Increasing the number of RNP AR approaches at Stockholm Arlanda Airport

To increase the number of RNP AR approaches performed to RWY 01R, Swedavia has created a program called IRIS (translated as non-straight in approaches to Stockholm Arlanda Airport). IRIS involves projects which affect daily operations and projects that carry out long term research and innovations.

Actions taken to increase the number of Required Navigation Performance Authorization Required (RNP AR) approaches to runway (RWY) 01R at Stockholm Arlanda Airport

Multiple prerequisites must change to increase the number of RNP AR approaches to runway (RWY 01R). One of the most important ones is to increase the portion of the fleet that has the correct approval for RNP AR approaches. Another important component is that Air Traffic Control (ATC) needs to have the tools and prerequisites to be able to combine straight in approaches (e.g. Instrument Landing System (ILS)) with RNP AR approaches.

In addition to the fact that less than half of the aircraft fleet at Stockholm Arlanda Airport is equipped and has permit to fly RNP AR approach procedures, eligible aircraft need to arrive at Stockholm Arlanda Airport during off-peak hours, i.e. when the traffic situation allows usage of RNP AR procedures.

RWY 01R is normally used for landing during peak hours. The use of curved RNP AR approaches to RWY 01R in combination with straight in approaches is a major challenge for ATC. This is further complicated by Condition number 10 in Stockholm Arlanda Airports environmental permit. Condition number 10 states that Upplands Väsby (approximately 10 km south of the airport) should be avoided to be overflown when possible. The only way to do this, is to fly RNP AR approaches to RWY 01R.

Within the IRIS program an incentive model has been developed targeting operators, where a network of Swedish airports is used to solve challenges at the more complex main airport of Sweden, Stockholm Arlanda Airport. The incentive is based on offering RNP AR approaches to several other airports. These RNP AR approaches are specifically designed to shorten track-miles and thus providing fuel savings for the airline, i.e. reducing operating costs. Due to lower traffic intensity and complexity at these airports, ATC will be able to offer these approaches more frequently and the airline will subsequently benefit from their RNP AR investment on a more regular basis.

Before a network of airports with RNP AR procedures can be materialized, the procedures need to be designed by a certified procedure designer, meet the requirements a safety assessment and obtain approval by the Swedish Transport

Agency. In some cases, changes to the airport's environmental permit may also be required which is an exhaustive process requiring additional effort and time.

ATC

To be able to efficiently merge RNP AR approaches into nominal traffic sequence, i.e. ILS approaches, ATC requires to have information about which aircraft are certified and approved to conduct RNP AR operation. To increase the number of RNP AR approaches, the IRIS program is investigating whether a support tool for the Air Traffic Controllers (ATCOs) might be a way forward.

New RNP AR procedures to RWY 01R

Swedavia has published three RNP AR procedures to RWY 01R. They are designed to avoid Upplands Väsby whilst minimally affecting the ATCOs ability to handle the arrival flow. The procedures are illustrated in Figure 1 and Figure 2 with contours for estimated maximal sound level 70 dB(A) for two common aircraft types.

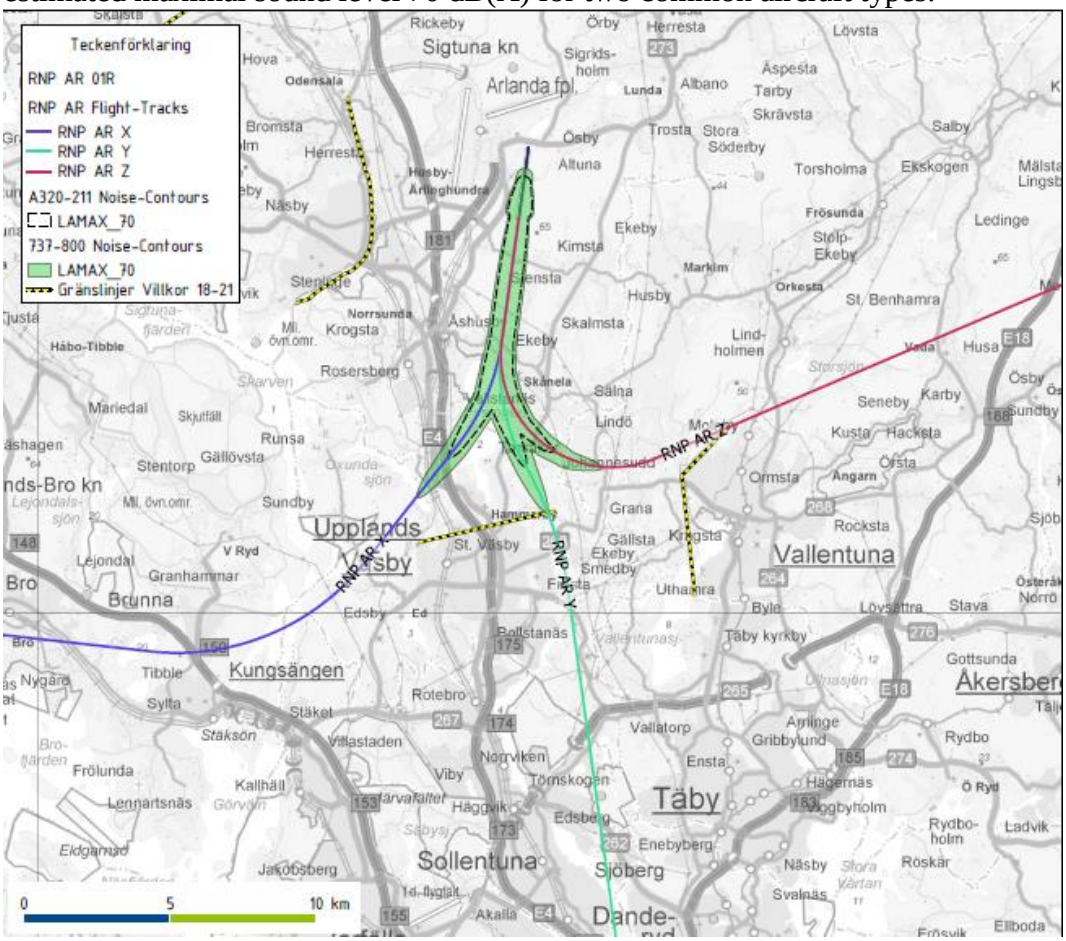

Figure 1 Three RNP AR procedures (X, Y, and X) to RWY 01R, published 21 June 2018, including noise contours for maximal sound level 70 dB(A) for Airbus 320-211 and Boeing 737-800.

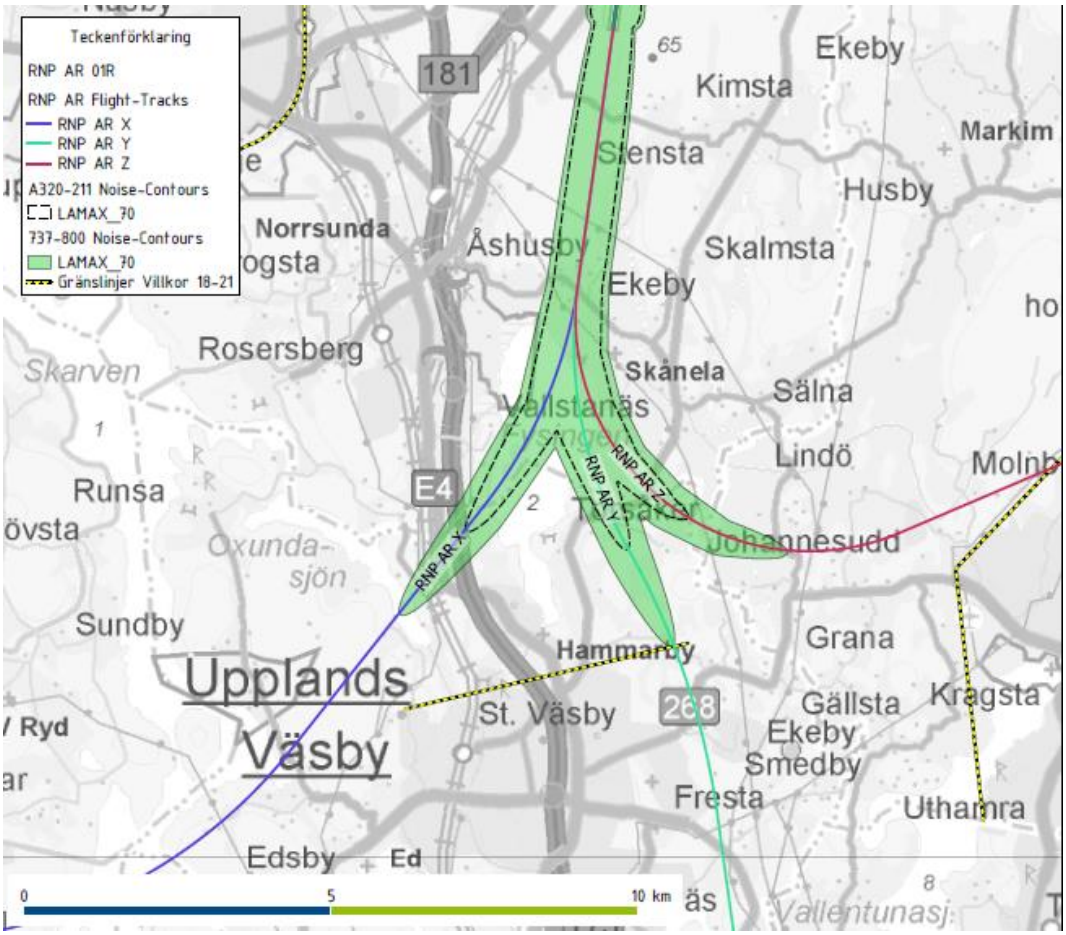

Figure 2 Enlargement of the noise contours for maximal sound level 70 dB(A) for Airbus 320-211 and Boeing 737-800 for the RNP AR procedures X, Y, and Z to RWY 01R.

Several simulations of the three procedures have been performed in an A320 simulator in Copenhagen and in a B737 simulator in Oslo. Novair, LFV (the Swedish Air navigation Service Provider (ANSP)) and the Swedish Transport Agency have all been involved in these simulations. These new procedures were published in the Swedish AIP on 21 June 2018.

Swedavia published these RNP AR procedures with support from Condition number 17 of Stockholm Arlanda Airports environmental permit which enables usage of different approach procedures.

The condition says that the airport should actively contribute in the work of developing techniques to adapt RNP AR procedures. However, the condition also says that RNP AR approach procedures to RWY 01R cannot exceed 10 percent of the total amount of approaches to RWY 01R per year.

The test period ranged from 21 June to 31 December 2018 and was very successful. Swedavia will now apply for a permanent approval for the procedures or apply for a

change request in the environmental permit. The number of performed approaches and departures will be presented quarterly to the local authority, within a month after every quarter, as well as in the environmental report.