Väylävirasto
Trafikledsverket

TTR
For Smart Capacity Management

Capacity Strategy 2027

Finnish Transport Infrastructure Agency

Draft version

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0 Introduction

TTR (Timetabling and Capacity Redesign) is the reform of railway capacity planning prepared in cooperation by European infrastructure managers and railway undertakings with the aim of improving the competitiveness of rail transport through the predictability, efficiency, and flexibility of capacity usage.

Compared to the current capacity process in Finland, the most visible reforms include abandoning adjustment dates in capacity application and increasing the role of advanced planning.

The purpose of the TTR Finland project launched at the beginning of 2022 is to create, based on the European TTR reform, a version that is suitable for Finland's conditions in cooperation with the entire railway sector. The key objective is to build railway traffic planning into a coherent iterative process. This requires the development and advancement of track works' planning impacts on traffic, the launch of advance planning of traffic and the development of capacity allocation processes to improve the quality of the plans in the competitive railway market. With draft regulation of capacity management by EU Commission published July 2023 the legislative changes need to be considered as well.

The TTR Finland project is divided into three different areas: advanced planning; the reform of the capacity allocation process; the development of the coordination of track work and traffic. These three are taken forward both together and separately. All three areas are linked to each other in some way, but the advancement of any of the areas does not depend on the progress of another area, and thus outputs can be taken to production at different times.

The Capacity Strategy is the first phase of TTR advanced planning. Its preparation begins five years before the start of the timetable period in question, ending in its publication three years before the start of the timetable period at X-36. The publications of the first Capacity Strategies are carried out at an accelerated pace, as the implementation of TTR could only be started behind schedule.

This Capacity Strategy has been created for the timetable year 2027. This document contains a description of the geographical scope of the strategy; predicted permanent changes in the infrastructure; the largest predicted capacity restrictions; planning principles for track work and a description of traffic flows. The content of the Capacity Strategy document follows the template by RNE (RailNetEurope).

0.1 Contact Information

We kindly ask you to send your comments concerning the Capacity Strategy to the address TTR@ftia.fi.

0.2 Geographical Scope

The Capacity Strategy covers the entire Finnish railway network, with a few exceptions. The map below shows the routes included in the Capacity Strategy. The Capacity Strategy excludes commuter traffic tracks and the following low-volume lines: Raisio-Naantali, Kerava-Olli, Olli-Porvoo, Olli-Sköldvik, Toijala-Valkeakoski, Mäntyluoto-Tahkoluoto, Vilppula-Mänttä, Jämsä-Kaipola, Niinisalo-Parkano, Seinäjoki-Kaskinen, Vaasa-Vaskiluoto, Pännäinen-Alholma, Kokkola-Ykspihlaja, Lahti-Loviisa, Lahti-Heinola, Kouvola-Kuusankoski, Mynttilä-Ristiina, Pyhäkumpu-Pyhäsalmi, Murtomäki-Otanmäki, Murtomäki-Talvivaara, Imatra-Imatrankoski, Joensuu-Ilomantsi, Säkäniemi-Niirala, Huutokoski-Rantasalmi, Viinijärvi-Siilinjärvi, Vuokatti-Lahnaslampi, Vuokatti-Talvivaara, Kontiomäki-Vartius, Kemi-Ajos, Haaparanta-Tornio and Tornio-Röyttä.

The railway network infrastructure is presented in more detail in the map service of the Network Statement[1], in open data sets, in the Railway Information Extranet and the Network Statement's chapter 2.3 and

[1] https://suomenvaylat.vayla.fi/theme/fi/1/326669/7197753/6?lang=en

appendices 2A and 2B[2]. Basic information on track sections is given in the Network Statement's appendix 2A. Appendix 2B describes railway traffic operating points in more detail.

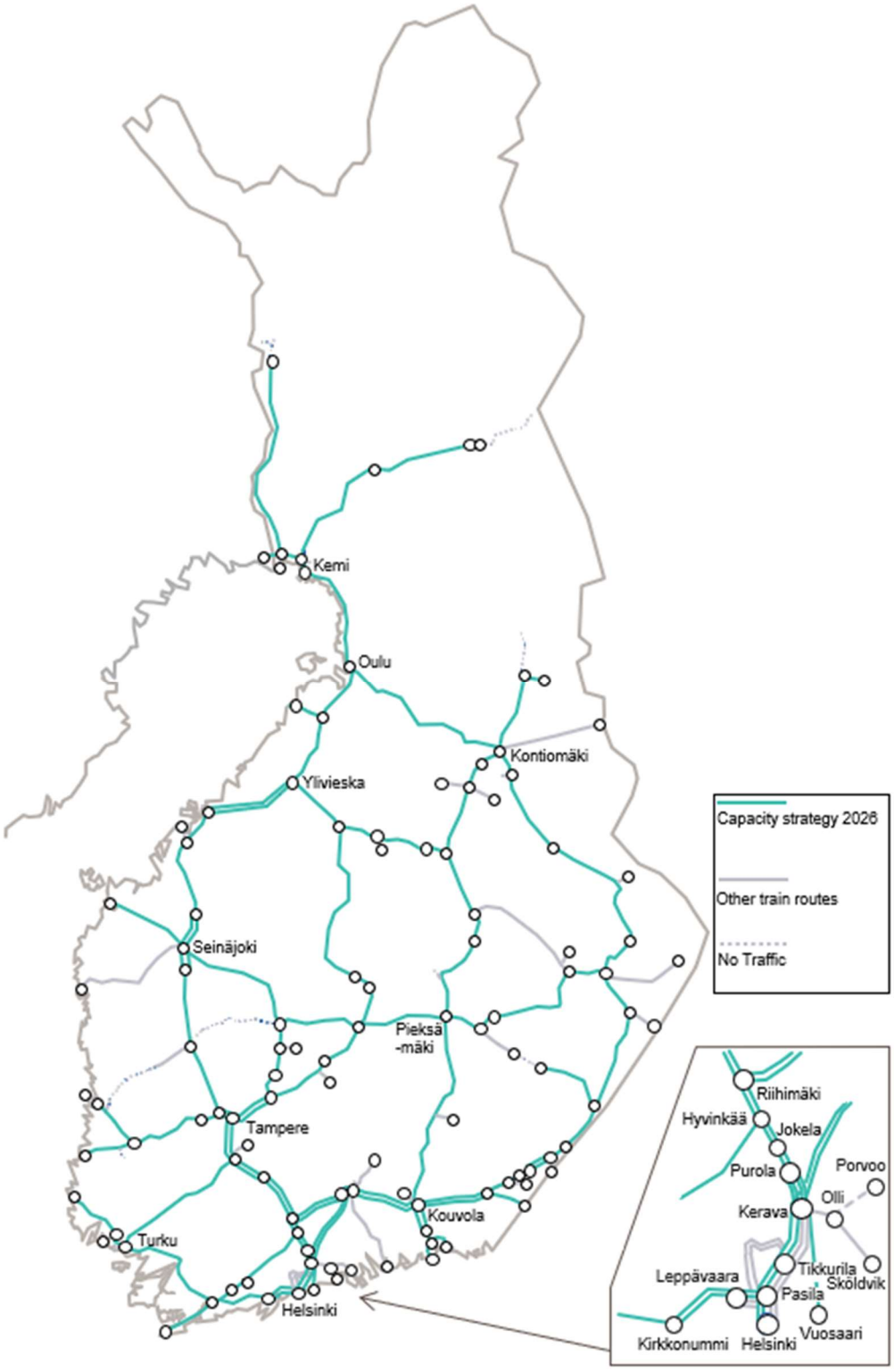

Figure 1: Geographical scope of the strategy.

[2] https://www.doria.fi/bitstream/handle/10024/186244/vj_2022-55eng_978-952-405-089-0.pdf?sequence=5&isAllowed=y

0.3 Service Facilities

The Capacity Strategy's service facilities, that is, the service facilities in general use in the railway network, are available in the Network Statement on the Finnish Transport Infrastructure Agency's website https://vayla.fi/palveluntuottajat/ammattiliikenne-raiteilla/rautateiden-verkkoselostus/rataverkon-palvelun-tarjonta.

1 Expected Capacity of Infrastructure in TT 2027

The purpose of this chapter is to provide an overview of how railway projects completed in 2023–2026 will have a permanent impact on available capacity in the timetable period 2027. This chapter describes the infrastructure changes that increase or decrease capacity in order to avoid an information break between the present (2023) and December 2026 in terms of available capacity. No projects leading to permanently reduced available capacity are expected on the Finnish rail network, but projects that increase available capacity have been identified.

1.1 Additional Available Capacity

The table below lists the projects that will increase capacity by the timetable period 2027 compared to the time of publication of this Capacity Strategy. After the table, there is a more detailed description of the items on the list concerning their impacts on capacity.

Track section	Description	Impact on capacity	Impact on train volume	Implementation decision made	Funding
Nokia railway yard	Construction of a new island platform	Enables passenger train encounters at Nokia station and the stopping of several trains	N/A	No	Yes
Tampere-Jyväskylä	Improvement of the railway line	Extending the effective length of Torkkeli traffic operating point, Muurame 3rd track	N/A	Yes	Yes
Kupittaa-Turku	Construction of a double track	Enables train encounters and additional capacity	N/A	Yes	Yes
Hanko-Hyvinkää	Electrification	Enables operation of electrically powered trains	N/A	Yes	Yes
Iisalmi-Ylivieska	Electrification	Enables operation of electrically powered trains	N/A	Yes	Yes
Tornio-Haparanda	Electrification	Enables operation of electrically powered trains	N/A	Yes	Yes
Pasila-Riihimäki phase 2	Additional tracks between Kerava and Purola	Enables increase of capacity	Two commuter trains per hour for each direction	Yes	Yes

Table 1: Additional available capacity reached by 2027.

The measures to be carried out in the Nokia railway yard development project, such as adding a new island platform, are expected to streamline train traffic on the Pori-Tampere line section, reduce traffic's vulnerability to disruptions and improve the maintainability of the railway yard. The stopping of several trains at the railway yard will be possible, and the possible increase in traffic volume can be realised when train encounters are possible at the station.

The Tampere-Jyväskylä line's improvement project aims to improve the transport possibilities of freight traffic, increase the speed level and capacity of passenger traffic, and reduce traffic's vulnerability to disruptions. A 3rd track will be built at the Muurame traffic operating point for train encounters, and the effective length of the Torkkeli traffic operating point will be extended.

The Kupittaa-Turku, KUTU railway project develops Turku's passenger and freight yards and builds a double track between the Kupittaa and Turku railway stations. The aim is to improve and increase the capacity of railway traffic in the project area and along the entire coastal line with a double track.

In the timetable period 2027, the implementation of Pasila-Riihimäki project phase 2 is at a stage where Kytömaa-Purola will have four tracks and will enable capacity to be increased on the line section. The work of the project itself will continue until 2028, so it is not expected that full benefits will be obtained from the additional tracks in 2027.

The Hanko-Hyvinkää, Ylivieska-Iisalmi and Tornio-Haaparanta projects concern the electrification of the railway line, after which trains can be operated with electric traction. This enables, for example, changing the type of passenger rolling stock.

No permanently reduced available capacity is expected on the railway network. Chapter 2.2 lists the capacity restrictions in force in 2027, which may lead to temporary capacity reductions.

2 Temporary Capacity Restrictions (TCRs)

2.1 Principles for TCR Planning

In the planning of Temporary Capacity Restrictions, i.e., track works, the aim is to find best solutions that serve all the parties: IMs, capacity applicants, and other clients. The Finnish Transport Infrastructure Agency (FTIA) works closely with its stakeholders through various regular cooperation meetings where capacity applicants can also comment on future track works, their scheduling and traffic impacts and communicate their own needs. Cooperation to develop the coordination of track work and traffic is continuously developed.

The Finnish rail network is primarily consisting of single-track lines which can be considered the main challenge in track work planning. Almost the entire Finnish rail network consists of single-track lines, so carrying out track work often leads to a so-called total closure that prevents all train traffic in the area. In addition, there are relatively few detour routes available in Finland, which means that a total closure often results in passenger trains being replaced by buses and freight trains having to be cancelled. For this reason, it is important to plan track work well in advance so that it would cause as little disruption to traffic as possible.

The following principles have been described based on the idea that they concern track work that requires a total closure.

Examples:

- TCRs should be clustered to minimise the gravity of impact and duration.
    - Track works on track sections from Kerava to Oulu should be planned simultaneously
- For example, on lines Kerava-Riihimäki and Kerava-Hakosilta or Kouvola-Joensuu and Kouvola-Kuopio no TCRs shall be planned simultaneously
- Due to insufficient re-routing capacity, no total closure shall be planned during peak hours.
- TCR windows should be planned together with other track work in the area/along the transport chain.

Clustering of track work can be considered to be one of the principles of track work planning. Track works can be clustered either geographically or timely to minimize the gravity of impact and duration. One of the aims of clustering of track work is to ensure that track works located on the same line or along the same transport chain are carried out in the same track possession if possible. This procedure aims to reduce the consecutive traffic impacts. The scheduling of track work with consideration to other track work carried out on the rail network can also be counted as a planning principle. For example, if it is desirable to work simultaneously on some line sections and not, for example, during consecutive weeks when their combined traffic impact would become too great. An example of this is the track sections from Kerava to Oulu.

On certain line sections working simultaneously is not recommended because it prevents efficient train traffic due to the lack of diversionary routes. For example, attempts are made to avoid simultaneous total closures on Kerava-Riihimäki and Kerava-Hakosilta lines and Kouvola-Joensuu and Kouvola-Kuopio line sections.

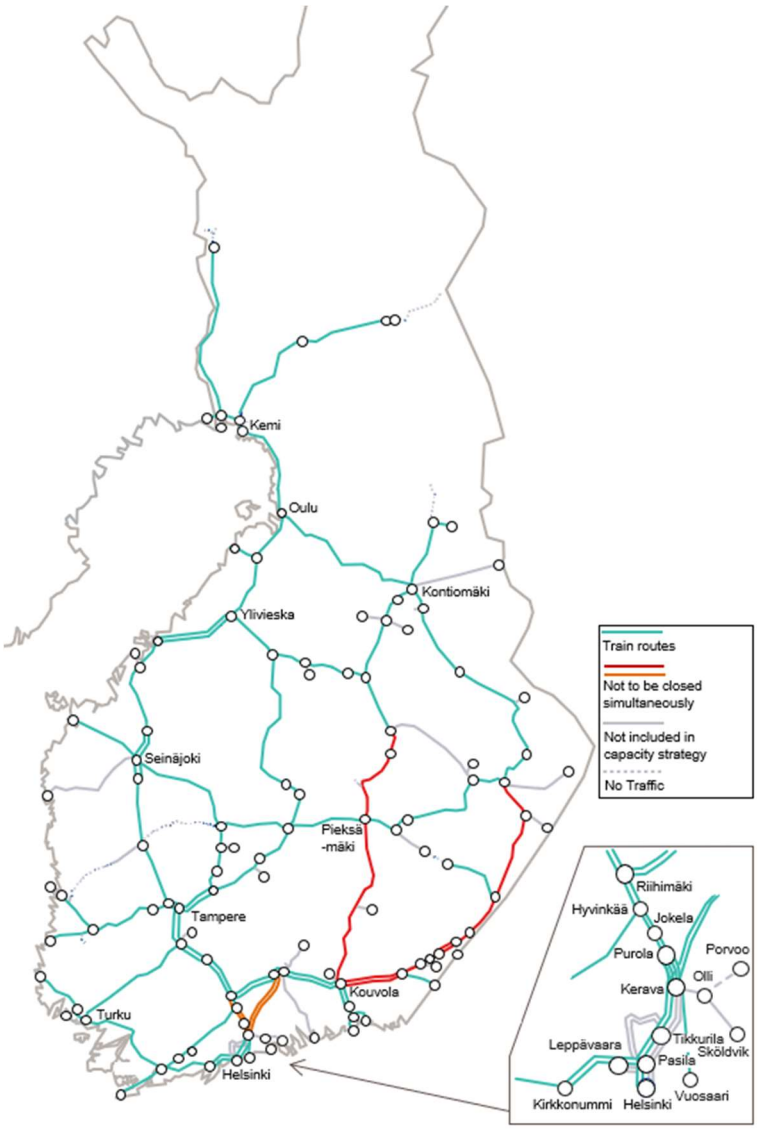

Figure 2: Example how can be highlighted when TCRs due to shortage of capacity shall not be planned simultaneously.

One of the principles of track work planning is striving to schedule track work at certain times, either with consideration to a certain time of the day or the annual calendar. Efforts are made to carry out track work during low traffic to avoid traffic disruptions. Track works on the busiest line sections are avoided during peak hours. Occasionally, trains must be replaced with other modes of transport. However, in these cases, arranging replacement transport and the costs arising from it are the responsibility of the railway operators. In many line sections, track possessions are more easily available at night. The aim is to schedule track work in so-called natural track possessions in order to minimise the traffic disruptions.

From the perspective of the annual calendar, total closure caused by track work on, for example, Midsummer is an established practice, as passenger traffic will almost completely stop for a few days at the peak construction season. Also, factory shutdowns are taken into consideration when planning track works. The construction season being relatively short due to the Finnish climate also poses a challenge to track work planning.

The Finnish Transport Infrastructure Agency strives to respond to these coordination challenges with the help of different co-operation meetings. One of them is a biannual “Väylä-LISU” meeting which aims to form FTIA’s common, in-house, understanding of track works in upcoming years well in advance. The implementing divisions in FTIA compare and plan upcoming projects and their preliminary dates and traffic impacts so that synergy benefits can be found even before the construction work begins. Väylä-LISU can be considered to be the first glance to coordination between different track works as well as between traffic and track works.

A central meeting is so called “Lisu”-meeting which is held four times a year. In Lisu FTIA as the infrastructure manager chairs the meeting and starts the negotiations between FTIA and capacity applicants about the scheduling of track works and the possible impacts on traffic. The aim with Lisu-meeting is to refine the information given out in the network statement for the upcoming year and the year after. The goal with Lisu-meetings is to give an over-all picture of track works in Finland, but when it comes to more precise commenting and scheduling, the work is done in meetings called “Alue-Lisu”, which will be opened next.

The aim with Alue-lisu is to go through all the track works in certain area in Finland. Finland is divided into four different areas, each of them have their own Alue-lisu-meeting. In bi-monthly Alue-lisu, track work information from network statement and Lisu-meeting are taken into more careful discussion, and the specific scheduling and impact assessment is being made. The goal with having these Alue-Lisu meetings is to give the stakeholders as well as FTIA a platform where to discuss and find the best possible alternative to everyone included. Alue-Lisu concentrates in close future, next construction season. The purpose is to specify the scheduling and traffic impacts of track work, to coordinate track work and traffic and to find solutions that serve all parties as well as possible. Based on the results of the negotiations, the infrastructure manager decides on anticipated timings, track possessions and other measures impacting traffic. Alue-Lisu aims to give information back to the Lisu-meeting but also refine the information given there.

TCR windows also determine track work planning. The Finnish Transport Infrastructure Agency is progressing towards a new contract practice where certain times for TCR windows are agreed upon with the maintenance operator for the whole contract period, typically 4 years. The contract indicates that the maintenance operator receives, for example, 7 x 6 hours of total closure track possession twice a year in spring and autumn. This point in time will be specified as the coordination process between track work and traffic progresses either in the Network Statement or at the latest in Alue-Lisu-meetings, in consultation with operators and traffic planning. TCR windows and other track works are clustered to the widest extent as possible via coordination process.

2.1.1 Coordination and Consultation Process

The process of coordinating track work and traffic begins years before the start of the timetable period in question by the planning of new infrastructure investments. It could be said that the coordination of track work and traffic begins already with the preparation of the National Transport system plan by Finnish parliament for the next 12 years. The National Transport system plan provides directions for the managing, improving, and developing of our rail network in the following years.

Track work to be implemented is accumulated from different sources of funding, and this brings its own challenges to the coordination process. Most of the track work to be implemented consists of track renovating projects, where old track is being repaired or replaced, or investment projects, which are projects where new tracks are being built. In addition to these, cities or ELY-Centres, for example, may also implement their own construction projects that have an impact on the traffic operated on the railway line, such as overpass and underpass repairs. Funding for track renovating at the Finnish Transport Infrastructure Agency is managed by the programming group, which programmes the funding for next three years. The programming group divides funding by themes, and there are several of these theme groups, such as bridge or tunnel theme. After the programming group’s annual process and the Government budget session in the autumn, we will know the projects that will receive money for the following year and tentatively for the next three years. Coordination between these projects and traffic can begin.

Investment projects receive separate funding from Parliament in the (supplementary) budget, and they are usually longer projects lasting several years and often have greater traffic impacts than track renovating projects. Once investment projects have received funding, construction must usually start as soon as possible, which means that there is little time left for the actual coordination of traffic and track work.

In other words, the process of coordinating track work and traffic must already be started before track work has implementation decision, otherwise the traffic impacts will be known to the operators too late. The procedures for the coordination of track work and traffic in use are outlines below.

Deadlines for providing notification of TCRs
In its role as the infrastructure manager, the Finnish Transport Infrastructure Agency observes the thresholds laid down in section 124 of the Rail Transport Act and the Commission Delegated Decision (EU) 2017/2075 (10, 11 and 14) when providing information on known track work and on the capacity restrictions arising from them.

TCR	Consecutive days	Impact on traffic (number of cancelled, rerouted, or replaced trains)	First publication
Major TCRs	> 30 days	> 50%	x-24
High TCRs	> 7 days	30–50%	
Medium TCRs	≤ 7 days	10–30%	x-12
Minor TCRs	not specified	< 10%	x-4

Table 2: First publication of TCRs.

Specifying information on track work before the start of a new timetable period

The announced capacity restrictions should be seen as a factor guiding traffic planning. The applicant must take the restrictions into account when preparing its capacity request. Before the request for annual capacity is submitted, the infrastructure manager and the capacity applicant must jointly determine which capacity restrictions are taken into account in the request for annual capacity.

In accordance with the publication and consultation procedure for capacity restrictions laid down in the Commission Delegated Decision (EU) 2017/2075 (Annex VII(8)), the infrastructure manager must publish all capacity restrictions and the preliminary results of the applicant's consultation for the first time at least 24 months before the relevant timetable change, to the extent they are known, and for the second time in the updated format at least 12 months before the relevant timetable change. The first and second consultation rounds will be held as part of the meetings specified for the purpose and the national traffic and track work coordination meetings.

Track work affecting the timetable period that has been known to the infrastructure manager at least six months before the change of the timetable period and that will result in capacity restrictions is reported in connection with the publication of the proposal for allocating infrastructure capacity (EU 2017/2075, APPENDIX VII section (12)).

The infrastructure manager conducts negotiations with applicants for infrastructure capacity, railway undertakings, and maintenance and transport providers on the timing of track work, track possessions, speed limits and other capacity restrictions arising from the work.

Specifying track work information during a timetable period

The allocated infrastructure capacity is available to the railway operator unless it overlaps the track possessions required for infrastructure management work. The work programme, timing of the work and the track possessions required may, however, change as the funding and planning are specified. Occasionally, the traffic impacts of the work will have to be reviewed during the timetable period in question, or infrastructure maintenance work not foreseen in the annual plan must be carried out. These situations arise because of the following factors: safe train traffic has to be ensured despite the capacity restrictions; the infrastructure

manager has no influence on the timing of the restrictions; application of the time limits is not cost-efficient or causes unnecessary damage to railway asset management; or there are other situations in which all parties concerned approve the change (EU 2017/2075, Annex VII(14)).

In such cases, the infrastructure capacity allocated to railway undertakings that overlaps infrastructure management needs is not available to railway operators or the capacity restrictions affecting track work are made more specific. In that case, notification of the restrictions is provided four times a year, at the times (times of specification) indicated in the Network Statement. The times of specification are in January, March, August and December, and their purpose is to finalise the traffic impacts and scheduling of track work for the following months.

Stakeholder groups are also invited to join the planning of the work stages of rail projects with traffic impacts and, if necessary, the weekly meetings held during track work projects. These track work coordination meetings are organised throughout the railway network, always focusing on one small area at a time.

If the traffic impacts of the work will have to be specified so that the time limits referred to above cannot be observed, the infrastructure manager will discuss the matter with railway operators before making its decision. If decisions must be made at short notice, a representative of the infrastructure manager (Fintraffic Raide Oy's traffic planning or, outside office hours, Fintraffic Raide Oy's Rail Traffic Management Centre) will conduct the necessary negotiations before decision-making.

In addition to the infrastructure capacity allocations made in connection with annual planning, capacity is also allocated for maintenance during the timetable periods in slots with no traffic, and the capacity is defined in the JETI system. After it has been entered in the advance information system, the required infrastructure capacity has been allocated to track work, and railway operators cannot request or use any of the capacity at the same time.

Requesting a track possession affecting traffic

The party requiring the track possession (contractor) must always contact Fintraffic Raide Oy's traffic planning and agree on the track possession and its details in accordance with the infrastructure manager's decision on track possessions no later than

- two months before the start of the work if the work causes one-off traffic disruptions or affects cross-border traffic
- 3 months before the start of the work if the work results in daily traffic disruptions lasting several weeks or months or the work affects traffic at several weekends
- 4 months before the start of the work if fast international passenger services are affected.

2.2 Expected Major Impact TCRs

Line section	Description	Duration	Start	Impacts on capacity during construction	Impact on passenger and freight traffic	Implementation decision received	Funding
Digirail: Lielahti-Pori/Rauma	Renewal of the train control system	4/2025–1/2027	Q1/2025	Will be specified as planning proceeds	Will be specified as planning proceeds	Yes	Yes
Espoo Rail Line	Construction of additional tracks Leppävaara Kauklahti	5/2023–8/2028	Q2/2023	e.g., full-service interruption 5 weeks	Passenger traffic replaced by buses between Kauklahti and Leppävaara	Yes	Yes
Tampere passenger railway yard	Improving the throughput capacity of the station	5/2025–5/2030	Q2/2024	Track alterations	Track alterations	No	No
Pasila-Riihimäki phase 2	Construction of an additional track Purola–Jokela	4/2021–10/2028	Q2/2021	Only one track in use between Pur-Jok	Changes in running times and stops for commuter trains	Yes	Yes

Table 3: Major TCRs in 2027.

The reform of Digirail, that is, train control systems, begins in Finland on the line section Lielahti-Pori/Rauma in 2025. Its traffic impacts during construction are not yet known.

For the Espoo Rail Line project (ESKA), a longer total closure between Leppävaara and Kauklahti lasting five weeks from Midsummer is known for 2027. Also shorter, 24h disruptions have been announced.

The Tampere passenger railway yard project (TAHERA) causes traffic impacts during construction, especially on the track use of passenger trains.

Planning for the phase 2 of Pasila-Riihimäki is still ongoing, and the workload for 2027 still depends on more detailed planning and the progress of construction during the preceding years.

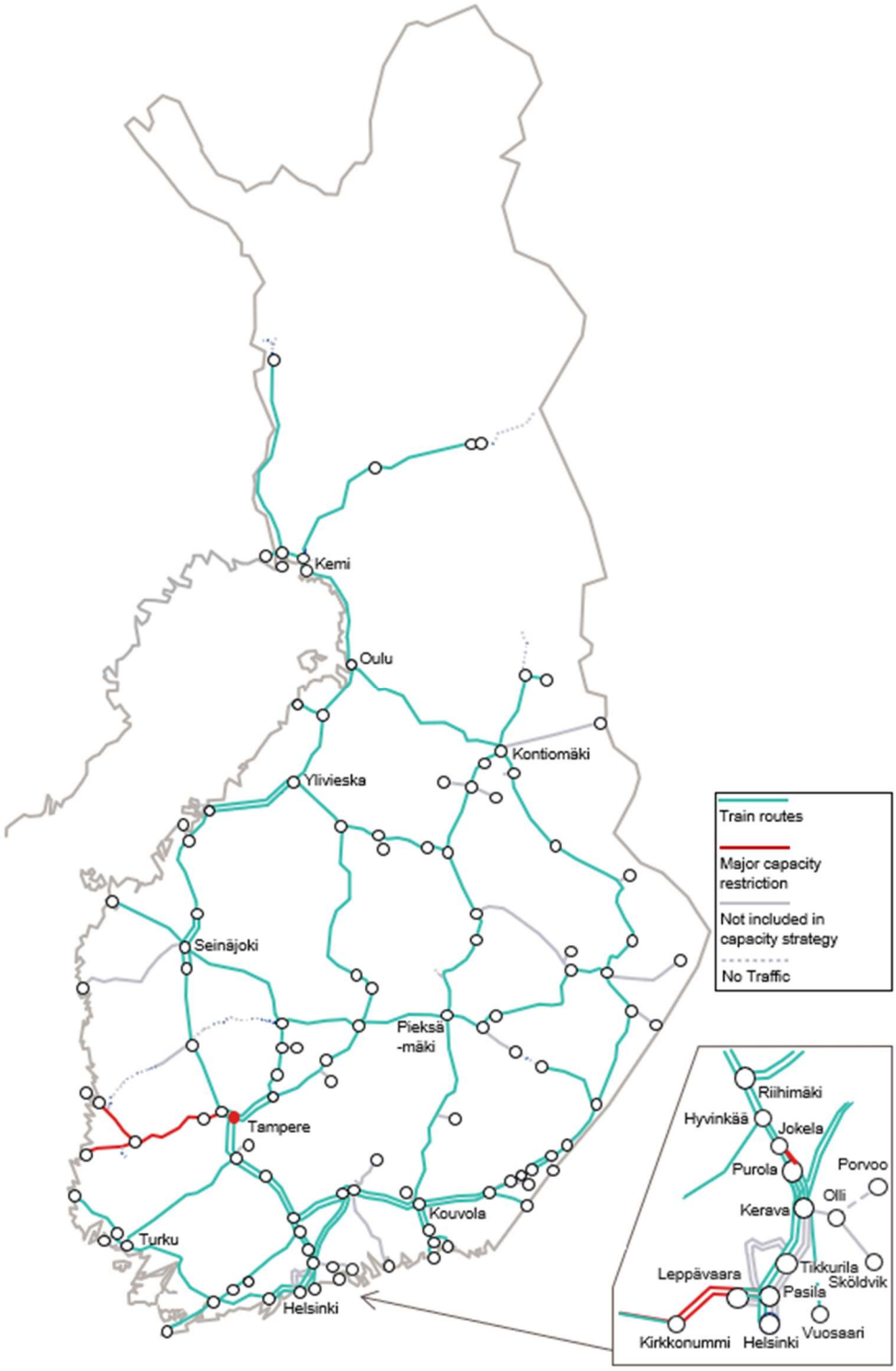

Figure 3: Major TCRs in 2027.

3 Traffic Planning Principles and Traffic Flows

3.1 Traffic Planning Principles

Traffic in the capacity strategy is planned in accordance with the planning process published in the Network Statement. As the infrastructure manager, the Finnish Transport Infrastructure Agency is responsible for allocating capacity to traffic. The principles on the coordination of traffic and the priorities applicable to trains in case of possible overload situations are published in the Network Statement. For applicants of capacity there are also more detailed technical instructions published by FTIA in Finnish.

The Finnish Transport Infrastructure Agency participates in RNE's TTR project and develops traffic planning and the coordination process following the TTR development, taking national specificities into account.

Today FTIA's capacity allocation is, in accordance with current law, based on the applications made. Currently capacity applications in Finland are submitted with full path details, applied paths are then coordinated in the yearly capacity process. In future following on the TTR development and EU commission's new regulation proposal, FTIA will assume more responsibility in preparing the yearly capacity allocation using strategic capacity planning. The Capacity Strategy is the first step in strategic planning process and its purpose is to produce a longer-term vision of the development of traffic and capacity use that can be utilised in future planning phases.

For the subsequent TTR planning phases and for the analysis of capacity utilisation, the railway routes are divided into shorter track sections within which traffic flows are largely uniform. A capacity utilisation limit (so called Intended capacity usage line) has been calculated for each line section. This means the highest number of regular capacity trains per hour that is representative of good planning practice. The limits have been calculated based on actual hourly traffic volumes and actual traffic performance with different train volumes. The limits are not absolute maximum values but can be exceeded in some hours when necessary if coordinating the trains is possible. However, going over the limit repeatedly can be expected to lead to problems in operative traffic activities. The limit is used to analyse capacity needs at later TTR planning phases, and it will serve as an advance warning in case of a critical capacity situation.

The track sections and intended capacity usage lines are listed in Table 4, with some other basic information. For the purposes of sorting the track sections and for map presentation, the sections are combined into eleven train lines shown in figure 4 below.

In next strategic planning phase, capacity model, the track sections are used to calculate more detailed estimated hourly traffic volumes. In case of critical capacity situation, and depending on development in the EU regulation, a capacity supply plan with pre-planned train paths can be created for critical track sections which then can be used to guide the yearly capacity allocation process. In capacity model and capacity supply planning the pre-planned traffic is divided to train categories for which hourly capacity on track sections will be pre-allocated. In FTIA's network trains will be currently divided in strategic planning to following categories:

- Freight trains
- Passenger trains, subdivided into:
    - Long distance trains
    - Express regional trains
    - Regional trains.

Cooperation with service facilities is described in the network statement.

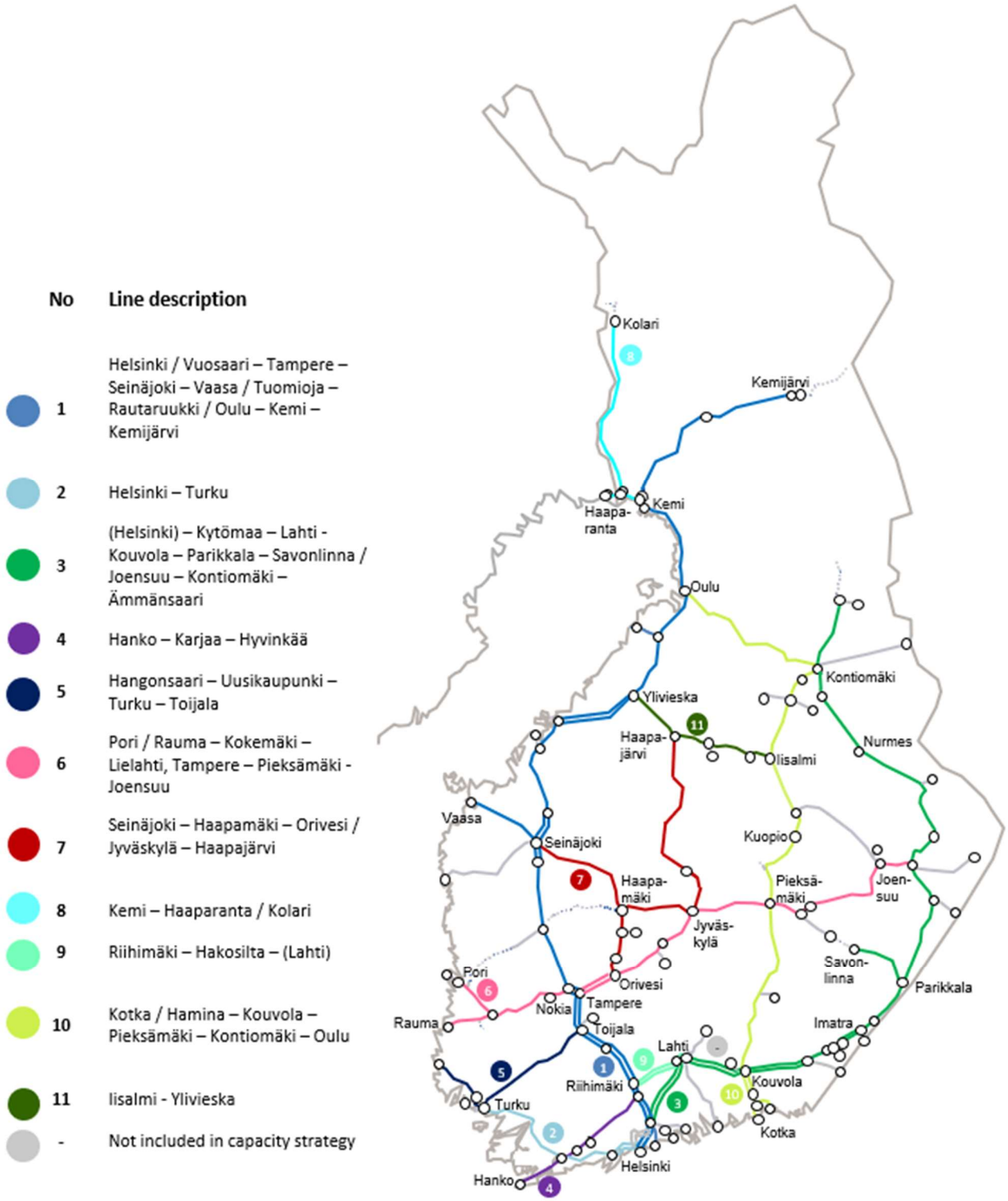

Figure 4: Train lines and track sections.

Line	Track section	T	E	ICL	Description
1. Helsinki/Vuosaari – Tampere – Seinäjoki/Vaasa – Tuomioja – Rautaruukki/Oulu – Kemi – Kemijärvi	Helsinki – Kerava	4	x	6 + 6	Main line from Helsinki to north with mostly high-capacity consumption. Commuter trains between Helsinki and Riihimäki and to Tampere. Long distance passenger trains from Helsinki to Tampere, Oulu and Rovaniemi. Night trains to Kolari and Kemijärvi. Freight trains from Vuosaari harbour, heavy freight traffic between Riihimäki and Oulu. From Tampere to north single-track line with some double track sections around Kokkola and Seinäjoki.
	Kerava – Vuosaari	1	x	2	
	Kerava – Purola	2	x	6 + 6	
	Purola – Hyvinkää	2	x	6 + 6	
	Hyvinkää – Riihimäki	3	x	7 + 7	
	Riihimäki – Hämeenlinna	2	x	6 + 6	
	Hämeenlinna – Toijala	2	x	6 + 6	
	Toijala – Tampere	2	x	6 + 6	
	Tampere – Lielahti	2	x	6 + 6	
	Lielahti – Parkano	1	x	6	
	Parkano – Pohjois-Louko	1	x	6	
	Pohjois-Louko – Seinäjoki	2	x	3 + 3	
	Seinäjoki – Lapua	2	x	3 + 3	
	Seinäjoki – Vaasa	1	x	3	
	Lapua – Pännäinen	1	x	6	
	Pännäinen – Kokkola	1	x	5	
	Kokkola – Ylivieska	2	x	4 + 4	
	Ylivieska – Tuomioja	1	x	6	
	Tuomioja – Oulu	1	x	6	
	Tuomioja – Rautaruukki	1	x	2	
	Oulu – Kemi	1	x	5	
	Kemi – Laurila	1	x	4	
	Laurila – Rovaniemi	1	x	4	
	Rovaniemi – Kemijärvi	1	x	3	
	Kemijärvi – Patokangas	1	x	3	
2. Helsinki – Kirkkonummi – Turku	Helsinki – Kirkkonummi	2	x	6 + 6	Line is almost completely single-track line, between Helsinki and Kirkkonummi there are two tracks and from Kupittaa to Turku as well. Regional traffic until Kirkkonummi. Freight traffic only from Karjaa to Salo, low volume. Long-distance trains follow clock-face timetable.
	Kirkkonummi – Karjaa	1	x	3	
	Karjaa – Turku	1	x	2	

Line	Track section	T	E	ICL	Description
3. (Helsinki) – Kerava – Kouvola – Joensuu – Ämmänsaari	Kerava – Hakosilta	2	x	3 + 3	Heavy freight volumes between Kouvola railway yard and Imatra forest industry production facilities. Regular freight traffic north of Imatra thinning out towards Kontiomäki. Long-distance passenger trains between (Helsinki-) Kerava and Joensuu. Few regional trains between Joensuu and Nurmes.
	Hakosilta – Lahti	2	x	6 + 6	
	Lahti – Kouvola	2	x	6 + 6	
	Kouvola – Luumäki	2	x	5 + 5	
	Luumäki – Lappeenranta	1	x	6	
	Lappeenranta – Lauritsala	1	x	6	
	Lauritsala – Joutseno	1	x	6	
	Joutseno – Imatra	2	x	6 + 6	
	Imatra – Simpele	1	x	3	
	Simpele - Parikkala	1	x	3	
	Parikkala – Savonlinna	1		2	
	Parikkala – Kitee	1	x	3	
	Kitee – Joensuu	1	x	3	
	Joensuu – Uimaharju	1		2	
	Uimaharju – Nurmes	1		2	
	Nurmes – Vuokatti	1		1	
	Vuokatti – Kontiomäki	1		2	
	Kontiomäki – Ämmänsaari	1		3	
4. Hanko – Hyvinkää	Hanko – Karjaa	1	x	3	Line with a medium level of capacity saturation, freight traffic and regional trains
	Karjaa – Kirkniemi	1	x	3	
	Kirkniemi – Lohja	1	x	3	
	Lohja – Hyvinkää	1	x	2	
5. Toijala – Turku – Hangonsaari	Toijala – Turku	1	x	3	Track section from Toijala to Turku is a mixed traffic with long-distance trains and freight trains. From Turku to Hangonsaari there is only freight traffic. The line has low level of capacity saturation.
	Turku – Raisio	1		3	
	Raisio – Hangonsaari	1		2	

Line	Track section	T	E	ICL	Description
6. Pori / Rauma – Kokemäki – Lielahti, Tampere – Pieksämäki – Joensuu	Kokemäki – Rauma	1	x	3	Connection between ports in southwest and eastern parts of the country. Long distance passenger trains between Pori and Tampere and from Tampere to East. Commuter trains between Tampere and Nokia. High capacity consumption close to Tampere. Between Pieksämäki and Joensuu non-electrified lines with low capacity due to infrastructure characteristics. Few freight trains and regional trains.
	Kokemäki – Pori	1	x	4	
	Nokia – Kokemäki	1	x	4	
	Lielahti – Nokia	1	x	4	
	Tampere – Orivesi	2	x	5 + 5	
	Orivesi – Jämsänkoski	1	x	5	
	Jämsänkoski – Jyväskylä	1	x	4	
	Jyväskylä – Pieksämäki	1	x	3	
	Pieksämäki – Huutokoski	1		3	
	Huutokoski – Varkaus	1		3	
	Varkaus – Viinijärvi	1		2	
	Viinijärvi – Joensuu	1		3	
7. Seinäjoki – Haapamäki – Orivesi/Jyväskylä – Haapajärvi (Haapamäen tähti)	Haapamäki – Seinäjoki	1		2	Line with low level of capacity saturation. Track sections from Orivesi to Seinäjoki have regional train flows, also occasional freight traffic on track sections.
	Vilppula – Haapamäki	1		3	
	Korkeakoski – Vilppula	1		3	
	Orivesi – Korkeakoski	1		3	
	Haapamäki – Jyväskylä	1		2	
	Jyväskylä – Äänekoski	1	x	3	
	Äänekoski – Haapajärvi	1		2	
8. Kemi – Haaparanta / Kolari	Laurila – Tornio	1	x	3	Very low level of capacity saturation. Low level of available capacity due to long distance between sidings. Cross border traffic to Haaparanta (Sweden), possible passenger traffic and freight trains in future. Note different rail gauges on Finnish and Swedish side. Both rail gauges provided on the line between Tornio and Haaparanta.
	Tornio – Haaparanta (Sweden)	1	x	n/a	
	Tornio – Kolari	1		3	
9. Riihimäki – Hakosilta – (Lahti)	Riihimäki – Hakosilta	2	x	6 + 6	Regional line with a medium level of capacity saturation, regional trains and a freight train connection between south-east and western parts of the country.

Line	Track section	T	E	ICL	Description
10. Kotka / Hamina – Kouvola – Pieksämäki – Kontiomäki – Oulu (Savon rata)	Kotka – Kymi	1	x	4	Heavy freight volumes between Port of Kotka-Hamina and Kouvola railway yard. Regional train services provided between Kouvola and Kotka. Long-distance passenger trains and frequent freight traffic on the single-track line between Kouvola and Kontiomäki. High level of capacity saturation all the way along the route.
	Kymi – Juurikorpi	1	x	4	
	Hamina – Juurikorpi	1	x	2	
	Juurikorpi – Inkeroinen	2	x	5 + 5	
	Inkeroinen – Kouvola	2	x	5 + 5	
	Kouvola – Pieksämäki	1	x	5	
	Pieksämäki – Kuopio	1	x	4	
	Kuopio - Siilinjärvi	1	x	4	
	Siilinjärvi – Iisalmi	1	x	3	
	Iisalmi – Murtomäki	1	x	3	
	Murtomäki – Kontiomäki	1	x	3	
	Kontiomäki – Oulu	1	x	4	
11. Iisalmi – Ylivieska	Iisalmi – Kiuruvesi	1	x	2	Regional train and freight volumes between Iisalmi and Ylivieska. Low level of capacity saturation.
	Kiuruvesi – Pyhäsalmi	1	x	3	
	Pyhäsalmi – Haapajärvi	1	x	2	
	Haapajärvi – Ylivieska	1	x	2	

Table 4: Train routes and track sections.

T: Number of tracks

E: Electrified, x = yes

ICL: Intended capacity usage line = number of trains/hour not recommended to be exceeded.

3.2 Traffic Flows

This chapter provides an overview of traffic flows and track capacity in Finland. This overview can be utilized in later strategic planning phases to create a more detailed estimation of track capacity on different routes in 2027. However, at the moment predicting future changes in Finnish train traffic is challenging due to external circumstances. The war in Ukraine and related economic sanctions towards Russia have mostly stopped traffic across the eastern border. This has created further changes in freight flows within Finland which make it difficult to predict future traffic situation on different train lines. Current economic downturn further complicates the situation.

In passenger traffic the effects of Covid pandemic have also made future passenger capacity needs more difficult to predict. In preparing this document various stakeholders have been consulted about future traffic needs but in current situation it has not been possible to provide reliable predictions of future changes. Therefore, numbers in this chapter are based at the moment on 2024 capacity application (passenger traffic) and statistical analysis of previous traffic (freight trains). These now provide the closest available estimation of future traffic situation. In next versions of this document as well as in further phases of TTR strategic planning these numbers will be updated with any available information.

Together with creating the capacity strategy FTIA will also create a traffic plan, so called basic timetables. They describe traffic on line sections on a typical weekday. For freight transport with a high degree of daily variation, the basic timetables describe the average daily number of freight trains and the distribution of

trains between different times of the day. Information on future changes is also considered. Passenger trains in this traffic plan are based on current traffic and any available information on future changes. The timetables are used to produce the key traffic figures for the strategy, and they will serve as baseline timetables for studies that require traffic and infrastructure capacity data for the future network development.

The more detailed planning principles of the timetables are described in the planning instructions and the TTR process description document.

For each Traffic Flow described, the tables below present the train types that, based on the FTIA's forecasts, are expected to operate each route between two nodes. This section describes the main principles for each rail line. Capacity utilisation at stations is not included in the assessment.

Figure 5 provides an estimation of train numbers on different routes during a typical weekday based in the current situation. Figure 6 shows typical departure and arrival minutes of passenger trains in Southern Finland main passenger routes during weekdays on off peak hours. Note that not all lines have hourly traffic, some have traffic every two hours etc. Figure 7 shows an example of estimated capacity situation during afternoon peak. A more detailed 24 hours estimation will be created later in the capacity model phase of strategic planning.

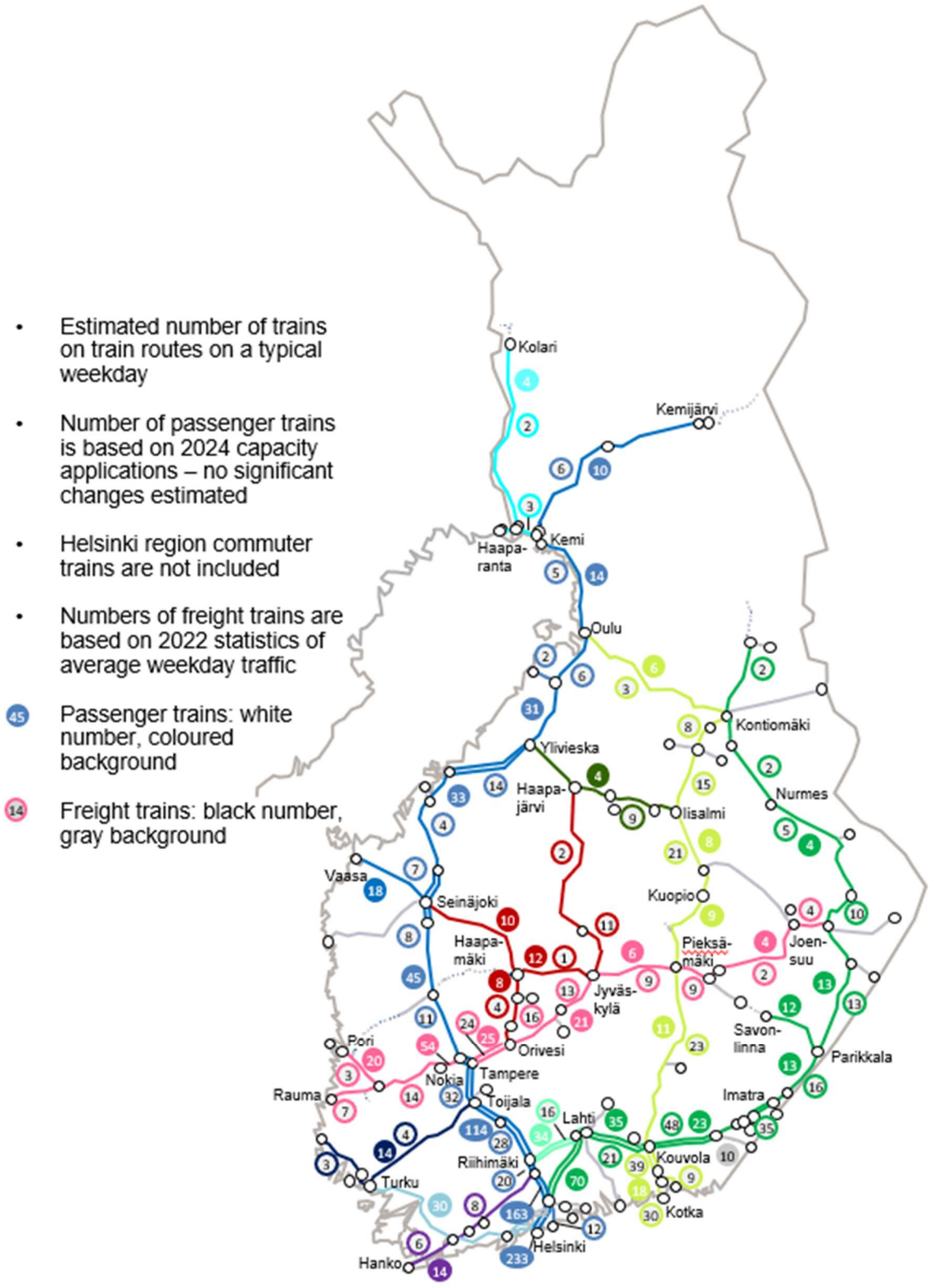

Figure 5: Estimated number of trains on an average weekday.

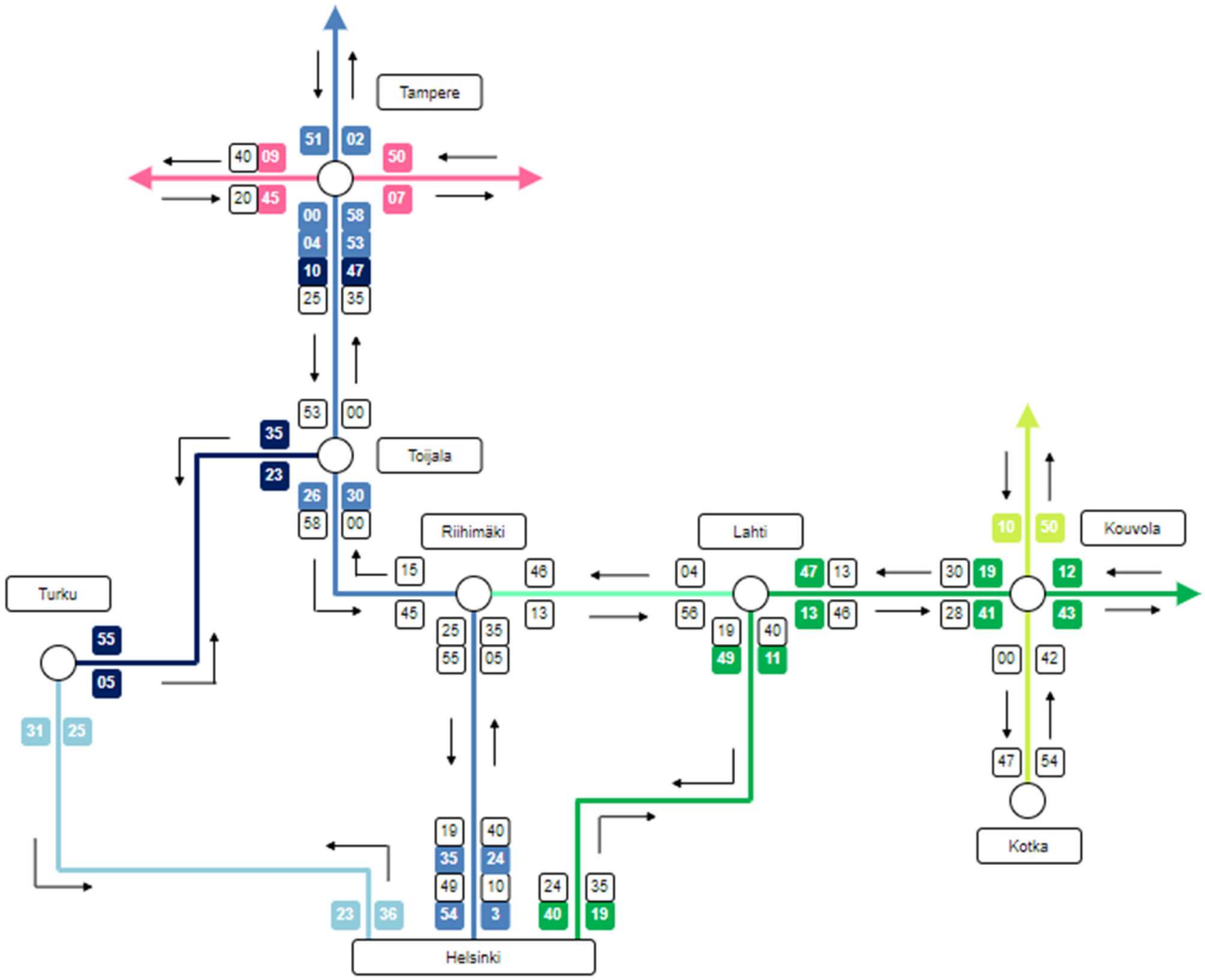

Figure 6: Typical departure and arrival minutes of passenger trains in Southern Finland main passenger routes.

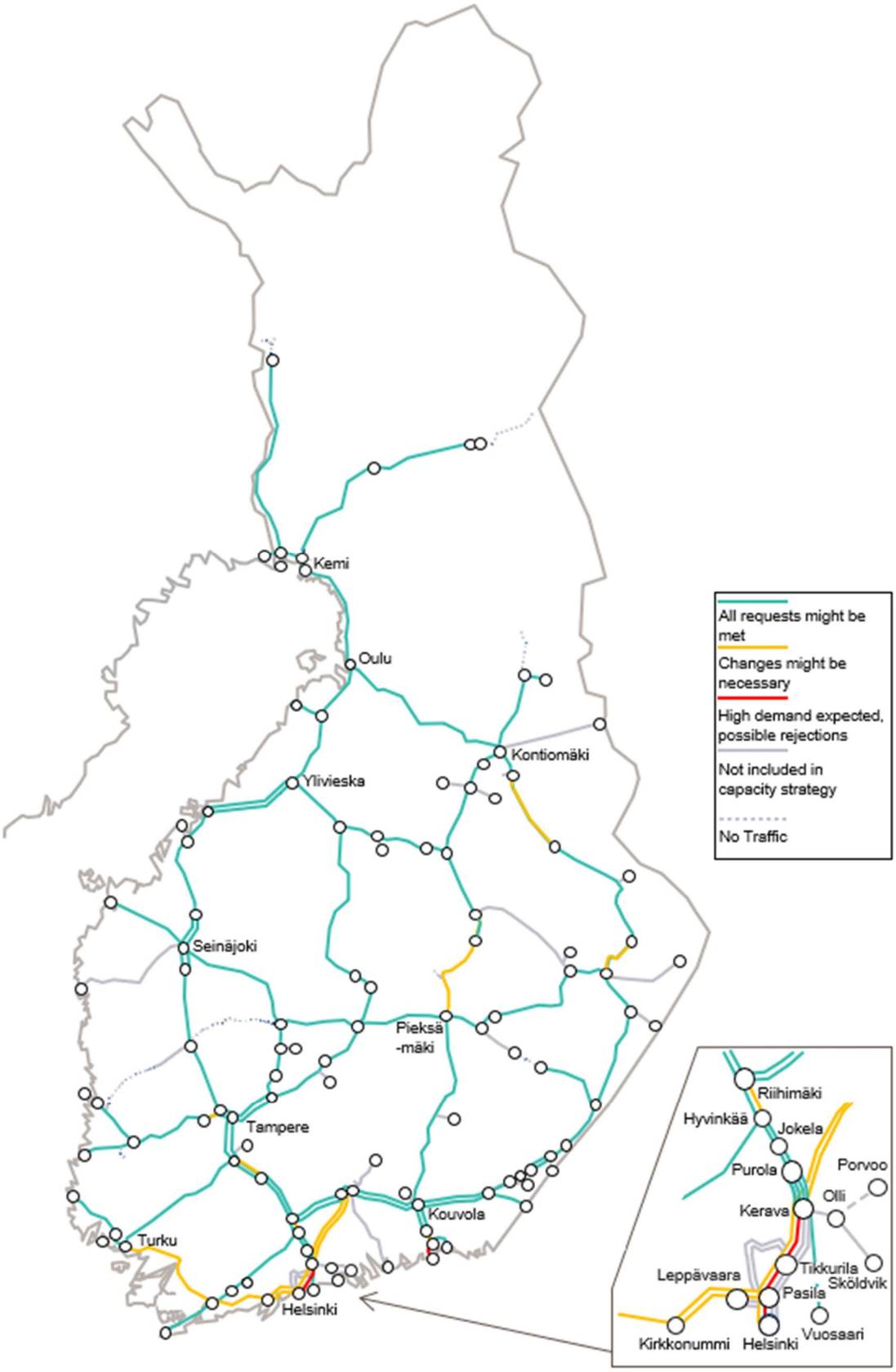

Figure 7: Estimated average capacity utilization on a typical weekday during afternoon peak (16:00 – 18:00).