Appendix 1

Appendix description:

This appendix is part of a previous feasibility study conducted for the *Inlandslänken Project*, which was carried out in 2017 and investigated an upgrade of Inlandsbanan. Parts of that feasibility study are used in this appendix to present Inlandsbanan's present infrastructure and technical condition.

Note that the information is 7 years old and that there may have been technical and strategic changes to parts of the line and operating sites since the text was produced.

The information in the appendix is taken from the report *Fördjupningsstudie Inlandsbanan – dragkraften som utvecklar inlandet* (2017).

1. Inlandsbanan's existing infrastructure

Inlandsbanan’s railway network historically stretches from Kristinehamn in the south to Gällivare in the north. The Mora-Brunflo, Östersund-Gällivare, and Orsa-Furudal sections are managed by the municipally owned company Inlandsbanan AB, IBAB. The sections Brunflo-Östersund (Mittbanan), Kristinehamn-Nykroppa, Nykroppa-Daglösen (Bergslagsbanan), and Daglösen-Persberg are managed by the Swedish Transport Administration. The stretch between Persberg and Mora is closed to traffic and is not maintained.

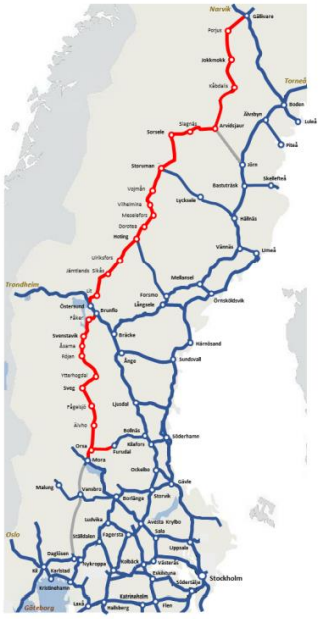

Figure 1: The Inlandsbanan and the rest of the railway network in Sweden.

The line is single-track (track gauge 1.435 mm), non-electrified (except for the Kristinehamn-Nykroppa section) and has no centralized traffic control (CTC). Of the tracks that are currently in operation, the Swedish Transport Administration manages 7.3 km and IBAB 104.9 km.

1.1 Operational and track locations

Along Inlandsbanan, there are these following operating sites: Orsa, Älvho, Fågelsjö, Sveg, Ytterhogdal, Röjan, Åsarna, Svenstavik, Fåker, Lit, Jämtlands Sikås, Ulriksfors, Hoting, Dorotea, Meselefors, Vilhelmina, Vojmån, Storuman, Lomselenäs, Sorsele, Slagnäs, Arvidsjaur, Moskosel, Kåbdalis och Jokkmokk. Track locations for freight handling along Inlandsbanan are available at: Tallhed, Överhogdals grusgrop, Röjan, Brånan, Skuckuviken, Åskott, Munkflohögen, Lövberga, Storbergets industrispår, Lövliden, Vinlidsberg, Avaviken, Klocksta, Norra Kikkejaur, Varjisträsk och Maitum.

1.2 Train coupling and decoupling points and terminals

Along Inlandsbanan, there are train coupling and decoupling points or shunting yards at the following locations: Orsa, Sveg, Svenstavik, Lit, Ulriksfors, Hoting, Dorotea, Vilhelmina, Storuman, Arvidsjaur och Jokkmokk.

Other railway yards are located at operating sites and adjacent to track locations, and are defined on the basis that the two following are met:

- 1 switch or more
- 1 track or more

All operating sites and track locations on Inlandsbanan have sidings where parking can take place. The lengths of the tracks vary from 300 meters to 600 meters.

For handling freight, there are 19 terminals along Inlandsbanan, with track lengths varying between 182 – 800 metres, of which 18 terminals are less than 750 metres long.

1.3 Fuel depots

There are operating sites along the Inlandsbanan with equipment intended for refuelling trains. Inlandsbanan has a fuel depot located in Östersund. In addition, there are depots in Sveg and Hoting that meet current environmental requirements. General agreements with fuel suppliers can be used.

1.4 Features of Inlandsbanan

The maximum permitted speed on the rail network is 105 km/h with railcars and 70 km/h with locomotive-drawn trains. The actual speed on the track varies from 105 km/h to 10 km/h due to the track's standard regarding rails, sleepers, and substructure. The following variation has been identified.

Section	Line Book part B			Line Book part D				
	STAX (tonnes)	Railcar with STAX D	Max. permissible speed	≤40 km/h (km)	41-79 km/h (km)	80 km/h (km)	81-99 km/h (km)	>100 km/h (km)
Mora-Sveg	22,5	70	80	4,5	3,0	117,4	0,0	0,0
Sveg-Brunflo	20,0	*)	80	5,4	1,7	162,6	0,0	0,0
Brunflo-Östersund	22,5	100	140	0,5	0,0	0,4	0,0	14,0
	25,0	90	140					
Östersund-Ulriksfors	22,5	70	80-100	3,7	1,1	12,4	128,8	19,1
Ulriksfors-Hoting	22,5	60	85	1,2	0,0	0,0	50,0	0,0
Hoting-Arvidsjaur	22,5	60	80	23,3	8,0	274,1	0,0	0,0
Arvidsjaur-Jokkmokk	20,0	*)	80	6,8	0,3	166,3	0,0	0,0
Jokkmokk-Gällivare	20,0	*)	80	2,0	0,8	97,4	0,0	0,0
*) *Operated with special permission*			**Total**	**47,4**	**15,0**	**830,5**	**178,8**	**33,0**

Figure 2: Compilation of the Inlandsbanan's load-bearing capacity and speeds according to the Line Book 2016.

1.5 Traffic and communication systems

Traffic management on Inlandsbanan is handled manually by local signallers who send the trains between them, so-called system M (previously called train notification) and the communication system TAM2014. System M is based on the line being monitored by two signallers without the help of line blocking or radio blocking. The operating sites can be monitored with manual methods supported by a simple signalling system but can also have complete signalling switchgear. In system M, it may occur that operating sites are unattended, guarded or closed.

Guarded operating sites are monitored and managed by a signaller, either locally on site or remotely. A guarded operating site is an area of the line demarcated that can be monitored by signallers in more detail than is required for the line. A guarded route is the line between two guarded operating sites. To regulate and secure a train journey on a guarded route in system M, notification between two signallers, so-called train notification, is required.

On some sections of Inlandsbanan, traffic is operated on system S by one or more barrier journeys operating the line for a limited time. System S is only controlled by one signaller, usually the signaller that controls the location boundary to system S. The speed may not exceed 40 km/h.

At all operating sites after Inlandsbanan, there are sidings, with or without signal controls, where traffic is carried out by shunting. Normally, traffic is conducted in these areas by the parties responsible for the various shunting movements agreeing on how these are to be carried out.

1.6 Railway bridges

On Inlandsbanan, there are 195 registered bridges, of which just over 85% are shorter than 50 m. The longest bridges cross the Stora Lule River (192.5 m) and the Ångerman River (151.8 m). Approximately 5% of the bridges are over 100 m long.

Completed main inspections on the Mora-Brunflo and Östersund-Storuman sections show that the bridges are in better condition than previously feared and there are no restrictions on train traffic for the short term. Some steel bridges have been exposed to rust, which is being remedied according to a bridge painting programme to meet line category D2, i.e. maximum permissible axle load of 22.5 tonnes and metre weight 6.4 tonnes.

An upgrade to 25 tonnes axle load and 8 tonnes metre weight (line category E) requires further inventory and investigation to identify load-bearing measures on the existing railway bridges and culverts in the embankment along Inlandsbanan.

1.7 Adjacent rail lines

Inlandsbanan is adjacent to other rail lines which connect to other railway networks in Sweden and Norway. Below is a brief overview of the status of the connection line between Arvidsjaur and Jörn, which is expected to be upgraded for implementing the Upgrade of Inlandsbanan.

Arvidsjaur – Jörn

This rail line has been closed since the end of the 1990s when the connecting switch to the main line was demolished. IBAB's goal is for the line to be reopened as a diversion line by 2019 at the latest. At present, the bearing capacity on the line is estimated to be 22.5 tonnes on just over 70 per cent of the line and 20 tonnes on the rest, which limits the capacity and in some cases the speed of the line. Since the line has been closed for a long time, the need for an upgrade is expected to be great.

The connection points in Arvidsjaur and Jörn are designed so that trains running in a northerly and southerly direction from the main line through Upper Norrland to Inlandsbanan can be operated without stopping. Trains that run north of Arvidsjaur can also be operated through the point, but if the trains are running southbound on the main line through Upper Norrland, a locomotive turnaround in Jörn is required. Inlandsbanan has a major shortcoming in that all through trains in the Sorsele-Jokkmokk stretch must make a time-consuming locomotive turnaround at Arvidsjaur station.

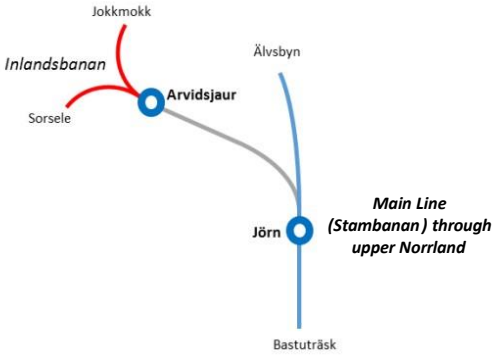

Figure 3: Connection points between Inlandsbanan (Arvidsjaur) and the Main Line (Stambanan) through upper Norrland at Jörn.