ScanMed RFC
STOCKHOLM/OSLO-COPENHAGEN-HAMBURG-INNSBRUCK-PALERMO

Longer & Heavier Trains study

Summary report – Phase 1 and 2

Co-financed by the Connecting Europe Facility of the European Union

Change History

Version	Author	Reviewed by	Change	Date
1.0	JC		1st draft	18/02/2020
1.1	JC		3.2. Phase 2 added to 1st draft	06/03/2020
1.2	SN		Finalised annexes added to report	12/03/2020
1.3	JC		Results of Phase 1 summarised in 4. Results	16/03/2020
1.4	SN		Results of Phase 2 summarised in 4. Results	09/04/2020

1. Description

This summary report provides an additional description on the results of the two initial phases of the Longer & Heavier Trains study, in the sense that it gives the relevant context from which the results have emerged. In order to understand and asses the results when continuing with the third and final phase of the Longer & Heavier Trains study, the purpose of the summary report is therefore to bring clarity to the applied approaches of the first and second phases of the study.

1.1. Outline

The report includes a brief summary of the relevant steps prior to the initiation of the 1st and 2nd phases of the study. Subsequently, the progression of the two phases are described, emphasising the "theoretical framework" which has brought the results of the study this far. The results, provided in detail in Annex 1, are then summarised and commented.

2. Background

In 2017, the ScanMed RFC Management Board temporarily put the elaboration of the Terms of Reference (ToR) of the study on hold, considering that results from other available studies could be an alternative to benefit from in order to achieve the objectives of Phase 1 of the study. Consequently, the approval of the ToR was postponed and an assessment to which extent results from other studies could replace the 1st phase in the draft ToR was carried out. The benchmark led to an update of the ToR, but it was concluded that results from other studies couldn't replace Phase 1. In March 2019, Phase 1 could therefore be restarted following the approval of the ToR, including the subsequent Phase 2.

The approved ToR stipulates that the 1st phase should include:

- Description of current infrastructure features (in terms of track length, axle load and maximum speed) along the ScanMed which, in principle, prevent the running of longer and/or heavier trains and the list of planned infrastructure investments aimed at removing these hindrances at different at different future scenarios (e.g. 2020, 2025, 2030). The list is provided in O/D relations
- Identification of operational possibilities and related conditions, which allow longer and/or heavier trains to run in the above listed O/D relations, until the infrastructure investments are completed

It's also stated in the ToR that the Phase 1, as well as Phase 2, is carried out by internal ScanMed resources. As regards the 2nd phase, this includes an estimation of how many longer/heavier trains (and how much longer/heavier) can run when the planned investments are completed.

3. Progression and Success

As referred above, the concerned two phases of the Longer & Heavier Trains study of this summary report, have been carried out internally; INF WG providing the description of current infrastructure features and planned investments along the routing of ScanMed RFC and WG CAP the estimation of

the traffic development w.r.t. train length and weight. As regards the identification of operational possibilities included in Phase 1, the IM representatives of INF WG coordinated this action internally within their concerned company.

The 1st phase was, as already mentioned initiated in March of 2019 following the approval of the ToR, but the actual activities of describing the current state and identifying those measures expected according to the ToR, were done between July and September of 2019.

The results from Phase 1 was then handed over to the WG CAP in September and the actual estimation of the 2nd Phase started in October 2019.

3.1. Phase 1

The deliverable from Phase 1 is based on Annex 9 of the ScanMed RFC Implementation Plan, CID Book 5, Description of technical parameters of the infrastructure – realised and planned, last updated in 2014. The correctness of the annex was assessed and handled in order to present an accurate routing of the Corridor. This explains the colour coding of the Line sections in Annex 1:

= Line section of Principal line already reported in the Implementation plan, Annex 9

= Line section of Diversionary line already reported in the Implementation plan, Annex 9

= Future line section as reported in the Implementation plan, Annex 9, as well as updated future line section not reported in the Implementation plan, Annex 9

= Updated line section of Principal/Diversionary line not reported in the Implementation plan, Annex 9

As for the description of the current infrastructure features, each IM representatives of the INF WG updated the data of each line section (Principal, Diversionary and Future) included in the network of their corresponding IM. The current infrastructure features of the Corridor's line sections are given by the specific Technical Parameter where '**2020**' is reported.

In addition to the description of the current infrastructure features of all the line sections which together constitute the routing of the Corridor, including future line sections, the list of planned investments was included to the updated and modified Annex 9 of the Implementation plan (i.e. Annex 1 of this report). The list of investments was extracted from the Scandinavian Mediterranean Core Network Corridor Project List, last updated in May 2019 (ScanMed CNC project list), where the projects reported in the latter were linked to the corresponding described Line section/sections of Annex 1. The project/projects corresponding to a certain line section/certain line is/are showed in Annex 1 via the entries P .

With the projects of the ScanMed CNC project list as basis, each IM representative of the INF WG assessed to what extent and in what year these projects would be reflected with regard to improved infrastructure parameters on a certain line section/certain line sections included in the network of their corresponding IM. The overall result of this assessment is presented in Annex 1 where the foreseen change (improvement) of a specific Technical Parameter, on a certain line section/certain line sections, are reported for the years **2025** and **2030**.

The internal consultation among the IMs, regarding the identification of operational possibilities and related conditions, which allow longer and/or heavier trains to run until the infrastructure investments are completed, pointed out that longer trains than the reported train length are allowed in certain parts of the corridor (SE, DE, IT). However, these possibilities aren't reported in Annex 1, as the conclusion to be drawn from the consultation is that these operational possibilities and related conditions are depending on circumstances which have to be considered on a case by case basis within the allocation process.

3.2. Phase 2

When concluding the 1st phase of the study, the WG CAP was asked to conduct the estimations as stipulated in the ToR:

- Phase 2: estimation of how many longer/heavier trains (and how much longer/hevier) can run when planned investments are completed

Even though stated in the ToR, that Phase 1 should be presented in O/D relations, INF WG proposed the WG CAP to identify the specific O/D relations in order to make a relevant estimation in Phase 2. The reason behind the INF WG's proposal to let WG CAP identify the specific O/D relations, thus not fulfilling all the criteria stated for the 1st Phase according to ToR, was a common conclusion within the INF WG that WG CAP possess the relevant knowledge about the market's needs, being directly involved in the PaP construction and allocation processes.

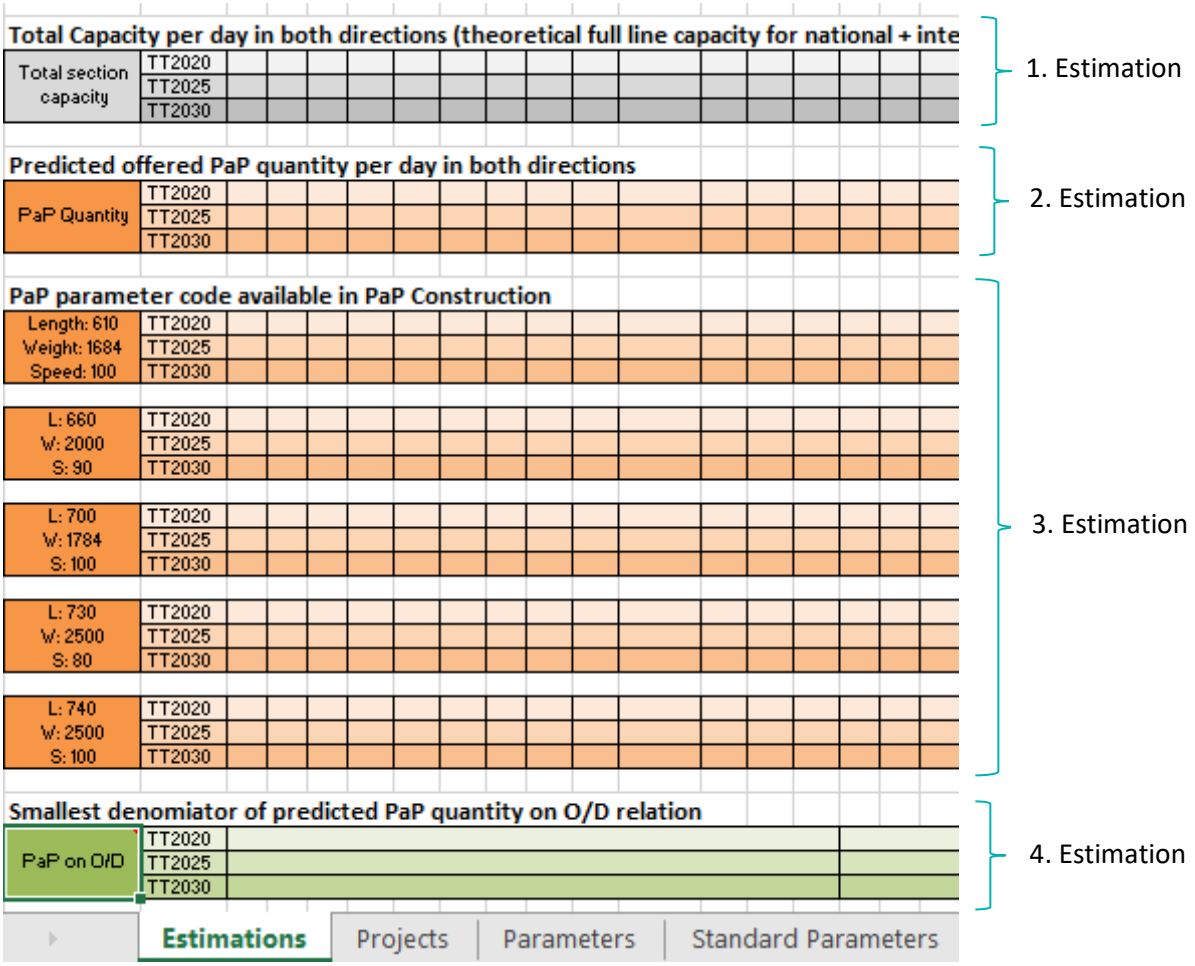
The WG CAP agreed to take the same O/D relations as used for ScanMed RFC KPIs, as a basis for the estimation of Phase 2, i.e.:

- Alnabru – Göteborg
- Göteborg – Malmö
- Katrineholm – Malmö
- Hallsberg – Malmö
- Malmö – Maschen
- Maschen – München
- München – Verona

The initial step of the 2nd phase was to set up the work plan and agree on intermediate deliverables that would allow the WG CAP to achieve the estimation according to ToR. While proceeding according to the agreed work plan, WG CAP realised when the preliminary results of each expert in the concerned technical working group was presented and compared (as an intermediate step of Phase 2), that the data and the estimations had to be more precise in order to achieve an overall result that would comply with the ToR. The WG CAP agreed on a four-step estimation approach for TT2020, TT2025 and TT2030:

1. Total Capacity per day in both directions (theoretical full line capacity for national + international freight trains) per section (internal use)
2. Predicted offered PaP quantity per day in both directions per section (internal use)
3. PaP parameter code available in PaP Construction per section for five pre-defined parameter codes (highest PaP Parameter code 5 complies with CNC target) (external publication)
4. Smallest denominator of predicted PaP quantity on O/D relation (external publication)

Following the agreed approach, the estimations were then delivered by the experts in the WG CAP by filling in data for each TT-period in the table as presented below:



After compiling all results together in one file with all details of both phases (Annex 1), the WG CAP agreed jointly on the predicted PaP quantity (4. Estimation) especially for cross-border sections to achieve harmonized estimations. In addition, asked by the Management Board, the WG CAP worked on visualisations of the deliverables of the 1st and 2nd phase.

There are schematic maps available if the PaP Parameter codes are available during PaP Construction and an overview of the predicted PaP quantity on defined O/D-relations (Annex 2). In both cases particularly the developments and changes are highlighted on the maps to make it easier to focus on it.

4. Results

The compilation of the planned investments carried out during the 1st phase of the study, shows a stepwise improvement of the infrastructure as regards train length. For the time being (TT2020), only the Danish part of ScanMed RFC's network and some of the Norwegian, Swedish and Austrian parts are compatible with the TEN-T requirement of 740 meters. On the other hand, following the TEN-T guidelines (Reg. 1315/2013/EU) and the implementation of the Core Network, freight trains up to 740 meters should be able to run on most parts of the Corridor by 2030. The most considerable improvements as regards train length resulting from those investments identified in Phase 1, are

expected in the southern part of the Corridor and RFI's network; the limitations of the current infrastructure normally allowing freight trains up to 600 meters, will be enhanced by 2025 southbound from Brennero to Bologna and east towards the Adriatic coastline where trains up 750 meters should be able to run down towards the region of Puglia. By 2030 such improvement is also foreseen for the part of ScanMed RFC along the western Italian mainland. By 2030 the significant German part of ScanMed RFC which by today allows freight trains in the range 650-720 meters, will also be compatible with the TEN-T requirement of 740 meters.

As regards axle load, the results of Phase 1 show that most parts of the Corridor already correspond to the TEN-T requirement ≥ 22.5 t/axle and that the requirement will be achieved by 2030.

From the results of the second phase it can be concluded that the minimum parameter code of PaP trains with 610m, 1684t and an average speed of 100km/h is feasible and can be used in all examined and predicted TT years during the PaP construction. There a significant parameter code improvements predicted on Swedish and Italian stretches for TT2025, and in addition for Norwegian, German, Austrian and further Swedish and Italian stretches for TT2030.

These improvements will impact the predicted PaP quantity on several Origin and Destination relations. The PaP quantity will increase from 16 to 40 PaPs between Hallsberg/Katrineholm-Malmö and from 24 to 32 PaPs between Malmö-Maschen in 2030. In addition, the important infrastructure major projects Fehmarn Belt Tunnel and Brenner Base Tunnel will have an additional impact on PaPs in 2030 which cannot be assessed for the moment. These improvements will be considered and incorporated during the annual strategical decision of the Management Board one year before TT change about the PaP quantity. Therefore the disclaimer that all quantity estimations are provisionally linked to this annual MB decision.

5. Annex

5.1. Annex 1 – All study results of 1st and 2nd Phase (detail information file)

longer_&_heavier_t
rains_study_phase_1

5.2. Annex 2 – Schematic Maps with visualisations of the 1st and 2nd Phase

Longer and Heavier
Train Study Presenta