

Joint Network Secretariat Normal Procedure Task Force  
Great Belt bridge Accident/Incident

# Final report

Annex 1 : Impact Assessments

- Impact assessment - Subgroup Ia. Update of Action Plan 2019
- Impact assessment - Subgroup Ib. Communication and training related to hitches
- Impact assessment - Subgroup IIa. Cross-wind stability of rolling stock & Subgroup IIb. Measures at infrastructure side
- Impact assessment - Subgroup IIIa. Hitch sensors
- Impact assessment - Subgroup IIIb. Locking force

# Impact assessments

## Subgroup Ia. Update of Action Plan 2019 (1/3)

<b>1. Context and assessment of impacts</b>
<b>1.1. The Subgroup outcome in object</b>
TF Subgroup 1a Secure Loading: Update of Action Plan 2019.
<b>1.2. Analysis performed</b>
<p>The analysis performed included a review of the document detailing out risk mitigation measures for pocket wagons equipped with any hitch types at different stages of unloading / loading, notably:</p> <ol style="list-style-type: none"><li>1. <i>Maintenance concerning pocket wagons</i></li><li>2. <i>(Optional) At arrival, after removing the semi-trailer or container from the pocket wagon (unloading)</i></li><li>3. <i>Before placing the semi-trailer on to the pocket wagon (loading - preparation)</i></li><li>4. <i>During placing the semi-trailer onto the pocket wagon (loading).</i></li><li>5. <i>Immediately after placing the semi-trailer onto the pocket wagon (loading)</i></li><li>6. <i>Before train departure</i></li><li>7. <i>Communication: actors involved and links</i></li><li>8. <i>Staff competences</i></li></ol> <p>For each of these elements it is determined the timing (when), the stakeholder(s) involved (who), the actions, tools and resources, the consequences of the actions and any relevant documentation</p>
<b>1.3. Assessment of impacts</b>
<p>Overall, the document provides an overview of best-practice for these different operational phases linked to the use of pocket wagons. This draws on several elements, incl. GCU requirements, legal requirements (e.g., the ECM Regulation, OPE TSI and the CSM SMS) as well as other guidance at industry level. For example, there are requirement in the OPE TSI concerning 'Safety of Load: <i>The railway undertaking shall make sure that freight vehicles are safely and securely loaded and remain so throughout the journey</i>' (Para. 4.2.2.4.1 in Annex to the OPE TSI).</p> <p>It is likely that this best-practice was already in force before the Great Belt Bridge accident in 2019. Therefore, for those stakeholders that are already fully applying these elements systematically there should only be negligible costs. On the other hand, for stakeholders without having adopted these practices yet there could be additional costs. Systematic use of the indicated best-practices is likely to have a positive impact on reducing the risk associated with pocket wagons with respect to secure loading.</p>

# Impact assessments

## Subgroup Ia. Update of Action Plan 2019 (2/3)

<b>1.4. Stakeholders affected</b>			
The main stakeholders affected are listed in the following table			
Railway undertakings (RU)	<input checked="" type="checkbox"/>	Member States (MS)	<input type="checkbox"/>
Infrastructure managers (IM)	<input type="checkbox"/>	Third Countries	<input type="checkbox"/>
Manufacturers	<input type="checkbox"/>	National safety authorities (NSA)	<input checked="" type="checkbox"/>
Keepers	<input checked="" type="checkbox"/>	European Commission (EC)	<input type="checkbox"/>
Entity Managing the Change (EMC)	<input checked="" type="checkbox"/>	European Union Agency for Railways (ERA)	<input type="checkbox"/>
Notified Bodies (NoBo)	<input type="checkbox"/>	Terminal operators	<input checked="" type="checkbox"/>
Associations	<input checked="" type="checkbox"/>	Other (Please specify): Entity in Charge of Maintenance / Staff in RUs / Terminals / Truck drivers	<input checked="" type="checkbox"/>
Shippers	<input checked="" type="checkbox"/>		<input type="checkbox"/>
The identification of these stakeholders is based on the information provided in the report subgroup 1a.			

## 2. Preferred option and follow-up information

### 2.1. Recommendation

The identified best-practice outlined in the report should be taken forward and systematically used by the concerned stakeholders. Overall, benefits are likely to be outweighed by costs.

A key issue would be to ensure that the best practices are taken on board to a larger extent than before the Great Belt Bridge accident. This may be facilitated through several means, notably NSA supervision, audits by ECM certification bodies, industry / sector activities to increase awareness among members etc.

Moreover, attention should be given to generate confidence in the correct implementation of the action plan. In particular, this confidence should rely on the demonstrated capability of RUs, through their SMS, that critical variability in secure loading can be detected and prevented early. It would be relevant if the current action plan is updated with information concerning how the assurance regime is built/set up.

### 2.2 Follow-up information

The document provides a clear overview of the actions, tools, and resources to be deployed by the stakeholders. It would be useful to get information about:

- *Extent to which the best-practice has been achieved*
- *Specific aspects for which the best-practice has already been achieved or only achieved to a limited extent*
- *Country variations*
- *Challenges / barriers to implement best-practice and possible solutions to address those challenges*
- *An assessment of the contribution on risk reduction from systematic use of the best practices for secure loading*

# Impact assessments

## Subgroup Ib. Communication and training related to hitches (1/3)

<b>1. Context and assessment of impacts</b>
<b>1.1. The Subgroup outcome in object</b>
TF Subgroup 1b Secure Loading: Communication and training related to hitches
<b>1.2. Analysis performed</b>
<p>The analysis performed included reviewing the section in the draft final report concerning the findings from Subgroup 1b. This subgroup examined two main aspects linked to secure loading for combined traffic in the railway sector:</p> <ul style="list-style-type: none"><li>• <i>Communication, and</i></li><li>• <i>Training related to hitches</i></li></ul> <p>The findings concern specifically the management of hitches. It is highlighted the flow of information between the different stakeholders in CT, incl. who owns the related documents and/or is responsible for the actions to be taken. Further details are provided concerning information exchange among actors (preparation for Business), information exchange in case of damages and information exchange with components in service (return of experience). Key points include confirming receipt of information, distribution to the right persons and the understanding along with traceability. As for staff competencies the report addresses both training before business start as well as maintaining competencies stressing importance of follow-up (through audits) and traceability.</p>
<b>1.3. Assessment of impacts</b>
<p>Overall, the report from Subgroup 1b provides an overview of best-practice for communication flow among the stakeholders involved in combined transport along with principles for training to assure staff competencies. It is likely that this best-practice was already in force before the Great Belt Bridge accident in 2019. The Subgroup findings mentions relevant requirements (e.g., GCU) as well as provisions in the ECM Regulation. Moreover, the CSM SMS is also of relevance, e.g., with respect to staff competencies. As such these provide the overall frame which can be used for optimizing the management of hitches in terms of communication flows and staff competencies according to the specific contexts for the different companies. For those stakeholders that are already fully applying these elements systematically there should only be negligible costs. On the other hand, for stakeholders without having adopted these practices yet there could be additional costs. Systematic use of the indicated best-practices is likely to have a positive impact on reducing the risks associated with pocket wagons with respect to secure loading considering the importance of efficient and effective communication flows along staff competencies. The report also mentions the frequency with which audit / monitoring of staff competencies should be undertaken, although without providing specific indications on this.</p>

## Impact assessments

### Subgroup Ib. Communication and training related to hitches (2/3)

<b>1.4. Stakeholders affected</b>			
The main stakeholders affected are listed in the following table			
Railway undertakings (RU)	<input checked="" type="checkbox"/>	Member States (MS)	<input type="checkbox"/>
Infrastructure managers (IM)	<input type="checkbox"/>	Third Countries	<input type="checkbox"/>
Manufacturers	<input checked="" type="checkbox"/>	National safety authorities (NSA)	<input checked="" type="checkbox"/>
Keepers	<input checked="" type="checkbox"/>	European Commission (EC)	<input type="checkbox"/>
Entity Managing the Change (EMC)	<input checked="" type="checkbox"/>	European Union Agency for Railways (ERA)	<input type="checkbox"/>
Notified Bodies (NoBo)	<input type="checkbox"/>	Terminal operators	<input checked="" type="checkbox"/>
Associations	<input checked="" type="checkbox"/>	Other (Please specify), Entity in Charge of Maintenance, Staff in RUs / Terminals / Truck drivers	<input checked="" type="checkbox"/>
Shippers	<input checked="" type="checkbox"/>		<input type="checkbox"/>
The identification of these stakeholders is based on the information provided in the report subgroup 1b.			

## Subgroup Ib. Communication and training related to hitches (3/3)

<b>2. Preferred option and follow-up information</b>
<b>2.1. Recommendation</b>
<p>The identified best-practice outlined in the report should be taken forward and systematically used by the concerned stakeholders. Overall, benefits are likely to be outweighed by costs.</p> <p>A key issue would be to ensure that the best-practices are taken on board to a larger extent than before the Great Belt Bridge accident. This may be facilitated through several means, notably NSA supervision, audits by ECM certification bodies, industry / sector activities to increase awareness among members etc.</p> <p>It should be stressed that it would be relevant to include consideration regarding the interface between the action plan (under Subgroup 1a) and the issues under consideration in Subgroup 1b. In particular, confidence in the correct implementation of the action plan cannot rely only on implementing measures related to competence management. This assurance should rely on demonstrated capability of RUs, through their SMS that, critical variability in secure loading can be detected and prevented early (see Subgroup 1a).</p>
<b>2.2 Follow-up information</b>
<p>The document provides a clear overview of relevant aspects of importance for appropriate communication flow and approach towards assurance of staff competencies. It would be useful to get information about certain aspects in order to facilitate monitoring of progress:</p> <ul style="list-style-type: none"><li>• <i>Extent to which the best-practice has been achieved</i></li><li>• <i>Specific communication aspects for which the best-practice has already been achieved or only achieved to a limited extent</i></li><li>• <i>Country variations</i></li><li>• <i>Challenges / barriers to implement best-practice and possible solutions to address those challenges</i></li><li>• <i>An assessment of the contribution on risk reduction from systematic use of the best practices for communication flow / staff competencies</i></li></ul>



## Subgroup IIa. Cross-wind stability of rolling stock &amp; Subgroup IIb. Measures at infrastructure side (1/4)

<b>1. Context and assessment of impacts</b>
<b>1.1. The Subgroup outcome in object</b>
TF Subgroup 2a/b: Crosswind safety (a) Crosswind stability of rolling stock; (b) Measures at infrastructure side
<b>1.2. Analysis performed</b>
<p>The analysis performed included a review of the part of the report summarizing the subgroup findings. Subgroup 2a/b considered the following elements:</p> <ul style="list-style-type: none"> <li>• <i>Benchmarking activities</i> <ul style="list-style-type: none"> <li>○ <i>Examples from Eurotunnel, SNCF, PRORAIL, DB regarding best-practice for addressing crosswind safety issues</i></li> </ul> </li> <li>• <i>UIC-SAFIRST project</i> <ul style="list-style-type: none"> <li>○ <i>Vehicle assessment, Assessment of line wind exposure, application of the Reference Characteristic Wind Curves (RCWC's)</i></li> </ul> </li> <li>• <i>Statement of Cluster II members and recommendations</i></li> <li>• <i>Banedanmark inputs</i></li> </ul> <p>As such the best-practice examples provide suggestions for individual companies (notably IMs and RUs) to address crosswind safety issues and may also identify measures that could be examined as part of a systematic risk analysis. In this context it may be useful to specify criteria to facilitate comparison between the selected examples.</p> <p>This subgroup proposes to extend the results of the SAFIRST project related to cross wind safety to freight wagons including pocket wagons loaded with semi-trailers. The intention is to clarify the responsibilities between Rolling Stock and Infrastructure regarding cross wind safety. This would allow a subsequent update of EN14067-6 to consider the issue of crosswinds on semi-trailers wagons.</p> <p>Moreover, it is emphasised the importance of complementing the already performed risk analysis, via the application of a harmonised methodology onto the related risk scenario with pocket wagons running on Great Belt Bridge to determine measures to be adopted on vehicle and infrastructure side. This may also examine whether the Great Belt Bridge is to be categorized as special or general case.</p> <p>Finally, it is suggested that the Agency should assess the conditions for the delivery of an “AMOC”, in the frame of Cross Wind Safety, to provide the railway sector with a European/International methodology for assessing and evaluating risks, coping with the objectives of Safety and Interoperability Directives</p>

## Subgroup IIa. Cross-wind stability of rolling stock &amp; Subgroup IIb. Measures at infrastructure side (2/4)

**1.3. Assessment of impacts**

The Subgroup outlines a relevant approach for addressing issues linked to Crosswind safety on vehicle and infrastructure side. In this context, it is proposed that a follow-up risk assessment should be developed drawing on the methodology from SAFIRST specifically applied to the Great Belt Bridge (updating the specific methodology to consider cross wind safety for pocket wagons loaded with semi-trailers). The risk assessment would include analysis of costs and benefits for the possible different measures allowing for a ranking of these. Therefore, the Subgroup does not propose concrete measures now but indicates a framework that can be used to determine measures that reduces the risks while considering costs of measures.

As a result of this work, change requests for the WAG TSI, the LOC&PAS TSI and the INF TSI might be developed. In addition, the holistic risk assessment methodology in SAFIRST could become an additional in-depth guideline to the CSM for Risk Evaluation and Assessment. From an impact assessment perspective, the findings from the Subgroup will not lead to significant benefits and costs at this point. Any measures that would be proposed would be determined based on a risk assessment / cost-benefit analysis. This approach should ensure that any measures would be selected in such way that costs are outweighed by the benefits.

It should be highlighted that the suggested way forward would allow to gather and consolidate existing analyses on crosswind safety issues with particular focus on pocket wagons loaded with semi-trailers. As such this would ensure evidence-based and transparent decision-making. Moreover, the subgroup findings also mention the relevance of resilience of transport systems in a context with climate change which are likely to increase the incidence of extreme weather phenomena.

## Subgroup IIa. Cross-wind stability of rolling stock &amp; Subgroup IIb. Measures at infrastructure side (3/4)

**1.4. Stakeholders affected**

The main stakeholders affected are listed in the following table

Railway undertakings (RU)	<input checked="" type="checkbox"/>	Member States (MS)	<input type="checkbox"/>
Infrastructure managers (IM)	<input checked="" type="checkbox"/>	Third Countries	<input type="checkbox"/>
Manufacturers	<input checked="" type="checkbox"/>	National safety authorities (NSA)	<input checked="" type="checkbox"/>
Keepers	<input checked="" type="checkbox"/>	European Commission (EC)	<input type="checkbox"/>
Entity Managing the Change (EMC)	<input checked="" type="checkbox"/>	European Union Agency for Railways (ERA)	<input checked="" type="checkbox"/>
Notified Bodies (NoBo)	<input checked="" type="checkbox"/>	Terminal operators	<input checked="" type="checkbox"/>
Associations	<input checked="" type="checkbox"/>	Other (Please specify), Staff in RUs / Terminals / Truck drivers	<input checked="" type="checkbox"/>
Shippers	<input type="checkbox"/>		<input type="checkbox"/>

The identification of these stakeholders is based on the information provided in the report subgroup 2a/b.

## Subgroup IIa. Cross-wind stability of rolling stock &amp; Subgroup IIb. Measures at infrastructure side (4/4)

**2. Preferred option and follow-up information****2.1. Recommendation**

The suggested approach put forward by Subgroup 2a/b is appropriate by ensuring a robust decision-making basis for selecting efficient and effective measures within a holistic perspective. However, this holistic view should not be limited to the identified risk that « semi-trailers on pocket-wagons move outside the gauge during transport » (on the GBB) but should in addition cover all possible rail traffic throughout Europe.

With specific reference to the Great Belt Bridge context this approach could confirm whether with existing operational and rolling stock related risk control measures additional risk control measures are still needed. This may also consider potential issues linked to the existing wind measurement on the GB west bridge.

**2.2 Follow-up information**

The information provided in the final reporting is comprehensive. It should be considered whether there are any methodological issues to be resolved prior to update the SAFIRST project to consider cross wind safety to freight wagons including pocket wagons loaded with semi-trailers. Moreover, it would be important to ensure that any further / complementary risk analysis linked to the Great Belt Bridge context would be put in place based on consensus and the overall shared aim of increasing the available knowledge among the stakeholders to identify and implement efficient and effective solutions.

# Impact assessments

## Subgroup IIIa. Hitch sensors (1/3)

<b>1. Context and assessment of impacts</b>
<b>1.1. The Subgroup outcome in object</b>
TF Subgroup 3a Reliable King-pin Locking: Hitch sensors
<b>1.2. Analysis performed</b>
<p>The analysis performed included a review of the part of the report summarizing the subgroup findings. This subgroup proposes a technical solution for an on-board locking indicator (hitch sensor) available to be used by any interested party. The information provided details out:</p> <ul style="list-style-type: none"><li>• <i>Basic Prerequisites</i></li><li>• <i>Functional requirements</i></li><li>• <i>Minimum Information to be transmitted to Data Systems</i></li></ul> <p>Such an indicator would show: 1) status of right king pin position; and 2) status of the king pin locking. Transport would be allowed when both criteria are fulfilled, while transport would not be allowed if one of the criteria is not fulfilled.</p>
<b>1.3. Assessment of impacts</b>
<p>The assessment of impacts is influenced by whether the locking indicator (for which several products may be available, TBC) would be mandatory or voluntary. So far, such a locking indicator is not mandatory. In that case, only those companies choosing to use the indicator would face additional costs for purchasing, installing and maintenance. However, given that such companies would use these voluntarily it is likely that perceived benefits are outweighing the costs. On the other hand, if it was to become mandatory there may be additional costs to be weighed up against the benefits. Information about the approx. cost of an indicator (purchase, installation, maintenance) has been estimated to be 1000 EUR per wagon. As it currently stands without mandatory requirements on the use of the identified indicator benefits are likely to be higher than any costs.</p>

## Impact assessments Subgroup IIIa. Hitch sensors (2/3)

### 1.4. Stakeholders affected

The main stakeholders affected are listed in the following table

Railway undertakings (RU)	<input checked="" type="checkbox"/>	Member States (MS)	<input type="checkbox"/>
Infrastructure managers (IM)	<input type="checkbox"/>	Third Countries	<input type="checkbox"/>
Manufacturers	<input checked="" type="checkbox"/>	National safety authorities (NSA)	<input type="checkbox"/>
Keepers	<input checked="" type="checkbox"/>	European Commission (EC)	<input type="checkbox"/>
Entity Managing the Change (EMC)	<input checked="" type="checkbox"/>	European Union Agency for Railways (ERA)	<input type="checkbox"/>
Notified Bodies (NoBo)	<input type="checkbox"/>	Terminal operators	<input checked="" type="checkbox"/>
Associations	<input checked="" type="checkbox"/>	Other (Please specify), Entity in Charge of Maintenance, Staff in RUs / Terminals / Truck drivers	<input checked="" type="checkbox"/>
Shippers	<input type="checkbox"/>		<input type="checkbox"/>

The identification of these stakeholders is based on the information provided in the report subgroup 3a.

<b>2. Preferred option and follow-up information</b>
<b>2.1. Recommendation</b>
<p>The use of the proposed hitch sensor indicator could be a relevant measure to adopt by companies in the CT chain. However, it would be worthwhile to provide further information about the indicator (see below).</p>
<b>2.2 Follow-up information</b>
<p>The document provides an overview of the hitch sensor indicator. It could be useful to get information about:</p> <ul style="list-style-type: none"><li>• <i>Likely take-up in case the indicator would remain voluntary</i></li></ul>

# Impact assessments

## Subgroup IIIb. Locking force (1/3)

<b>1. Context and assessment of impacts</b>
<b>1.1. The Subgroup outcome in object</b>
TF Subgroup 3b Reliable Hitch Locking: Locking force
<b>1.2. Analysis performed</b>
<p>The analysis performed included a review of the part of the report summarizing the subgroup findings. This subgroup examined the following elements:</p> <ul style="list-style-type: none"><li>• <i>Safety barriers: definition, classification and performance criteria (literature review)</i></li><li>• <i>Hitch &amp; Pocket wagons: standards, rules and safety barriers</i></li><li>• <i>System approach for designing pocket wagons</i></li><li>• <i>Locking mechanisms: best practices, locking forces, tests, recommendations</i></li></ul> <p>The subgroup concludes that there is no need for additional assessments of the hitch within a system approach for the design of pocket wagons. Moreover, based on a set of tests undertaken on the locking mechanism it is concluded that these and the accompanying documentation provided by the hitch manufacturer are sufficient, to ensure a safe transportation of semi-trailers on pocket wagons.</p> <p>As such the Subgroup stresses the importance of a holistic approach considering infrastructure, wagons, hitches and loading units. Overall, the Subgroup 3b emphasises that wind speed remains the key factor in wagon running behaviour and should be further investigated after the JNS. Moreover, it is recommended that a minimum threshold value of locking force shall be the result of an in-depth risk assessment (see proposal from Subgroup 2a/b).</p> <p>Following the results of the additional work suggested additional specifications could be added in the TSI WAG and in the EN standards and/or UIC-related IRS. However, this can only be put forward once the results from this work are available.</p>
<b>1.3. Assessment of impacts</b>
<p>The Subgroup outlines a relevant approach for addressing issues linked to locking forces associated with the use of pocket wagons. It is highlighted that a holistic approach is required considering infrastructure, wagons, hitches and loading units in order ensure efficient and effective approach. In this context, it is proposed that a follow-up risk assessment should be developed (See Subgroup 2a/b). The risk assessment would include analysis of costs and benefits for the possible different measures allowing for a ranking of these. Therefore, the Subgroup does not propose concrete measures now but indicates a framework that can be used to determine measures that reduces the risks while taking into account costs of measures. On the basis of the results from the risk assessment there could be added specifications to the TSI WAG, EN standards and/or UIC-related IRS. From an impact assessment perspective, the findings from the Subgroup will not lead to significant benefits and costs at this point. Any measures that would be proposed would be determined based on a risk assessment / cost-benefit analysis. This approach should ensure that these measures would be selected in such way that costs are outweighed by the benefits.</p>



#### 1.4. Stakeholders affected

The main stakeholders affected are listed in the following table

Railway undertakings (RU)	<input checked="" type="checkbox"/>	Member States (MS)	<input type="checkbox"/>
Infrastructure managers (IM)	<input checked="" type="checkbox"/>	Third Countries	<input type="checkbox"/>
Manufacturers	<input checked="" type="checkbox"/>	National safety authorities (NSA)	<input checked="" type="checkbox"/>
Keepers	<input checked="" type="checkbox"/>	European Commission (EC)	<input type="checkbox"/>
Entity Managing the Change (EMC)	<input checked="" type="checkbox"/>	European Union Agency for Railways (ERA)	<input checked="" type="checkbox"/>
Notified Bodies (NoBo)	<input checked="" type="checkbox"/>	Terminal operators	<input checked="" type="checkbox"/>
Associations	<input checked="" type="checkbox"/>	Other (Please specify), Staff in RUs / Terminals / Truck drivers	<input checked="" type="checkbox"/>
Shippers	<input type="checkbox"/>		<input type="checkbox"/>

The identification of these stakeholders is based on the information provided in the report subgroup 3b.

# Impact assessments

## Subgroup IIIb. Locking force (3/3)

<b>2. Context and assessment of impacts</b>
<b>2.1. Recommendation</b>
<p>The suggested approach put forward by Subgroup 3b is appropriate by ensuring a robust decision-making basis for selecting efficient and effective measures within a holistic perspective. More details are included under Subgroup 2a/b.</p> <p>The Subgroup could include as part of its final reporting the reasons for not putting forward any minimum value for a king-pin locking force. Moreover, in the report a clear distinction should be made between 'design safety' and 'operational safety'.</p>
<b>2.2 Follow-up information</b>
<p>The information provided in the final reporting is comprehensive. It could though be useful to include the reasons for not putting forward a minimum value for a king-pin locking force (see above).</p>
<b>2.1. Recommendation</b>
<p>The suggested approach put forward by Subgroup 3b is appropriate by ensuring a robust decision-making basis for selecting efficient and effective measures within a holistic perspective. More details are included under Subgroup 2a/b.</p> <p>The Subgroup could include as part of its final reporting the reasons for not putting forward any minimum value for a king-pin locking force. Moreover, in the report a clear distinction should be made between 'design safety' and 'operational safety'.</p>

**END**