

ERTMS Border Crossing EKB (Lijn 12 Infrabel)Roosendaal - Essen

Safetymanagement plan

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Met opmerkingen [AS1]: Wat is de functietitel bij Infrabel?

HISTORY

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1 Introduction

Cause and background

On the Kijfhoek - Belgian Border corridor, the current NS'54 train protection system consisting of light signals, ATB-EG, B-relay IXL and GRS track circuits, among others, needs to be replaced. The corridor includes, among other things, an interface with Infrabel's network in Belgium.

In the new situation, Kijfhoek - Belgian Border will be equipped with a European Rail Traffic Management System (ERTMS) level 2 only Baseline 3 system (L2B3). The transition to Infrabel's network is also included in the scope of EKB.

1.1 Purpose Safetymanagement Plan

The purpose of the Safetymanagement Plan (SMP) is to define the organization, activities and processes necessary to manage the safety aspects associated with the system rejection by this project in such a way that the project result can be safely put into service. For this, it must comply with European regulations and with that, it must also be examined whether declarations of ISA, AsBo, NoBo and ERA are required.

ProRail operates a Safety Management System (SMS) and regards this as an instrument for the structural and demonstrable control of the safety risks related to the development, use, management and demolition of the infrastructure insofar as ProRail is responsible for this.

Part of the SMS is the Corporate Procedure Safe Design and Realization [23]. The second step of this procedure calls for a Safetymanagement Plan. The applicable NEN-EN standards also require the preparation of a "Safety Plan."

This SMP details the creation of the safety foundation, including the Verification and Validation required for this purpose. The purpose of a SMP is to incorporate the relevant safety aspects and considerations in all phases of a project into a single document in an orderly manner. It describes which safety management activities will be carried out during the project so that a safe railroad system can be delivered and commissioned. By making the safety management activities transparent in advance, a plausible case can be made that all safety risks will be identified and properly controlled.

Specifically for the EKB border crossing, it is important that the collaboration between Infrabel and ProRail is well described. This is because there will have to be close coordination between the stakeholders and, for example, system suppliers Siemens and Hitachi.

1.2 Relation to other documents

This border crossing SMP serves as the underlying safety plan for the general safety plan EKB (SMP EKB) [1] and is thus related to it. Other relationships within the project are mentioned in the aforementioned general SMP.

1.3 Reading guide

This safety management plan starts in the first chapter with general information on the content of the document. This chapter also includes the reading guide as well as a reference list. The second chapter defines and details the system change envisaged by the project. The fourth chapter describes what needs to be done for safety management and the specific agreements therein with Infrabel. The fifth chapter consists of how hazard management will be shaped and

mainly consists of a reference to the SMP EKB as it will follow the same structure. Lastly in the sixth chapter are some milestones specific to the border crossing.

1.4 References

In this SMP for the Roosendaal - Essen border crossing, part of the EKB project, the following documents apply as framework documents.

Ref.	Title	Share Point
[1]	Veiligheidsmanagementplan E-R50008 ERTMS Kijfhoek – Belgische grens (EKB), versie 1.3, datum n.t.b., status, kenmerk n.t.b	
[2]	Programmadirectie ERTMS, 'Implementatieopgave Migratiedeelstap mds-09.20 Kijfhoek – Belgische grens met Level 2 only', aan Manager IEP, 14 januari 2021, definitief, ERTMSMGRTO MN-677743662-203 Zoals nadien aangepast met invoegen van 'Rangeren zonder ERTMS (RZE)', 20 mei 2021, definitief, PDEI-2065985341-37502	Link en link
[3]	"Smart" PVE Vervoersysteem met ERTMS, Frits van der Laan, ERTMSALG0SI-2123672669-6924, 24 september 2020, versie 2.	Link
[4]	Ombouw ERTMS – Integrale CRS (ICRS) ten behoeve van Programma ERTMS Traject Kijfhoek – Roosendaal – Belgische grens, P1310164, Versie 1.0, 7-3-2016, Definitief	Link
[5]	Informatie dossier indienststellingsvergunning project ERTMS Kijfhoek Belgische grens, versie 1.0, 22-03-2022, 4W7W55TK2QFQ-139044670-900	Link
[6]	ILT, brief betreffende 'Besluit informatiedossier ERTMS Kijfhoek – Belgische grens', ILT-2022/24664, 9 mei 2022	Link
[7]	Projectplan Realisatie E-R50008 ERTMS Kijfhoek – Belgische Grens, René vd Haar, versie 2.0, 8 juni 2023, definitief, 4W7W55TK2QFQ-139044670-1644	Link
[8]	Overzicht planning EKB, bijgewerkt op 27 mei 2024	Link
[9]	ERTMS Level 2 Kijfhoek – Belgische Grens – Functioneel Integraal Systeemontwerp (FIS), versie 4.0, 6-4-2018, definitief, EKB_1.01_10_001	Link
[10]	ERTMS Level 2 Kijfhoek – Belgische Grens – Technisch Integraal Systeemontwerp (TIS), versie 1.0, 17-12-2019, definitief, EKB_TIS_0.00_0	Link
[11]	Overkoepelend SE Plan KA EKB, ProRail, RHDHV, Movares, Sweco, Arcadis, versie 2.7, zonder datum, YM5K434NN3MM-123423429-409	Link
[12]	Baseline Kennis Alliantie ERTMS Kijfhoek - Belgische grens (afgekort in bestandsnaam: Baseline KA EKB), versie 4.03-0, 1-1-2023 30-4-2024, definitief, Documentnummer ym5k43nn3mm-123423429-25	Link
[13]	Grensbaanvakovereenkomst Roosendaal – Essen Lijn 12, Versie 21.0, 1 september 2023, Auteur: ProRail VL stafcluster logistieke operatie, Eigenaar: Roger Timmers Manager staf Logistieke Operatie, Kenmerk: T20170019-1652213598-1560	Link

[14]	Operationeel Concept Definitie (OCD) EKB Roosendaal – Essen, Versie 2.0, 23-1-2024, Auteur: Henrik Koelewijn / Ellen Hogerwerf, Eigenaar: René van der Haar / Nikolai von Hoffmann	Link
[15]	JRS_EKB_Roosendaal – Essen – v.01, Versie 0.1, 1-2-2024, Auteur: Ellen Hogerwerf / Henrik Koelewijn, Eigenaar: René van der Haar / Nikolai von Hoffmann <u>Not yet available</u>	Link
[16]	Mem_Veiligheid en Nigtestraat, Definitief, 26-7-2024, Auteur: Gert-Jan van Westerlaak, Kenmerk: W7W55TK2QFQ139044670-2641	Link

Table 1 – Overview of relevant documentation on EKB project

The following table lists a selection of relevant design manuals and procedures of ProRail.

Ref	Title	Share Point
[17]	Certificaat KMS van ProRail, LRQA, Nr. 10558486, uitgifte; 15 november 2023, vervaldatum; 14 november 2026.	Link
[18]	Veiligheidsvergunning ter aanvaarding van het veiligheidsbeheersysteem in de Europese Unie overeenkomstig Richtlijn (EU) 2016/798 en de toepasselijke nationale wetgeving, Inspectie Leefomgeving en Transport, NL 2 1 2024 0001, ILT-2024/26744, 4 juni 2024, geldig tot 16-6-2029	Link
[19]	Veiligheidsmanagementsysteem (VMS), Corporate Procedure, Veilig Ontwerpen & Realiseren, T20150179-796396657-135, 01-10-2019, Definitief CP	Link
[20]	Veiligheidsmanagementsysteem (VMS), Corporate Procedure, Veilig Ontwikkelen systemen voor toepassing in het Spoorwegsysteem, T20150179-796396657-784, 1-1-2018, Definitief	Link
[21]	Veiligheidsmanagementsysteem (VMS), Corporate Procedure, Risicobeheersing bij wijzigingen, T20150179-796396657-829, Versie 3, 01-05-2018, Definitief	Link
[22]	Kernproces Projecten, Overzicht procesflow Kernproces, DC20150004-1749770475-205, april 2023, Definitief	Link
[23]	Proces 76 Proces Veilig Ontwerpen & Realiseren, versie 4.0, definitief, oktober 2019	Link
[24]	Proces 77 Proces Vergunning Voor Indienststelling (VVI), versie 3.1, definitief, 19-10-2022	Link
[25]	Proces 78A Proces Veilige Berijdbaarheid (PRC00036), versie 2.0, definitief, Juni 2018	Link
[26]	Proces 78B Proces 78B Veilige Transfer (PRC 00036B), versie 2.0, definitief, Juni 2018	Link
[27]	Proces 83 Proces 83 Overwegveiligheid, versie 1.0, definitief, 01-09-2019	Link

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[28]	PRC00055-V10 A t/m J Protocolen 'Overdracht infraproject aan beheerder', versie 10, 15 oktober 2022, definitief	Link
[29]	PRC00256 Toestemming voor afwijking, versie 006, 01-09-2014	Link
[30]	PRC00250-1 Product- en systeemautorisatie Assetmanagement (Vrijgave en TvG), versie 001, 01-03-2021	Link
[31]	ProRail Risicomatrix 2023-2033 , Corporate Risk Management, VT20160107-837755825-2004, 8 februari 2023, Definitief	Link
[32]	Overzicht Veiligheidsrisico's spoorwegsysteem d.d. 12-6-2023	Link
[33]	Risicomanagementbeleid Cybersecuriteit, Afdeling Cybersecuriteit, IBP-O-03, versie 1.1, september 2023, Definitief concept.	Link
[34]	KMS IEP, procesbeschrijvingen voor 'Initiatie fase', 'opdrachtverstrekking', Projectplan en voorloopbudget', 'besluitvorming' en 'review en toets'. Geen datum. Geen versienummer.	Link

Table 2 – Overview of relevant company manuals by ProRail

In the Table underneath are relevant legislation summarized.

Ref	Title	Link
[35]	Spoorwegwet Wet van 23 april 2003, houdende nieuwe algemene regels over de aanleg, het beheer, de toegankelijkheid en het gebruik van spoorwegen alsmede het verkeer over spoorwegen (Spoorwegwet), Staatsblad 2003, 264, 30-06-2003	Link
[36]	Interoperabiliteitsrichtlijn RICHTLIJN (EU) 2016/797 VAN HET EUROPEES PARLEMENT EN DE RAAD van 11 mei 2016 betreffende de interoperabiliteit van het spoorwegsysteem in de Europese Unie (herschikking). 11 mei 2016.	Link
[37]	Spoorwegveiligheidsrichtlijn RICHTLIJN (EU) 2016/798 VAN HET EUROPEES PARLEMENT EN DE RAAD van 11 mei 2016 inzake veiligheid op het spoor (herschikking). 11 mei 2016	Link
[38]	TSI CCS UITVOERINGSVERORDENING (EU) 2023/1695 van de commissie van 10 augustus 2023 betreffende de technische specificatie inzake interoperabiliteit van de subsystemen besturing en seingeving van het spoorwegsysteem in de Europese Unie en tot intrekking van Verordening (EU) 2016/919.	Link
[39]	TSI OPE UITVOERINGSVERORDENING (EU) 2019/773 VAN DE COMMISSIE van 16 mei 2019 betreffende de technische specificaties inzake interoperabiliteit van het subsysteem exploitatie en verkeersleiding van het spoorwegsysteem in de Europese Unie en tot intrekking van Besluit	Link

	2012/757/EU. Zoals nadien gewijzigd door uitvoeringsverordening (EU) 2023/1693 van 10 augustus 2023.	
[40]	CSM-REA UITVOERINGSVERORDENING (EU) Nr. 402/2013 VAN DE COMMISSIE van 30 april 2013 betreffende de gemeenschappelijke veiligheidsmethode voor risico-evaluatie en -beoordeling en tot intrekking van Verordening (EG) nr. 352/2009. 30 april 2013 Zoals nadien gewijzigd met uitvoeringsverordening (EU) 2015/1136 van 13 juli 2015.	Link

Table 3 – Overview of relevant legislation

And to close, an overview with selection of relevant industrial standards.

Ref	Title
[41]	NEN-EN50126-1 Spoorwegen en soortgelijke geleid vervoer – De specificatie en het bewijs van de betrouwbaarheid, beschikbaarheid, onderhoud-baarheid en veiligheid (RAMS – Deel 1: Algemene activiteiten en procedures in het kader van RAMS, Oktober 2017
[42]	NEN-EN50129-1 Spoorwegen en soortgelijk geleid vervoer – Communicatie, seinwezen en procesleiding – Veiligheidsgerelateerde elektronische systemen voor het seinwezen. December 2018
[43]	NEN-EN50716 (en) Railway applications – Requirements for software development. December 2023. <i>Replaces NEN-EN 50128:2011</i>
[44]	NEN-EN-IEC 60812 Failure modes and effects analysis (FMEA and FMECA). November 2018
[45]	NEN-EN-IEC 61025 Fault tree analysis (FTA). April 2007
[46]	NEN-EN-IEC 61882 Risicobeoordeling (HAZOP studies) – Toepassingsrichtlijn. Juni 2016

Table 4 – Selection of relevant industrial standards

2 Project EKB Border Crossing the Netherlands – Belgium

2.1 Introduction

This SMP for the interface with Infrabel's network is written as an underlying SMP for the EKB project. Part of the EKB project is the border crossing of Belgium and the Netherlands, between Roosendaal and Essen. In order to keep the dossier manageable for both ProRail and Infrabel, it was decided to draw up a separate safety dossier specifically for the border crossing. This document concerns the SMP and is written in collaboration with Infrabel as mentioned in §1.1.

An introduction to the EKB project can be found in Chapter 2 of the EKB SMP project [1]. Section 2.2 below provides a brief description of the changes in the border area.

2.2 Project description

The goal of the project is mentioned in section 2.2 of the EKB Project Plan [7] and it reads, "to build, configure, test and deliver working ERTMS systems for all infra-related Kijfhoek-Belgian border section." This plan specifically covers the border crossing between Roosendaal and Essen. In section 2.3 and 2.4 the physical and technical scope are described in detail.

The SMP EKB [1] describes the project description in detail including an overview of key milestones.

2.3 Physical scope

The border area includes the stretch between Roosendaal and Essen as per the figure below.

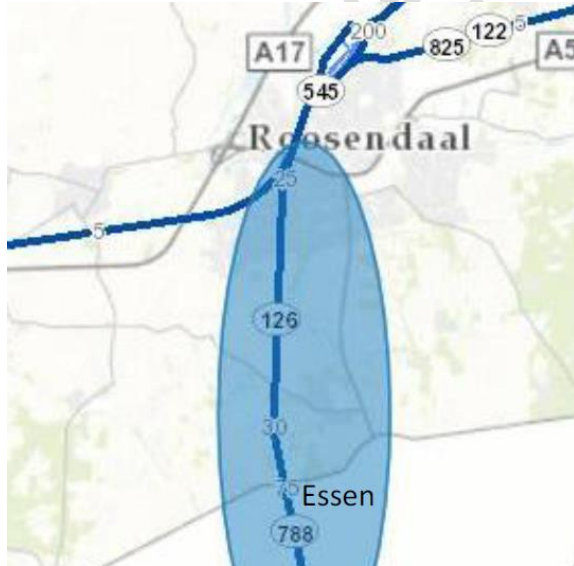


Figure 1 – Project area border crossing EKB

2.4 Technical Scope

The full technical scope of EKB is described in section 2.7 of the project plan [7] [and also in greater detail in the OCD \[14\]](#). This plan specifically describes the technical scope of the border crossing between Roosendaal and Essen. The exact scope is still to be determined. It depends on the position of the balises that will be placed in both countries.

Present situation

Figure 2 shows the current situation. The Roosendaal - Essen section is a double-track section that is supplied for traction power partly with 1500VDC and partly with 3000VDC.

The entire section of track on the Dutch side is currently equipped with a conventional safety system according to NS'54. The Roosendaal yard is equipped with ATB-EG. The railway section is partially equipped with ATB-EG and partially equipped with the Memor System (KrokoDillen). GSM-R is suitable for 'voice' on this section. Part of the section is equipped with GSM-R data for ERTMS Level 2 in Belgium. An STM-STM transition is located 5 km before the national border. The Essen railway yard is equipped with combination ERTMS Level 2 and TBL1+.

The emplacement Roosendaal and the free track Roosendaal - Essen is secured with a B-Relay protection system. The Essen yard is secured with the PLP security system (Belgian interlocking). The Essen entry signals are on Dutch territory. On the free track Roosendaal - Essen there are 7 level crossings. Right behind the Essen entry signals there is a level crossing on Belgian territory.

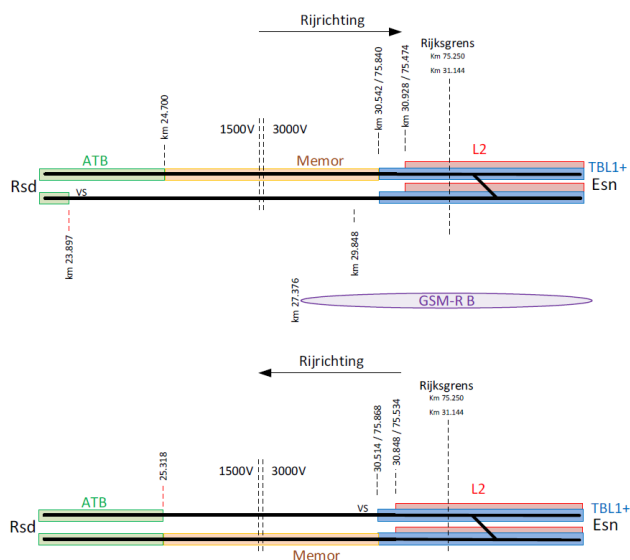


Figure 2 – Present situation 2022; Active systems on the track

Future situation

A nationwide ERTMS program has been started in both countries, with both programs recognizing the need for good interoperable border connections. For this reason, among others, the existing systems are being replaced by systems suitable for operation under ERTMS Level 2.

In the Netherlands, ERTMS Level 2 baseline 3 release 2 is being installed on the Kijfhoek - Belgian Border section. This will no longer have signals along the track and eventually this system will be the only operational system in the Netherlands. This is called ERTMS Level 2 Only in the Netherlands. In Belgium, ERTMS Level 2 Baseline 3 Maintenance Release 1 is installed in 2022. The current systems will remain in place until it is decided to decommission them.

On the Roosendaal - Essen section, a necessary RBC-RBC transition between the two systems will have to be realized along with all necessary systems.

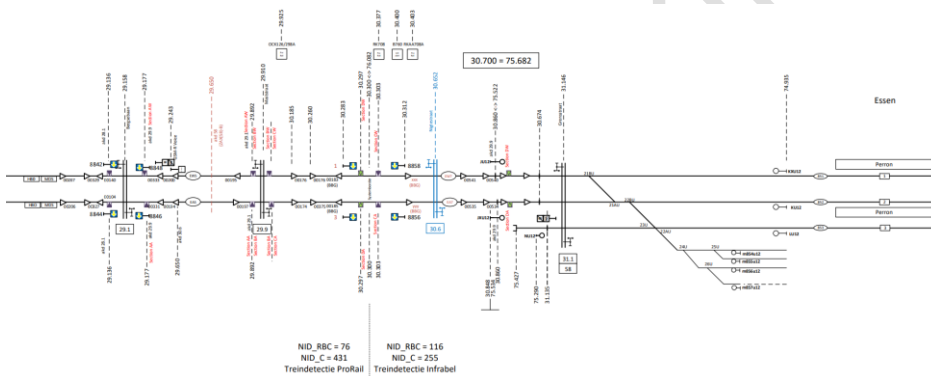


Figure 3 – Sketch drawing IRS [15]

2.5 Schematic overview systems

Figure 4 below shows the overview of systems which should be checked on changes to create an integral working transportation system.

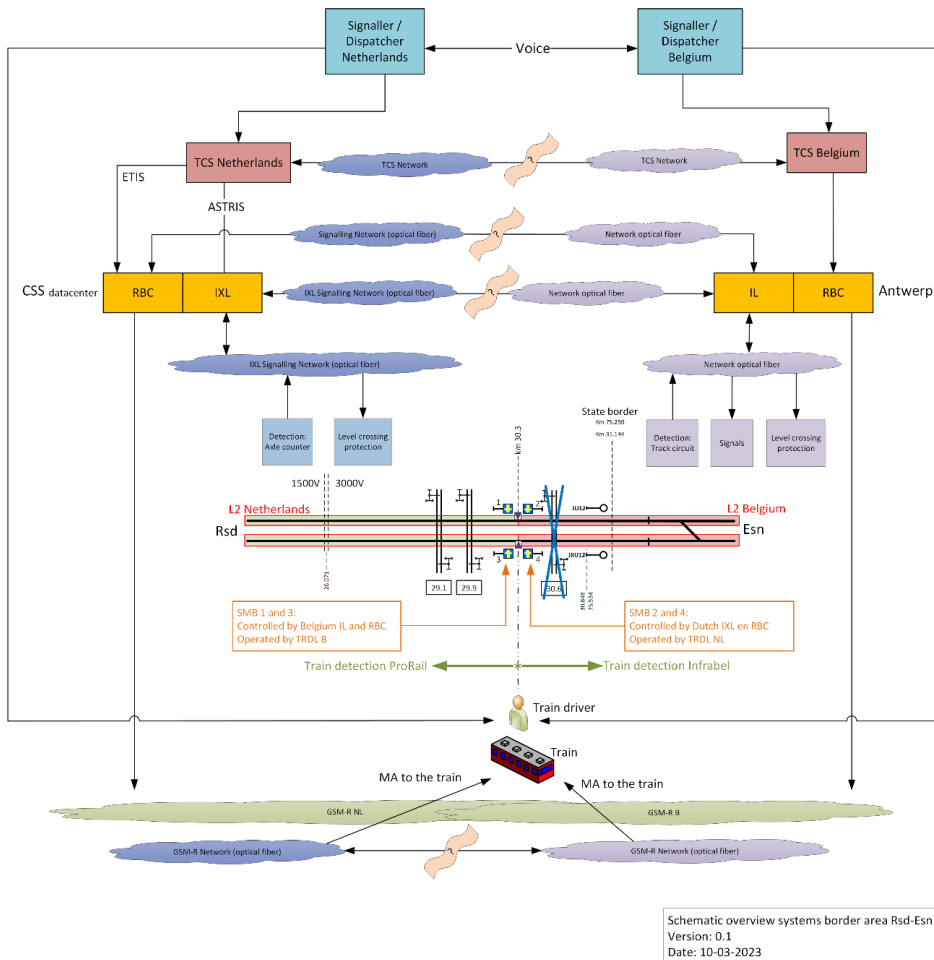


Figure 4 – Schematic overview of all system in the border area

The Interface Requirements Specification (IRS) [15] is currently being drafted. This is a joint document by Infrabel and ProRail and the purpose of this document is to define the requirements and design at the border between Roosendaal (NL) – Essen (BE) for both ETCS Level 2 systems. The IRS is not yet final and the list below is therefore subject to change and expansion. It is now expected that at least the following interfaces will be covered in the IRS: The following interfaces will be covered in the document:

- RBC - RBC,

- IXL - IXL,
- Train detection,
- GSM-R,
- Voltage changeover,
- ICT
- Operational control.

2.6 Guiding principles concerning Safetymanagement

For the EKB safety management guiding principles, please refer to the SMP EKB [1]. The principles below are specific to the Roosendaal - Essen border crossing.

The following guiding principles apply to the considered system:

Infrabel

heeft opmaak toegepast: Lettertype: Vet

ProRail

The following guiding principles apply to the considered system:

heeft opmaak toegepast: Lettertype: Vet

- GP 1: The starting situation, at the start of realisation EKB border crossing, is an accepted safe situation. This is evidenced by driving without restrictions.
- GP 2: Only changes in the rail infrastructure compared to the starting situation, at the start of EKB realisation, fall within the scope of the safety management EKB border crossing.
- GP 3: The systems, elements and materials are released at the time of application in accordance with PRC00250-1 [30]
- GP 4: Infrastructure designed according to current (draft) regulations, complies with applicable TSIs.
- GP 5: All procedures and practices for driving in operation are applicable, during conversion and after realisation.
- GP 6: All procedures and practices around track access and rail out of service (in Dutch: 'Toegang tot spoor en Buitendienststelling') apply.
- GP 7: Safety management is not responsible for the decisions made on the mitigation and acceptance of technical hazards and safety related application conditions (SRACs). Safety management will take care of registering hazards and SRACs so that they are assigned to the party best equipped to manage the hazard or SRAC, and of monitoring their handling.
- GP 8: Safety management is responsible for offering SRACs to successor parties, who demonstrably accept receipt of the SRAC.
- GP 9: If an SRAC is not accepted by the receiving party, then a change in the SRAC or design will have to be made so that the security issue is mitigated.
- GP 10: There is a test manager for system verification & validation activities.

2.6.1 Scope of application safety plan

This plan applies to the preparation, procurement and commissioning of this project and is written by ProRail in collaboration with Infrabel. For the design and realization phase, the IB (Arcadis) ~~should has~~ prepared a separate SMP for EKB. This SMP should be updated, using this SMP as a framework for the border crossing.

2.6.2 Prerequisites

The prerequisites for safety management within the EKB project are mentioned in the SMP EKB in section 2.5.3. There are no specific preconditions for the border crossing that need to be mentioned here.

2.7 System definition according to CSM-REA

The CSM-REA [40] requires several issues to be addressed in a system definition. Those issues are described in this section. Where relevant, references are made to other chapters and sections in this SMP.

Section of System definition CSM-REA	Description
System objective	A working ERTMS system (L2B3) on sections of track and yards within the project area, on which train operations can be safely commanded, controlled and adjusted. See elaboration in chapter 2 above.
System functions and elements	See the technical scope in § 2.4.
System boundary including other interacting systems	See the technical scope in § 2.4 and Physical scope in 2.3.
Physical and functional interfaces	See the technical scope in § 2.4.
System environment	The system environment consists of rural areas and is located between the towns of Essen (Belgium) and Roosendaal (the Netherlands). Apart from having to close the level crossing on Nigtestraat [16] for the purpose of the ERTMS transition, the environment has no impact on system safety.

Section of System definition CSM-REA	Description
Existing safety measures	The current safety measures for EKB are laid down in rules and regulations from the safety management systems of infrastructure manager and carrier. This is a requirement under the Dutch Railway Act. For ProRail, these include (non-exhaustive): • Design regulations (OVS'en) • Maintenance documentation • Procedures for various processes Insofar as these documents are relevant to parties working on behalf of ProRail, they are laid down in ProRail's "Rail Infrastructure Catalogue" (RIC). In addition, ProRail has internal procedures. The carrier's safety measures are laid down in a safety management system. This is a requirement under the Dutch Railways Act and is evaluated by ILT. For the border specifically, a so-called border lane agreement (Grensbaanvakovereenkomst Roosendaal – Essen Lijn 12) [13] has been drawn up in accordance with the VMS. This sets out agreements, relating to the operation, between the two infrastructure managers. <u>input Infrabel</u>
Assumptions that determine the limits for the risk assessment	The general assumption for the risk assessment is that safety is primarily controlled by applying ProRail's released systems and design regulations, and that deviations from these are approved by the authorised system manager via procedure PRC00256 [29]. For the border crossing specifically, it is also assumed that both Hitachi (formerly Thales) and Siemens have trained staff, a quality management system and adequate processes. In addition to these general assumptions, section 2.6 describes the principles for safety management.

Met opmerkingen [AS2]: Hier moet nog input van Infrabel worden gevraagd over bestaande safety maatregelen

Table 5 – Description of system (according to CSM-REA requirements)

3 Structure Authorization-file EKB

The EKB border crossing safety file is part of the entire EKB safety file and is part of the authorization by ILT. For a description of this file structure, please refer to the SMP EKB [1]. The section below describes the structure of the border crossing file.

3.1 Structure Authorization-file Border Crossing EKB

The border crossing will be unique in the Dutch railroad system and will consist of a system crossing from the Belgian system to the Dutch system. This section refers specifically to the CCS train protection system and not to other subsystems. This will make the safety file different from the rest of the EKB safety file. Part of the Belgian system will be placed on Dutch territory. The system transition will take place at kilometre 30.3. Schematically this is shown in Figure 5. This means that a Dutch and a Belgian file will be prepared. Each infrastructure manager will have to apply to the NSA for approval and a license in its own country as is shown in Figure 5 below.

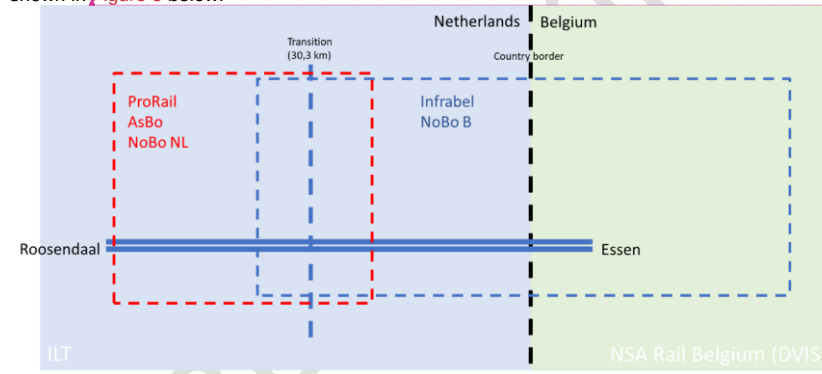


Figure 5 – Scope of responsibilities

The guiding principle in designing the border crossing and preparing the associated substantiation file is to explore first and then produce the substantiation. After the explorations for the design are completed and a thus plausible design (including details) is ready, the design will be challenged on 'hazards'. When drafting the IRS during the exploration phase, hazards are implicitly considered. The reconnaissance phase takes place by coordinating with engineers from the various parties to arrive at a design. Minutes of these meetings will be recorded as substantiation.

At the time of writing this SMP, the RBC-RBC transition is included in the RVTO 2.0. However, the RVTO 2.0 does not contain any other design details. A cut for the boundary and a separate RVTO will be made for this interface. It is expected that the engineering firm will barely have any design freedom as the design is largely established by Infrabel and ProRail. It is not yet decided whether the design of the border crossing will be recorded in an amendment to the OVS ERTMS or whether unique design rules will be established. When fixed-added in the OVS, it is common for the system specialist (ERTMS OVEB) to demonstrate that the generic

Met opmerkingen [AS3]: Navragen of Infrabel hier ook iets wel opnemen over hoe het dossier opgebouwd gaat worden.

Gewijzigde veldcode

Gewijzigde veldcode

heeft opmaak toegepast: Engels (Verenigd Koninkrijk)

design is safe. The project is responsible for demonstrating the correct application, and thus safety, of OVS at -on the specific corridor.

3.2 TSI-files

Part of the authorization file is also the demonstration of compliance with the relevant TSI requirements, particularly TSI CCS [38]. The evidence for this will also be collected in a file. Arcadis is conducting the design activities for the parcel that includes the border crossing and will therefore be primarily responsible for preparing this file. This dossier will then become part of the EKB-dossier above. Together with Infrabel, ProRail carries out most of the design tasks and is therefore also responsible for preparing the TSI file. To do this, knowledge from the OVEB cluster will be needed. When the border crossing is included in an OVS, it too will be TSI-certified, thus demonstrating compliance. For this, the structure of the EKB TSI file and the relevant TSI's, see the SMP EKB [1].

For the TSI OPE [39], compliance is demonstrated through the CCS TSI. Annex A of TSI CCS refers to TSI OPE, so these requirements are included in the NoBo assessment of TSI CCS. In addition, the OPE TSI states that it is necessary to have a border lane agreement. This is there for the border lane and will be updated to the new situation according to the regular processes.

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4 Safety management

This chapter discusses the objectives and organization of Safety Management. It describes which safety management activities will be conducted during the project so that a safe railway system can be delivered and commissioned. By providing insight into the safety management activities in advance, it is plausible that all safety risks will be identified and properly controlled. The **VMPSMP** provides insight into the project design required to demonstrably adapt a railway system and make it suitable for the application of a product at a specific location. Through this document, care is taken to manage safety within the project and strengthen the safety culture, through broad involvement of roles and parties.

4.1 General; managing risks in project EKB Border crossing

The rail system on the Kijfhoek - Belgian border corridor is subject to the highest requirements for safety performance. To achieve this, all risks that threaten safety must be controlled.

The border crossing between Roosendaal and Essen and the associated system transition is a unique 'one-off' design. Therefore, this SMP sets up a special process with a separate safety file to ensure that a safe system is built. The safety steps taken to achieve this are described in the section below.

4.2 Safety objective

The safety objective is equal to the safety goal set in the SMP EKB ProRail.

The Smart PVE [3] includes the safety objective that, with the introduction of ERTMS, the safety level of operations should be at least equal to the safety level of the track section before conversion (standstill).

"The safety level on track sections and in rolling stock should remain at least the same, compared to the situation before conversion to ERTMS."

For the modernisation of the Kijfhoek - Belgian border corridor, this requirement is formulated as;

Safety objective:

The Kijfhoek - Belgian border corridor, including transitions to surrounding sections of track, should perform at least equivalent safety levels both during conversion and after installation and commissioning of ERTMS as at the time before modernization.

4.3 Safetymanagement team

In order to be able to understand and manage the safety risks associated with the system change, organization has been set up with certain activities, as described in the following paragraphs. For an overview of the organization of the project beyond safety management, see the Project Plan [7].

4.4 Safety organisation

The safety organization for the EKB project is described in the **VMPSMP** EKB ProRail [1]. The border crossing requires a great deal of coordination between Infrabel and ProRail. Therefore, an adapted organization is also needed for this. Which is further described below.

4.4.1 Specific arrangements for collaboration with Infrabel

The transition between the networks of Infrabel and ProRail will be designed in close cooperation between both inframanagers. Necessary arrangements will be made on an *ad hoc* basis and may include third parties such as suppliers and other specialists.

Both parties will establish agreements with suppliers Siemens and Hitachi. Each will prepare, possibly with the help of (sub-)contractors, the trackside modifications required for the transition. The planning for construction, a program for testing and commissioning of the transition will be worked out in mutual agreement between Infrabel and ProRail.

Each inframanager will be responsible for approval and authorization processes as applicable for their own network.

On a regular basis, meetings will be held to discuss progress and solve issues that may have occurred.

4.4.2 Actors

Figure 5 below shows the actors involved in the realization of ERTMS at the Roosendaal-Essen border crossing.

Infrabel

Input door Infrabel

ProRail

Safety manager:

The Safety Manager defines the processes, methods and tools for safety activities; writes and updates this safety plan; monitors the execution of the activities described in this Plan, programs and performs safety audits, evaluates the validation and verification activities described in this plan; manages the Hazard log; writes the Safety Case; ensures the interface to ISA/AsBo/NoBo and submits the Safety Case to the ISA/AsBo/NoBo for assessment and approval. Finally, the safety manager is responsible for the authorization file (VVI-dossier) and contact with ILT.

The SMP EKB [1] describes the entire safety organisation.

ISA/AsBo/NoBo

It is expected that Infrabel will only need a NoBo assessment to certify that the implemented modification at the CCS-system of Lijn 12 complies with TSI CCS. This is to be decided by Infrabel.

For the Dutch part of the file, besides a NoBo for assessment against TSI CCS, an ISA/AsBo will be contracted by the project to assess the safe implementation of the modification.

At a regular basis an 'interface meeting' will be organized between the two NoBo's, Infrabel and ProRail.

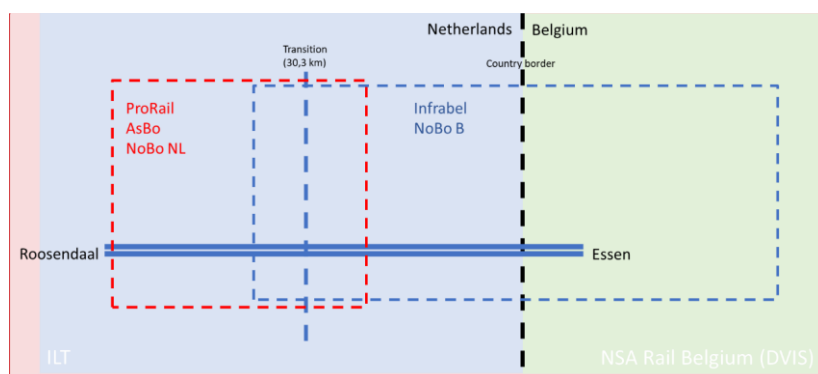


Figure 56 – Identified actors

Met opmerkingen [AS4]: Plaatje dubbel, deze verwijderen en alleen actoren in tekst noteren

4.4.3 Scope and responsibilities

Each infrastructure manager is responsible for the supply, installation, data preparation, programming and commissioning of the ETCS constituents (RBC, LEU, balises) that must be installed on its network as well the ETCS constituents associated to the signals installed in the adjacent network and that fall under its scope of responsibility. For the transition function this means that Infrabel is responsible for the balise groups and eventually the LEUs that will be installed on ProRail network for ETCS2 operation of Lijn 12. Thus the operational border of Infrabel is extended up to the first ETCS constituent installed inside ProRail network. Where the exact scope and responsibilities will lie is still to be determined and elaborated in the IRS.

4.4.4 Specification

Both infrastructure managers shall approve the specification of the transition function. The description of the border transition area shall contain at least:

- The geographical limitation of the transition area
- The description of the transition area (maximum allowed speeds, topographic information between signalling elements, gradients)
- The TSI CCS applicable for either network
- The list of balise groups in the field with their functions and localization
- The national values of each network and their application area
- The ETCS data to be transmitted to the trains entering either network of Belgium or the Netherlands (e.g. list ETCS levels and SN modes, radio network registration, text messages, etc.)
- Infrabel national safety rules applicable inside the border transition area
- ProRail national safety rules applicable inside the border transition area
- The eventual phasing of the works if applicable
- The identification of infrastructure manager responsible for each balise group inside the transition area.

Infrabel and ProRail shall agree on the electric visibility of the MA transmitted by the last balises at either network.

Met opmerkingen [AS5]: Dit geldt niet voor een RBC-RBC overgangf

4.4.5 Risk analysis

It is assumed that the national values of each infrastructure manager are suitable for use and have been approved by its NSA. Thus, the national values of Infrabel shall not be put in question by ProRail or vice versa. However, to ensure smooth movements across the border, it might be useful to use the most restrictive national values out the two networks to avoid undesired events (e.g. brake application during ceiling speed supervision by a national value).

The design of EKB will be based on the generic ERTMS solution developed for the conventional network of ProRail. However, it may be possible that the transition function on the EKB border crossing is a specific feature that is not fully covered at generic level. It remains to be determined whether specific functionalities are needed that have not been developed at the generic level. For this specific transition, ProRail will perform a risk analysis. The aim of this risk analysis is to analyse the effects of failure modes of the transition function both at subsystem and system levels, to identify the hazards resulting from these failures, to perform the risk classification and define mitigation measures that eliminate or reduce the risks at an acceptable level.

Hazard identification sessions will be organised as often as necessary and at *ad hoc* basis. It will be determined for each session whether Infrabel should attend and which other parties should be invited (e.g. Hitachi and Siemens).

Met opmerkingen [AS6]: Deze aanpassen naar Risk of de tekst hierboven aanpassen naar hazard

4.4.6 Lab and site testing

It is the responsibility of each infrastructure manager to perform the relevant tests and to provide test evidence and reports to the other party if needed. Lab tests within the scope of EKB will be performed by ProRail and its subcontractor and may require cooperation from Infrabel (for example temporarily providing IXL for simulation purposes to the test lab). Given that onsite testing methods might be different between ProRail and Infrabel, both infrastructure managers shall agree on the onsite test strategy (common or separate test specification(s), test planning and execution, type of rolling stocks etc.). This onsite test specification shall fulfil the operational requirements applicable in the border transition area. The rolling stock to be used in on site testing, if any, must be determined.

4.4.7 Testing Operator Trials

There will be a period for operators to conduct trials. The old system and new ERTMS systems at the ProRail network will then coexist temporarily. Tests-Trials will then be conducted during weekends and nights when the line is out of service. For the border crossing, it has yet to be determined what these tests will consist of and whether they will be conducted across borders.

4.4.8 Local operational regulation

Both Infrabel and ProRail are responsible to set up the operational rules applicable in the border transition area. The operational regulations cover the operation in nominal and degraded modes, the maintenance, the commissioning and decommissioning of TSR's in the border transition area. The approval of this local operational regulation by the two NSA's (ILT and NSA Rail Belgium) is a condition for the final commissioning of EKB. The border lane agreement (grensbaanvakovereenkomst) [13] should be agreed before completion of the safety case.

4.4.9 Authorization for final commissioning

Each infrastructure manager is responsible for taking the necessary actions with its NSA to obtain the required authorizations for commissioning and operation. If required, relevant documentation (such as EC certificates and safety assessment reports) might be shared between Infrabel and ProRail to support the authorization from NSA Rail Belgium and ILT.

4.4.9.1 Authorization for Use (Toestemming voor gebruik)/release/dispensation

As long as ERTMS, with all associated documentation, has not yet been generically released, the roll-out of ERTMS per track section will require an Authorization for Use (Toestemming voor Gebruik TVG) TVG-I/T and TVG-E in agreement with ProRail's procedures (see Procedure PRC00250-1 [30]). Within ProRail, team OVEB is responsible for the timely provision of any necessary TVG-I/T and TVG-E.

It is expected that some parts of the design will deviate from ProRail's design manuals. For this, dispensations will be requested and recorded in accordance with ProRail-procedure PRC00256 [29].

4.4.10 ISA/AsBo/NoBo

An ISA/AsBo/NoBo will be appointed for the EKB project who will also assess the border crossing file for ProRail. It is Infrabel's responsibility to determine whether they should appoint an ISA/AsBo/NoBo to assess the change on the Belgian side.

Input Infrabel opvragen

heeft opmaak toegepast: Markeren

4.4.11 Final commissioning

ProRail and Infrabel will consult to set date of the commissioning of the new border transition function.

4.5 Responsibilities

the responsibilities regarding safety within the EKB project are described in section 4.5.1 of the SMP EKB [1].

4.6 Scope Safetymanagement ProRail / Infrabel

Normally, ProRail directs both design and construction through contractors. However, in the border crossing situation, in close collaboration with Infrabel, the design is being worked out in greater detail. This means that the engineering firm has less design freedom than in the regular process. A larger part of demonstrating safe design will therefore lie with ProRail.

Input Infrabel opvragen

heeft opmaak toegepast: Markeren

5 Hazard management

A hazard log will be prepared for the border crossing that meets the agreements in the SMP EKB [1] mentioned in chapter 5 of the SMP EKB. It is expected that there will be one hazard log, but it is possible that other actors will maintain their own hazard logs. These agreements will be included in the SMP when known in a future release.

IN BEWERKING

6 Planning, Milestones & Products

For EKB planning, please refer to the project schedule [8]. A safety planning is included in the SMP EKB [1]. The following milestones are specific to the border crossing.

Milestones

The following overall milestone are identified:

- Fault situations and relevant process handling will be reviewed quarter 3 of 2024
- IRS to be ready by summer 2025
- Design of the transition (by ProRail and Infrabel) to be ready by end 2026
- IMX and configuration files available for laboratory validation testing in summer 2027

Products

- SMP EKB Border crossing (this document)
- Hazard log EKB border crossing
- TSI compliance file
- SASC (design phase and realisation)
- Safety accountability in accordance with CSM REA (design phase and realisation)
- Risk control statement
- ISA report
- AsBo report
- NoBo report
- VvI

This SMP will be regularly updated, typically once per year.

Met opmerkingen [AS7]: Helemaal schrappen en alleen naar projectplanning verwijzen zoals Henrik in zijn review aangeeft?

heeft opmaak toegepast: Lettertype: Niet Vet

heeft opmaak toegepast: Lettertype: Niet Vet

Met opmaak: Lijstaline, Met opsommingstekens + Niveau: 1 + Uitgelijnd op: 0,63 cm + Inspringen op: 1,27 cm

Met opmaak: Standaard, Geen opsommingstekens of nummering

7 Abbreviations

Abbreviation	Description
AsBo	Assessment Body
CSM-REA	Common safety methods Risk evaluation and assessment
EKB	ERTMS Kijfhoek – Belgische Grens (project)
ERTMS	European Rail Traffic Management System
ETCS	European Train Control System
ILT	Inspectie Leefomgeving en Transport (Dutch National Safety Authority)
IMX	XML format of an IMspoor file
IRS	Interface Requirements Specification
ISA	Independent Safety Assessor
IXL	Interlocking
LEU	Lineside Electronic Unit
MA	Movement Authority
NoBo	Notified Body
NSA	National Safety Authority
OVS	Ontwerpvoorschrift (design regulations)
RBC	Radio Block Centre
RIC	Rail Infrastructure Catalogue
SMP	Safety Management Plan
SMP	Safety Management Plan
SN mode	System National
SRAC	Safety Related Application Condition
TSI-CCS	Technical Specifications for Interoperability – Command Control and Singalling
<u>TSI-OPE</u>	<u>Technical Specifications for Interoperability – Operation and Traffic Management</u>
TSR	Temporary Speed Restriction
TVG	Toestemming voor Gebruik (authorization for use)
VMS	Veiligheidsmanagementsysteem (safety management system)
Vvl-dossier	Vergunning voor indienstelling (authorization file)

ProRail

ERTMS

IN BEWERKING