SAFEWAY

GIS-Based Infrastructure Management System for Optimized Response to Extreme Events of Terrestrial Transport Networks

Emergency Management Plan
D8.1

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PUBLIC

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GIS-BASED INFRASTRUCTURE MANAGEMENT SYSTEM FOR OPTIMIZED RESPONSE TO EXTREME EVENTS OF TERRESTRIAL TRANSPORT NETWORKS

Grant Agreement No. 769255

Emergency Management Plan

WP 8 Action Plan for Long-Term Resilience of Interconnected Transport Network (Measures and Safety Management)

Deliverable ID	**D8.1**
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SAFEWAY Project Synopsis

According to European TEN-T guidelines, due consideration must be given to the risk assessments and adaptation measures during infrastructure planning, in order to improve resilience to disasters. SAFEWAY's aim is to design, validate and implement holistic methods, strategies, tools and technical interventions to significantly increase the resilience of inland transport infrastructure. SAFEWAY leads to significantly improved resilience of transport infrastructures, developing a holistic toolset with transversal application to anticipate and mitigate the effects extreme events at all modes of disaster cycle:

1. **"Preparation":** substantial improvement of risk prediction, monitoring and decision tools contributing to anticipate, prevent and prepare critical assets for the damage impacts;
2. **"Response and Recovery":** the incorporation of SAFEWAY IT solutions into emergency plans, and real-time optimal communication with operators and end users (via crowdsourcing and social media);
3. **"Mitigation":** improving precision in the adoption of mitigation actions (by impact analysis of different scenarios) together with new construction systems and materials, contributing to the resistance & absorption of the damage impact.

SAFEWAY consortium has 15 partners that cover multidisciplinary and multi-sectorial business fields associated with resilience of transport infrastructure in Europe: national transport infrastructure managers & operators, a main global infrastructure operator, partners able to provide various data sources with large coverage in real time, comprehensive ITC solutions, and leading experts in resilience, risk databases, remote sensing-based inspection, and decision systems based on predictive modelling.

SAFEWAY will carry-out 4 real case studies distributed through 4 countries, linked to 5 corridors of the TEN-T Core Network. SAFEWAY has as main expected impacts:

1. at least 20% improvement in mobility; and
2. at least 20% lower cost of infrastructure maintenance.

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Executive Summary

Emergency Plans need to be adapted to the changing scenarios related to extreme derived climate change events, as well as the serious concern in Europe about human-provoked catastrophes. This document presents an effective Emergency Plan Guideline for linear infrastructures.

For the realisation of the present Guideline, it was necessary to review both current regulations and plans and their evolution over the last decades. Once the starting point was established and based on the experience of key stakeholders related to emergency events, a content index was designed that contained all the relevant information to be reflected in an Emergency Plan and was structured to simplify its consulting and understanding.

Within the content proposed for the Emergency Plan Guideline, several innovative aspects have been included, among which the most relevant ones are the followings:

- Inclusion of the "SAFEWAY Platform" for alarm communication and decision support: "SAFEWAY Platform" is the software that is being developed within the project and that could facilitate direct communication between the different Operations Centres.
- Inclusion of prevention actions determined by declaring a pre-alert phase in a particular area facing a specific hazard.
- Inclusion of the scope and interconnection between the different Emergency Plans that affect both railway and road network.
- Inclusion of the identification of activity ownership of dependent activities within the Emergency Plan.
- Classification of emergencies by command level.
- Inclusion of a single emergency response procedure.

Table of Contents

1. Introduction

This document develops an effective Emergency Management Plan for linear infrastructures, which includes specific short-term actions considering the hazardous natural events identified as critical in terms of infrastructure resilience and man-made events.

The Emergency Management Plan is composed by two sections: Section 2 includes a detailed guideline to develop a resilient Railway Emergency Plan while Section 3 adapts the Railway Emergency Plan to Road related issues to be considered. Finally, Section 4 specifies the involvement of stakeholders related to emergency events.

1.1 Purpose

The present document aims to become an Emergency Plan guideline that outlines response procedures to hazards threatening the resilience of railway and road infrastructures in Europe.

In so doing, the document will identify the main risks linked to infrastructure resilience, as well as the key agents in charge and the technical and human resources available. The goal is to prevent and monitor said risks, and to effectively coordinate all response procedures triggered by emergency situations.

This document falls within the SAFEWAY European project framework, incorporating both data and documentation from said source. Hazards that have not been identified as particularly serious to infrastructure resilience will not be included in the accompanying plan, nor will they fall within the project scope.

1.2 Structure

The structure of this document is set out forthwith, outlining examples of the content a standard railway or road installation Emergency Plan should have.

Naturally, due to the generic nature of the document, some of the points have not been developed in detail. Instead, generic examples and/or methodologies to be applied have been presented to ensure their correct implementation.

Both, the Railway and the Road Emergency Plan follow the structure shown in Table 1.

Table 1: Emergency Plan Structure

Chapters	Sections
Chapter 1: Introduction	1.1.- Purpose.
	1.2.- Scope of application.
	1.3.- Structure.
	1.4.- Legal framework.
	1.5.- Hazard identification and definition.
Chapter 2: Activity description.	2.1.- Network map.
	2.2.- Infrastructure listing.
Chapter 3: Identification of Key Responsible Agents.	3.1.- Identifying activity ownership.
	3.2.- Identifying Emergency Plan owners.
Chapter 4: Inventory of available prevention and emergency response resources and services	4.1.- Preventive resources and services.
	4.2.- Emergency response resources and services.
Chapter 5: Emergency identification and classification.	5.1.- Classifying emergencies in terms of elements affected.
	5.2.- Classifying emergencies by command level.
Chapter 6: Emergency response procedures.	6.1.- General Emergency response procedures.
	6.2.- Outline of duties and responsibilities. Emergency Response Activity Sheets.
	6.3.- Emergency Response Activity Sheets aimed at specific hazards.
Chapter 7: Emergency Plan Implementation, Maintenance and Update.	7.1.- Emergency Plan implementation: content proposal and training cycles.
	7.2.- Maintaining the efficiency of the Emergency Plan.
	7.3.- Emergency Plan update.
Annexes	Annex I: Emergency Directory.
	Annex II: Emergency Forms.
	Annex III: Railway or Road network maps /

2. Railway Emergency Plan Guidelines

2.1 Chapter 1: Introduction

Section 2 of the present document presents an emergency Plan guideline that outlines response procedures to hazards threatening the resilience of railway infrastructures in Europe. It follows the structure defined in Table 1.

2.1.1 Scope of application

Since this document presents a set of guidelines, it is not restricted to a specific installation, but rather aims to encompass analyses and repercussions of all potential emergencies that may affect railway infrastructure resilience. The starting point, however, is based on the outcomes of identified risks (both natural and man-made) within the SAFEWAY project, as presented in deliverable D2.1 [GIS map and identification of hot spots of sudden extreme natural hazard events, including database with Impact and Return Periods]. Moreover, when it comes to the implementation of this standard Emergency Plan in a particular installation, identification of hazards that are relevant to the case study of choice and their characteristics will become absolutely essential.

2.1.1.1 Scope and extent of Emergency Plan coordination

It is important to highlight that Emergency Plans are not made up of isolated documents. They need to be coordinated with other Emergency Plans at equivalent, higher or lower hierarchy levels.

In this context, National Emergency Management Plan together with the Territory Emergency Plans would occupy a first superior level. These are designed by the Administrations to plan emergency response procedures within their territory or when it comes to National Emergency Management Plan – within all country. Naturally, within these plans, different levels coexist depending on each Administration and remit. In any case, Territory Emergency Plans are always one level above the Emergency Plans assigned to a particular installation, which will abide by the overarching guidelines of their respective Territory Emergency Plans. This is essential for coordinating roles and responsibilities in emergency response and recovery operations across different levels and agencies.

It is precisely for this reason that Emergency Plans for a particular railway installation must always be coordinated with the Territory Emergency Plans set out by the Administration (like for example, Municipalities and Autonomous Communities in Spain) where the installation is located. Coordination will be achieved thanks to the close collaboration of officers and commanders when the emergency so requires.

In terms of railway infrastructure Emergency Plans, and as a second level of hierarchy, we can find the collection of Emergency Plans grouping railway infrastructures for a particular territory but also for a particular infrastructure management which is divided and separates different types of railway infrastructure (national railway, regional and suburban). Whether to divide these infrastructures up into one or more corresponding Emergency Plans depends on the feasibility of efficiently coordinating emergency response plans from one sole

Emergency Operations Centre. For simplification purposes we will refer to these as Network Plans.

Network Plans encompass railways' stations, tunnels, bridges and all other structures that may require their own separate Emergency Plans. Hereinafter, we shall refer to them as Station Plans, Bridge Plans, or by the name of any other relevant infrastructure. Station Plans (or equivalent) should naturally be aligned with their respective Network Plans, thanks to the coordination of the different teams in charge.

Depending on the organisational chart of each Emergency Response Plan, as well as on the characteristics of each installation, the contents of the accompanying Emergency Plan guideline can be duly divided into Network Plans and Station Plans (or equivalent, if necessary).

Lastly, we must remember that the railway network is surrounded by other installations that may be impacted by it. As a result, cross-sectorial coordination is vital in the event of an emergency. Specific agreements and treaties can govern the details of this close collaboration, should this become necessary.

2.1.2 Legal framework

An Emergency Plan should list the applicable legislation that has (or could have) an impact on it, indicating the date the legislation was passed and any potential updates or revisions.

An Emergency Plan is likely to be updated whenever some new (and potentially applicable) Regulations enter into force, or when significant variations or update to the current legislation occurs.

By way of example, we will detail below the main legislation applicable to the railway sector and emergency response management in Spain.

2.1.2.1 General legislation on emergency response management in Spain

- Basic Norm on Self-defence. Royal Decree 393/2007, of 23 March 2007 (and all subsequent amendments).
- Regulation on fire protection installations. Royal Decree 513/2017, of 22 May 2017.
- Royal Decree 840/2015, of 21 September, approving control measures for inherent risks associated to serious accidents involving hazardous substances.
- Law 17/2015, of 9 July, on the National Civil Protection System.
- Royal Decree 1378/1985, of 1 August, on Provisional Measures for emergency response in case of grave danger, catastrophe or public calamity.
- Royal Decree 407/1992, of 24 April, passing the Civil Protection Basic Norm.
- Law 31/1995, 8 November, on the Prevention of Occupational Hazards.

2.1.2.2 Specific legislation on railway emergency response management in Spain

- Rail Regulatory Law 38/2015 of 29 September.
- Royal Decree 2387/2004 of 30 December, passing the Rail Regulatory Law (consolidated version).

- Royal Decree 623/2014 of 18 July, regulating railway incident and accident investigation by means of the Railway Accidents Investigating Committee.
- Royal Decree 22/2012 of 20 July, regulating the adoption of measures in the matter of railway infrastructure and services.
- Royal Decree 810/2007 of 22 June, passing the Public Interest Law on Railway Network Traffic Security (consolidated text).
  - Royal Decree 918/2010, 16 July, modifying Royal Decree 810/2007.
  - Royal Decree 641/2011, 9 May, modifying Royal Decree 810/2007.
  - Royal Decree 1006/2015, 6 November, modifying Royal Decree 810/2007.
- Tunnel Security Instruction, of 20/06/2006. Draft.
- Royal Decree 387/1996 of 1 March, passing the Basic Directive on Civil Protection Planning, regulating road and rail accident hazard for freight transportation.

2.1.2.3 Policies on how to combat risks that could affect rail infrastructures

- Royal Decree 893/2013, of 15 November, passing the Directive for Civil Protection Planning on forest fire emergencies.
- Resolution of the Under-secretariat, of 29 March 2010, publishing a Cabinet Agreement reached on 26 March 2010 that approves the National Civil Protection Plan on seismic hazards.
- Resolution of the Under-secretariat, of 2 August 2011, publishing a Cabinet Agreement reached on 29 July 2011 that approves the National Civil Protection Plan on flooding.
- National Plan for the Prediction and Surveillance of Adverse Weather Phenomena. Meteoalarm (15 June 2018-Version 7).

2.1.2.4 Local regulations

Together with the national regulatory framework detailed above, a local regulatory framework may exist. The local regulatory framework may affect all of the railway network structure or only part of it. It is therefore crucial to take it into consideration when designing the Emergency Plan.

The main local regulatory framework for Catalonia is detailed below by way of example. Catalonia is the Autonomous Community that in all of Spain's territory has more specific Regulations on the matter.

- Generic legislation on emergency management:
  - Decree 30/2015, of 3 March 2015, approving the catalogue of activities and centres that are obliged to take self-protection measures and detailing what these measures will be.
- Rail Regulatory Law:
  - Special Emergency Plan in the event of accidents involving the transport of dangerous goods transport by road and railroad in Catalonia (TRANSCAT).
- Legal framework governing emergency response activities linked to hazards that may affect railway infrastructure:
  - Special Emergency Plan in the event of Flooding in Catalonia (INUNCAT)
  - Special Emergency Plan in the event of a Seismic hazard in Catalonia (SISMICAT).

- Special Emergency Plan in the event of forest fires in Catalonia (INFOCAT)
- Special Emergency Plan in the event of heavy snows in Catalonia (NEUCAT).
- Special External Emergency Plan for the chemical sector in Catalonia (PLASEQCAT).
- Special Emergency Plan in the event of strong winds in Catalonia (VENTCAT).
- Special Emergency Plan in the event of landslides in Catalonia (ALLAUCAT).

2.1.3 Hazard identification and definition

The detail and definition of the hazards that, within the SAFEWAY project framework, have been identified as affecting the resilience of railway infrastructures are listed below.

In the Emergency Plan of a particular installation, only hazards that may impact said installation should be considered. These plans must clearly state the areas affected and the parameters that constitute an emergency situation.

Areas affected should, where possible, be defined through plans or maps[1] and, with regards to alert parameters, the source of the data and values/thresholds that will trigger an emergency alert level for each installation area should be established (in case they need to be analysed separately).

2.1.3.1 Flooding

Flooding is defined as excess water accumulation due to natural causes, triggered by adverse weather phenomena.

Flooding involves water occupying areas previously free of water, be it through rivers, streams and/or watercourses overflowing, or due to torrential rain, thawing, rising tides over the usual level, tsunamis or hurricanes, amongst other weather events.

Affected areas

By way of example, in the south of Spain, some regions have variable rainfall patterns, oscillating from draught periods to heavy rainfall. These unusual precipitations cause extreme flows usually known as flash floods (i.e., surges or floods that, following the overflow of their natural watercourse, cause terrain inundation and affect people and property).

Sudden disparities between ordinary and extraordinary flows in some rivers cause severe damages in countries such as Spain, Portugal and the United Kingdom, where flooding remains a particularly serious concern.

[1] *In principle, maps prove far more useful in Network Emergency Plans whilst plans are more suitable for Station Emergency Plans (or those of equivalent installations). In any case, the most appropriate option should be assessed on a case-by-case basis, including the convenience of having hazard area plans available across the railroad network.*

When identifying affected areas through an Emergency Plan, the regions identified in Territory Emergency Plans should be taken into account. Special care should be taken when studying railway infrastructures in:

- Coastal areas.
- Torrential rainfall areas (based on historical data).
- Areas close to natural water sources (rivers or swamps).
- Areas close to dams or reservoirs.

These areas, as well as any railway infrastructures nearby, will need to be added to "SAFEWAY Platform" so that the platform can issue an alert signal immediately after an event that could potentially trigger an emergency occurs. The aim of said alert signal is to either control or launch an emergency response procedure to manage the situation.

Alert parameters

Taking the origin of flooding as an example, areas with recurrent floods triggered by heavy rainfall should be monitored closely using the "SAFEWAY Platform", with precipitation levels by square meter becoming a key hazard parameter alert. Depending on the features of each territory or area, adequate alert parameters with sufficient periodic updates should be considered to enable and ensure a swift preparation before an emergency crisis.

The periodicity with which these data will be revised should be enough to enable readiness in case of an emergency.

In an event of dam breakage, no specific alert parameter will be defined, but adequate communication with the dam management teams should be set in place. This communication protocol should be outlined in the Emergency Plan of each dam, as well as in those of the corresponding railway installations. Similarly, the alert signal issued by said installations can be received via "SAFEWAY Platform".

2.1.3.2 Storms / torrential rainfall

A storm is a weather event that is characterised by the coexistence in proximity of two or more masses of air at different temperatures. This contrast, associated to the physical effects involved, results in instability characterised by rainfall, winds, lightning, thunder and occasionally hail, amongst other weather events.

The main difference between the storm/torrential rainfall and the flooding hazard referred to in the previous section resides in that the effects of flooding are caused by a sudden event and not by seasonal rainfall.

Rainfall depends on three factors: atmospheric pressure, temperature and atmospheric humidity.

Affected areas

As highlighted in the above flooding section above, torrential rainfall usually occurs in coastal areas, mountain areas or in proximity to rivers, with other areas enjoying far more uniform precipitation levels. This said, isolated torrential rainfall incidents can happen almost anywhere in Europe.

When identifying affected areas, it is important to highlight those with a higher probability of torrential rainfall and, where necessary, classify them based on their duration.

Alert parameters

Alert parameters for this hazard will mirror those highlighted for flooding: precipitation levels per square meter. This information will be available via the "SAFEWAY Platform", which is linked to the corresponding records.

This alert parameter can be different based on the affected areas identified, with the "SAFEWAY Platform" being able to forecast critical precipitation levels in any affected area by leveraging the data at hand.

2.1.3.3 Landslides

Landslides are mass movements of soil or rock, gliding through one or several net fracture surfaces and overcoming the fracture resistance of the different plates. The mass generally is displaced as a whole, behaving as a unit along its journey. Speed can be variable, but these are usually impressively fast events of huge proportions (several million cubic meters).

Damage caused by landslide slope movements and soil subsidence depends on the speed and magnitude of the process.

Fast landslides are considered a greater hazard, causing serious damage and putting lives at risk, whilst slower landslides and soil subsidence are likely to cause less damage.

Soil subsidence causes devastating damages when it impacts the surface. Its effects on the surface are far more critical than the damages caused by the process itself.

In many cases, higher-risk phenomena associated to landslide hazards are of a smaller scale (e.g. rock detachment and sudden collapses).

Affected areas

Across Europe, and due to factors such as rugged terrain, varied geology and diverse weather conditions, landslides are considered serious hazards, with most material damages resulting from external geodynamic processes (erosion and flooding hazards excluded), putting at risk mainly urban areas and logistic infrastructure.

When identifying the main affected areas, different types of landslides are to be considered, together with different types of surfaces across terrains.

Generally speaking, this information is available through the Territory Plans that encompass railway infrastructures. In addition, there are historical registries in Europe listing past incidents that may help to identify areas that could be potentially affected.

Alert parameters

Alert parameters are based on the implementation of early warning systems. Specific measurement mechanisms and equipment installed in high-risk areas would be sensitive to minimal deviations in terrain settlement patterns.

Said mechanisms would be linked to SAFEWAY, enabling the platform to relay a global alert to all interested parties in case of anticipated or actual emergency.

2.1.3.4 Earthquakes

Earthquakes are the brusque and sudden shaking of the surface of the Earth, resulting from a sudden release of energy from the lithosphere, creating seismic waves, projected in all directions.

The inner location where the earthquake starts is called the focus or hypocentre, and can be found buried deep within the Earth (the deepest earthquakes are generated at around 675 kilometres, which is the rock's fracture elastic limit).

The point on the earth's surface vertically above the hypocentre is called epicentre.

Affected areas

Earthquakes can take place anywhere in the world. However, most of them (and indeed the biggest) are generated on the brink of large tectonic plates. There are three main types of plate boundaries: convergent (where two plates collide together); divergent (where two tectonic plates move away from each other); and transform (where two plates slide past each other).

Earthquakes can also originate, albeit less frequently, inside the plates and away from their boundaries. The Iberian Peninsula (i.e., Spain and Portugal) is placed in the southwest boundary of where the Eurasian plate and the African plate collide, a location that explains why the Southern part of the Peninsula is more vulnerable to earthquake activity.

Tectonic displacement between both continents is responsible for seismic activity in Mediterranean countries and Northern Africa, including the earthquakes generated in Greece and Turkey. The Westernmost region of said plate's intersection is the fracture known as Azores-Gibraltar-Tunisia, which affects the Iberian Peninsula.

Fortunately, despite recurrent and significant seismic activity with a magnitude below 7, this fracture does not cause large earthquakes. Those originating in the Azores-Gibraltar geological fault (1755 and 1969 earthquakes) were an exception and caused serious damage. Between 1200 and 1400, registers show the Iberian Peninsula was regularly hit by earthquakes.

In order to identify the affected areas for an Emergency Plan linked to earthquake activity, both the frequency and intensity of these phenomena need to be studied and analysed, together with the impact these might have in railway infrastructures present in each region.

Alert parameters

There is currently no method that is capable of reliably anticipating seismic activity, in terms of time, location and magnitude. The difficulty hindering this progress is the non-linear and rather chaotic behaviour of seismic movements.

However, early warning response systems are being developed to calculate the size of an earthquake during its first few seconds, allowing the corresponding services to act accordingly within the shortest possible timeframe.

Yet again, these systems must be linked to "SAFEWAY Platform", ensuring the platform can issue all necessary warnings to kick-start planned emergency response procedures based on the magnitude of the earthquake and the area where it originates.

2.1.3.5 Heat waves

A heat wave is a period of extremely hot weather, where really hot wind invades an extended area, during days and, at times, weeks. A heat wave is usually measured with reference to the usual weather in the area and to normal temperatures for the season, with heat wave temperatures amongst the most extreme values for that particular area.

Given the special characteristics of this weather phenomenon, definition criteria such as permanence and lowest temperature values, as well as other variables, remain key. Territory Plans usually relay special heat wave alerts once certain thresholds are exceeded.

Despite it being unusual, a heat wave can take place during a humid period. Normally, however, the atmospheric heat condenses humidity into clouds, allowing for atmospheric heat (condensing heat) to be partially absorbed by the clouds. The equatorial area does not boast the highest temperatures in the planet precisely on account of its cloudiness, which keeps temperatures average and shuns extremes.

If the heat wave takes place during a draught, dead vegetation can be a contributing factor to wildfires.

Affected areas

Affected areas in heat regions will be identified by the Territory Plans of said regions. Determining which railway infrastructures in each region may be affected by heat waves, as well as the severity of the hazard threat, will be critical.

Alert parameters

European countries boast early warning systems for adverse weather phenomena, which probably constitute the most reliable and appropriate source of data when establishing alert parameters. These systems should be linked to the "SAFEWAY Platform", which will issue potentially adverse weather condition alerts, together with recommendations of the most suitable emergency response procedures to follow in the event of heat wave.

2.1.3.6 Cold waves

Cold waves are weather phenomena distinguished by a distinct cooling of the air, or a sudden invasion of freezing air (polar or continental air masses) over an extended area. Falling temperatures during a cold wave can drop to minimum extreme values for an area.

Cold waves are usual phenomena during the wintertime and tend to be explained by the gradual cooling of the air in cold regions whilst moving towards other regions down South.

Frosting appears as a result of the soil's humidity freezing over. Freezing is not strictly a weather phenomenon (since it does not take place in the atmosphere), but remains directly related to temperature, a deciding factor in its emergence.

Affected areas

Each European region boasts alert thresholds that issue cold wave warnings adapted to the severity of the threat. Depending on the railway infrastructures present in each region, analysis of the impact said weather event may have on each territory becomes key when determining the affected areas.

Alert parameters

As previously mentioned, European countries own early warning systems sensitive to cold waves. "SAFEWAY Platform" must be linked to these systems to relay alert notifications and warnings of adverse weather conditions that may take place, as well as to recommend the most suitable emergency response procedures to follow in the event of cold waves.

2.1.3.7 Snowfall

Snowfall is a weather phenomenon characterised by ice crystal precipitation (mostly ramified but sometimes in the shape of a star). The main difference with water precipitations are potential accumulation levels.

Affected areas

Associated to cold waves, see section above.

Alert parameters

Associated to cold waves, see section above.

2.1.3.8 Terrorist attacks

Violent acts committed by people at the service of a given organization, carried out with the intent to cause fear and/or harm to a sector of society.

We can classify terrorism activity affecting railway structures as follows:

- Terrorist threat: warning received alerting on a potential terrorist attack in the vicinity of, or right within, railway infrastructures.
- Suspicious object: detection of an object that casts a reasonable doubt over the potential dangerous nature of its contents, thus a potential threat to people in the vicinity.
- Terrorist act: violent act executed to spread terror.
- Sabotage: harm or damage caused to railway installations, vehicles, etc. as a means to fight or protest siding with a social or political conflict.
- Vandalism: action involving deliberate destruction or damage to public or private property.

Affected areas

Terrorist attacks can take place anywhere, despite most attacks occurring in urban areas.

Alert parameters

There are no potential alert parameters for this hazard, other than the ones facilitated by the State Security Forces.

"SAFEWAY Platform" could be linked to these alerts in order to relay all notifications in real time and facilitate adequate emergency response procedures as appropriate.

2.1.3.9 Fires

Fires are blazes that sear what is not destined to burn.

For a fire to ignite, the mix of three elements is essential: fuel, oxidizing agent (usually oxygen) and activation energy (usually a source of heat). This is described as the Fire Triangle.

A forest wildfire is an uncontrolled fire that takes place in a forest area, consuming combustible vegetation, flora and fauna. A forest wildfire differs from other types of fires on account of its size. Regardless of its point of origin, wildfire spreads at a staggering speed covering huge extensions in a very short period of time. Likewise, it has the potential to change direction unexpectedly and a frightening ability to overcome obstacles such as roads, rivers and firewalls. In addition to the obvious forest and environmental damage, this hazard threatens civil population and their property, resulting in emergency and civil protection services to join efforts to fight it.

Whilst immediate causes of wildfire are widespread, all have something in common: huge masses of vegetation in areas suffering from draught periods, whether short or prolonged.

Affected areas

Naturally, affected areas will be those carrying dense vegetation and located in close proximity to railway infrastructures.

Alert parameters

Except for forest wildfires wilfully started by arsonists, natural wildfire alert parameters will be associated with heat waves as described above, thus strongly linked to the summer season.

2.1.3.10 Car or Train accidents

Car accidents are mainly caused by the proximity of highways or side roads to the rail tracks, especially in the case of train crossings.

Affected areas

These accidents can take place anywhere in the world. However, some areas do present a higher risk level (including those where an intersection between roads

and railway tracks is present, or areas where train tactical manoeuvring is necessary).

Additionally, areas where train and car accidents have consistently occurred in the past should be considered as affected areas for the purposes of the analysis.

Alert parameters

There are no specific alert parameters linked to this hazard, as they could occur at any given point in time. However, in areas where dangerous manoeuvring is required (whether in a railway track, a highway, or a side road close to the railway infrastructure) a swift and appropriate action may prevent the emergency altogether. To this effect, warning systems implemented through "SAFEWAY Platform" could aid prevention.

2.1.3.11 Strong winds

On the surface of the Earth, wind consists of the bulk movement of air. The flow of air against the surface of the Earth, despite ascending and descending currents, favours horizontal currents. Horizontal air displacement is thus the magnitude considered in wind speed vector analysis, together with wind direction.

The main challenge with wind is the strain under which it can put vulnerable objects.

Affected areas

The Territory Plans of each region will determine the areas affected by strong wind. It remains of paramount importance to identify the infrastructures that may appear more vulnerable to this weather phenomenon, both for the protection of said infrastructures as well as for the railway traffic in the area.

Alert parameters

In European countries, strong winds can usually be anticipated a couple of hours in advance. "SAFEWAY Platform" will need to be linked to early warning systems through the analysis of wind speed and duration of the event, in order for the platform to relay alert notifications with enough anticipation to allow adequate emergency response actions to be set in place.

2.2 Chapter 2: Activity description

This chapter should include a description of the activity. If we take a Network Plan as an example, the description should specify its infrastructures, while an Emergency Response Plan for a specific infrastructure (a Station or equivalent) should include a detailed planimetry (as found in the corresponding Annex), usage and surface tables, and a description of all accesses to infrastructures and potential premises (whether proprietary or belonging to a third party).

Where Network Plans are involved, the following points should most definitely be included:

- Network maps
- Infrastructure listing

2.2.1 Network map

Network Plans should include a railway network map of the chosen railway installations, reflecting rail connections and the different railway infrastructures it encompasses.

2.2.2 Infrastructure listing

This section should include one or more tables highlighting the network infrastructure (at least the railway infrastructure with its own Emergency Plan, which should include stations, tunnels, bridges, workshops, *cul de sac* or electric substations)[2], listing them in terms of the railway line, region or specific classification used on the railway network, in order to make it efficient and operational.

The table must include enough relevant details to picture the installation. Some examples are included below (see Table 2 and Table 3), outlining the critical information that should be listed:

Table 2: Railway station listing table (example)

Region	Station	Location/ Address/ Coordinates	Railway Line	Connected stations	Railway length (in km)	Railway station rooms and facilities	Additional external facilities (if

[2] *With regards to bridges, tunnels or similar installations, not all infrastructures will have an Emergency Plan or should be included in this listing. This shall depend on their features and specifications. A selection of the infrastructures to be listed in each Emergency Plan should be performed on a case-by-case basis.*

Table 3: Railway infrastructure (bridges, tunnels, cul de sac, etc.) listing table (example)

Region	Infrastructure	Description	Location/ Address/ Coordinates	Railway line	Connected stations	Railway length (in km)

Obviously, these tables should be customised based on each of the Emergency Plans, including, where appropriate, adding other types of installation (different from those highlighted).

2.3 Chapter 3: Identifying the Key Responsible Agents

In this section, the key relevant agents responsible for railway infrastructures will be identified. All must be included in their corresponding Emergency Plans.

Amongst the key agents, two types should be highlighted:

- Activity owners: agencies or bodies that will execute activities in railway infrastructures subject to an Emergency Plan.
- Emergency Plan owners: stakeholders responsible for Emergency Plan operations.

2.3.1 Identifying Activity Owners

2.3.1.1 Activity Owner

The activity owner is the agency, body or company owning (or responsible for the exploitation of) the railway infrastructure subject to the Emergency Plan.

The following details pertaining to the activity owner should be known:

- Company name:
- Registered address:
- Tax Identification Number:

Activity owner representative

The following details pertaining to the activity owner representative should be known:

- Name:
- ID card number:
- Position:
- Telephone/fax:
- Work address:
- E-mail:

2.3.1.2 Dependent Activity Owner

In a railway infrastructure, many different activities take place. Some are linked to rail traffic and some are not.

It is of vital importance to have the different railway infrastructure activities identified and their respective activity owners listed, to ensure swift response in case of emergency.

Special attention must be paid to activities with higher impact to the railway infrastructure, including those carried out by the railway company.

Amongst other activities linked to the railway infrastructure, the following can be listed:

- Rail companies linked to passenger transport.
- Rail companies linked to goods transport.
- Companies linked to the maintenance of railway installations.
- Other companies, usually carrying out one or more of these activities:
  - Public residential activities.
  - Recreational activities.
  - Commercial activities.
  - Administrative activities.
  - Parking.

For each activity, we should at least gather the following information:

- Company name:
- Registered address:
- Tax Identification Number:
- Activity description, including area of activity, within the given railway infrastructure.
- Representative:
  - Name:
  - ID card number:
  - Position:
  - Telephone/fax:
  - Work address:
  - E-mail:

It goes without saying that the format used to present the information highlighted above should contribute to its legibility and make it easy to update. To this effect, the most appropriate and effective method would be to build individual datasheets

for each owner. These may be included under this Emergency Plan section or attached as a separate annex.

Activities linked to temporary events of a short duration will not be included in the Emergency Plan, as they should have their own tailored ones.

2.3.2 Identifying Emergency Plan Owners

This section identifies the stakeholders that will take responsibility for the main Emergency Plan activities, endeavouring to keep them current and operative.

Each of the stakeholders outlined below will be part of the Activity Owner (not Dependent Activity Owner) organisational chart, and will have enough power to instruct the ceasing of an activity (if necessary).

Out of all the stakeholders listed below, an Owner and, at least, one Deputy must be nominated. In general, it is advisable to appoint more than one. Should more than one Deputy be appointed, a clear hierarchy order must be established.

2.3.2.1 Emergency Plan Director

The Emergency Plan Director, appointed by the Activity owner, will be solely responsible for managing activities aimed at risk prevention and control, including the study and implementation of all necessary and appropriate measures to monitor, prevent and reduce potential hazardous situations and any related damages.

Preventive actions must be established before the incident, emergency or accident takes place, or as a result of the experience gathered following an analysis of said actions.

In summary, the main goal of preventive actions will be to keep the Emergency Plan current and up to date, ensuring all pertinent reviews and updates are being done.

As a result, a potential candidate for the role of Emergency Plan Director could be the Civil Protection Lead and Activity Owner, or whoever is taking on said duties. Once the candidate has been appointed, the following details should be gathered:

- Name:
- ID card number:
- Position:
- Telephone/fax:
- Work address:
- E-mail:

2.3.2.2 Emergency Response Plan Director

The Emergency Response Plan Director will be appointed by the Activity Owner as the overall leader in an Emergency Situation, with unique management authority and responsibility. That is, the Emergency Response Plan Director will assume control in an emergency situation (Emergency Officer). Control duties could potentially be delegated to other first response management stakeholders, such

as the Emergency Room Coordinators. The right to delegate responsibilities should be detailed in the Emergency Plan.

The Emergency Response Plan Director (or to whomever these duties have been delegated to) will be responsible for activating the Emergency Plan in accordance with the procedures laid out therein, including declaring an emergency situation, notifying all Civil Protection authorities (if necessary), informing the staff, and adopting all immediate actions to reduce the consequences derived from the accident or event.

As a result, two potential candidates could be the Head of Infrastructure Exploitation or the Activity Owner Head of Security, or, in both cases, the person to whom these duties were delegated. Once the candidate has been appointed, the following details should be gathered:

- Name:
- ID card number:
- Position:
- Telephone/fax:
- Work address:
- E-mail:

Emergency Operations Centre

The Emergency Operations Centre is the physical control room where all Emergency Response Plan activities are received, managed and centralised, around the clock, to ensure the incidence/emergency affecting any of the installations covered by the Emergency Plan is under control.

In the absence of the Emergency Officer, his/her duties will be delegated to the person in charge of the Emergency Operations Centre (usually referred to as Emergency Room Coordinator). On account of its relevance, a railway network Emergency Operations Centre is usually managed by shifts covering activities around the clock, every day of the year, guaranteeing said duties are being fulfilled at all times during an emergency.

In the Emergency Plan, the following details on the Emergency Operations Centre should be gathered:

- Exact Name:
- Postal addressed:
- Location coordinates:
- 24h Telephone/Fax:
- E-mail:

As well as following up on the emergency and managing the Emergency Response Plan activities linked to the incident, the necessary contact with the Authorities, External Aid Services and Representatives of the Dependent Activities will be established from the Emergency Operations Centre. Additionally, the Emergency Operations Centre will engage in internal communications with Activity Owner personnel, both the intervention Team and the Management Team, whom (in line with the established procedures) hold management or counselling responsibilities in case of an incidence or emergency.

Depending on the complexity of the Rail Network, there may obviously be more than one Emergency Operations Centre for each infrastructure, with extended coordination between Emergency Operations Centres at different levels. That said, there should always be a Main Emergency Operations Centre coordinating all others.

2.3.2.3 Emergency Response Plan Implementation Officer

The Activity Owner will appoint the Emergency Response Plan Implementation Officer. Said person must be a figure with authority and management skills, as the role will require taking ownership for managing the human resources assigned to the Emergency Response Plan.

The main duties of the Emergency Response Plan Implementation Officer will be to ensure all the staff with assigned duties during an emergency has been trained to deliver, and is able to perform, their respective responsibilities. Since this role is directly linked to staff training, a potential candidate for the Emergency Response Plan Implementation Officer position would be the Head of Human Resources, or whoever might be fulfilling these duties. Once the candidate has been appointed, the following details should be gathered:

- Name:
- ID card number:
- Position:
- Telephone/fax:
- Work address:
- E-mail:

2.4 Chapter 4: Inventory of available prevention and emergency response resources and services

In an Emergency Plan, this section should highlight the available preventive measures and emergency response resources and services.

A generic outline of the resources and services that should, at the very least, be detailed in said Emergency Plans has been listed below. Naturally, these resources should be adjusted to the needs of every installation and particular situation.

2.4.1 Preventive resources and services

The main resources and services aimed at preventing emergency situations are listed hereunder. These resources and services can be classified in different groups, including:

- Preventive human resources
- Technical resources and preventive material

2.4.1.1 Preventive human resources

The members of the Maintenance Service shall constitute the preventive human resources staff. To all intents and purposes, this team will be authorised and qualified as technical staff.

Maintenance duties shall be divided into two types: preventive maintenance (programmed on an on-going basis) and corrective maintenance (executed upon detection of a specific need).

Corrective maintenance may either be part of the Emergency response protocol or take place without the Emergency Action plan being activated, should a particular maintenance need be detected. In the second instance, it will be essential to analyse and evaluate such need, whilst the first instance would suggest (rather than a preventive service) a response service to an emergency.

Due to the peculiarities of this service, the staff shall have the necessary access and travel means to visit any installation area under their responsibility (24/7 and all year round). This implies the need for designated on-duty staff. Their number and the way shift duties are assigned shall depend on the specific circumstances of each installation. If, during a certain season or period, the hazardous risks associated to a particular installation (or part of it) were to increase, the maintenance staff and their on-duty watch will be adjusted accordingly.

Obviously, in addition to the maintenance staff performing their duties, any other member of staff that may come upon an incident during their work and communicate the matter will be playing a preventive role.

2.4.1.2 Technical resources and preventive material

Means of detection

Means of detection make up a special group within the material resources involved in an emergency because they play a dual role: they act both as preventive resources and as an instrumental part of the emergency response actions.

1. "SAFEWAY Platform"

   Among the technical and material preventive resources involved in an emergency response action, special importance should be awarded to the "SAFEWAY Platform".

   Through this platform, an efficient alert system may be activated, consolidating all signals received, thus simplifying the activation of the Emergency Response Plan actions as well as the decisions to be taken during the emergency.

2. *Other resources*

   Despite other resources being potentially integrated within the "SAFEWAY Platform", the Emergency Response Plan should detail, at least, the main means of detection available at the installations.

   These resources can be divided into two major types:

   - Proprietary resources
   - External resources

   Among the external resources, the external tools of the Civil Protection Office (which generate early warning signals linked to weather phenomena) are worth highlighting.

In the case of proprietary resources, we can list the different receivers capable of appreciating any changes in infrastructure, so as to ensure:

- Early detection can be achieved, alerting of the potential onset of an event that may end up affecting infrastructures based on the relevant hazards identified for each installation.
- A latent incidence may be detected through the change of specific parameters and/or thresholds predefined for each infrastructure, which may be potentially linked to the onset of an emergency.

Due to its particular relevance within the means of detection, the fire detection system deserves special mention. This system applies to main infrastructures such as Stations and Tunnels, together with key posts in the face of an emergency such as the Main Emergency Operations Centre and Area Base Posts.

- The fire detection system is made up of smoke detecting sensors installed, at the very least, in the most vulnerable or least accessible sites (i.e., those vacant and/or locked). The fire detection system may be broadened so as to cover every area of the premises. These detectors shall be connected to a fire switchboard, with local insight and signal reception at the Security Control Centre, with presence at the Main Emergency Operations Centre (providing 24-hour service). The switchboard will be able to accurately locate the area that is presumably affected.
- Where Tunnels are concerned, fire detectors shall be installed along the length of the infrastructure.
- In addition to the fire detecting system, fire alarm devices equipped with acoustic and light indicators will locally warn those currently using the infrastructures where the system is installed about potential dangers. Moreover, alarm/call push buttons shall be available in general areas to forcibly activate an alarm and notify the Main Emergency Operations Centre.

Maintenance material

The Emergency Response Plan does not need to include an exhaustive list of maintenance tasks. However, it needs to guarantee that the necessary resources to successfully perform maintenance duties are readily available.

Anti-intrusion security material

Anti-intrusion security material aims to prevent all relevant hazards triggered by human action.

Amongst these, the following stand out:

- Metallic fencing: aimed at delimiting the railway track circuit (at least the most relevant part of it) and preventing people from accessing it, both as pedestrians or drivers. Dissuasive signalling can support the effort by:
  - Avoiding accidental access to the railway tracks, due to oversight, and causing any type of incident.

- Preventing any purposeful access to railway tracks, with the intent to vandalise or sabotage the railway infrastructures.

- Video surveillance system: in all relevant railway infrastructures (like Stations or Tunnels) a video surveillance system shall be fitted with the compulsory installation of cameras, visible from the Main Emergency Operations Centre. Additionally, access to specific infrastructure premises will take place through the opening of locked doors or through access managed by electronic reading cards.

Signalling

Signalling, together with the anti-intrusion security systems, will prevent hazards triggered by human action. Additionally, during an emergency, signalling will mark available resources and risk areas. The Emergency Response Plan should assess the level of detail required in listing and describing signalling.

In any event, only signalling formats that comply with the existing regulations should be used. Two main types of signalling are worth highlighting:

1. *Fixed block signals*

   Fixed block signals must be set out at all times, correctly supervised and maintained, defining the most relevant areas or those more prone to danger, including level crossings. To reinforce the protection of the infrastructure, all necessary protection barriers will remain in place.

   Main infrastructures like Stations, and in particular Tunnels, should rely on their own evacuation signalling, fire-fighting resources, etc.

2. *Moving block or temporary signals*

   Despite not being a permanent fixture, when maintenance work is carried out railway installations will be decked with signals warning of security hazards (like areas were work is in progress).

   Naturally, and depending on the nature and magnitude of these maintenance works, there will be subsequent communication procedures established with the companies that jointly exploit the railway infrastructures, through the Emergency Operations Centre of Railway Communications.

2.4.2 Emergency Response resources and services

The main Emergency Response resources and services are listed below, in a general manner.

Amongst them, it is important to differentiate between those that are locally available (either present in installations or that could be relocated to the required area), and those that intervene in Emergency Response procedures without requiring actual physical presence.

2.4.2.1 Human resources involved in Emergency Response

Local personnel involved in Emergency Response

This group will encompass both maintenance and operations personnel, or any other staff that, due to a specific emergency situation, may turn out to be close to the installations affected. In any event, during the course of said emergency, these teams should only be asked to carry out the duties they are fully trained and equipped to perform.

A generic classification of human resources potentially available for an Emergency Response at local level could be divided into the groups listed below:

1. *On-site personnel*

   On-site personnel refer to the teams present at, or in the vicinity of, the affected site for any of the following reasons:

   - An emergency occurs at their usual place of work.
   - Through early detection, personnel are already at the affected area having arrived there previously to carry out surveillance tasks.
   - Casually if, while performing standard rail supervision and maintenance duties, personnel are working near the affected area and their time of arrival is short.

   Likewise, given the existence of Coordination Protocols in case of Emergency between companies with different ownership that jointly exploit railway infrastructures, there may be personnel working for other Companies collaborating in Emergency Response procedures.

   Naturally, this group will encompass personnel with no specific training. Therefore, it is imperative to ask this staff to perform only the tasks they are qualified to do.

2. *Moveable personnel*

   "Moveable personnel" refers to teams that, upon the detection of an emergency, can travel to the affected area and try to control it.

   At any rate, an emergency area should rely on staff available around the clock. Intervention will be thus guaranteed regardless of the time in which an emergency is declared (be it day or night). Unlike the previous group, moveable personnel will be qualified staff that is able to perform specific actions during the course of an emergency.

   Moveable personnel can be subdivided into two groups:

   - Personnel assigned to the area: on the premise that the overall staff will be distributed tactically amongst a number of predefined areas to cover the extent of the railway infrastructure mentioned in the Emergency Response Plan, members of staff assigned to the affected area will be the ones travelling immediately to support Emergency Response procedures. They will collaborate with the potential staff that may have been in the affected area beforehand (on-site personnel).

- Personnel reinforcement: should the emergency so demand, and depending on its seriousness and typology, the Emergency Response Officer could insist on moving personnel from adjoining distribution areas to the area affected by the emergency as a reinforcement.
- Reinforcement staff may collaborate with moveable personnel at the affected area, including the staff that may have been on-site before the emergency is declared (on-site personnel).
- Should workforce from areas other than the one affected be required to travel to the emergency location to collaborate with the Emergency Response Team, personnel allocation should be optimised by:
- Bringing in workforce from the immediate vicinity of the affected area, depending on the nature of the emergency, but keeping in mind other criteria (such as the degree of accessibility of the existing tracks). Sometimes, staff located farther out can take less time to arrive to the affected area than those in closer proximity.
- Unless the emergency is deemed particularly serious, a minimum number of staff should remain in the surrounding areas to combat any potential new emergency or fight off any damages to adjacent areas caused by the worsening of the original emergency situation.
- As set out above, based on the typology and seriousness of the emergency, as well as the on proximity and quality of the access tracks, it may be better to move staff from more than one of the adjoining areas.

Likewise, the need to involve an in-house firefighting service should be considered. Highly qualified staff in Emergency Response procedures, suitably trained and skilled, should man said service. Obviously, the in-house firefighting service should have the necessary materials to perform their duties. As the case may be, they would assume Emergency Response Team control at local level, passing on command responsibilities to the External Aid Services that arrive on-site.

Remote personnel

Together with the teams responding to the emergency at local level, staff members that are unable to travel to the affected area will carry on performing their duties and support the Emergency Response Team remotely, in direct communication with the local task force.

The following work teams will make up this group:

1. *Emergency Response Plan Director*

   During working hours, the Emergency Response Plan Director will be referred to as the incumbent Emergency Response Officer. His/her physical workstation will be located next to (or within) the Main Emergency Operations Centre, so as to access this room in case of emergency.

   Outside working hours, the Emergency Response Plan Director would be on-call around the clock, should any emergency arise. If that were the case, the Main Emergency Operations Centre Officer would alert the Emergency

Response Plan Director, who would then proceed to the Main Emergency Operations Centre immediately (where necessary).

2. *Main Emergency Operations Centre*

The Main Emergency Operations Centre will be manned around the clock. Once an emergency alarm has been detected or received at the Centre, all Emergency Response Plan actions will be aimed at controlling the emergencies known, establishing direct communication with the incumbent Emergency Response Officer, as well the local Emergency Response Team.

The Main Emergency Operations Centre Officer will lead the Main Emergency Operations Centre team, made up of employees working in rotating shifts to guarantee both performance and physical presence around the clock. The Main Emergency Operations Centre Officer will also hold the deputy Emergency Officer role should the incumbent Emergency Officer be absent and until his presence in the Main Emergency Operations Centre is confirmed.

The Main Emergency Operations Centre will encompass the following operational centres, each of them managed by an Officer with full responsibility and physical presence 24/7 (within the framework of the corresponding shift pattern agreed) and manned by, at least, two employees around the clock:

- Electronic Alert Emergency Operations Centre: receives all kind of alerts and warnings related to the technical detection of railway infrastructure emergencies.
- From this Centre, trained personnel will continuously monitor parameters and electronic indicators alerting on the potential onset of an emergency. Should an emergency arise, the Electronic Alert Emergency Operations Centre Officer will immediately get in direct contact with the Main Emergency Operations Centre Officer.
- Emergency Operations Centre for Security Control: receives all kinds of alerts and warnings related to human detection of railway infrastructure emergencies.
  Warnings can arise from the following sources:
  - In-house personnel, mainly through a staff member assigned to the affected area.
  - External personnel assigned to any of the companies jointly exploiting railway infrastructures.
  - External Aid Services, both through direct visualization of personnel or indirectly through the warning of a third party who decided to contact these services after detecting the emergency.

  Similarly, railway infrastructures with fire detection warning systems installed can receive automated alerts remotely through the Emergency Operations Centre for Security Control.
  Once the alert has been received, all relevant communications with the Emergency Operations Centre Officer for Security Control and (through him/her) with the Main Emergency Operations Centre Officer will be established. The goal is to provide an effective response to callers and to duly monitor the incidence/emergency until it is under control.

Lastly, the Emergency Operations Centre for Security Control is responsible for notifying External Aid Services where necessary.

- Railway Communications Emergency Operations Centre: all warnings originating from the companies exploiting railway infrastructures, should be channelled in order of importance and, where possible, through the Railway Communications Emergency Operations Centre (instead of through the Emergency Operations Centre for Security). In any event, the Railway Communications Emergency Operations Centre Officer will relay the incidence/emergency to the Main Emergency Operations Centre Officer.
  Should early emergency detection take place through the Main Emergency Operations Centre, any of the other two Emergency Operations Centres quoted above will establish mandatory contact with the companies jointly exploiting the railway infrastructures. The goal is for them to assess the activation of their corresponding Emergency Response Plans, based on the type of incident/emergency, and the potential need to regulate or suspend railway traffic temporarily.

Depending on the specific characteristics of the installations subject to the Plan, a thorough evaluation on resource allocation should ensure all responsibilities are suitably covered.

3. Crisis Committee

The Crisis Committee is an advisory panel supporting the incumbent Emergency Officer, who can summon it when necessary (based on the level of emergency and its social impact). Should the seriousness of the situation require it, the deputy Emergency Officer may summon the Crisis Committee whenever the Emergency Officer is unavailable or unreachable.

This Committee is led by the incumbent Emergency Officer (or the Deputy Emergency Officer, in the absence of the former and until his/her arrival) and is formed by the Managing Officers responsible for the institutional and operational emergency response Activities.

By way of example, a list of personnel that could take part in the Crisis Committee includes:

- Emergency Response Plan Director
- Managing Director
- Officers managing the following areas:
  - Security
  - Infrastructure (Maintenance)
  - Exploitation
  - Environment
- Representatives for each of the areas integrating the Main Emergency Operations Centre
- The Company's Press Office
- Members of the Territory Emergency Plans (institutional members of the Civil Protection Office, whether local or national)
- Any other personnel that, based on the specific emergency declared, should be summoned to the Committee.

Should the Crisis Committee convene, they will be meeting in the Crisis Room, conceived for this sole purpose and located in the Main Command Control Centre.

2.4.2.2 Material resources available to support response in case of emergency

This section must describe the material resources available to support a coordinated response in the event of an emergency. These resources can be divided in the following groups:

- Material resources available for an emergency response to specific risks
- Material resources available for emergency response support

A list with examples of the different material resources available at a railway installation is provided below.

Material resources available for an emergency response to specific risks

The Emergency Plan should detail the specific resources available for each of the risks identified as relevant.

Examples of said resources are outlined below:[3]

1. *Resources available in case of fire*

   These will mainly be fire extinguishing systems, specifically:

   - Hydrant systems: Next to the most relevant railway installations (including Stations or Tunnels), municipal hydrant systems should be available for fire fighters to use.
   - Water supply against fires: Next to the most relevant railway installations (including Stations or Tunnels), there should be an exclusive water pressure system, made up of electrical, diesel and/or jockey pressure pumps and water tanks, to combat fires. It shall service the following installations, while being similarly present in the most relevant railway installations:
     - Hose reel systems: providing general coverage and offering the equipment and features set forth in the applicable legislation on self-protection. Said installation may be complemented with vaults storing ancillary equipment (fire-fighting nozzles, extensions, etc.).
     - Water-spray automatic fire extinguishing system: based on sprinklers strategically installed in higher risk sites. They could be replaced with gaseous automatic fire extinguishing systems in technical premises that must remain out of water reach.
   - Dry pillar systems: solely available in key installations, the dry-pillar system must only be used by the fire-fighting service. It basically consists of a hollow pipe network mounted above ground level and provided with connection outlets acting as a water conducting system from the ground to the lowest level of the premises covered.

[3] *Naturally, each and every emergency situation may cause different types of damage or affect different parts of the infrastructure, making repairs necessary. The accompanying listing does not include these resources or materials as, in principle, they are considered to be part of standard operations. This said, these could be included if the Emergency Response Plan considered any standard resource or material to be necessary.*

- Portable dry chemical extinguishers: multipurpose dry chemical fire extinguishers effective on Class A, B and C fires. They should be available in all Area Bases, in compliance with current regulations, as well as inside each of the vehicles. These will be complemented with CO2 fire extinguishers to be used when fighting a fire with an electrical component. Additionally, all key railway installations (such as Stations or Tunnels) will be equipped with the necessary fire extinguishers.

2. *Protection resources available for response in case of flooding, storms or torrential downpours*

   Tunnel installations, as well as underground Station facilities, should have efficient water evacuation systems. The latter could be the result of gradient building, the installation of water well pumps aimed at bailing water, or the use of mobile pumping equipment.

   If some outdoor railway infrastructures are at a high risk of waterlogging or flooding, these could also be equipped with manual pumps to remove water.

3. *Protection resources available for response in case of landslide*

   Applicable to any railway infrastructure, the following resources can be relied upon for Emergency Response in case of landslide:

   - Occasional mild landslides: spades and sandbags to fill in the holes caused by the landslide adjoining the railway structure.
   - Landslide high-risk areas: the possibility of relying on specific work vehicles, such as crane-tractors and trucks, for sand transportation and replenishment. Depending on the severity of the landslide threat, outsourcing the service can be an option worth considering. The same goes for the support of External Aid Services.

4. *Protection resources available for response in case of earthquakes*

   Earthquakes can cause similar damages to landslides. Consequently, the Emergency Response procedures and the material resources involved are also similar.

   However, should the earthquake aftermath affect not only the immediate vicinity of railway infrastructures but also the infrastructures themselves, Emergency Response procedures of a broader scope should be set in place, assessing each case on the basis of impact and type of infrastructure affected.

5. *Protection resources available for response in case of heat waves*

   Heat waves can generate similar effects due to the apparition of cracks in the ground and, consequently, in the terrain next to railway infrastructures. These emergencies can be dealt with in a similar manner to those posed by landslides. The potential severity of heat wave hazards, however, is not expected to require special vehicle support or broad-range emergency response actions.

6. *Cold waves*

   Together with cold waves, snow and frosting are expected, as outlined in the following section. The emergency response procedures detailed below apply to cold waves.

7. *Protection resources available for response in case of cold, snow, frosting and hail*

   Especially in areas with higher risk of snow, frosting or hail, special Winter Preparedness Sheds should be considered, storing material and salt bags to help melt ice in affected areas.

   In addition to spreading salt, affected railway infrastructures should have spades and additional equipment to remove the snow or hail accumulating next to the tracks.

8. *Protection resources available for response in case of terrorist attacks*

   Due to the specific nature of these attacks, in principle no consequences can be foreseen or anticipated. Therefore, it is of critical importance to always rely on State Security Forces.

9. *Protection resources available for response in case of car or train accidents*

   In both cases, there should be enough material and resources to free the tracks and move any items affected or, alternatively, have agreements and treaties in place to ensure this work is carried out.

   Having said this, Emergency Plan procedures in case of car or train accident will remain subject to the orders of External Aid Services.

Material resources available for response support

1. *Transport resources*

   Work vehicles will be assigned to the team members of every predefined Emergency Response area. Said vehicles will be chosen in accordance with the degree of accessibility in the vicinity of railway tracks, including 4x4 vehicles where adequate access may be compromised.

2. *Self-protection equipment*

   The teams assigned to Maintenance shall rely on adequate protection to avoid any personal accident or injury when accessing the different railway installations.

   They should, at least, wear security footwear and reflecting jackets to be seen. When performing high-risk activities, this protection can be complemented with helmets, gloves, etc., as well as flashlights and reflective devices for night work.

   Additionally, as part of the necessary equipment required in the exercise of their duties, maintenance staff shall be provided with tools and equipment that

enables them to carry out minor maintenance and repair work at local level. These materials should be available in all working vehicles.

3. *Warning and communication systems*

It is advisable to count on the following warning and communication systems:

- Mobile telephone: all emergency staff should have a company mobile phone where they can be reached 24/7. The Emergency Officer and all necessary staff (in particular, maintenance staff) should also have company mobile phones with them.
- Landline telephone: every Area Base should have at least one landline, together with those installed in the Main Emergency Operations Centre. All landline telephones should be wireless in order to ease local communications on the move.
- Radio transmission devices: should the need to access areas where the telephone signal may weaken or disappear altogether arise (e.g., Tunnels), the use of radio transmission devices can guarantee viable communication at all times.

In relevant infrastructures, such as Stations or Tunnels, these communication systems can be reinforced with intercom installation.

4. *Emergency lighting*

Anticipating potential electric supply failures, emergency lighting should be installed mandatorily in all main railway infrastructures such as Stations and, in particular, Tunnels. So as to provide general coverage, individual luminaires shall be installed across premises and in general transit areas and egress pathways.

Installations can also be equipped with emergency back-up lighting and/or emergency escape lighting, leveraging alternative electric supply sources.

2.5 Chapter 5: Emergency identification and classification

The present Emergency Plan defines emergency as a sudden unforeseen and unwanted situation that may impact infrastructure resilience, demanding immediate response to minimize consequences.

In order to respond adequately to an emergency, the Emergency Officer (incumbent or deputy), shall make a swift assessment of the situation, identifying the source of the emergency, whilst coordinating effectively all technical and human resources available to control it.

To this effect, it is imperative that the emergency may be classified urgently, listing the resources and teams that may be necessary to respond to the emergency and outlining an organisational chart that needs to be followed.

As an example, this Section will present two potential emergency classifications; with the person drafting each specific Emergency Plan taking on the responsibility to decide whether additional classifications may be required for each plan.

2.5.1 Classifying emergencies in terms of affected elements

Emergency classification based on the elements affected will facilitate understanding of the resources and teams that will prove essential to carry out the necessary Emergency Response Plans.

A list of elements identified as vulnerable to railway infrastructure resilience is provided hereunder, identifying the hazards each element is exposed to.

2.5.1.1 Railway infrastructure vulnerable elements

Underpasses and overpasses

These two elements may be affected by the following hazards:

- Landslides: they could cause differential stress in underpasses and overpasses, altering their alignment by changing the natural slope equilibrium.
- Earthquakes: depending on earthquake duration, location and magnitude, this hazard can impact both underpasses and overpasses.
- Car accidents: they can affect underpasses and overpasses; with the risk of impact and vehicle invasion of the tracks increasing the danger subject to duration and magnitude of the accident.
- Flooding.

Tunnels

Are exposed to one main hazard:

- Earthquakes: they can affect to a greater or lesser effect depending on location and magnitude.

Viaducts

Are exposed to the following hazards:

- Torrential rains (flooding): they may cause river overflow in a matter of hours, dragging along materials that may change terrain level with respect to the viaduct.
- Landslides: they can cause differential stress in viaducts altering their alignment by changing the natural slope equilibrium what may cause different force distribution in particular elements causing local internal tension and crack formation.
- Earthquakes: they can affect viaducts to a greater or lesser effect depending on duration, location and magnitude.
- Car or train accidents causing damages to external infrastructure elements.

Slopes

- Flooding: the presence of torrential rain can increase slope erosion affecting its 'lifespan' washing away of the soil, the rain chain, through its design, increase the negative impact on the slope construction.
- Storms: they have similar effects to flooding.
- Landslides: as a result of the lack of stability of the slope faced with sudden water presence, landslides can go as far as to cause rock detachment.

- Earthquakes: they can have a greater or lesser impact, depending on their duration, location and magnitude.
- Cold and heat waves: they could change terrain parameters, causing landslides.
- Car or train accidents.

Culverts

May be affected by the following hazards:

- Flooding or torrential rains: branches, leaves and any other sediment dragged by water, could collapse these structures. Should a blockage occur that prevents drainage, water could accumulate at railway track level, causing landslides, and potentially damaging a section of the track.
- Landslides.
- Cold waves: should blockage occur due to ice, it could have the same consequences as those described above for flooding.
- Earthquakes: they can have a greater or lesser impact, depending on their duration, location and magnitude.

Protection elements

Handrails and anti-climbing fencing are critical. The former consist of security elements mainly used in viaducts, overpasses, etc.; the latter prevents objects from being thrown to the railway tracks. They may be affected by the following hazards that could damage, displace or destroy said protection elements.

- Flooding
- Landslides
- Earthquakes
- Car or rail accidents

An object placed intentionally on a railway track or an accident in the tracks could cause train derailing.

Enclosures

Enclosures are dissuasive protection elements conceived to avoid inadvertent access to the railway tracks, in particular by children or animals. Enclosures can be affected by the following hazards, which may damage them, displace them from their original position or even destroy them:

- Flooding
- Storms
- Landslides
- Earthquakes
- Car accidents

Vegetation

Vegetation growth and proliferation in the vicinity of railway tracks is critical as it improves the stability of the embankment gradient. Vegetation can be affected by the following hazards, which may severely damage, displace or destroy it, thus worsening slope gradient stability:

- Flooding
- Storms
- Landslides
- Earthquakes
- Fires

Additionally, vegetation is affected by a last hazard:

- Heat waves followed by torrential rains: a heat wave can destroy vegetation located in the vicinity of the railway track, worsening embankment gradient stability. Should torrential rains occur during high temperature and draught periods, the damage caused to vegetation is likely to increase dramatically.

2.5.1.2 Vulnerable elements specific to railway infrastructures

Railway tracks

Even when railway tracks are properly held in place in the terrain, through either welding or tie plates tapered to the track, they are exposed to the following hazards:

- Cold and heat waves: they increase material fatigue, reducing the lifespan of railway tracks due to wear and tear:
  - Steel tracks contract when exposed to low temperatures
  - Steel tracks dilate when exposed to high temperatures
- Landslides
- Flooding
- Earthquake
- Car and train accidents

Onset of these last three phenomena may increase infrastructure mechanical failure, causing (for instance) railway track breakage, which, in turn, may result in train derailing.

Fish plate joints

Fish plate joints are exclusively used in conventional railroad networks, and are exposed to the following hazards:

- Earthquakes
- Cold or heat waves
- Car or train accidents

Any of these hazards can cause mechanical failure of the rail expansion joints. In case of fracture, they could cause the railroad tracks to overlap and lead to train derailment.

Railway sleepers

The structures upon which the actual railroad tracks rest on are called railway sleepers. A critical railway component, they distribute the loads from moving trains to the ballast and keep the correct track gauge.

Railway sleepers are exposed to the following hazards:

- Earthquakes - cracks and breaking

Ballast

The ballast setting is critical as it forms the track bed upon which the railroad sleepers rest on. The stability of the structure would thus be seriously affected should the ballast be laid down incorrectly. The main hazards to which the ballast is exposed include:

- Flooding, landslides and earthquakes that may potentially destabilise the ballast, and ultimately, the stability of the railroad track.
- Storms: faced with torrential rains, clogging may reduce the ballast's ability to properly drain cumulated water, causing debris to be sucked up from the sub-ballast and increasing fouling, thus affecting track safety.
- Flooding: a similar situation to that of torrential rains, but focused on seasonal rains where, following a period of seasonal downpour, there comes a moment where the terrain is unable to absorb more water. This increases the threat of landslides that may drag along branches and other debris, potentially damaging some part of the railway structure.
- Car and train accidents.

Railroad switch

A railroad switch is a mechanical installation allowing trains to be guided from one track to another. Railroad switches are subject to one main hazard:

- Earthquakes: as a result of earthquake occurrence, the ballast or any other material can get stuck in the switch, triggering train derailing.

Expansion joints

Expansion joints are structures specifically conceived to split sections of railway tracks located just before and after viaducts, alleviating thermic stress and/or movement, preventing track damage. Expansion joints are vulnerable to the following hazards:

- Earthquakes: they could cause track overlapping, triggering train derailing.
- Heat and cold waves: the excessive expansion of the joints due to temperature exposure could again cause track overlapping, triggering train derailing.

2.5.1.3 Emergency Table - Potential Affected Elements

Adding a table similar to the one proposed below to the Emergency Plan would help us understand, once the emergency had been declared, what is the list of potentially affected elements.

Table 4: List of Emergencies and potential elements involved

Emergency	Potential affected elements
Flooding/ torrential rains / storms	Viaducts
	Embankments
	Protection elements
	Fencing
	Vegetation
	Train tracks
	Ballast
Landslides	Underpass and overpass
	Viaducts
	Embankments
	Culverts
	Protection elements
	Fencing
	Vegetation
	Train tracks
	Ballast
Earthquakes	Underpass and overpass
	Tunnels
	Viaducts
	Embankments
	Protection elements
	Fencing
	Vegetation
	Train tracks
	Fish plate joints
	Railroad switches
	Expansion joints
	Railway sleepers
Heat waves	Embankments
	Vegetation
	Train tracks
	Fish plate joints
	Expansion joints
Cold waves	Embankments
	Trail tracks
	Fish plate joints
	Expansion joints
Fires	Vegetation
Car accident	Underpass and overpass
	Embankments

2.5.2 Classifying emergencies by command level

Classifying emergencies by command levels will help establish the key stakeholders accountable for each response scenario and the overall organisational chart for each emergency.

Emergency ranking and classification aims to assign the appropriate Command Level to a situation, identifying the adequate resources to mobilize based on the characteristics of the event. Once the type of emergency has been defined, the corresponding Emergency Response Plan is set in motion.

The proposed classification can be established in accordance with response capacity (speed and efficiency) to the event, as well as the necessary resource mobilization (both internal and external).

Table 5 includes a pre-alert level as well. Whilst this phase does not fall within the emergency classification, it may be declared should adverse circumstances occur that suggest a particular hazard is more likely to materialize in a specific area.

Table 5: Classification of Emergencies by command hierarchy

Emergency level	Level description	Command level
Pre-alert	Phase declared in a specific area against a particular hazard when identifying circumstances that increase the probabilities of an emergency occurring, or increase the seriousness of the event. Declaring a pre-alert phase does not amount to declaring an emergency.	Standard operational structure is maintained, increasing prevention and surveillance resources in the area, as well as (where appropriate), available resources to respond to emergencies.
Level 0	Localised event that can be controlled immediately through the presence of responders that, at the time of the emergency, are either in the vicinity of the affected area or can travel there swiftly.	At local level, transmitting information about the event to the Emergency Operations Centre as soon as possible. In some cases, communication will take place throughout actual emergency response or even after emergency response has been completed. Level 0 may not necessarily require activating the Emergency Response Plan.

Emergency level	Level description	Command level
Level 1	A localised event that can be controlled prior to specialised personnel arriving in the affected area, with potential support from on-site responders present in the area at the time the emergency struck.	The Emergency Operations Centre (with the Emergency Room Coordinator as the deputy Emergency Officer) will follow up the Emergency Response Plan and local operative with internal support. A Level 1 emergency, and every subsequent level thereafter, implies Emergency Response Plan activation.
Level 2	A localised event that cannot be controlled with in-house personnel and requires the mobilization of local External Aid Services.	Coordinating responses from the Emergency Operations Centre, local External Aid Services will be called in and, save for exceptional cases and subject to the type of emergency declared, will assume control of the emergency. Consideration may be given to the need for the incumbent Emergency Officer to be called to the Emergency Operations Centre.
Level 3	Specific events that cannot be controlled with in-house personnel and may not be localised and/or restricted, requiring the mobilization of local External Aid Services (with potential need for extensive resource deployment). Set off by the activation of the Territory Plans of the competent Administration.	Coordination of Emergency Response Plans from the Emergency Operations Centre (with the incumbent Emergency officer) local operative, with internal support, External Aid Services (both locally and in the Emergency Operations Centre), as well as the Crisis Committee and the Civil Protection Territory Plan integration if necessary. External Aid Services will assume control, as outlined in the Territory Emergency Plan activated.

The Emergency Levels proposed in the table above, will obviously be applicable internally to the owner of the activity (responsible for drafting the Emergency Plan), and will usually differ from those established in other Plans, especially in Territory Emergency Plans. Therefore, and to avoid confusion in communications with External Aid Services, referencing the Emergency Level applied in the affected

installations should be avoided at all times. Numeration of the different Emergency Levels for a particular installation may coincide with those in Territory Plans, but with different meanings and equivalences.

Different types of emergency will be established based on the materialisation of identified hazards that affect railroad infrastructures. Based on the characteristics, constraints, and severity of the event, the corresponding Emergency Level will be applied (*further detailed in Section 6 of the Emergency Plan).*

Once a significant Emergency Level has been declared for a specific railroad infrastructure, said action may lead to other surrounding infrastructures declaring an emergency level as well (usually lower than the first) should the risk of the first emergency affect the others, and depending on the type of emergency triggering the first alert.

As a general rule, there will be a number of factors conditioning the level of emergency to be declared in the affected installations, as well as its potential progression to a level higher than the one initially declared. Amongst other potential factors, the following should be highlighted:

- Exact location of the emergency and accessibility requirements.
- Estimated Time of Arrival (ETA) of responders arriving to the affected installations.
- Type and characteristics of the railway infrastructure (for those highly relevant, like Stations or Tunnels, exact nature of the premises or installation where the emergency has been declared).
- Level of frequency with which trains transit through said railway infrastructures.
- Occupation of the affected installations (applicable to infrastructures with a higher entity, like Stations and Tunnels).
- Moment/period during which the emergency is declared (night time and high activity periods can aggravate emergency risk).
- Local protection and emergency response resources.
- Potential impact on other in-house installations, annexed to the one where the emergency has been declared.
- Potential impact on other installations owned by third parties (vulnerable elements), that may be adjoining or in close proximity to the one where the emergency has been declared.
- Potential impact on vulnerable elements external to the railway network.
- Emergency degree progress, determining the speed with which it may end up affecting other adjoining facilities and installations.
- Concatenation in the sequence of risks materialising, potentially generating multiple emergencies.
- Additional impact generated by risks materialising in adjoining facilities and installations owned by third parties.
- Blockage of access routes leading to the affected area (whether caused by the actual emergency or not).
- Weather conditions existing at the time when the emergency is declared, which would constitute exposure risks and influence the response of emergency personnel:

- Favouring emergency response: for instance, rainfall during a fire originated emergency.
- Aggravating the situation (through adverse weather conditions):
  - Fostering emergency development.
  - Hindering/impeding mobilization of off-site responders and Exterior Aid Services to affected installations:
    - By road, commuting by moving vehicles.
    - By air, should helicopters be necessary to put out forest fires.

- Level of emergency determined by the National or Local Emergency Plan Authorities (for instance, when faced with an antiterrorist alarm).

2.5.2.1 Emergency Level 0

Definition of Level 0

A level 0 situation is one in which awareness and surveillance are kept at a standard and local level when faced with any of the scenarios below:

- Activation of technical early detection systems, with responses integrated in "SAFEWAY Platform", informing of an event that may end up affecting railroad infrastructures.
- Verified emergency that may affect railway infrastructures indirectly (at a later time). These alerts will be received through the "SAFEWAY Platform", which will consolidate the issuance of warnings.
  - Emergency in facilities or installations owned by third parties that, on account of their proximity to a certain railway installation, might affect it.
  - Emergency in installations, which, despite not being located in the immediate surroundings, may end up affecting railway infrastructures due to a higher severity and risk level. For instance, nuclear stations, relevant chemical firms, dams for hydraulic plants, etc.
  - Emergency in railway traffic that may affect in-house infrastructures.
  - Forest fires in surrounding areas, which may advance and end up affecting railway infrastructures.

General actions at Level 0

The corresponding alarm verifications must be duly carried out. In case an emergency has been detected that cannot be immediately controlled, the Main Emergency Operations Centre must be immediately alerted. The Emergency Operations Centre will assume control and will declare the corresponding Emergency Level, orchestrating the subsequent response.

Resources deployed in Level 0

- Emergency Room Coordinator (acting as deputy Emergency Officer).
- Personnel that, at the time of the emergency being declared, may be close to the affected area; should there be no on-site staff available, responders in close proximity will be relocated to the emergency area to undertake the

necessary verifications, bringing with them the relevant tools and basic equipment to carry out immediate intervention.

The Emergency Operations Centre will be alerted only once the emergency has been verified, or in case additional help may be necessary to proceed with said verification.

Both in Level 0 and all others, the resources to be deployed in an effort to control the emergency (subject to its characteristics) will be visible through the "SAFEWAY Platform".

2.5.2.2 Level 1 Emergency

Definition of Level 1

Generally speaking, Level 1 will be declared upon acknowledgment of the existence of any event that may affect railway installations and require relocating specialised personnel to the affected area. Once the request for resources has been placed, SAFEWAY will issue a Level 1 Emergency alert, that will be activated by the Emergency Officer or, failing this, the Emergency Room Coordinator.

General characteristics of a Level 1 Emergency

- An emergency, which, due to its limited gravitas or to having been detected and addressed at a very early stage, can be controlled with in-house personnel.
- Requesting the intervention of the External Aid Services is not deemed necessary.
- The focal point of the emergency is accurately located and defined, and it is not expected to spread to adjoining areas.
- The emergency effects may slightly impact railway installations located in the vicinity of the emergency focal point, with the potential to cause reversible and minor damage.
- The effects of the emergency are not expected to compromise the safety:
  - Of local on-site personnel.
  - Of railway infrastructures slightly removed from the emergency focal point.
  - Of facilities and installations owned by third parties and attached to, or adjoining, the affected railway installations.
  - Of potential housing in the proximity of the emergency focal point, as well as population living in the area.
  - Of existing railway traffic.
- Under unfavourable circumstances, and depending on the characteristics, constraints and severity of the event, the emergency could eventually evolve to a Higher Emergency Level.

Resources deployed in Level 1

- Alerting the Main Emergency Operations Centre, where the Emergency Room Coordinator (deputy Emergency Officer), will establish on-going contact with local on-site personnel (through the highest ranking staff member present). On-site personnel will execute locally all instructions

received by the deputy Emergency Officer in response to the Level 1 emergency declared.
- Local responders that, upon the emergency being declared, may have been close to the affected area.
- Mobilizing personnel from adjoining facilities to the affected area.
- Relocation and equipment of basic protection and emergency response teams.

2.5.2.3 Level 2 Emergency

Definition of Level 2

Generally speaking, Level 2 will be declared upon acknowledgment of the existence of any event that will require External Aid Service intervention. Once the request for External Aid Service resources has been placed, SAFEWAY will issue a Level 2 Emergency alert activated by the Emergency Officer or, failing this, the Emergency Room Coordinator.

General characteristics of Level 2

- Emergencies that cannot be controlled by in-house personnel and that may require External Aid Service involvement.
- The emergency focal point is accurately located and defined at first, but the risk of it spreading to adjoining areas remains.
- The effects of the emergency may severely impact railway infrastructures located close to the emergency focal point, potentially causing significant and irreversible damage.
- The effects of the emergency, if not controlled, could at a later stage compromise the safety:
  - Of local on-site personnel (which, at a later stage, may need to be evacuated to a safe location adjoining the affected area, or confined inside, and may need medical attention if injured).
  - Of railway infrastructures that may be further removed from the emergency focal point.
  - Of facilities and installations owned by third parties attached to, or adjoining, the affected railway infrastructure.
  - Of existing railway traffic (which could be temporarily suspended if necessary).
- Under unfavourable circumstances, and depending on the characteristics, constraints and severity of the event, the emergency could eventually evolve to a Higher Emergency Level (Level 3) when activating a Territory Emergency Plan is deemed necessary to control the emergency.

Resources deployed in Level 2

- Alerting the Main Emergency Operations Centre, where the incumbent Emergency Officer will establish on-going contact with local on-site personnel (through the highest ranking staff member present). On-site personnel will locally execute all instructions received by the Emergency Officer in response to the Level 2 emergency declared.

- Mobilization of the necessary local responders allocated to the affected area, supporting on-site personnel that, upon the emergency being declared, may have been close to the affected area. In any case, local staff will act without compromising their own safety and following the instructions given by the External Aid Services.
- Relocation and equipment of all necessary protection and emergency response teams.
- Request involvement of External Aid Services in line with emergency response needs.

2.5.2.4 Level 3 Emergency

Definition of Level 3

Generally speaking, Level 3 will be declared upon activation of Territory Emergency Plans when facing an emergency situation that may eventually affect railway infrastructures. SAFEWAY will issue a Level 3 Emergency alert that will be activated by the Emergency Officer or, failing this, the Emergency Room Coordinator.

General characteristics of Level 3

- Emergencies that cannot be controlled by in-house personnel, and that will require significant External Aid Service involvement, as well as the creation of a Crisis Committee.
- The emergency focal point is not accurately located and defined, with the risk of it spreading swiftly and in a manner that is potentially out of control to adjoining areas.
- The effects of the emergency may severely and irreversibly impact railway infrastructures located close to the emergency focal point, causing extreme damage.
- Asides from compromising railway infrastructures, the emergency can adversely affect on-site local personnel, requiring:
  - Staff evacuation to a safe location sufficiently removed from the emergency area (or where necessary confining personnel inside the railway infrastructure), following instructions from the External Aid Services.
  - Medical assistance for injured personnel, coordinating all necessary transportation to medical centres nearby.
- Emergency effects can have the following implications:
  - Potential affectation of railway infrastructures that may be further removed from the emergency focal point, but could be impacted at a later stage.
  - Affectation of facilities and installations owned by third parties that are attached to, or adjoining, the affected railway infrastructure.
  - Temporary suspension of railway traffic, establishing on-going mandatory contact and coordination amongst the companies jointly exploiting the railway network.

Resources deployed in Level 3

- Alerting the Main Emergency Operations Centre, where the incumbent Emergency Officer will establish on-going contact with local on-site personnel (through the highest-ranking staff member present). On-site personnel will execute locally all instructions received by the Emergency Officer in response to the Level 2 emergency declared.
- Mobilization of the necessary responders allocated to the affected area, supporting on-site personnel that, upon the emergency being declared, had been at the affected area. In any case, local staff will act without compromising their own safety and following the instructions given by the External Aid Services.
- Additional staff mobilization from adjacent areas to that affected, should it be deemed necessary.
- Any additional in-house staff mobilization that may be deemed necessary for emergency response support.
- Relocation and equipment of all necessary protection and emergency response teams (extensive deployment to be expected).
- Request for involvement of exhaustive External Aid Services in line with emergency response needs.
- Creation of the Crisis Committee.
- Emergency Plan integration with Civil Protection Territory Emergency Plans associated to the affected area.

2.6 Chapter 6: Emergency response procedures

This will be the most important section in any Emergency Plan. It should reflect all Emergency Response procedures detailing the specific activities to be carried out in case of emergency, as well as the owners of said activities.

On a general basis, all emergency responses will have a similar structure all the way to execution. They will be nearly universal, regardless of the hazard being fought. The stages of an emergency response procedure can be classified as follows:

0. **Prevention.** This phase is not strictly part of an emergency response procedure, given it refers to all actions and measures taken to diminish the probability/danger of a specific hazard materializing. Including it in every Emergency Plan is highly recommended, as is deep-diving in its contents (given the importance of outlining, even generically, emergency prevention procedures so as to measure their efficiency). Due to weather conditions and other circumstances, a pre-emergency alert phase may be declared in response of a specific risk affecting a particular area. During this time, preventative measures should be increased together with all available resources to aid emergency response procedures, where necessary.
1. **Phase 1 or Alert.** During this phase, an alarm will be received and its authenticity will need to be verified. It coincides with Emergency Level 0.
2. **Phase 2 or Intervention.** During this phase, intervention will take place to eliminate or reduce the emergency risk. It coincides with Emergency Levels 1 to 3.

3. Phase 3 or Resolution. The emergency will be deemed to be under control (emergency resolved) and all services will be restored, through intervention if necessary.

Given that all emergency response procedures follow the same phasing, and in order to simplify the learning curve, it is often advisable to draft one sole procedure that details specific actions for each hazard. The current section will set out a guideline for the drafting of all procedures.

Before developing an emergency response procedure, the organisational chart and basic activity flowchart to be set in place before an emergency should be clear. Once these two charts are known, the development of all emergency response procedures will be far simpler, facilitating the supervision of the whole procedure.

Examples of both an organisational chart and an activity flowchart for an emergency response are included below.

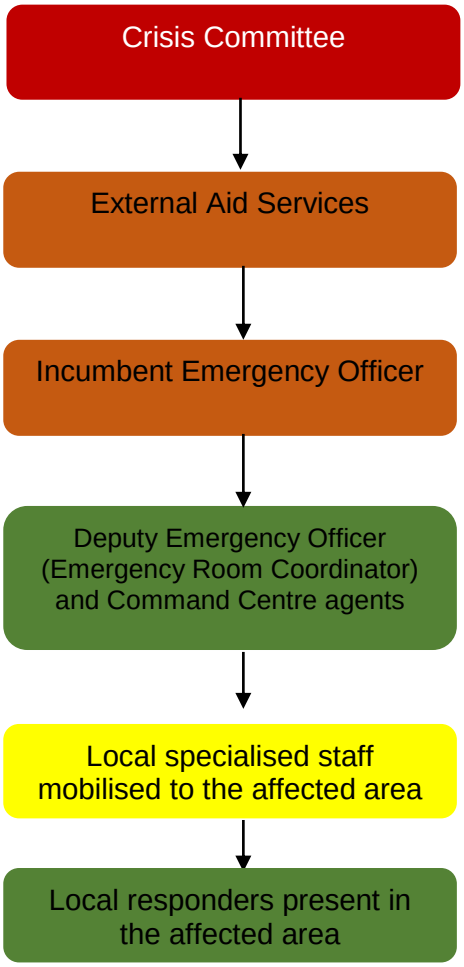
Emergency response organisational chart

The emergency response organisational chart included below details all emergency response actions, as well as the different groups and stakeholders involved in emergency response procedures. All emergency response personnel should have access to "SAFEWAY Platform" and the other tools that may be required during the course of an emergency.

To facilitate swift identification, the proposed colour coding linked to the Emergency levels described in Section 5 is used. Colours identify opportunities for involvement of the different stakeholders throughout the different Emergency Levels:

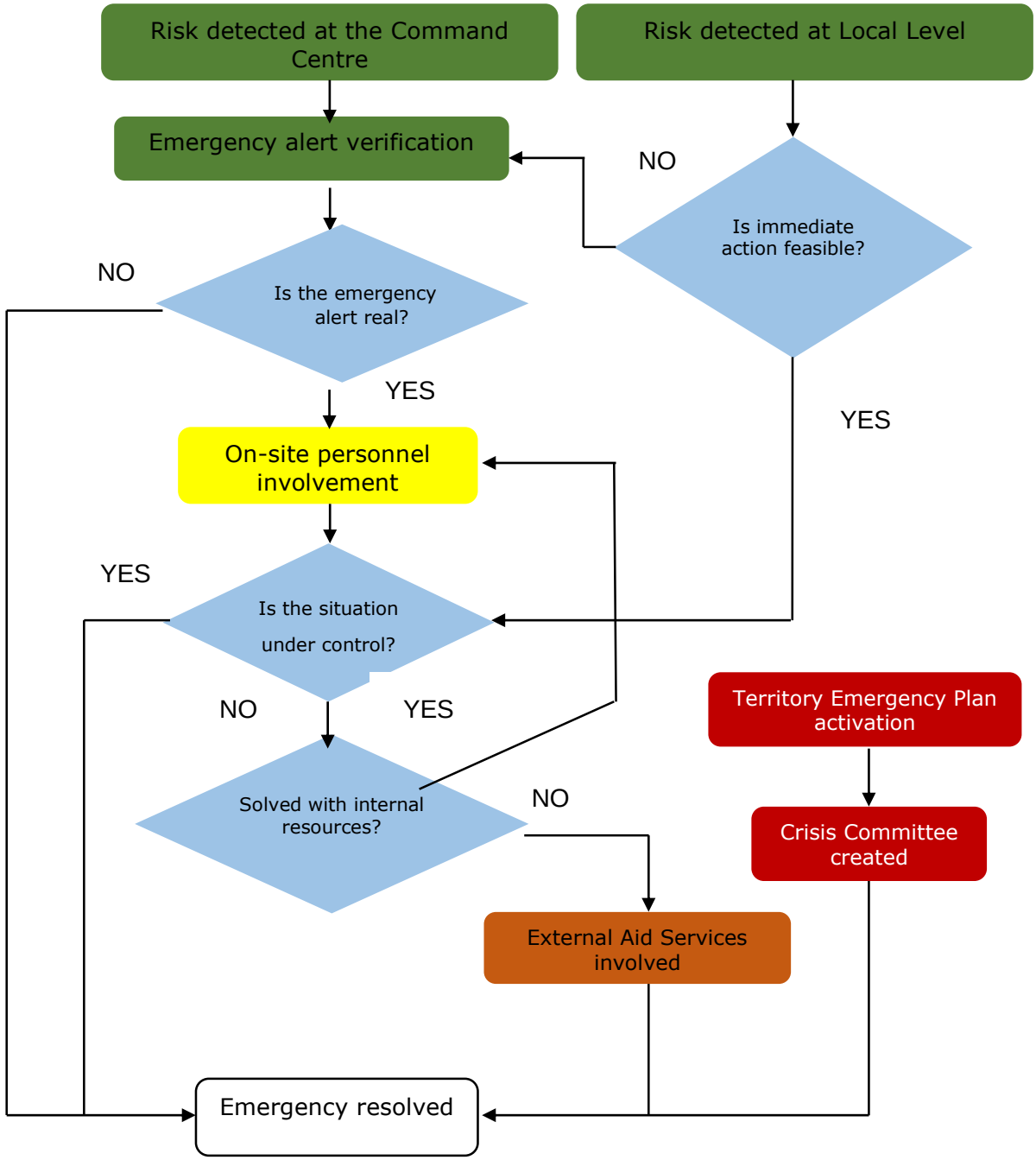
- **Red:** exclusively involved in Level 3
- **Orange:** involved in Level 2 and above
- **Yellow:** involved in Level 1 and above
- **Green:** involved in all emergency levels

In any case, local personnel will be reporting into a unique supervisor (usually referred to as Intervention Officer).



Emergency response activity flowchart

The basic emergency response activity flowchart shown below highlights the different emergency levels at every stage of the response procedures, with the same colour scheme applied to the organisational chart.



2.6.1 Overall emergency response procedures

Once the emergency organisational chart has been identified and the emergency response activity flowchart is known, general emergency response procedures should be designed.

A general response procedure has been outlined below, including examples of specific actions that can be tailored to the response needs for each emergency.

2.6.1.1 Prevention: prior actions

As previously discussed, prevention is not strictly part of the emergency response procedures but, due to its relevance in minimizing both the probability of emergency occurrence and the severity of the emergency risks arising, we recommend including it in this section.

A general overview of prior actions that need to be taken in order to prevent and be ready to face a potential emergency is hereby provided, together with a proposed response protocol in case of emergency (based on its nature and characteristics). With the aim to diminish the impact caused by a potential emergency risk, preventative response measures should be implemented to guarantee adequate performance of emergency risk response and protection procedures. They will also help ensure personnel is aware and prepared to act swiftly and efficiently, always in the safest possible manner so as to guarantee their physical integrity at all times.

To this effect, the following action protocols could be established:

- Each member of the local emergency teams should know their working area:
  - Exact extent and precise delimitation with other adjoining working areas.
  - The different railway infrastructures that are part of their working areas, their topology and specific characteristics, as well as the extent to which each risk affects the different installations.
  - The best access route to every railway infrastructure, as well as alternative routes (together with means to access potential auxiliary vehicles).
  - The most vulnerable points linked to each potential risk.
  - Minimum and sufficient knowledge on adjoining areas, should their support and assistance be needed there.
- During an emergency, individual action should never be the chosen approach. Personnel should work in teams or (at the very least) pairs, in order to avoid eventualities that could endanger a team member.
- A cycle of surveillance visits to the railway infrastructures should be set in place, with the following priorities:
  - Infrastructures recently affected by every risk or hazard.
  - Infrastructures considered more vulnerable to each risk or hazard.
  - Most relevant infrastructures.
- In case a particularly significant event or incidence that might compromise the safety of railway infrastructures was to occur, the Main Emergency Operations Centre should be immediately informed.
- A log should be created to record all incidents detected and actions undertaken on railway infrastructures.

- Members of the local emergency teams will have knowledge and understanding of the following resources and response procedures against each hazard (amongst those applicable):
  - Technical resources available:
    - IT systems
    - Warning and communication systems
    - Emergency response material tailored to each emergency type
    - Specific auxiliary vehicle use and driving
    - Protection means and related equipment to be used
    - "SAFEWAY Platform"
  - Communication resources and protocols with the Emergency Operations Centre
  - Specific emergency response procedures to fight each hazard
- Necessary regular inspections of all existing technical resources should be carried out to guarantee their expected performance in case of emergency.
- Ensure Training Plans for local emergency personnel include all relevant content and are carried out with the necessary frequency, guaranteeing all staff has the appropriate emergency training and know-how.

As illustrated above, local personnel responding to the emergency execute most of the procedures outlined above, proving local staff is of vital importance in risk prevention of railroad infrastructures. Off-site responders, or those working remotely, should rely on their own training, tailored to their responsibilities within emergency response procedures. An updated list of contacts that may be necessary in case of emergency should be readily available.

Pre-alert phase.

Due to weather conditions or any other circumstances, a pre-alert phase can be declared in a particular area facing a specific hazard.

During this phase, prevention and inspection protocols for the susceptible area should be strengthened (together with all available emergency response resources, where applicable).

The reasons that may justify declaring a pre-alert phase will depend on the area and railway infrastructures available, but the following are worth highlighting:

- Flooding/torrential rains/storm hazards:
  - During rainy season in locations susceptible to this type of emergencies in the past.
  - Presence of adverse weather conditions.
- Heat or cold wave hazards:
  - Adverse weather conditions forecast.
- Fire hazard:
  - During high temperature season or within proximity of forest areas.
- Landslides or earthquake hazards:
  - Sliding motion detected in the area, with potential aftershock threats.
- Terrorist attack hazard:
  - Authorities must set emergency alert thresholds.

Several emergency response procedures recommended during the pre-alert phase are listed below by way of example:

1. Intensify preventative inspection and surveillance visits of programmed sites and, in particular, their most vulnerable elements (i.e., those that are most likely to be affected by the potential hazard identified).
    a. Flooding/ torrential rains / storms: areas that contribute to water accumulation due to their specific location, slope gradient level, or past susceptibility (historical data analysis).
    b. Landslides: areas where slopes are more pronounced, have a lower stability or are located in highly critical areas.
    c. Cold waves / snow / frosting / hail: areas facilitating snow ice or hail accumulation due to their specific location.
    d. Fires: proximity of fuel tank storage or forest areas.
    e. Strong winds: infrastructures with a lower stability or resistance, as well as those, which, due to their location or surroundings, may facilitate storm or wind-borne debris accumulation.
2. Inspect the proper functioning of the most critical protection systems:
    a. Flooding / torrential rains / storms: cleaning of the culverts system, drainage and sludge pumps, and automatic water extraction systems.
    b. Landslides: steel nets and wire meshes put up on slopes where danger exists of sliding mass movements or dislodgement.
    c. Cold waves / snow / frosting / hail: cleaning of the culverts system and automatic water extraction systems.
    d. Fires: automatic fire extinguisher or ventilation systems.
3. Mobilising additional resources and carrying out preventive measures.
4. Should installations exist in adjoining locations or risk areas, communication channels should remain open with their Command Officers. The following installations and risk areas should be considered:
    a. Flooding / torrential rains / storm hazards: water sources close by (rivers, tributaries, reservoirs, etc.), supervising riverbeds and rising water levels to monitor any potential overflow.
    b. Landslide hazards: shallow depression and steep mountain areas in close proximity to the affected area, monitoring potential rock or soil dislodgement or sliding mass movements.
    c. Cold waves / snow / frosting / hail hazards: natural water sources close by (rivers, tributaries, reservoirs, etc.), supervising watercourses and rising water levels to monitor any potential overflow.
    d. Fire hazard: forest area adjoining the affected area, monitoring sudden wildfire occurrence.
5. Assess the need for diminishing train speeds, or suspend railway traffic altogether if specific risk thresholds are exceeded.

The pre-alert phase will be active as long as it's deemed necessary, modifying any original parameters where appropriate.

In many cases, these pre-alert phases can be linked to the Territory Emergency Plans of the different areas covered by the affected railway infrastructure.

2.6.1.2 General emergency response procedure

The guideline for a general emergency response procedure is outlined below, with examples of specific emergency response plans for each hazard identified.

For the sake of simplicity, the procedure has been divided in accordance with the activities taking place at each emergency level, unifying the End of the Emergency and Service Restoration procedures.

Emergency Level 0

The emergency will be detected at Level 0, to be followed by its inspection and verification, and by an immediate emergency response (where possible).

Emergency detection can take place at two different locations:

- At local level, during the course of infrastructure maintenance/inspection, through the performance of daily operations or through the "SAFEWAY Platform".
- At the Emergency Operations Centre, through the "SAFEWAY Platform" or any other source.

The emergency response procedure will vary depending on whether the detection takes place in one or the other.

1. *Emergency detection at Local level:*

A. Detection and verification

a. On-site local personnel detect a hazardous situation.
b. Assess whether immediate intervention is feasible, supported by the "SAFEWAY platform" (designed to help in the decision-making process in real-time).
c. Whether immediate intervention is feasible or not, notify the Emergency Operations Centre and share or confirm the following data:
   - Exact location of the affected area, in the manner stipulated.
   - Description of affected railway infrastructures.
   - Impact of detected risk materialization and existing damage, with particular focus on:
     - Flooding / torrential rains / storm hazards: type of precipitation, overflow of adjoining natural water sources, etc.
     - Landslides: origin, extension, type, etc.
     - Earthquakes: potential subsidence and cracks, etc.
     - Cold waves / snow / frosting / hail: type of precipitation, overflow of adjoining natural water sources, etc.
     - Fires: origin, extension, magnitude, spread rate, wind direction, etc.
     - Car accidents: victims (including those injured), severity of road obstruction, number and type of vehicles involved, tonnage, potential presence of hazardous cargo, etc.
     - Rail accidents: victims (including those injured), type of accident (derailing, impact, etc.), type of train, potential presence of hazardous cargo, etc.

        - Strong winds: origin, typology, type of wind-borne debris dragged, etc.
    - Description of immediate surroundings, indicating potential presence of buildings, installations, or vehicles close by, as well as potential victims (human and animals).
    - Estimated railway traffic impact.

d. The Emergency Operations Centre will request and consolidate all additional information deemed necessary to respond to the emergency, as well as analyse and record whether the situation is under control or not. Should specific intervention prove necessary, the Emergency Operations Centre will be ready to activate the emergency response plan.

B. Resource mobilization:

a. From this point onwards, the emergency procedure will carry on regardless of the origin of the alert. See the steps set out under "Emergency Detection at the Emergency Operations Centre".

2. Emergency Detection at the Emergency Operations Centre:

A. Detection and verification

a. The existence of a risk that can materialise affecting railway infrastructures is detected at the Emergency Operations Centre through the "SAFEWAY Platform" or other sources.

b. The Emergency Operations Centre agent receiving the alarm will notify the Emergency Room Coordinator.

c. Alarm verification will follow:
    - Contrasting the alarm with other external sources.
    - Contacting local level stakeholders.

d. Should the warning turn out to be a false alarm, it will be recorded as such. Should the alarm be verified, the corresponding Emergency Plan at Level 0 should be activated, triggering preparedness of all necessary interventions.

e. Following analysis of all information received, communication with all emergency personnel at the affected area will be established, requesting any additional information that may prove necessary.

B. Resource mobilization:

a. Identify all affected areas. Contrast the data with all risk areas predefined for each emergency type.

b. Analyse the exact location of potential facilities and installations that may be close to railway infrastructures, in anticipation of potential mutual impact, together with the following risk elements:
    - Flooding / torrential rains / storm hazards: water sources close by (rivers, tributaries, reservoirs, etc.), supervising riverbeds and rising water levels to monitor any potential overflow.
    - Landslide hazards: shallow depression and steep mountain areas in close proximity, in which, together with sliding mass movements, snow avalanches and ice-sheet block dislodgement could occur, resulting in landslides.
    - Cold waves / snow / frosting / hail hazards: water sources close by (rivers, tributaries, reservoirs, etc.), which may overflow.

- Fire hazard: forest areas in the surroundings, which could catch fire.

c. Resources and intervention teams assigned to respond to the identified hazard, will be mobilised:
   - Flooding / storms / torrential rains: manual drainage pumps, water drainage tools, contention barriers, tools for soil compaction, etc.
   - Landslides:
     i. Soil landslides: contention barriers, tools, material and soil collection containers, etc.
     ii. Subsidence: sand bags, tools for soil compaction, etc.
   - Earthquakes: tools, displaced material and soil collection containers, tools for soil compaction, etc.
   - Cold waves / snow / frosting / hail: salt bags, tools for snow/ice/hail removal, tools for soil compaction, etc.
   - Fires: fire extinguishers and fire extinguishing systems (in addition to those that may exist in railway infrastructures, including potential fire hydrants).
   - Car accidents: tools and material collection containers, components that may have broken loose as a result of the collision, etc.
   - Train accidents: tools and material collection containers, components that may have broken loose as a result of the collision, etc.
   - Strong winds: tools and soil collection containers, debris or any other material that may have been dragged, etc.

d. Analyse all existing access routes to the affected area, studying all potential constraints and alternative routes.
e. Intensify surveillance in areas close to those affected.
f. Keep in touch with the Command Control to acquire additional information or new updates on affected areas.

C. Update the Emergency Level of the activated Plan:

a. In case local on-site personnel can control the emergency immediately, the Emergency Operations Centre Officer will declare the End of the Emergency.
b. Once the specialist teams are mobilized, Emergency Level 1 will be activated.
c. If support from External Aid Services has been requested, Emergency Level 2 will be activated upon their arrival.

Level 1

Once the alarm has been verified, it remains to be determined whether the emergency can be resolved with internal resources or whether external support may be necessary. In either case, internal personnel will need to be mobilised, whether to intervene directly or report to External Aid Services.

The following emergency response breakdown is proposed by way of example:

1. The highest ranking local officer, will stay in touch with the Emergency Operations Centre at all times, providing follow-up reports detailing emergency response plans, potential difficulties and progress in controlling said emergency.
   a. At any given time, should the Emergency Room Coordinator consider it appropriate, the presence of in-house counselling personnel at the

Emergency Operations Centre can be requested. Similarly, in-house personnel could be contacted at any given time to require *ad hoc* advice.

b. If necessary, reduction of rail traffic speed (or its suspension in the affected area) can be instructed, depending on the progress made and the circumstances surrounding the emergency.

2. Until specialised responders arrive to the affected area, any in-house staff working on-site shall, where possible, carry out the following:
   a. Cordon off both the risk and intervention areas, preventing potential trespassing.
   b. Prioritise their own safety whilst performing their duties or any additional activity, making use of their individual protection equipment.
   c. Act concertedly when leveraging available emergency technical resources to the extent possible:
      - Flooding / storms / torrential rain: draining water accumulation mainly through portable pumps and earth grounding measures.
      - Landslides: removing earth and debris accumulations, reinforcing and grounding the terrain in case of subsidence.
      - Earthquakes: removing detached earth and debris, reinforcing and grounding the terrain in case of subsidence or cracks.
      - Cold waves / snow / frosting / hail: melting and removing snow/ice/hail deposits, with salt bags and specific tools.
      - Fires: extinguishing a fire affecting railway infrastructures (or surrounding vegetation) and removing potential combustible material in the vicinity of the affected area, leveraging the protection means available to that effect.
      - Car accidents: alert other road users of the stationary presence of the vehicles involved in the accident to redirect traffic, proceeding (where necessary) to the removal of the affected vehicles enlisting the help of their occupants, removing elements or material that may have broken lose as a result of the collision.
      - Rail accidents: alert of the rail accident, removing material and components that may have broken lose as a result of the collision.
      - Strong winds: removing earth and potential debris dragged by the wind.
   d. Prioritise emergency response plans on events impacting railway infrastructures directly.
   e. Remove potential material or debris that may remain in the rail tracks, with particular focus on the most relevant infrastructures.
   f. Activate complementary emergency response procedures to fight the emergency efficiently:
      - Flooding / storms / torrential rains: consider cutting power of all electrical equipment nearby (informing the Emergency Operations Centre, which can plan power cuts remotely).
      - Earthquakes: once the earthquake is over, leverage the existing installations, coordinating with the Emergency Operations Centre:
        - Cut water supply and close off gas valves.
        - In areas where gas may be present, avoid cutting power should a gas leak occur, as a spark can cause the gas vapours to ignite.
        - Avoid using equipment that may cause electrical outlet sparking.

- Cold waves / snows / frosting / hail: consider cutting power of all electrical equipment nearby (informing the Emergency Operations Centre, which can plan power cuts remotely).
- Fires: consider cutting power of all electrical equipment nearby (informing the Emergency Operations Centre, which can plan power cuts remotely) as well as cutting all gas supply; in specific installations such as Tunnels, activate ventilation systems (in coordination with the Emergency Operations Centre and other railroad companies exploiting the railroad activity).

g. Should the existing risk, due to its magnitude, threaten to compromise the safety of the local on-site personnel, the following emergency response procedure will be followed:
   - Abandon all emergency response activities.
   - Emergency staff will retreat to safety, away from the emergency, in order to safeguard their physical integrity. The following considerations should be taken into account:
     - Flooding / storms / torrential rain: should there be no buildings nearby, staff will take cover in vehicles, and where necessary, will retreat to safety (should driving present no additional danger).
     - Landslides: staff will keep away from the potential trajectory of landslides and subsidence.
     - Earthquakes: staff will take into account potential earthquake aftershock; and be particularly vigilant when taking cover inside buildings, always remaining in the safest areas.
     - Cold waves / snowing / frosting/ hail: should there be no buildings nearby, staff will take cover in vehicles, and, where necessary, retreat to safety (should driving present no additional danger).
     - Fires: staff will keep away from the areas more susceptible to fire; and be particularly vigilant when taking cover inside buildings, evacuating as instructed.
     - Car accidents: be particularly vigilant on accident sites involving hazardous cargo.
     - Rail accidents: be particularly vigilant on accident sites involving hazardous cargo.
     - Strong winds: stay away from objects or debris that could be potentially ripped, uprooted and/or dragged by strong winds.
   - Once the emergency risk situation is over, where possible, return to the affected area to continue performing all necessary emergency response procedures, should safety conditions allow.

3. Upon arrival of specialised response teams:
   a. Inform the Emergency Operations Centre of their arrival.
   b. Support all local on-site personnel, taking control of the situation where applicable.
   c. Work in coordination with the local on-site personnel as planned, leveraging, where necessary, the emergency equipment brought to the emergency site.

4. Update the Emergency Level of the activated Plan:
   a. Should it be feasible to control the emergency with the available resources, the Emergency Room Coordinator will declare the End of the Emergency.
   b. Should the emergency fail to be resolved with the available resources, the Emergency Room Coordinator will decide whether to request External Aid Service support. Upon its arrival, Emergency Level 2 will be activated.

Level 2

Once the support of the External Aid Services has been requested, local preparedness to receive them should begin. As soon as these responders arrive, the local staff member in command should inform them of the situation, and from then on, External Aid Services will assume control, with all local teams under their command.

The following summary of emergency response procedures outlines a sample procedure of how to greet External Aid Services:

1. The Emergency Room Coordinator will contact the Incumbent Emergency Officer in the manner established, informing him/her of the situation and jointly evaluating the need for his/her presence at the Emergency Operations Centre.
2. Up until the arrival of the Incumbent Emergency Officer, should this take place, the Emergency Room Coordinator will remain in charge of operations. From the Emergency Operations Centre, the following actions will take place:
   a. Request External Aid Services support and intervention in the manner established, sharing all relevant information and, more specifically, the:
      - Exact location of the affected area, in the manner established.
      - Exact location of the person who will be receiving them in the affected area and identification means displayed.
      - Description of the emergency type and situation status.
      - Description of the immediate surroundings, indicating potential presence of buildings, installations or any other relevant elements. Likewise, other potential risk threats in the surroundings will be highlighted:
        i. Flooding / storms / torrential rains: water sources (rivers, tributaries, reservoirs, etc.).
        ii. Landslides: shallow depression and steep mountain areas.
        iii. Earthquakes: shallow depression and steep mountain areas.
        iv. Cold waves / snow / frosting / hail: natural water sources (rivers, tributaries, reservoirs, etc.).
        v. Fires: high-risk premises and installations (including vehicles), combustible material storage, forest areas, etc.
        vi. Car accidents: potential hazardous cargo.
        vii. Rail accidents: potential hazardous cargo.
      - Potential impact level to adjacent areas.
      - Number of local emergency responders.
      - Temporary emergency development.
      - Presence of injured victims.

b. Inform the local level person in charge of the upcoming arrival of External Aid Sources.
c. Assess whether train speed should be diminished or rail traffic suspended in the affected area.
d. Inform the Officers of the adjoining installations whenever the emergency may extend to their locations. Said warning can also be given at an earlier stage if necessary. Should their support be deemed necessary, the relevant request shall be made.
e. Inform the railway companies overseeing rail service in affected infrastructures. Said warning can also be given at an earlier stage if necessary. Should their support be deemed necessary, the relevant request shall be made.
f. At any given moment, the presence of in-house counselling personnel at the Emergency Operations Centre can be requested, as and where appropriate. Similarly, in-house personnel could be contacted at any given time to provide ad hoc advice.

3. The person in command at local level will greet External Aid Services, and:
   a. Update them with all relevant details pertaining to the emergency and the installations.
   b. Pass on control of emergency response operations.
   c. Ensure all local personnel will be at their disposal. Should External Aid Services so require, in-house personnel will collaborate with External Aid Services facing the emergency jointly, and facilitate any technical resources available that may be of use in emergency response.
   d. Keep in touch with the Emergency Operations Centre at all times, issuing periodic reports on External Aid Services activity.
4. At any given time:
   a. Teams will remain extra vigilant in order to detect any potential new risk alerts that may affect railway infrastructures, either directly or indirectly:
      - Flooding / storms / torrential rains: potential water accumulations, as well as any overflows involving natural water sources (rivers, tributaries, reservoirs, etc.)
      - Landslides: potential soil and debris accumulations, or any other subsidence material.
      - Earthquakes: potential aftershocks (together with new detachments or subsidence caused by previous earthquake occurrence)
      - Cold waves / snow / frosting / hail: potential new accumulations of snow/ice/hail, as well as any potential overflow of adjacent natural water sources (rivers, tributaries, reservoirs, etc.)
      - Fires: potential sources of re-ignition or fire propagation in adjoining areas.
      - Car accidents: potential hazardous cargo.
      - Rail accidents: potential hazardous cargo.
      - Strong winds: potential new soil, materials or debris accumulations.
   b. Keep monitoring surrounding premises and installations (or any other potential element) at risk, which may be impacted by the emergency at a later stage.

5. Updating Emergency Level:
   a. Should External Aid Services report the situation to be completely under control, the Emergency Officer will declare the End of the Emergency.

Level 3

Emergency Level 3 corresponds to the activation of Territory Emergency Plans, (hierarchically superior to installation Emergency Plans). This level will never be set in motion by an Activity Owner, but rather as a reaction to the activation of Territory Emergency Plans.

A Level 3 emergency may be declared when an inferior emergency level is escalated, even without the Emergency Plan having been activated.

For instance, terrorist attacks will entail activation of a Level 3 Emergency Plan as standard procedure, although some minor acts of vandalism may result in Emergency Plan activation at lower levels.

The summary below outlines all emergency response procedures to be carried out should a Level 3 Emergency be declared:

1. The incumbent Emergency Officer or, in his/her absence, the Emergency Room Coordinator, will assemble the Crisis Committee, which will take control of the situation from that moment on.
2. Should a Level 3 Emergency be directly declared (i.e. without prior emergency levels having been triggered), or faced with new requests and information, the Crisis Committee will take the following actions:
   a. Request mobilisation of the required personnel to the affected area, with all necessary technical resources and safeguarding staff safety at all times.
   b. Ensure any other action requested by the Crisis Committee is duly performed.
   c. When requested, establish contact with the Officers responsible for the adjoining installations and the railway companies exploiting railway services in the affected railway infrastructures.
3. At local level:
   a. Keep in touch with the Emergency Operations Centre, reporting on situation development.
   b. Remain at the disposal of the External Aid Services mobilised to the affected area.
4. Declare the End of the Emergency when the Crisis Committee so instructs.

End of the Emergency and Service Restoration

It is of vital importance to distinguish between the End of the Emergency (the emergency situation is under control) and Service Restoration, which may require additional actions to ensure the infrastructures affected by the emergency are back to normal.

Once the End of the Emergency has been declared, the following actions are to be carried out:

1. If there are injured victims, follow up on their progress.
2. Proceed to service restoration:

a. The affected area will be cordoned off to avoid access of unauthorised personnel.
b. A post-emergency damage assessment and list of repercussions will be prepared.
c. All potential railway infrastructure damage will be repaired.
d. All railway infrastructures located in the affected area will be inspected, with particular focus on the following:
   - Flooding / storms / torrential rain:
     i. Water accumulation.
     ii. Debris dragged by water.
     iii. State of the terrain.
     iv. Arrangement and reinforcement of all repaired or replaced elements.
     v. Drainage slopes by railway infrastructures.
     vi. Correct performance of electronic equipment powered off during the emergency.
   - Landslides:
     i. Soil, materials and debris accumulation, particularly if it affects rail tracks or their immediate surroundings.
     ii. Ground stability.
     iii. Arrangement and reinforcement of all repaired or replaced elements.
     iv. Protection nets installed in mountain slopes and steep mountain areas.
   - Earthquakes:
     i. Dislodged materials.
     ii. Firm set up of railway infrastructures on the terrain.
     iii. Arrangement and reinforcement of all repaired or replaced elements.
     iv. Energy installations powered off during the emergency.
   - Cold waves / snow / frosting / hail:
     i. Residual snow/ice/hail/water accumulations.
     ii. Objects or material dragged by the snow/ice/hail.
     iii. Firm set up of railway infrastructures on the terrain.
     iv. Drainage slopes by railway infrastructures.
     v. Correct performance of electronic equipment powered off during the emergency.
   - Fires:
     i. Potential re-ignition areas.
     ii. Cleaning up burnt material and extinction residue.
     iii. Firmly secure railway infrastructures to the terrain.
     iv. Correct performance of potential electronic equipment powered off during the emergency.
     v. Ventilation of affected installations.
   - Car accidents:
     i. Detached materials and components, as well as any potential cargo remains.
     ii. Protection barriers and signalling elements that may have been damaged or destroyed.

iii. Firmly secure railway infrastructures to the terrain.

- Rail accidents:
  i. Detached materials and components, as well as any potential cargo remains.
  ii. Signalling elements that may have been damaged or destroyed.
  iii. Firmly secure railway infrastructures to the terrain.
- Strong winds:
  i. Dragged objects and material.
  ii. Firmly secure railway infrastructures to the terrain.
  iii. Signalling elements that may have been damaged or destroyed.

e. Once the proper condition of railway infrastructures can be fully guaranteed, restoration of services in the affected area can be initiated.

3. To ensure the proper functioning of the Emergency Plan, should the need for it to be reactivated arise:
   a. All technical resources leveraged in emergency response should be inspected, as well as ensuring equipment replenishment and collection of all necessary emergency response material.
   b. Access routes to the affected area will be inspected, proceeding to clearing or repairing them where necessary, subject to the severity of the emergency and its aftermath.
   c. Stay alert throughout the days following the emergency, looking out for new potential emergency threats.
4. Increase Emergency Plan efficiency:
   a. Proceed to draft a detailed report of the emergency and the emergency response actions taken.
   b. Keep an updated record of past emergency events, with details on all emergency response activities and measures adopted, as well as the consequences and impact on railways infrastructures.
   c. Know-how acquired in previous emergency response plan scenarios should be leveraged to improve SAFEWAY implementation.
5. The established communication protocol should be adhered to at all times.

2.6.2 Outline of duties and responsibilities. Emergency Response Activity Sheets

In an Emergency Plan, the outline of duties and responsibilities for each identified member of the emergency organisational chart would be listed hereafter.

The vital importance of this content lies in simplifying emergency personnel training. Step by step procedures will allow for a clear and simple understanding of the general emergency response procedure overview. Emergency Response Activity Sheets will convey, schematically, the list of duties and responsibilities of each team member. Consequently, they have strong educational value and will aid in scoping the duties that need to be covered in an emergency event by each emergency response team member.

Even though, to a certain extent the content below could be repetitive (extrapolating the data readily available via emergency procedures), only two

sheets will be shared below by way of example. A specific Emergency Plan could contain a tailored sheet layout to ensure it can be handled simply and efficiently.

2.6.2.1 Incumbent Emergency Officer

The Emergency Officer will be the person in charge for as long as the emergency lasts. Due to the relevance of this role, around the clock cover should be arranged by appointing deputies, as well as by ensuring their duties can be delegated to the Emergency Room Coordinator.

Due to the characteristics of the role, two good candidates to fulfil these duties would be the Infrastructure Exploitation Officer or the incumbent Safety Officer.

Involvement of the incumbent Emergency Officer will start as of Emergency Level 2. Consequently, having completed his/her working hours, the incumbent Emergency Officer will be on-call 24/7 and readily available should his/her presence be required at the Emergency Operations Centre.

Duties and responsibilities assigned to the incumbent Emergency Officer include:

Level 2:

- The Emergency Room Coordinator will be responsible for informing the incumbent Emergency Officer about any emergency situation that arises.
- Together with the Emergency Room Coordinator, the incumbent Emergency Officer will assess whether his/her presence at the Emergency Operations Centre is necessary for the performance of his/her duties. Should this prove not to be necessary, the incumbent Emergency Officer will remain alert should the situation change and his/her presence be required at the Emergency Operations Centre.
- Should the incumbent Emergency Officer decide his/her presence is required at the Emergency Operations Centre, he/she will:
  - Assume control of the emergency response procedures.
  - Collect all available information related to the emergency.
  - Coordinate communications with on-site local personnel.
  - Coordinate the greeting of External Aid Services, in case they have not yet arrived.
  - Coordinate the execution of the emergency response actions instructed by the Emergency Aid Services, both at local level and from the Emergency Operations Centre (including suspending rail traffic or managing ventilation, for instance).
  - Coordinate the mobilisation of resources and teams to the affected area.
  - Coordinate surveillance of the areas affected by the emergency and their adjoining installations.
  - Coordinate communications with activity owners of installations next to the emergency area, as well as companies present in the railway installations affected.
  - Declare the End of the Emergency when the situation is confirmed to be under control.

Level 3:

- Coordinate the creation of the Crisis Committee.
- Become part of the Crisis Committee.

In any case, after the End of the Emergency has been declared:

- Supervise the drafting of all emergency reports; taking full responsibility for writing these up whenever he/she acted as Emergency Officer.
- Supervise the update of emergency log records.

2.6.2.2 Deputy Emergency Officer (Emergency Operations Centre Officer)

The Emergency Room Coordinator will be the Emergency Officer in the absence of the incumbent Emergency Officer (or in the absence of his/her replacements).

The role of Emergency Room Coordinator requires availability around the clock, all year long. As a result, this role needs to be covered by personnel working on rotation.

The main duties assigned to the Emergency Room Coordinator include:

Level 0:

- Be warned of an emergency alert being received.
- Coordinate alert verification.
- Coordinate communications with local on-site personnel.
- Should the alert be confirmed:
  - Coordinate immediate emergency response actions.
  - Coordinate mobilisation of means and resources to the emergency area.
  - Assess the need to alert External Aid Services.
  - Declare the corresponding Emergency level.

Level 1:

- Assume control of emergency response procedures.
- Coordinate communications with local on-site personnel.
- Collect all available information on the emergency.
- Coordinate mobilisations of teams and resources to the emergency area.
- Assess the need to request support from External Aid Services and, should that be the case, coordinate placing the request, updating Emergency Level to 2 and arrange the greeting of said Services.
- Coordinate the monitoring of areas affected by the emergency and their adjoining installations.
- Coordinate communications with the activity owners of installations next to the emergency area, as well as companies present in the railway installations affected.
- Coordinate all emergency response actions including, if necessary, reducing rail traffic speed in the affected section or suspending rail traffic altogether, as appropriate.
- Declare the End of the Emergency when the situation is confirmed to be under control.

Level 2:

- Contact the incumbent Emergency Officer whenever a situation arises. Together, they will assess whether his/her presence at the Emergency Operations Centre is mandatory when assuming control over Emergency response activities.
- Should the incumbent Emergency Officer fail to be at the Emergency Operations Centre, take on board all duties and responsibilities previously outlined for the incumbent Emergency Officer role, Level 2.
- Should the incumbent Emergency Officer be at the Emergency Operations Centre, put him/herself at his/her disposal, coordinating the execution of all instructions received.

Level 3:

- Should the incumbent Emergency Officer be away from the Emergency Operations Centre, coordinate the creation of the Crisis Committee.
- Remain available to the Crisis Committee for whatever they may require.

In any case, at the end of an emergency:

- Draft all emergency reports whenever he/she had been acting as Emergency Officer.
- Update the records of the emergency log related to the emergency event where he/she had been acting as Emergency Officer.

2.6.3 Emergency Response Activity Sheets aimed at specific hazards

As explained above, despite having a single Emergency Response Procedure is preferable for training purposes and to understand how emergency response procedures work, to thoroughly review the different emergency response actions orchestrated from the Emergency Operations Centre, it is better to look at the Activity Sheets that detail response procedures for each emergency.

An Emergency Response Activity Sheet sample is provided below. It has a schematic layout to simplify decision making throughout the course of the emergency.

2.6.3.1 Activity Sheet against torrential rains

Pre-alert values

There should be pre-established values of rainfall by square metre for each geographic area, as well as specific elements identified as vulnerable to torrential rains. This way, the pre-alert emergency warning could be activated in the event of torrential rains in a particular area.

Additionally, past seasonal periods in which each specific area was subject to an emergency should be taken into account.

These values are better presented in a table to simplify their reading and understanding.

Vulnerable elements

The vulnerable elements affected by emergencies triggered by torrential rains (identified in Table 5 of the present document) shall be schematically represented as follows:

Table 6: Vulnerable elements affected by torrential rain

Emergency	Potential elements affected
Torrential rains	Viaducts
	Embankments
	Protection elements
	Fencing
	Vegetation
	Rail tracks
	Ballast

Should a particular element historically appear more vulnerable to the risk of torrential rain in a specific area, said element should be highlighted in the current section and the possibility of including bespoke preventative actions tailored to said risk should be considered. Any elements that could be particularly relevant from a service standpoint should also be highlighted. In this case, specific emergency response procedures should be considered to that effect.

Preventative actions against torrential rains

Both the main preventative actions carried out under normal circumstances against torrential rains, as well as the specific preventative actions to be carried out during the pre-alert phase, should be duly recorded. Special attention should be paid to preventative actions involving the vulnerable elements identified against this hazard.

Emergency response procedures could be different depending on the characteristics of each area.

Amongst these the following can be highlighted:

- Periodic supervision and maintenance of the vulnerable and most relevant elements identified.
- Update the emergency log records on torrential rain events.
- Training cycles on behalf of emergency response personnel involved in fighting torrential rain hazards (including the "SAFEWAY Platform").
- Regular maintenance of resources and equipment used for emergencies against torrential rain.

Amongst the emergency response procedures carried out in the pre-alert phase, the following could be included:

- Cleaning of the culverts systems, sludge pumps and automatic water extraction systems.

- Surveillance of water sources close to railway infrastructures, paying special attention to water level overflows that may result in flooding.
- Reducing rail traffic speed or suspension of rail traffic in specific areas should precipitations exceed set thresholds.
- Issuing training reminders to personnel in charge of emergency response against torrential rain.
- Intensify the supervision and maintenance of all vulnerable and relevant elements identified.
- Intensify the maintenance cycles of resources and equipment used in emergencies against torrential rains.

Emergency response procedures against torrential rains

Lastly, the specific emergency response protocol against torrential rains will be taken from the general emergency response procedure, which will separately outline the specificities linked to this particular scenario.

1. Level 0

Detection of an affected area at local level (flooding or water-dragged debris):

1. Detection and verification
   a. Local personnel detect a risk situation or "SAFEWAY Platform" issues a warning.
   b. Assess whether immediate intervention is feasible, supported by the "SAFEWAY Platform", which helps make real-time decisions.
   c. Regardless of whether immediate intervention is feasible or not, inform the Emergency Operations Centre of the situation, relaying or confirming the following data:
      - Exact location of the affected area, in the manner established.
      - Description of the railway infrastructures affected.
      - Probability of a detected risk materializing and overview of existing damages, specifying for each emergency:
        - Torrential rains: hazard identified, type of rainfall, potential water source overflow, natural water sources close by, etc.
      - Description of immediate surroundings, indicating potential presence of buildings, installations or vehicles close by, as well as potential victims (humans and animals).
      - Estimated impact on railway traffic.
   d. The Emergency Operations Centre will request and consolidate all additional information deemed necessary to respond to the emergency, as well as analyse and record whether the emergency situation is under control. Should specific intervention prove necessary, the Emergency Operations Centre will be ready to trigger emergency response actions.

2. Mobilising resources:
    a. From this point onwards, the emergency procedure will carry on regardless of the origin of the alert. See the steps set out under "Emergency Detection at the Emergency Operations Centre".

Emergency Detection at the Emergency Operations Centre (a warning is received of a specific area being affected, whether by flooding or debris being dragged):

1. Detection and verification
    a. The existence of a risk that can materialise affecting railway infrastructures is detected at the Emergency Operations Centre through the "SAFEWAY platform" or other sources.
    b. The Emergency Operations Centre agent receiving the alarm will notify the Emergency Room Coordinator.
    c. Alarm verification will follow:
        - Contrasting the alarm with other external sources (Local Administrations, companies in charge of adjacent water supplies that may be the source of the threat, etc.).
        - Contacting local level stakeholders.
    d. Should the warning turn out to be a false alarm, it will be recorded as such. If the alarm is confirmed, the corresponding Emergency Plan at Level 0 will be activated, triggering preparedness of all necessary interventions.
    e. Following analysis of all information received, communication with all emergency personnel at the affected area will be established, requesting any additional information that may prove necessary.
2. Resource mobilization:
    a. Identify all affected areas. Contrast the data with all risk areas predefined for each emergency type.
    b. Analyse the exact location of potential premises and installations that may be close to railway infrastructures, in anticipation of potential mutual impact, together with the following risk elements:
        - Torrential rains: water sources close by (rivers, tributaries, reservoirs, etc.) that may be subject to any potential overflow.
    c. Resources and intervention teams assigned to respond to the identified hazard will be mobilised:
        - Torrential rains: manual drainage pumps, water drainage tools, contention barriers, tools for soil compaction, etc.
    d. Analyse all existing access routes to the affected area, studying all potential constraints and alternative routes.
    e. Intensify surveillance in areas adjoining that affected.
    f. Keep in touch with the Emergency Operations Centre to remain aware of any additional information or changes impacting affected areas.
3. Update the Emergency Level of the activated Plan:
    a. In case local on-site personnel have been able to immediately control the emergency, the Emergency Room Coordinator will declare the End of the Emergency.

b. Once the specialist responder teams are mobilized, Emergency Level 1 will be activated.
c. If support from External Aid Services has been requested, Emergency Level 2 will be activated upon their arrival.

2. Level 1

1. At all times, the highest-ranking local officer will stay in touch with the Emergency Operations Centre to provide follow up reports detailing emergency response actions, potential difficulties and progress in controlling said emergency.
   a. At any given time, should the Emergency Room Coordinator consider it appropriate, the presence of in-house counselling personnel at the Emergency Operations Centre can be requested. Similarly, in-house personnel could be contacted to provide *ad hoc* advice.
   c. If deemed necessary, reducing rail traffic speed or suspending rail traffic in the affected area can be instructed (depending on the progress made and the circumstances surrounding the emergency).
2. Until specialised responders arrive to the affected area, the in-house staff working on-site should, where possible, do as follows:
   a. Cordon off both the risk and intervention areas, preventing potential trespassing.
   b. Prioritise their own safety whilst performing their duties or any additional activity, making use of their individual protection equipment.
   c. Act concertedly when leveraging available emergency technical resources to the extent possible:
      - Torrential rains: draining water accumulation, mainly through portable pumps and earth grounding measures.
   d. Prioritise emergency response actions on events directly impacting railway infrastructures.
   e. Remove potential material or debris that may remain in the rail tracks, with particular focus on the most relevant infrastructures.
   f. Activate complementary emergency response procedures to fight the emergency efficiently:
      - Torrential rains: consider cutting power of all electrical equipment nearby (informing the Emergency Operations Centre, which can plan power cuts remotely).
   g. Should the existing risk, due to its magnitude, threaten to compromise the safety of the local on-site personnel, the following emergency response procedure will be followed:
      - Abandon all emergency response activities.
      - Emergency staff will retreat to safety, away from the emergency, in order to safeguard their physical integrity. The following considerations should be taken into account:
        - Torrential rains: should there be no buildings nearby, staff will take cover in vehicles and, where necessary, will retreat to safety (should driving present no additional danger).

- Once the emergency risk situation is over, where possible, return to the affected area to continue performing all necessary emergency response procedures (provided it is safe to do so).

3. Upon the arrival of specialised response teams:
   a. Inform the Emergency Operations Centre of their arrival.
   b. Support all local on-site personnel, taking control of the situation where applicable.
   c. Work in coordination with the local on-site personnel as planned, leveraging, where necessary, the emergency equipment brought to the emergency site.
4. Update the Emergency Level of the activated Plan:
   a. Should it be feasible to control the emergency with the available resources, the Emergency Room Coordinator will declare the End of the Emergency.
   b. Should the emergency fail to be resolved with the available resources, the Emergency Room Coordinator will decide whether to request External Aid Service support. Upon its arrival, Emergency Level 2 will be activated.

3. Level 2

1. The Emergency Room Coordinator will contact the incumbent Emergency Officer in the manner established, informing him/her of the situation and jointly evaluating the need for his/her presence at the Emergency Operations Centre.
2. Up until the arrival of the incumbent Emergency Officer, should this take place, the Emergency Room Coordinator will remain in charge of operations. From the Emergency Operations Centre, the following actions will take place:
   a. Request the support of External Aid Services and their intervention through the established means, sharing all relevant information and, more specifically, the:
      - Exact location of the affected area, in the manner established.
      - Exact location of the person who will be greeting them in the affected area and identification means displayed.
      - Description of the type and status of the emergency.
      - Description of the immediate surroundings, indicating potential presence of buildings, installations or any other relevant elements. Likewise, other potential threats in the surrounding areas will be highlighted:
        - Torrential rains: water sources (rivers, tributaries, reservoirs, etc.).
      - Potential impact to adjacent areas.
      - Number of local responders.
      - Temporary emergency development.
      - Presence of injured victims.
   b. Inform the local level person in charge of the upcoming arrival of External Aid Services.
   c. Assess whether train speed should be diminished or rail traffic suspended in the affected area.

d. Inform the Officers of adjoining installations whenever there is a risk the emergency will extend to their locations. Said warning can also be given at an earlier stage if necessary. Should their support be deemed necessary, the request shall be made.
e. Inform the railway companies overseeing rail service in affected infrastructures. Said warning can also be given at an earlier stage if necessary. Should their support be deemed necessary, the request shall be made.
f. At any given moment in time, the presence of in-house counselling personnel at the Emergency Operations Centre can be requested, as and where appropriate. Similarly, in-house personnel could be contacted at any given time to provide ad hoc advice.

3. The person in command at local level will greet External Aid Services, and:
   a. Update them with all relevant details pertaining to the emergency and the installations.
   b. Pass on command of emergency response operations.
   c. Ensure all local personnel will be at their disposal. Should External Aid Services so require, in-house personnel will collaborate with External Aid Services facing the emergency jointly, and facilitating the available technical resources that may be of use.
   d. Keep in touch with the Emergency Operations Centre, at all times, issuing periodic reports on External Aid Services activity.
4. At any given time:
   a. Teams will remain extra vigilant in order to detect any potential new risk alerts that may affect railway infrastructures, either directly or indirectly:
      - Torrential rains: potential water accumulations, as well as natural water sources overflow (rivers, tributaries, reservoirs, etc.)
   b. Monitor the surrounding premises and installations (or any other potential element) at risk, which may be impacted by the emergency at a later stage.
5. Updating Emergency Level:
   a. Should External Aid Services report the situation to be completely under control, the Emergency Officer will declare the End of the Emergency.

4. Level 3

1. The incumbent Emergency Officer or, in his or her absence, the Emergency Room Coordinator, will assemble the Crisis Committee, which will take control of the situation from that moment on.
2. If a Level 3 Emergency is directly declared (i.e. without prior emergency levels having been triggered), or when faced with new requests and information, the Crisis Committee will take the following actions:
   a. Request mobilisation of the required personnel to the affected area, with all necessary technical resources and safeguarding staff safety at all times.
   b. Ensure execution of any other action the Crisis Committee requests.
   c. When requested, establish contact with the Officers responsible for the adjoining installations and the railway companies exploiting railway services in the affected railway infrastructures.

3. At local level:
   a. Remain in contact with the Emergency Operations Centre, reporting on situation development.
   b. Remain at the disposal of the External Aid Services mobilised to the affected area.
4. Declare the End of the Emergency when the Crisis Committee so instructs.

5. End of the Emergency and Service Restoration

1. If there are injured victims, follow up on their progress.
2. Proceed to service restoration:
   a. The affected area will be cordoned off to avoid trespassing.
   b. A post-emergency damage assessment and list of repercussions will be prepared.
   c. All potential railway infrastructure damage will be repaired.
   d. All railway infrastructures located in the affected area will be inspected, with particular focus on the following:
      - Torrential rains:
        i. Water accumulation.
        ii. Debris dragged by water.
        iii. State of the terrain.
        iv. Arrangement and reinforcement of all repaired or replaced elements.
        v. Drainage slopes by railway infrastructures.
        vi. Correct performance of potential electronic equipment powered off during the emergency.
   e. Once the proper condition of railway infrastructures can be fully guaranteed, restoration of services in the affected area can be initiated.
3. To ensure the proper functioning of the Emergency Plan, should the need for it to be reactivated arise:
   a. All technical resources leveraged in emergency response should be inspected, as well as ensuring equipment replenishment and collection of all necessary emergency response material.
   b. Access routes to the affected area will be inspected, proceeding to clearing or repairing them where necessary, subject to the severity of the emergency and its aftermath.
   c. Stay alert throughout the days following the emergency, looking out for new potential emergency threats.
4. Increase Emergency Plan efficiency:
   a. Proceed to draft a detailed report of the emergency and the emergency response actions taken.
   b. Keep an updated record of past emergency events, detailing all emergency response activities and measures adopted, as well as the consequences and impact on railways infrastructures.
   c. Know-how acquired in previous emergency response plan scenarios should be leveraged to improve "SAFEWAY Platform"implementation.
5. The established communication protocol should be adhered to at all times.

2.7 Chapter 7: Emergency Plan Implementation, Maintenance and Update

In order to activate an Emergency Plan, it is of critical importance to implement it first. This refers to the process of training personnel that will be involved in emergency response activities.

Similarly, the currency of the Emergency Plan must be guaranteed to ensure it remains functional, enhanced by adjustments and updates involving additional risks, including new railway infrastructures and adapting the emergency response plan accordingly.

Maintaining the Emergency Plan up-to-date can be achieved through two different processes:

- Emergency Plan Maintenance: including timely and pertinent updates on specific risks that may take place.
- Emergency Plan Update: including a scheduled full Emergency Plan review that will take place on a regular basis, or when significant changes occur that may affect the content of the Emergency Plan.

To guarantee the correct performance of the emergency response plan procedures, it will be of vital importance to appoint an owner for each process (as proposed in Section 3).

2.7.1 Emergency Plan Implementation: content proposal and training cycles

Once the Emergency Plan has been drafted, the following process should be to train/inform/qualify the staff identified in the emergency organisational chart under Section 6.

Emergency Plan implementation will start with the definition and development of the courses to be taught, tailored to the profiles assigned by the Emergency Organization to each of its staff. Subject to the professional profiles assigned to each Team, as well as their work location, job rotation and duties before an emergency, the appropriate and most suitable training methodology for each group will be defined, differentiating between on-site and online training.

Once the appropriate groups and methodologies have been identified, it becomes necessary to determine the training content for each profile. As an example, the following summary has been put together outlining the basic content of a standard emergency training course:

- Introducing the Emergency Plan.
  - Purpose.
  - Scope.
  - Structure.
  - Coordination with other Emergency Plans.
  - Activity Owners.
  - Emergency Plan implementation process.
- Premises and installations of the railway installations subject to the Plan.
  - Main activity.
  - Subsidiary activities and associated uses.

- Risks associated to railway infrastructures.
  - Definition.
  - Vulnerable elements.
  - Affected areas.
- Protection means.
  - Technical resources (including the "SAFEWAY Platform").
  - Human resources.
- Emergency response procedures.
  - Emergency levels.
  - Emergency response organisational chart.
  - Emergency response activity flowchart.
  - General procedures.
  - Specific procedures.
  - Roles and responsibilities: Emergency Activity Sheets.
- Drive home the importance of a swift, efficient and coordinated response before an emergency.
- Raise awareness of the importance of shared responsibility for everyone's benefit.

Obviously, contents should be adjusted and tailored to each of the identified profiles, broadening content aligned to the specific needs of each group. For instance, local personnel should have access to extensive content on the technical resources at their disposal to fight each and every emergency risk. In any case, the feasibility of testing training know-how with practical exercises using said means would be worth considering.

Similarly, the frequency with which the training will be refreshed should be assessed and agreed: a minimum annual revision is recommended. Annual training refresh sessions need not include all original training content. When new staff joins the Emergency Organisation, they will receive the same training offered to the original organisation members.

Once the emergency personnel have completed all necessary training/information sessions, drill exercises will be carried out with the aim to rehearse procedures, expand knowledge and verify the efficiency of procedures.

These drills may cover an entire emergency response cycle, or focus exclusively on a particular section of the emergency procedure (depending on the available means and resources). As with training courses, the regularity with which these drills take place will depend on the frequency with which emergency scenarios occur for each of the forecasted risks. Performing drills during pre-alert phases caused by specific risks may be considered. The different scenarios outlined in each drill may also vary depending on the most relevant situations that require rehearsing.

In any case, drills will help verify the efficiency of the Emergency Plan with the purpose of:

- Training all Emergency Organization members in their assigned duties and responsibilities, in accordance with emergency response procedures.

- Assess the effectiveness of the emergency response of all Emergency Organization members, as well as the practical degree of assimilation of the training knowledge acquired before the drill.
- Review the level of coordination and communication amongst the members of the Emergency Organization.
- Detect potential circumstances or anomalies in the development of the emergency response actions to be executed by the different members of the Emergency Organisation.
- Verify correct maintenance and performance of available technical resources: both internal emergency response means and communication procedures between the different Emergency Organization members.
- Detect potential circumstances that may not have been taken into account or may not have been reflected sufficiently clearly in the current Emergency Plan.
- Evaluate the suitability of the Emergency Plan on the basis of final conclusions drawn.
- Measure intervention times, aid mobilization, etc. with the aim to improve efficiency.

After each drill has been completed and detailed information has been collected, a Drill Report must be drafted. This shall include:

- Training: verified list of personnel taking part in the drill, certifying training/information courses received as well as knowledge acquired.
- Drill:
  - Drill approach, management and organisation.
  - Chronological development (sequence of times and activities).
  - Analysis of duties and actions of each Emergency Organisation member.
  - Performance of existing resources.
  - Detection of potential missed circumstances in the Emergency Plan.
  - Potential anomalies occurred during the drill.
  - Measurement of response times: results.
  - Potential errors detected.
  - Proposed improvements.

The incumbent Emergency Officer, whose duty is to remedy any and all deficiencies observed during drill performance, must sign off the Drill Report. Once the Implementation Report has been approved internally, an Implementation Certificate will be issued and will be processed through the appropriate regulatory framework established to this effect.

Lastly, an emergency log collecting all Drill Reports carried out in the past will be kept duly up to date, including any additional annotations deemed necessary. This will facilitate:

- An adequate follow-up of the development and improvement of the emergency response actions and, consequently, of the railway infrastructure's resilience.
- Traceability of every simulated emergency drill, with the aim to cover different scenarios, constraints, emergency levels, etc.
- Improvement in the use and efficiency of all technical resources employed.
- Improvement in the design of all emergency response procedures.

2.7.2 Maintaining the efficiency of the Emergency Plan

Every time the characteristics of the installations or its work procedures may change (or should new technologies be brought in, etc.), the need to add these to the Emergency Plan must be considered. Moreover, a training refresher course for the emergency personnel involved may be necessary. The Owner of the Emergency Plan will be responsible for this process.

2.7.3 Emergency Plan Update

The present Emergency Plan will be in effect and current as long as the railway infrastructures suffer no substantial variations in terms of their establishment, activity, provision of means (technical or human), significant deficiencies detected during drill performance, or the apparition of risk elements (external or internal) different to those considered initially when the original Emergency Plan was conceived.

In any case, with the aim to keep the Emergency Plan up to date, the following maintenance operations must be carried out periodically (with a minimum frequency that should be agreed for each of them):

- Review and re-evaluate all risk factors.
- Include works in progress and any other modifications to the railway infrastructure.
- Update the inventory of protection means.
- Incorporate any variations to the human resources structure (members of the Emergency Organization).
- Append all updated plans.
- Verify the course of action forecasted for Emergency Response procedures.
- Recycle the Emergency Organization and actively disseminate emergency directives and know-how to all personnel.

Additionally, potential variations to the applicable legislation or the current internal regulatory framework that may impact the Emergency Plan should be taken into account.

Consecutive versions of the Emergency Plan, conveniently signed and filed, should be kept at the disposal of Authorities should they require access, with particular emphasis on the Emergency Plan version currently in effect.

2.8 Annex I. Emergency Directory

This Annex will collect contact details for all the relevant personnel involved in Emergency Plan operations.

This information could be available to all Emergency Organization staff through "SAFEWAY Platform".

As an example, the following contact list should be present in this Annex:

- Crisis Committee Members.
- Emergency Officer.
- Area Managers.
- External Aid Services (specifying their scope of work).
- Railway Companies (specifying their scope of work).

- Other non-railway related Companies.

2.9 Annex II. Emergency Forms

A number of emergency forms that need to be included in an Emergency Plan are detailed below by way of example.

These forms, or any other deemed necessary, will become available to all emergency personnel through the "SAFEWAY Platform", for necessary use and consultation at any given time.

- Declaring and Communicating a Pre-alert Phase Form.
- Emergency Communication Form: it will include the contact details of all stakeholders that should be informed in case of emergency, as well as the information to be shared.
- External Aid Service request form: it will include details of all stakeholders that should be informed in case of emergency, as well as the information to be shared.
- End of the Emergency and Service Restoration Form.

2.10 Annex III. Railway Network Maps/Planimetry

The present Annex should include all representative maps of the railway infrastructures referenced in the Plan:

- Cartographic maps of the global Railway Infrastructure (for Railway Network Plans), including main communication routes and all relevant risk areas.
- Situation maps for Railway Network sections or specific railway infrastructures, including main access routes, protection means and all vulnerable elements.
- Floor plans and section plans of the most relevant railway infrastructures, like Stations or Tunnels.

3. Road Emergency Plan Guidelines

3.1 Chapter 1: Introduction

As referred previously in section 1 Introduction of this deliverable, the subsequent chapters of the guideline to a Road Emergency Plan have the same structure and content, when possible, of the guideline to a Railway Emergency Plan. It will be underlined the situations that are different or don't apply to a road infrastructure.

Road context should be interpreted as all road elements.

3.1.1 Scope of application

This section is similar to 2.1.1 from the Railway Emergency Plan Guidelines, however in road network infrastructures unlike the railway there aren't any buildings associated with the road infrastructure (e.g. stations) so structures like buildings should not be considered in the Road Emergency Plan.

3.1.2 Legal framework

See topic 2.1.2 from the Railway Emergency Plan Guidelines.

3.1.3 Hazard identification and definition

The identified hazards and their corresponding definitions regarding road networks, are the same as the identified hazards for railway networks as specified in topic 2.1.3.

For section 2.1.3.10 of the Railway Emergency Plan Guidelines and when applied for the Road Emergency Plan it must be considered that car accidents are the most common and frequent hazard events in a road network and have multiple causes to occur influenced by a system of three variables: driver, vehicle and infrastructure. The probability of occurrence of a train accident that affects road infrastructure is much lower, however, it is possible that a train accident that interferes with a near road.

These accidents can take place anywhere in the world (Affected areas like in 2.1.3.10).

3.2 Chapter 2: Activity description

This section is similar to 2.2 of the Railway Emergency Plan, however in road network infrastructures unlike the railway, there aren't any buildings associated with the road infrastructure so structures like buildings should not be considered in a definition of a Road Emergency Plan.

3.2.1 Network map

See topic 2.2.1 from the Railway Emergency Plan Guidelines, which is also applicable to road context.

3.2.2 Infrastructure listing

This section is similar to topic 2.2.2 of the Railway Emergency Plan Guidelines, but in road network infrastructures unlike the railway, there aren't any buildings associated with the road infrastructure so the example of Table 2: Railway station listing table (example)

is not applicable in the definition of a Road Emergency Plan.

See road infrastructures listing table example below.

Table 7: Road infrastructure (bridges, tunnels, etc.) listing table (example)

Region	Infrastructure	Description	Road identification	Initial kilometre/ Coordinate	final kilometre/ Coordinates	raod length (in km)

3.3 Chapter 3: Identifying the Key Responsible Agents

See topic 2.3, from the Railway Emergency Plan Guidelines, which is applicable to road context.

The only difference is that the Dependent Activity Owner key agent is only applicable to the Railway Emergency Plan Guidelines (topic 2.3.1.2). In the road context there is no legal connection with companies that use the road in opposition of the railway sector.

3.4 Chapter 4: Inventory of available prevention and emergency response resources and services

This section has in general the same content as the one defined in the Railway Emergency Plan Guidelines on section 2.4. However, resources as fire detection systems installed in buildings (e.g. stations) are not considered as part of the road network context, as previously referred in topic 3.2.

It is important to mention that in the road infrastructure system context there aren't other companies operating in road infrastructure that need to make a connection with the Road Emergency Plan.

3.4.1 Preventive resources and services

The topics 1 and 2, from the Railway Emergency Plan Guidelines, are not applicable to road infrastructure.

Fixed block signals are a resource specific of railway system. For roads, a similar resource is only applicable to road tunnels.

However, road tunnels have a separate emergency plan based on specific legislation that stablishes the emergency response and where signalling is already considered.

It is worth to highlight another resource available only in road system, the variable-message signs. The Emergency Response Plan should assess the level of detail required in listing and describing the messages adapted to a specific event according to traffic regulations.

3.4.2 Emergency Response resources and services

In the topic 2, from the Railway Emergency Plan Guidelines, the Railway Communications Emergency Operations Centre is a particularity of this kind of infrastructure and are not applicable to the road context because there aren't any companies exploiting the road infrastructure.

3.5 Chapter 5: Emergency identification and classification

See topic 2.5 from the Railway Emergency Plan Guidelines, which is applicable to road context.

3.5.1 Classifying emergencies in terms of affected elements

3.5.1.1 Road infrastructure vulnerable elements

See topic 2.5.1.1 from the Railway Emergency Plan Guidelines, which is applicable to road context.

3.5.1.2 Vulnerable elements specific to road infrastructures

Pavement

Pavement is exposed to the following hazards:

- Heat waves
- Landslides
- Flooding
- Earthquake
- Cold waves
- Fires
- Car accidents

Lighting columns

Lighting columns are structures design to support single or multiple luminaires and are exposed to the following hazards:

- Storms
- Landslides
- Earthquake
- Fires
- Car accidents

Any of these hazards can interrupt road circulation when columns fall to the road.

Road gantries

Road gantries are metallic structures over the road design to support traffic signs or road traffic management equipment's such as variable message traffic signs, cameras or open road tolling systems.

These structures can be:

- Bridges with poles in each side of the road
- One sided – half gantry

Road gantries are exposed to the following hazards:

- Storms – wind loads can have a negative impact on the stability of the structure, in half gantry.
- Landslides
- Earthquake
- Fires

Vehicle restraint systems

Vehicle restraint systems are devices designed to restrain a crash from different kind of vehicles in different conditions and reduce as much as possible the extent of damage and injuries in case of accidents where an errant vehicle leaves the roadway and they can be:

- Safety barriers - installed lengthwise on the roadside or central reservation of roadway;
- Crash cushions – installed in special locations where a point hazard cannot be solved. This hazard must be view in the perspective of the consequences to the occupants of the vehicle, in the case of an accident.

The vehicle restraint systems are exposed to the following hazards:

- Fires – high temperatures can cause a reduction in the strength of the material especially in the case of steel vehicle restraint systems.
- Landslides
- Earthquakes
- Car accidents – impact damage from the vehicle collision.

3.5.1.3 Emergency Table - Potential Affected Elements

See topic Emergency Table - Potential Affected Elements2.5.1.3, from the Railway Emergency Plan Guidelines, which is applicable to road context.

However, pavement and vehicle restraint systems should be considered on the list of emergencies and potential road elements involved, according to the table below.

Table 8: List of Emergencies and potential road elements involved

Emergency	Potential affected elements
Flooding/ torrential rains / storms	Viaducts
	Embankments
	Protection elements
	Fencing
	Vegetation
	Pavement
	Lighting columns
	Road gantries
Landslides	Underpass and overpass
	Viaducts
	Embankments
	Culverts
	Protection elements
	Fencing
	Vegetation
	Pavement
	Lighting columns
	Road gantries
	Vehicle restraint systems
Earthquakes	Underpass and overpass
	Tunnels
	Viaducts
	Embankments
	Protection elements
	Fencing
	Vegetation
	Pavement
	Lighting columns
	Road gantries
	Vehicle restraint systems
Heat waves	Embankments
	Vegetation
	Pavement
Cold waves	Embankments
Fires	Vegetation
	Lighting columns
	Road gantries
	Vehicle restraint systems
Car accident	Underpass and overpass
	Embankments

Emergency	Potential affected elements
	Lighting columns
	Vehicle restraint systems

3.5.2 Classifying emergencies by command level

See topic 2.5.2 from the Railway Emergency Plan Guidelines, which is applicable to road context.

3.6 Chapter 6: Emergency response procedures

See topic 2.6, 2.6.1 and 2.6.2, from the Railway Emergency Plan Guidelines, which is applicable to road context.

3.6.3 Emergency Response Activity Sheets aimed at specific hazards.

See topic 2.6.3, from the Railway Emergency Plan Guidelines, which is general applicable to road context in case of emergency related to torrential rains.

The differences are:

In topic 0, pavement should be considered as a potential element affected (see Table 6: Vulnerable elements affected by torrential rain)Table 6: Vulnerable elements affected by torrential rain. In this context, rail tracks and ballast elements should not be considered.

In topic 0, when applicable to road context, the reduction traffic speed should not be considered as an emergency response procedure carried out in the pre-alert phase.

So, when precipitations exceed set thresholds in specific areas, the proper action considered is the suspension of road traffic. It is considered very difficult to guarantee in the road infrastructure the compliance of signalling reduction speed circulation without a presence of authorities therefor is not considered a safe practice for the general road infrastructure. Also, it is safer and more viable to redirect the traffic to alternative roads.

In topic 0, when applicable to road context, the reduction traffic speed should not be considered in Level 2 emergency response procedures against torrential rains in as explained above. The proper action considered is the suspension of road traffic. Also, in Level 2 and Level 3 is not applicable the procedure to inform the officers of adjoining installations and railway companies overseeing rail service in affected infrastructures.

In the End of the Emergency and Service Restoration, the correction performance of potential electronic equipment powered off during the restoration service procedure is not applicable to road infrastructure located in the affected area.

3.7 Chapter 7: Emergency Plan Implementation, Maintenance and Update.

See topic 2.7 from the Railway Emergency Plan Guidelines.

3.8 Annex I. Emergency Directory

See topic 2.8 from the Railway Emergency Plan Guidelines.

3.9 Annex II. Emergency Forms

See topic 2.9 from the Railway Emergency Plan Guidelines.

3.10 Annex III. Road Network Maps/ Planimetry

See topic 2.10 from the Railway Emergency Plan Guidelines, applied to road context.

4. Participation of other stakeholders related to emergency events

4.1 Introduction

As defined in the Grant Agreement, it was expected the participation of other stakeholders related to emergency events such as Nacional Civil Protection (NCP). After several failed attempts to invite the NCP authorities and other stakeholders to participate in the development of task 8.1 to stablish a guideline to construct an emergency plan for linear infrastructures, it was stablished that:

- All partners involved in the task would carefully revise the Emergency Plan and provide feedback since they are all stakeholders closely related to emergency events.
    - Network Rail is the owner and infrastructure manager of most of the railway network in Great Britain.
    - Infraestruturas de Portugal (IP) is the Portuguese rail and road infrastructure manager. Besides, the IP safety department would be highly involved in providing feedback for the Road Emergency Plan Guideline. IP safety department is a good alternative since IP as all his emergency procedures are aligned with the way of treat emergency by Portuguese NCP.
    - Ferrovial Agroman is one of the main contractors and maintenance providers of High-Speed rail worldwide.
    - Budimex is one of leading infrastructure construction and maintenance in Poland.
- Ferrovial would look for a consulting company highly specialised in the development and implementation of Emergency and Self-Protection Plans with great experience in infrastructures in order to develop a Railway Emergency Plan Guideline (guideline to be used as a baseline for the Road Emergency Plan).

4.2 Railway Emergency Plan Guidelines

Securitec, the consultancy company hired to develop the Railway Emergency Plan Guideline, has proven experience in developing and implementing Emergency and Self-Protection Plans. Since its activity began in October 1991, in Securitec more than 5,000 Emergency Plans have been developed for a large number of companies, in different sectors. Furthermore, Securitec has among its main clients Adif (the Spanish state-owned railway infrastructure manager) Renfe (the Spanish state-owned company which operates freight and passenger trains) and Madrid Metro.

To develop the Guideline for a general infrastructure in the context of SAFEWAY project, it was necessary to review both current regulations and plans and their evolution over the last decades. As a result, several innovative aspects have been included, among which the most relevant ones are the followings:

- Inclusion of the "SAFEWAY Platform" for alarm communication and decision support: "SAFEWAY Platform" is the software that is being developed within

the project and that could facilitate direct communication between the different Operations Centres.
- Inclusion of prevention actions determined by declaring a pre-alert phase in a particular area facing a specific hazard.
- Inclusion of the scope and interconnection between the different Emergency Plans that affect a railway network.
- Inclusion of the identification of activity ownership of dependent activities within the Emergency Plan.
- Classification of emergencies by command level.
- Inclusion of a single emergency response procedure.

4.3 Road Emergency Plan Guidelines

A draft of the deliverable D8.1 Emergency Management Plan, was submitted for approval to the Safety Department of IP, that is responsible for emergency management in the company.

It should be noted that IP, the largest infrastructure manager of road and railway in the Portuguese context, has the emergency plan aligned with the procedure of Portuguese NCP, in the way that classifies and treats the Emergency.

The following ideas where presented in order to have a structured feedback from the IP safety Department of the proposed Road Emergency Guideline:

- Integration of the "SAFEWAY Platform" for alarm communication and decision support;
- Inclusion of interdependence specific Emergency Plans that affect the road network;
- Classification of emergencies based on the Command Level;
- Risk evaluation;
- Inclusion of a single unified emergency procedure;
- Main differences between the company's official plan and the proposed one (Road Emergency Plan Guidelines);
- Challenges in the adoption of Road Emergency Plan Guidelines; and
- Additional important aspects to refer.

4.3.1 Consideration of the "SAFEWAY Platform" for alarm communication and decision support

The inclusion of software tools to support the decisions from a control centre which allow to improve the overall efficiency, particularly concerning the road system.

The prospect of computerizing procedures related to the emergency, in order to indicate the level of emergency of a given event. The presentation of the available and allocated means. And above all, the decision support for the presentation of safe alternative paths, will be very useful in solving cases like the unfortunate case of the Pedrogão Grande fires.

The possibility of having updated risk maps for different risks is considered as another important point.

4.3.2 Inclusion of interdependence specific Emergency Plans that affect the road network

In the Portuguese case, the management of emergencies in buildings is carried out in separate procedures because there is a specific legislation. Thus, it should be noted that the description of the activity to which the plan refers, depends on the legal framework of each country.

4.3.3 Classification of emergencies based on the Command Level

The classification of the emergency based under the command hierarchy is a disruptive proposal in relation to the Portuguese case. In the Portuguese case emergency is function of the impact it represents for the circulation (injured, dead, environmental and material damages, interruption of the roads).

Adapting the alert scales defined in the guideline with the current civil protection / IP emergency scale is the most sensitive point.

Despite the alert level is defined according to the command one, this classification will be the reference applied to the operational levels, with the need of an adaptation work, as external entities use another type of classification, depending on other variables (material and environmental damage, impact on circulation and victims).

One of the main aspects whereby the guideline differs is that the pre-alert level is a phase of detection of a future situation, in which the level of alert may rise. IP doesn't consider the state of pre-alert because it must be included on the contingency procedure.

Practice led to classify the processes separately - emergency / contingency, that are being managed by different collaborators (operation / maintenance). The direct connection with Civil Protection, particularly when there are alerts for meteorological conditions, IP activates a contingency plan and reinforce means (patrolling, inspection, policing) to shorten the response time for clearing roads.

According to this is possible to establish alternative routes preventing, (at outsets), that drivers travelling on highways going enter to closed roads.

The pre-alert state depends on the internal resources available and as such, for now, contingency processes allow to guarantee the emergency response. In parallel. inspection processes seek to identify the weaknesses of the infrastructure. Both concepts are fundamental to guarantee that during an emergency event the infrastructure is in its best state of conservation.

The consideration of the pre-alert state, as a process, is not consensual, there are companies (including IP in the past), that have networks to manage consider all in one emergency treatment process. Others (such as managing companies, distribution networks), divide their operations into contingency, emergency and business continuity into distinct, but interconnected, processes.

In sum, each organization is responsible of the resources, emphasizing that a support system as SAFEWAY platform can greatly facilitate the implementation of a unified process.

4.3.4 Risk Evaluation

The Road Emergency Plan Guidelines integrate a more detailed approach of risk assessment of the infrastructure that seeks a detailed knowledge of their weaknesses. It is important to define the type of operational response that the plan owner must assemble. The actual practice is based on (local) coordination with the civil protection agents appointed from the emergency coordinating centre.

4.3.5 Inclusion of a single unified emergency procedure

Theoretically, it is undeniable that the unification of emergency treatment in a single procedure would bring operational advantages, since one of the principles of emergency procedure is to know how to deal with the development of the emergency, regarding to the allocation of means and contacts with external entities (when necessary).

However, and although the guideline points it, the unified emergency procedure will be a very demanding exercise because of the particularities that each plan has. Special infrastructures (*e.g.* tunnels, bridges) have specific legislation that are included in each emergency plans.

4.3.6 Main differences between the company's official plan and the proposed one (Road Emergency Plan Guidelines)

The risks considered in the Road Emergency Plan Guidelines were previously identified.

In the company's Official plan, the nature of the emergency defines how to allocate the resources as they depend on variables like severity of possible injuries as well as the dimension of the emergency.

4.3.7 Challenges in the adoption of Road Emergency Plan Guidelines

- Means. The manager's priority is to restore the road functionality, in co-operation with the Emergency Services. Currently, the company does not have its own heavy equipment (e.g. cranes) in the prevention phase, as it exists on the railroad, and which can be used immediately in certain emergency cases. There is a huge dependence on the resources of external entities involved to solve the emergency.

- Assignment of means. Only concessionaires can provide remote surveillance coverage through their traffic control centers in a more satisfactory way using video surveillance. Concessionaries manage high-capacity roads as highways, with a more controlled environment in the network and closed to animals and people. IP network is characterized by a more heterogenic road environments and an extensive network to managed. This is a huge challenge that affects remote means of surveillance, such as human resources., Only in the high-performance network, like Highway's, would it be possible to apply the guidelines proposed in the Road Emergency Plan in a more effective and realistic way.

- Generic support from external entities like as civil protection and security forces among others.

- The guideline can only be applied effectively on the network where it is possible to carry out a real-time monitoring. Because of the size of the road network that IP manages, much of the information is provided by other entities as civil protection and security forces among others.

4.3.8 Additional important aspects to refer

- Currently, the infrastructure manager in case of a road emergency outside the high-performance network, like Highway's, has a more passive posture and depends on third- party means.

- In opposition of the railway network, the road circulation is open to pedestrians and vehicles, which makes very difficult to centralize operations in the infrastructure. However, in the case of road tunnels that integrate the trans-European network, emergency management is carried out on the Emergency Coordinating Center, as the management of the security equipment and systems are monitored there.

- The existing road emergency plan is designed to be as simple as possible and has been developed under the same hierarchy of emergency classification that the Portuguese Civil Protection adopted in accordance with the National Legislation.

- There is no prior risk identification, as proposed on the Road Emergency Plan Guidelines.

- As a positive aspect to highlight with the implementation of the Road Emergency Plan Guidelines, it's the possibility to know in real time what action procedure for a certain risk has to be taken, as there is already a plan where specific means must be allocated to respond to the emergency. This will allow the management of resources to response and act in a more efficient way specially in risk areas, which are not the same throughout the network. The production of risk maps prior to the establishment of an emergency plan, will allow the establishment of more efficient regional and local procedures, where the organization between entities can be done in a more solid way.

- Emergency contacts of external emergency services should be included in the emergency directories.

- General road emergency plans (excluding special infrastructures, such as tunnels and bridges) are unknown in other companies similar to IP, so the challenges are enormous.

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