accident (source: PKBWK documentation)

Geographical coordinates of the level crossing are 52°08'37,1"N, 20°48'21,3"E. The occurrence took place in daylight with no fog present, light drizzle, ambient temperature +16°C.

No works that could have impact on the occurrence were being carried out in the area of the level crossing.

Figure 1 - A drawing of the accident (author: PKBWK)



1.4. Deaths, injuries and material damage

a) passengers, employees or contractors, level crossing users, trespassers, other persons at a platform, other persons not at a platform

As a result of the accident, neither the driver of the passenger car nor any of the passengers or train crew sustained any injuries.

b) cargo, luggage and other property

The road vehicle (passenger car) was destroyed as a result of the accident. The luggage of the passengers on the train was not damaged.

c) rolling stock, infrastructure and the environment

Rolling stock

The train was not derailed. The head of the EN97-005 electric multiple unit, on side of Cabin "a", sustained damage to: paint coat on the front fender, coupler cover, paint coat on the coupler, and the coupler limiter.



Photograph 5 A view of the damage to the rail vehicle after the accident (source: documentation made by the railway commission)

Infrastructure

No rail infrastructure was damaged as a result of the occurrence.

Environment

No environment pollution took place as a result of the occurrence.

1.5. The description of other consequences, including the impact of the occurrence in the regular operations of the actors involved

The occurrence resulted in the necessity to stop train traffic on track no. 1 of railway line no. 47 on the Komorów – Podkowa Leśna Główna route. Track no. 1 was closed at 09:53 hrs. Single-track bidirectional traffic was introduced on track no. 2 at 10:00 hrs. After the effects of the occurrence had been cleared, track no. 1 was opened at 11:15 hrs.

As a result of the occurrence, 11 passenger trains were cancelled and 7 were delayed.

1.6. The identification of the persons, their functions, and entities involved, including possible interfaces to contractors and/or other relevant parties

The following persons were directly involved in the occurrence:

- the driver of the road vehicle (passenger car - a cab with no passengers),
- the driver of passenger train no. 347 of railway carrier Warszawska Kolej Dojazdowa Sp. z o. o.

1.7. The description and identifiers of train(s) and their composition including the rolling stock involved and their registration numbers

Train no. 347 was set up of electric multiple unit EN97-005, vehicle type 33WE, year of manufacture 2012, consisting of a triple locomotive "a" and a triple locomotive "b". The rail vehicle was moving with Cabin "a". It had a valid "Technical railworthiness certificate" no. WKD 7/1/2021, valid from 6 April 2022 until 30 August 2024 or for the mileage of 525,000 km counted from:

- the starting state of the triple locomotive "a" – 468,012 km,
- the starting state of the triple locomotive "b" – 479,024 km.

The rail vehicle type had "Rail vehicle type operation approval certificate" no. PL 59 2016 0063, valid indefinitely.

Details of train 347 – from the brake test sheet:

– total mass of the train.....	138	tonnes
– required braked mass percentage.....	120%	
– actual braked mass percentage.....	187%	
– required braked mass.....	166	tonnes
– actual braked mass.....	259	tonnes

1.8. A description of the relevant parts of the infrastructure and signalling system – track type, switch, interlocking, signal, train protection systems

Track

Rail type.....	– S49
Sleepers.....	– prestressed concrete, PS94 type
Attachment type.....	– flexible, type Sb3
Ballast type.....	– crushed stone
Maximum permitted train speed en route...	– 80 km/h
Speed limit for the train head at the level crossing at km 18.805 of railway line no. 47	20 km/h

Level crossing:

- a Cat. D level crossing forming a level junction of railway line no. 47 Warszawa Śródmieście WKD – Grodzisk Mazowiecki Radońska with county road no. 3107W Komorów – Pruszków managed by the County Governor's Office in Pruszków,
- individual level crossing ID number (yellow sticker): 047 18 805,
- crossing axis - km 18.805,
- angle of railway line-road crossing – 75°,

- the surface of the level crossing is built of 4 sets (2 sets per track) of EDILON LC-L type crossing slabs,
- road surface on the approaches - bitumen,
- access road gradeline:
 - right side – a 2.03% drop along the distance of 30 m,
 - left side (the direction of entry of the road vehicle to the level crossing) a +0.56% elevation along the distance of 30 m,
- exposure factor at the level crossing – 1,724,541; the last measurement was made on 20 February 2023,
- total length of the level crossing - 13.23 m,
- width of the road crown on the level crossing – 9.0 m,
- width of the roadway on the level crossing – 12.0 m,
- width of the roadway on the approaches, left side – 7.5 m,
- width of the roadway on the approaches, right side – 9.0 m,
- maximum speed of road vehicles on the level crossing – 50 km/h,
- level crossing lighting – none (not required for Cat. D level crossings),
- due to the exceeded traffic ratio on the county road and lack of the required visibility, there is a 20 km/h speed limit at the level crossing.

Signage of the level crossing on the day of the occurrence

From the side of the county road

Left side of the level crossing (looking in the direction of the ascending chainage of the railway line):

a warning sign A-10, indication posts G-1a, G-1b and G-1c, and signs B-20 "Stop" and G4 (St. Andrew's Cross) at 2.4 m away from the outermost rail - placed on a shared mast.

Right side of the level crossing:

a warning sign A-10, indication posts G-1a, G-1b and G-1c, signs B-20 "Stop" and G4 at 2.4 m away from the outermost rail, placed on a shared mast.

Trackside W6b indicators:

- in the ascending direction of the railway line chainage, at km 18.665, i.e. 140 metres from the axis of the level crossing,
- in the descending direction of the railway line chainage, at km 18.940, i.e. 125 metres from the axis of the level crossing.

An on-site inspection carried out by members of the Investigation Team directly after the occurrence revealed the following irregularities:

- when approaching the level crossing from its left side (as during the occurrence), the road sign A-10 was completely obscured for the driver, and the signs G1-a and G1-b were partially obscured by the trees and shrubs growing along the county road; the sign B-20 was obscured both by a hedgerow and the road signs D-6 and G4 (St. Andrew's Cross), and was visible only from the distance of around 30 m before the level crossing from the outermost rail of track no. 2,
- the T-6d and B1 boards standing at the county road on the left side of the level crossing mislead drivers because they did not inform them about the railway line,
- the B-20 signs before the level crossing were positioned too low – on the left side at the height of 1 m, on the right side at the height of 1.5 m instead of 2 m as prescribed by applicable regulations,
- apparatus and power supply cabinets (3 pcs.) on the left side of the level crossing limited visibility of the train head from 5 m for drivers because they were positioned within the visibility triangle,

- the P-12 lines on both sides of the level crossing (in a place which did not ensure visibility of train approaching the level crossing) were located in the axis of junctions with roads running parallel with the railway line and required the road manager to move them closer to the level crossing,
- cars going from the right side of the level crossing (from the direction of Pruszków) towards the level crossing, and turning left behind the level crossing caused traffic jams on the level crossing, which endangered the safety of road and rail traffic,
- no U1 separation posts on both sides of the level crossing,
- the pedestrian crossing on the county road on the left side of the level crossing was too close to the level crossing, i.e. at the distance of 20 m,
- no yellow sticker on the G4 sign (St. Andrew's Cross) on the left side of the level crossing (from the direction of the town of Granica),
- the F6-a boards positioned at the roads running in parallel with the railway line in the vicinity of the level crossing did not provide any information about the actual layout of roads and, additionally, limited visibility of the train head from 5 m.

Due to the irregularities, which affected the safety of rail traffic and road users, the Chairman of PKBWK issued recommendations listed in Section V Point 2 of this Report.

1.9. Other information relevant for the purpose of the description of the occurrence and background information

The Investigation Team did not identify any other information relevant for the purpose of the description of the occurrence.

2. The factual description of the events

2.1. The proximate chain of events leading up to the occurrence, including actions taken by persons involved, the functioning of rolling stock and technical installations, the functioning of the operating system.

On 19 May 2023, train no. 347 (cycle 6) of carrier Warszawska Kolej Dojazdowa Sp. z o. o., operated by the EN97-005 electric multiple unit with Cabin "a" moving forward, departed from the Komorów station at 09:50:29 hrs as per the official timetable. After 257 m, the speed of the train increased to 64.25 km/h. Because of the permanent 20 km/h speed limit at the level crossing located at km 18.805 of line no. 47, the train driver initiated service braking at 09:51:05 hrs when the train head was around 205 m from the axis of the level crossing. Approaching the level crossing, at the W6b indicator positioned at km 18.655 (140 m from the axis of the level crossing), the train driver gave the "Caution" signal. As the train was nearing the level crossing, when its head was around 15 m from the level crossing axis, its speed was 16.5 km/h in line with the 20 km/h permanent speed limit. At that time, the train driver noticed a Toyota Corolla passenger car nearing the level crossing from the left and initiated emergency braking while giving the continuous "Caution" signal and reducing the speed to 3 km/h at the moment of hitting car.

According to the recording from the forward looking camera installed in Cabin "a" of the EN97-005 rail vehicle, the passenger car did not stop at the B-20 "Stop" sign and P-12 line, and drove onto the level crossing at the speed of around 20 km/h (as calculated on the basis of the recorded footage).

The car drove across track no. 2, despite the continuous "Caution" signal given by the train driver, and directly before the head of the train travelling on track no. 1. The train was marked correctly with the Pc-1 signal (three white lights on the head of the rail vehicle).

At 09:51:28 hrs, as a result of driving right before the oncoming train, the passenger car was hit by the EMU's coupler (locomotive "a") on its rear right door, and was pushed for around 3 m hanging on the coupler.

After the accident, the head of the train stopped 2 m from the axis of the level crossing at km 18.807.

Shown below is a sequence of events that took place prior to the occurrence, as recorded by a forward looking camera installed on the EN97-005 electric multiple unit:

SEQUENCE OF EVENTS



Photograph 6 - A view of the foreground at around 2 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)



Photograph 7 - A view of the foreground at around 1.5 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)



The passenger car involved in the occurrence

Photograph 8 - A view of the foreground at around 1 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)



The passenger car involved in the occurrence

Photograph 9 - A view of the foreground at around 0.7 s prior to the accident recorded by the rail vehicle's camera (source: the railway commission)



The passenger car involved in the occurrence

Photograph 10 - A view of the foreground at the moment of the accident recorded by the rail vehicle's camera (source: the railway commission)



Photograph 11 - A view of the foreground after the train stopped following the collision (source: the railway commission)

2.2. The chain of events from the occurrence until the end of the actions of the rescue services, including measures taken to protect and safeguard the site of the occurrence, the efforts of the rescue and emergency services

After the collision of the train with the road vehicle, the train driver reported the accident to the signaller at the Komorów station at 09:52 hrs. The signaller called the emergency number 112 and notified the Public Safety Answering Point about the occurrence. At 09:53, the signaller closed track no. 1 of the Komorów – Podkowa Leśna route. At 10:00 hrs, single-track bidirectional traffic was introduced on track no. 2. No person was injured in the accident, but there was damage to property in the form of damage to the body of the car and damage to the rail vehicle. Immediately after the occurrence, the train driver announced through the train's public address system that the stop could last around 1 hour and persons willing to leave the train would receive assistance while getting off. There were no more than 10 persons on the train; they got off and headed for the Komorów station on foot. A patrol from the County Police Headquarters in Pruszków and a crew of Pruszków Fire Service arrived at the scene; the latter took off the passenger car from the train coupler. On checking the extent of damage, at 11:07 hrs the train driver started the EMU and the damaged EN97-005 entered track no. 2 to the Podkowa Leśna Główna station. Track no 1 was opened at 11:15 hrs, and normal train traffic was restored. As a result of the occurrence, 11 passenger trains were cancelled and 7 were delayed.

IV. ANALYSIS OF THE OCCURRENCE

1. Roles and responsibilities

1.1. Railway undertaking(s) or infrastructure manager(s)

Infrastructure manager and railway carrier - Warszawska Kolej Dojazdowa Sp. z o.o. ("WKD")

Warszawska Kolej Dojazdowa Sp. z o.o. with its registered office in Grodzisk Mazowiecki was established on 22 December 2000 as a company wholly owned by PKP S.A. (up to 13 August 2008, the name of the company was "PKP Warszawska Kolej Dojazdowa" Sp. z o.o.). WKD commenced business operations on 1 July 2001. On 27 September 2007, the ownership of WKD was acquired by local governments, i.e. the Government of the Mazowieckie Voivodship, the City of Pruszków, the Municipality of Grodzisk Mazowiecki, the Municipality of Brwinów, the Municipality of Milanówek, the City of Podkowa Leśna, and the Municipality of Michałowice.

The primary business of Warszawska Kolej Dojazdowa Sp. z o.o. includes:

1. Organising passenger carriage on the WKD line as per a defined train timetable on the Warszawa Śródmieście WKD – Grodzisk Mazowiecki Radońska route with a branch line in Podkowa Leśna to Milanówek.
2. Managing the infrastructure on which the carriage service is provided.

WKD manages a separate suburban railway system where passenger carriage services are provided on railway line no. 47 Warszawa Śródmieście WKD - Podkowa Leśna Główna - Grodzisk Mazowiecki Radońska route and on railway line no. 48 Podkowa Leśna Główna - Milanówek Grudów route. The company is the rail infrastructure manager and, at the same time, railway carrier on lines no. 47 and 48, and it manages railway line no. 512 Pruszków - Komorów, which is a connection line linking WKD with the PKP PLK S.A. network.

WKD runs its business under obtained licenses and certificates in accordance with applicable regulations.

Licences held:

1. Licence no. WPO/043/2004 to provide rail carriage of persons - granted indefinitely.
2. Licence no. WPO/042/2004 to provide rail carriage of things - granted indefinitely.

Safety certificates held:

1. Safety certificate no. 236/PK/16 for a railway carrier issued by the President of the Rail Transport Office on 21 November 2016 which attests that Warszawska Kolej Dojazdowa Sp. z o.o., as a railway carrier, meets the requirements concerning safe provision of railway carriage in accordance with the provisions on rail traffic and safe operation of rail vehicles,
2. Certificate no. 256/ZI/16 for a rail infrastructure manager issued by the President of the Rail Transport Office on 21 November 2016 which attests that Warszawska Kolej Dojazdowa Sp. z o.o., as a railway carrier, meets the requirements concerning appropriate maintenance of rail infrastructure and safe operation of rail traffic.

Pursuant to Article 15 z.zy¹ (3) of the Act of 2 March 2020 on specific solutions to prevent, counteract and combat COVID-19, other infectious diseases and crisis situations caused by them (Journal of Laws of 2021, item 2095, as amended), the safety certificate was extended by 180 days from the day of lifting the state of epidemiological threat or the state of epidemic. Both certificates remained valid as of the day of the occurrence.

The primary tasks of the Company include the provision of agglomeration passenger carriage on railway lines no. 47 (Warszawa Śródmieście WKD - Grodzisk Mazowiecki Radońska), no. 48 (Podkowa Leśna Główna - Milanówek Grudów) and no. 512 (Komorów - Pruszków). Warszawska Kolej Dojazdowa Sp. z o.o. is the rail infrastructure manager and railway carrier within the area of the railway lines under its management, and is

exempt from the obligation to hold a safety certificate as a railway carrier pursuant to Article 17d(2) and Article 17e(2) of the Rail Transport Act.

The infrastructure manager is responsible for *inter alia* appropriate maintenance of the railway line, including level crossings. The responsibilities of the infrastructure manager are laid down in *inter alia* Article 62 of the Act of 7 July 1994 on the Construction Law. The said provision requires the infrastructure managers to conduct annual and five-year reviews of construction works (including level crossings and traffic protection devices installed thereon). The infrastructure manager's internal instruction WKD D-1 provides that periodic checks arising from the provisions of the "Construction Law" are conducted at least once a year (annually) and once every five years by workers authorised by the infrastructure manager who have appropriate construction qualifications. Periodic checks are documented by reports.

In accordance with the provisions of Article 62 of the Act of 7 July 1994 on the Construction Law, the infrastructure conducted periodic checks of the level crossing at km 18.805 of railway line no. 47.

Four annual check reports from 2019-2022 concerning the construction aspect of the level crossing were analysed.

The checks in question were conducted on 12 March 2019, 23 February 2020, 19 June 2021 and 18 June 2022. The 2019-2021 reports did not formulate any conclusions regarding the object concerned. The 2022 report formulated some conclusions, i.e. *"replace and supplement the board 'Level track crossing'; A 10 and G-la - overgrown; supplement G-1c; G-3 St. Andrew's Cross - replace at track no. 2"*.

In a letter of 21 July 2022, the infrastructure manager (WKD) informed the county road manager (the County Governor's Office in Pruszków) about *inter alia* *"A 10 and G-la signs overgrown by vegetation, and the absence of a G-1c sign"*.

The rail vehicle designated to carry out the transport task by the carrier Warszawska Kolej Dojazdowa Sp. z o. o. had a rail vehicle type operation approval certificate and a valid technical railworthiness certificate. The designated train crew that operated the train held all ratings and qualifications requirement by law. The train was driven on the basis of an internal timetable.

The responsibilities concerning the safety of rail traffic are defined in *inter alia* the infrastructure manager's instructions WKD R-1 "Instruction on operation of train traffic", WKD A-1 "Instruction on signalling on WKD lines",

and WKD T-1 "Instruction for drivers of trains or electrical/diesel traction vehicles on WKD lines".

Based on an analysis of the material gathered in the case, the Investigation Team did not find any irregularities in the conduct of the train crew during operation of the train or after the occurrence.

1.2. The entities in charge of maintenance, the maintenance workshops, or any other maintenance suppliers

Railway carrier Warszawska Kolej Dojazdowa Sp. z o. o. dostarczający tabor odpowiada za jego sprawność, technical condition i przestrzeganie procesu utrzymania pojazdów. Powered rail vehicle serii EN97-005 prowadzący train posiadał świadectwo typu pojazdu kolejowego and ważne świadectwo sprawności technicznej. The carrier submitted documentation concerning the latest technical inspections of its rail vehicles. The Investigation Team did not find any irregularities as regards rolling stock maintenance and operation. The technical condition of the rail vehicle had no impact on the occurrence concerned.

1.3. Manufacturers of rolling stock or other suppliers of rail products

Based on the investigation material gathered, the Investigation Team did not identify any factors that would be affected by manufacturers of rolling stock and suppliers of rail products.

1.4. National safety authorities or the European Union Agency for Railways

The President of the Rail Transport Office (Polish: *Urząd Transportu Kolejowego*, UTK) supervises the safety of rail traffic. Based on the investigation material gathered in the case, the Investigation team did not identify any factors on the side of the national safety authority that would have impact on the occurrence.

1.5. Notified bodies, designated bodies or risk assessment bodies

Based on the investigation material gathered, the Investigation Team did not identify any factors that could be affected by notified bodies.

1.6. Certification bodies of entities in charge of maintenance mentioned under Point 1.2

Based on the investigation material gathered, the Investigation Team did not identify any factors that could be affected by certification bodies of the rail carrier.

1.7. Any other person or entity relevant to the occurrence, documented or not in one of the relevant safety management systems or referred to in a register or relevant legal framework

County road no. 3107W is managed by the County Governor's Office in Pruszków. Under Article 20(4) and (16) of the Act of 21 March 1985 on public roads, a road manager's obligations include *inter alia* maintenance of road signs and removal of shrubs. A road manager has specific obligations regarding *inter alia* removal of vegetation that obscures level crossings and their signage. A road manager is obliged to maintain level crossings in an appropriate condition, including remove all obstacles, including vegetation, that may obscure a level crossing. Vegetation around level crossings should be kept so as it does not reduce the visibility of a level crossing from the road for drivers.

Furthermore, in accordance with Article §81 of the Regulation of the Minister of Infrastructure and Development of 20 October 2015 *on the technical conditions to be met by crossings of railway lines and sidings with roads, and on their positioning* (consolidated text: Journal of Laws of 2015, item 1744, as amended), a road manager is under obligation to place, in particular, road signs B20, A-10, G-1a, G1-b, G-1c before level crossings. The obligations concerning appropriate signage and maintenance of the county road at approaches to the level crossing at km 18.805 of railway line WKD no. 47 rest on the manager of county road no. 3107W, i.e. the County Governor's Office in Pruszków. As regards municipal roads that run in parallel with the railway line, the said responsibilities rest on the Municipality of Michałowice (municipal roads along the railway line).

2. Rolling stock and technical installations

Powered rail vehicle

The EN97-005 electric multiple unit is equipped by the manufacturer with an electronic event data recording system ATM.

The Investigation Team used FDS10 ver. 10.1.10 software to analyse selected driving parameters recorded by the recorder immediately prior to the occurrence. The chart below shows the train's parameters recorded from the moment of its departure from the Komorów station (09:50:59 hrs) up to the place where the train stopped after the accident (09:51:29 hrs), which corresponds to the distance of 659 m. After colliding with the passenger car, the train continued to travel for around 2 m.

The charts below show *inter alia* the following driving parameters of train WKD no. 347:

- CIS_PRZ_GL - pressure in the main tube,
- DROGA_ODC – distance covered since the last stop,
- PRĘDKOŚĆ - speed in km/h,
- ŚWIATŁA – head lights of the train,
- HAM_NAG – use of emergency brake,
- PRZ_SYR_PN – use of the pneumatic horn button.

Fig. 2 shows the driving characteristic of train WKD no. 347 in the time function, and Fig. 3 in the distance function.

Description:

- 09:50:29 hrs – departure from the Komorów station,
- 09:50:30 - 09:50:57 hrs – an increase in speed from 0 to 64.75 km/h along the distance of 257 m,

- 09:50:57 - 09:51:05 hrs – non-electric drive, a decrease in speed from 64.75 km/h to 62.25 km/h along the distance of 195 m,
- 09:51:05 - 09:51:25 hrs – dynamic service braking with a decrease in speed from 62.25 km/h to 16.5 km/h along the distance of 196 m, after giving the "Caution" signal,
- 09:51:25 – 09:51:29 – a long "Caution" signal (4s) – start of the signal at around 13 m from the axis of the level crossing, initiation of emergency braking at around 5 m from the axis of the level crossing at the speed of 16.5 km/h; the train collides with the car at the speed of around 3 km/h; the train stops around 2 m behind the axis of the level crossing (the road axis) at km 18.807 at the distance of 659 m from the place of departure at the Komorów station.

The speed below 20 km/h required under the speed limit as per WOS (*Wykaz Ostrzeżeń Stałych* - List of Permanent Warnings) was reached by the train at around 638 m from the place of departure, i.e. 19 m from the axis of the level crossing.

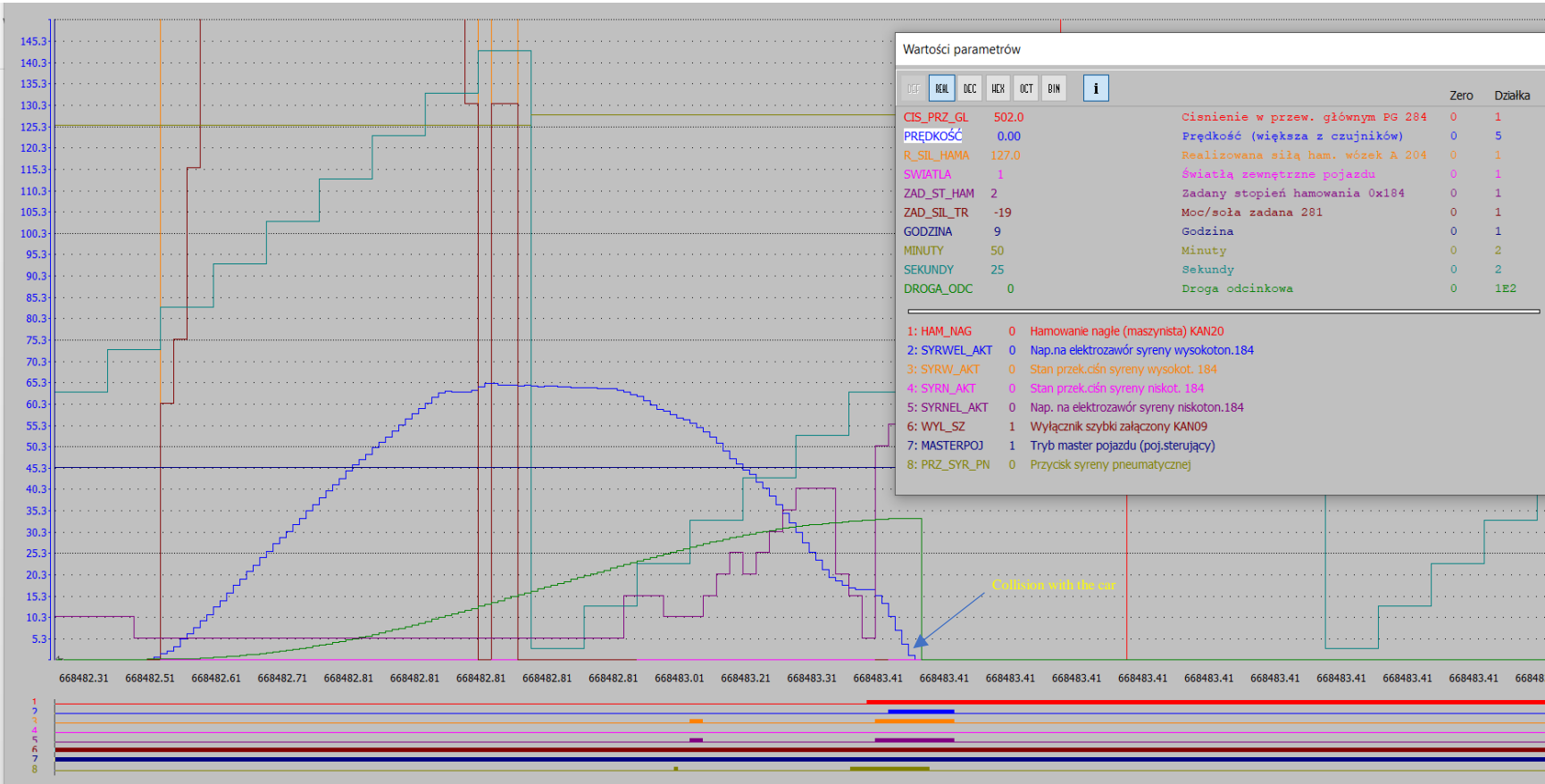
The lighting of the train head with the Pc-1 signal was active throughout the entire driving time. Driving with Cabin "a" forward.

The mileage of the rail vehicle at the moment of the occurrence was 668,483 km.

Figure 2 - A chart of driving parameters of train no. 347 (developed by PKBWK)



Figure 3- A chart of driving parameters of train no. 347 (developed by PKBWK)



3. Human factors

3.1. Human and individual characteristics

The Traffic Law of 20 June 1997, also known as the "Traffic Code", is the primary regulation applicable to users of public roads.

Specific rules concerning level crossings and applicable to road vehicle drivers are contained in Article 28 of the Traffic Law. They provide that:

"1. When approaching and driving through a level crossing, the driver of a vehicle is obliged to take special caution. Before entering the track, he is obliged to make sure whether or not a rail vehicle is approaching and take appropriate precautions, in particular where air transparency is reduced due to fog or other causes.

2. The driver of a vehicle is obliged to drive his vehicle with a speed that allows him to stop the vehicle in a safe place if a rail vehicle is approaching or if a protection device or signal indicated prohibits entry to the crossing."

Although the level crossing was marked with a B-20 "Stop" sign and a G4 "St. Andrew's Cross" sign, the driver of the passenger car did not maintain special caution when approaching the level crossing and did not stop before the level crossing as instructed by the signs, driving across track no. 2 of the railway line right before a train oncoming on track no. 1, despite a continuous "Caution" signal given by the train driver. The speed of the road vehicle at the moment of entry onto the level crossing was around 20 km/h. An examination of the passenger car driver did not show any alcohol content in his body.

The Investigation Team established that the train driver behaved appropriately as he had immediately initiated emergency braking with a simultaneous "Caution" signal after noticing the car approaching from the left side of the level crossing. An examination of the train driver did not show any alcohol content in his body. The train driver's work time was in compliance with the applicable standards. The driver of train no. 347 had had 32 hours of rest prior to starting work. The train driver held the required documents and had received training required for operating EN97 series traction vehicles, and had completed other training courses related to his job.

The Investigation Team found that the entry of the passenger car onto the level crossing right before the oncoming passenger train no. 347 travelling from Warszawa Śródmieście WKD – Podkowa Leśna Główna was the causal factor of the occurrence.

Considered as contributing factors were failure of the driver of the Toyota Corolla passenger car to stop before the level crossing as instructed by the "Stop" sign and failure of the driver of the Toyota Corolla passenger car to maintain special caution while approaching the level crossing.

3.2. Job factors

The EN97-005 series electric multiple unit had an appropriate release to operation on railway network in Poland and was railworthy. The job of the train driver was typical and had no impact on the occurrence.

The road vehicle was roadworthy, and had a valid technical examination providing for its safe operation. The driver of the road vehicle held applicable authorisations to drive this type of vehicles. The Investigation Team does not raise any reservations concerning job factors.

3.3. Organisational factors and assignments

As it transpires from the evidence material gathered by the Investigation Team, the rail carrier had ensured that the driver of the rail vehicle involved in the occurrence had the legally required rest time. The said worker held all ratings and authorisations required by the applicable law and instructions for actions performed on the job concerned. The employer provided the said worker with all necessary instructions and regulations ensuring safe performance of his job. The Investigation Team does not raise any objections concerning the organisational assignments.

3.4. Environmental factors

The level crossing is located in an urban area where the permitted speed limit for road vehicles is 50 km/h. It is located in an area of dense single-family development with a large number of shrubs and trees growing along the county road on both sides of the level crossing. An on-site inspection carried out by members of the Investigation Team directly after the occurrence revealed that some of the road signs informing drivers about approaching the level crossing was overgrown by vegetation. When approaching the level crossing from its left side (as during the occurrence), the road sign A-10 was completely obscured for the driver, and the signs G1-a and G1-b were partially obscured by the trees and shrubs growing along the county road. The B-20 sign was obscured by both a hedgerow and the D-6 road sign, and in consequence was visible only from the distance of around 30 m. The G4 sign (St. Andrew's Cross) was obscured by the D-6 road sign and in consequence was visible only from the distance of around 50 m from the level crossing, counting from the outermost rail of track no. 2 of the level crossing.

In accordance with the provisions of the Regulation of the Minister of Infrastructure and Development of 20 October 2015 on the technical conditions to be met by crossings of railway lines and sidings with roads, and on their positioning, the minimum required visibility of a level crossing from the road in an urban area should be 60 m.

The B-20 signs before the level crossing were positioned to low – on the left side at the height of 1 m, on the right side at the height of 1.5 m instead 2 m as prescribed by applicable regulations. The T-6d and B1 boards standing at the county road on the left side of the level crossing mislead drivers because they did not inform them about the railway line. The Investigation Team found the above circumstances to be other irregularities. In the opinion of the Investigation Team, hindered observation of the head of the oncoming train on the part of the driver of the passenger car from the distance of 5 metres from the outermost rail was an environmental contributing factor due to:

- the location of the apparatus cabinets in the vicinity of track no. 2,
- the location of road signs at a road near track no. 2 (F6-a boards), which limited the visibility of the train head from the distance of 5 m from the outermost rail.

Visibility from 5 metres on the part of the driver is shown in Photograph 5.

Photographs no. 12, 13 and 14 below show the visibility from the approach road (the left side of the level crossing); they show the following:

- photograph 12 - the B-20 ("Stop") and G4 stops obscured by a hedgerow, and the D-6 road sign from 60 m (from the outermost rail),
- photograph 13 - the B-20 sign obscured by a hedgerow from 40 m,
- photograph 14 – full visibility of the B-20 ("Stop") and G4 signs from 30 m.



Photograph 12 – Visibility of the level crossing from 60 m (source: PKBWK own material)



Photograph 13 – Visibility of the level crossing from 40 m (source: PKBWK own material)



Photograph 14– Visibility of the level crossing from 30 m (source: PKBWK own material)

3.5. Any other factors relevant for the purpose of the investigation

In the course of the investigation, the Investigation Team did not identify any other factors linked to the accident.

4. Feedback and control mechanisms, including risk and safety management as well as monitoring processes

WKD has a Quality Management System implemented under Resolution no. 94/2014 of the Management Board of Warszawska Kolej Dojazdowa sp. zoo. of 30 October 2014. The Quality Management System includes the following processes containing relevant procedures:

1. PS - Strategic management.
2. PC - Continuous improvement process:
 - PC1 - Internal audit;
 - PC2 - Planning and implementation of internal control;
 - PC3 - Process risk and opportunity management;
 - PC4 - Non-compliance and corrective actions;
 - PC5 - Overview of the management system.
3. PD - Data management process:
 - PD1 - Supervision of documents and data;
 - PD2 - Supervision of records;
 - PD3 - Internal and external communication at the Company.
4. PI - Infrastructure management process:
 - PI1 - Maintenance of rail traffic control and telecommunication devices;
 - PI2 - Maintenance of the power supply system, and repairs and maintenance of the lighting system;
 - PI3 - Maintenance and management of railways.
5. PK - Process of adjusting the carriage offer to customer needs:
 - PK1 - Analysis of the passenger carriage market;
 - PK2 - Timetable planning;
 - PK3 - Development of tariffs and sales of carriage services;
 - PK4 - Handling of customer complaints and requests;
6. PL - Personnel management process:

- PL1 - Training and development.
- 7. PP - Process of planning and implementation of the carriage offer:
 - PP1 - Control of the carriage offer process.
- 8. PT - Process of maintenance of engineering structures of technical assets:
 - PT1 - Supervision of station buildings, stations, passenger stops and other engineering structures;
 - PT2 - Supervision of control and measurement machines/devices and equipment.
- 9. PU - Process of maintaining rolling stock serviceability:
 - PU1 - Rolling stock maintenance system.
- 10. PZ - Supplies and suppliers management process:
 - PZ1 - Purchases and assessment of suppliers.

Supervision of the implemented Quality Management System is exercised by a Plenipotentiary for the . Quality Management System appointed under Resolution no. 108/2014 of the Management Board of Warszawska Kolej Dojazdowa Sp. z o.o. of 30 December 2014, whose responsibilities include specifically the establishment and maintenance of the processes. The established processes and procedures define the technical conditions, rules and requirements relating to the maintenance and operation of rail vehicles, as well as employment of workers meeting the conditions required for jobs directly related to driving specific types of rail vehicles.

The Quality Book PN-EN ISO 9001:2015 Warszawska Kolej Dojazdowa Sp. z o.o. (fourth edition), approved and adopted for application under Resolution no. 97/2021 of the Management Board of Warszawska Kolej Dojazdowa Sp. z o.o. of 27 October 2021, is the primary document of the Quality Management System. The Book is attached to the aforementioned Management Board Resolution as Annex 1. The Quality Book is a document for internal use only and the basic source of information for Company about the implemented Quality Management System, and its provisions are binding upon all organisational units.

Within the framework of the ISO 9001:2015 Quality Book, Warszawska Kolej Dojazdowa Sp. z o.o. conducts risk analyses for its processes. Risk analyses for the Company operations include risks relating to accidents at level crossings.

In a risk analysis whose findings were included in the "Risk assessment card - the process of implementation of tasks relating to maintenance of the continuity of the carriage service", rev. 5 of 18 July 2022, edition of 26 August 2022, the risk relating to accidents at level crossings was defined as "tolerable". In the opinion of the Investigation Team, there is a need for the infrastructure manager to update the risk analysis due to the increased frequency of occurrences at level crossings, including the one located at km 18.805 of railway line no. 47.

Between 2019 and the day of the accident, the President of the Rail Transport Office carried out a total of 15 inspections at Warszawska Kolej Dojazdowa Sp. z o.o.

The inspections concerned *inter alia*:

- implementation of PKBWK recommendations,
- compliance with the conditions of the safety certificate as an infrastructure manager and carrier,
- execution of the carriage process and preparation of train sets for service,
- safety at level crossings.

No inspections were carried out at the level crossing concerned.

The Investigation Team did not identify any systemic factors that had impact on the occurrence concerned. No feedback or control mechanisms, including risk and safety management or the monitoring process, did not have impact on the occurrence.

5. Previous occurrences of a similar character

As part of the investigation, the Investigation Team analysed accidents that took place in similar circumstances at the level crossing concerned in 2022-2023. Apart from the occurrence being the subject of this Report, there were 3 Cat. B21 accidents at the level crossing in the analysed period.

A brief description of the events and their consequences

1. On 17 January 2022 at 13:25 hrs, passenger train no. 230 was approaching the Cat. D level crossing located at km 18.805 of line no. 47 on track no. 2 of the double track route Komorów - Podkowa Leśna Główna. The driver of passenger train no. 230 gave the Rp1 signal at the W6b indicator. The speed of the train at entry onto the level crossing was 20 km/h, at the 20 km/h speed limit in the area of the level crossing. When the head of the train was on the level crossing, a BMW passenger car came from the left side at high speed right before the oncoming passenger train. No person was injured in the collision, but the side of the passenger car and fender of the EN97-008a rail vehicle were damaged. The railway commission established the following causes of the accident:
 - a. direct cause: passenger train no. 230 ran into a BMW passenger car,
 - b. primary cause: approaching the level crossing, the driver of the passenger car ignored both the B-20 sign and P-12 obligatory stop line, i.e. he did not stop the road vehicle at the designated spot.
 - c. indirect cause: entry of a passenger car onto the level crossing following the driver's failure to comply with the provision of the Road Traffic Law.
 - d. systemic cause: none.

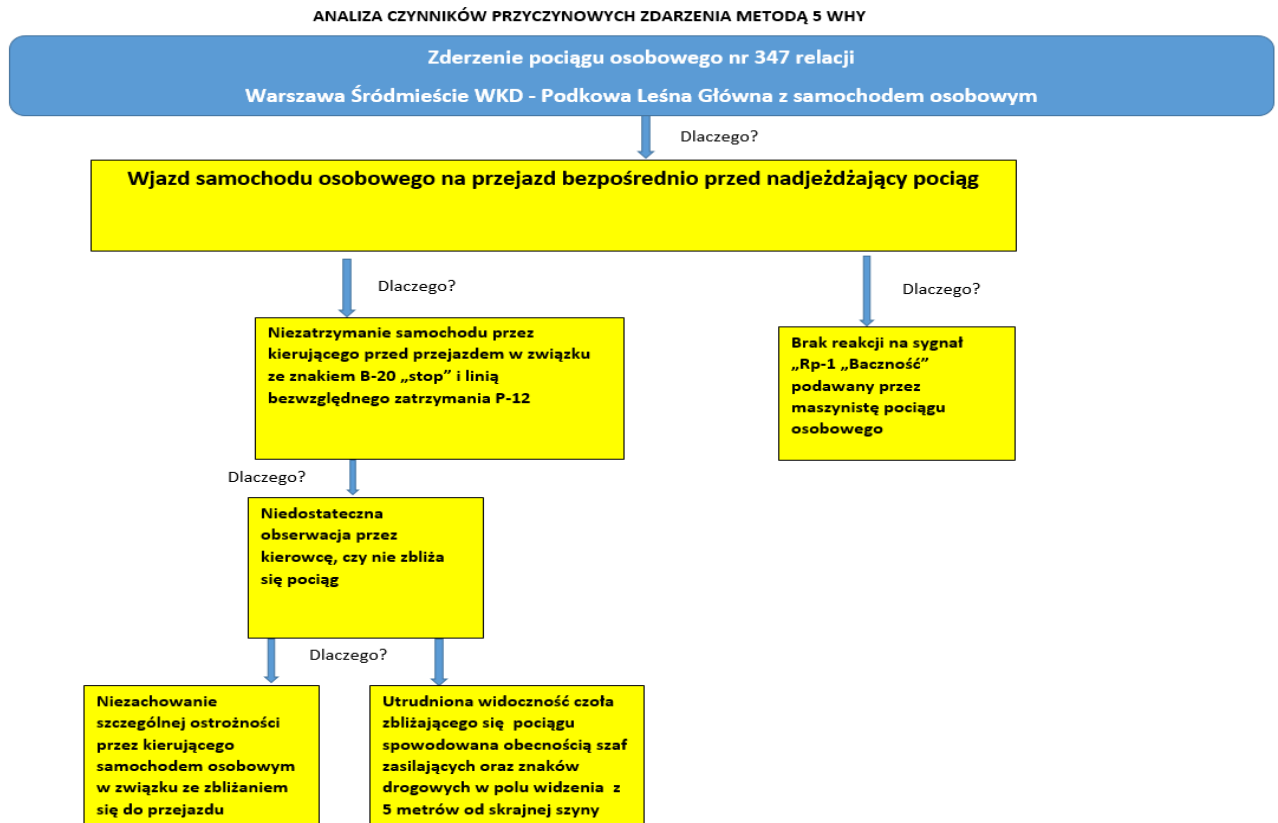
2. On 7 March 2023, the driver of passenger train no. 307 approaching the Cat. D level crossing at km 18.805 gave the Rp1 "Caution" signal at the W6b indicator and reduced the speed at the level crossing to 20 km/h (as marked by indicators W8 and W9), "List of Permanent Warnings" for WKD lines in force since 20 February 2023. When the head of the train was entering the level crossing, a passenger car suddenly came from the right; the train driver repeated the Rp1 signal and initiated emergency braking; the road vehicle was lightly hit by the EN97-007a coupler and turned onto track no. 2. After the head of the train stopped around 8 m from the axis of the road, the driver of the passenger car pulled over from track no. 2 to the roadside. A patrol from the Pruszków County Police Headquarters arrived on the scene. No person was injured in the occurrence. The railway commission established the following causes of the accident:
 - a. direct cause: passenger train no. 307 ran into a Toyota Prius passenger car,
 - b. primary cause: approaching the level crossing, the driver of the passenger car ignored both the B-20 sign and P-12 obligatory stop line, i.e. he did not stop the road vehicle at the designated spot,
 - c. indirect causes:
 - failure to maintain due caution and entry of a passenger car onto the level crossing following the driver's failure to comply with the provision of the Road Traffic Law.
 - G-1c sign obscured from view by a hedgerow,
 - d. systemic cause: none.

3. On 8 April 2023 at 21:32 hrs, an accident occurred as passenger train no. 3087 ran into a BMW passenger car at the Cat. D level crossing on track no. 1, double-track route Komorów - Podkowa Leśna Główna of line no. 47. Approaching the Cat. D level crossing at km 18.805, the driver of passenger train 3087 gave the Rp1 "Caution" signal after passing the W6b indicator and reduced the speed to 18 km/h; just before entering the level crossing, the train driver set the power to 43%, which caused the speed to increase to 21.75 km/h (at the 20 km/h speed limit). When the head of the train was on the level crossing, a passenger car suddenly came from the right; the train driver repeated the Rp1 signal; the passenger car was hit by the head of EN97-006b and pushed from track no. 1 onto the safety barrier that separated the track from the road. After covering the distance of 34 m, the train driver initiated emergency braking and the train stopped after 19 m. Exceeding the speed limit by 1.75 km/h had impact on the effects of the collision. The railway commission established the following causes of the accident:
 - a. direct cause: passenger train no. 3087 ran into a BMW passenger car,
 - b. primary cause: approaching the level crossing, the driver of the passenger car ignored both the B-20 sign and P-12 obligatory stop line, i.e. he did not stop the road vehicle at the designated spot,
 - c. indirect causes:

- failure to maintain due caution and entry of a passenger car onto the level crossing following the driver's failure to comply with the provision of the Road Traffic Law,
 - G-1c sign obscured from view by a hedgerow,
 - exceeding the speed limit permitted in the area of the level crossing by 1.75 km/h,
- d. systemic cause: none.

V. CONCLUSIONS

1. A summary of the analysis and conclusions with regard to the causes of the occurrence



The PKBWK Investigation Team established that the causal factor of the occurrence was the entry of the passenger car onto the level crossing directly before passenger train no. 347 travelling from Warszawa Śródmieście WKD to Podkowa Leśna Główna on track no. 1 of line no. 47.

The contributing factors included:

1. Failure of the Toyota Corolla passenger car to stop before the level crossing in connection with the "Stop" sign.
2. Failure by the driver of the Toyota Corolla passenger car to maintain special caution while approaching the level crossing.
3. No reaction of the car driver to the "Caution" signal given by the driver of the train approaching the level crossing.
4. Hindered observation of the head of the oncoming train on the part of the driver of the passenger car from the distance of 5 metres from the outermost rail due to:
 - a. the location of apparatus cabinets in the vicinity of track no. 2,
 - b. the location of road signs at a road near track no. 2 (F6-a boards), which limited the visibility of the train head from the distance of 5 m from the outermost rail.

2. Measures taken since the occurrence

Pursuant to the provisions of Article 281(1a) of the Act of 28 March 2003 on rail transport (consolidated text: Journal of Laws of 2023, item 602), the Chairman of PKBWK sent a letter on 31 July 2023 to the road manager, i.e. the County Governor's Office in Pruszków, and the infrastructure manager, i.e. Warszawska Kolej Dojazdowa Sp. z o.o., in which he issued the following recommendations to enhance the safety in rail transport with respect to the level crossing concerned:

1. Introduce no left turn after passing the level crossing from left to right from the county road to the municipal road running in parallel with track no. 2 of line 47 WKD (addressee: the manager of the county road – the County Governor's Office in Pruszków).
2. Ensure visibility of road signs, in particular: A-10, G1-a, G1-b, G1-c, B-20 and G-4 from both sides of the approach roads, and introduce mechanisms to ensure on-going supervision in the future of removing the vegetation to ensure good visibility of those signs (addressee: the manager of the county road - the County Governor's Office in Pruszków).
3. Adjust the settings of the mirrors so that they ensure visibility of the head of trains approaching the level crossing (addressee: the manager of the county road - the County Governor's Office in Pruszków).
4. Adjust – move the apparatus cabinets to ensure visibility of the head of train approaching the level crossing (addressee: the infrastructure manager – WKD Sp. z o. o.).
5. Install speed bumps on both sides of the level crossing to limit the speed of cars approaching the level crossing (addressee: the manager of the county road - the County Governor's Office in Pruszków).
6. Move the obligatory stop lines P-12 on both sides of the level crossing so that they are no longer located as today in the axis of intersections with the roads running parallel with the railway line (addressee: the manager of the county road - the County Governor's Office in Pruszków).
7. Install additional devices at the level crossing to record transgressions committed by road vehicle drivers where the B-20 sign is placed, and install light panels with the message "Caution. Train" to inform road vehicle drivers about the level crossing (addressee: the infrastructure manager – WKD Sp. z o. o.).
8. Considering the exposure factor, the manager of the railway line shall take action to re-classify the level crossing from Category D to a higher category "C" (*it is not possible to install Cat. B devices due to terrain limitations*) and to install additional devices to warn/record transgressions of road vehicle drivers when signals are given by roadside signalling devices (addressee: the infrastructure manager - WKD Sp. z o.o.).

The recommendation contained in Point 4 above had been implemented by the date of the completion of the investigation.

3. Additional comments

Not applicable.

VI. SAFETY RECOMMENDATIONS

- 1) The infrastructure manager Warszawska Kolej Dojazdowa Sp. z o. o. and the County Governor's Office in Pruszków shall implement the recommendations issued during the investigation and set forth in Section V.2 of this Report.
- 2) The manager of the county road - the County Governor's Office in Pruszków shall ensure supervision and control mechanisms for the appropriate visibility of the level crossing from the road, and of the road signs informing about the level crossing, including actions to ensure regular removal of vegetation that obstructs the visibility of the road signs.
- 3) The infrastructure manager - Warszawska Kolej Dojazdowa Sp. z o. o. shall re-analyse the risk of accidents at level crossings and, where necessary, shall take measures to mitigate the risk.

STATE COMMISSION ON RAILWAY ACCIDENT INVESTIGATION
CHAIRMAN

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Tadeusz Ryś

List of entities mentioned in Report No. **PKBWK 03/2024**

Entity	Symbol (acronym)	Explanation
<i>1</i>	<i>2</i>	<i>3</i>
1.	EUAR	European Union Agency for Railways
2.	PKBWK	State Commission on Railway Accident Investigation (Polish: <i>Państwowa Komisja Badania Wypadków Kolejowych</i>)
3.	UTK	Office of Rail Transport (Polish: <i>Urząd Transportu Kolejowego</i>)
4.	WKD	Warszawska Kolej Dojazdowa sp. z o. o. - infrastructure manager and carrier