Appendix A: Description of data process for the accessibility study for electric aviation

1) Selection criteria for airports

- All Nordic airports with both a ICAO-code and a IATA-code was collected and put together in a Masterfile in Excell. The airports were given the correct coordinates. The file was saved as tab-separated text file

- From the text file a point feature class was created in GIS Pro, through the tool ***XY Table to Point***

- The default coordinate system is the WGS 1984 geographic coordinate system. The point layer was given new projection system with the tool ***Project (Data management).*** The new projection: *Lambert conformal conic*

- All airports were verified against orthophoto map in GISPro, to secure they had been given the correct location. If not, the point was moved.

- The x- and y- coordinates was re-calculated. This was done through the tool ***Calculate Gemoetry*** in the Attribute table.

2) Selection criteria for routes

- From the Airports point layer all possible routes were created with the tool ***Field Calculator*** in QGIS. The following expression was used in ***Geometry Generator***:

```
collect_geometries(
  array_foreach(
    aggregate('point_layer','array_agg',$geometry),
      make_line($geometry,@element)
  )
)
```

- The be able to accomplish the expression in Geometry Generator, two new fields for ending coordinates were created

- The output layer consists of an array of lines, where each object corresponds to one starting point which is connected to all other points as ending points

- All line segments were split based on intersection with the features in the Airport point layer with the tool ***Split Line at Points*** in GIS Pro.
  Output: Line layer consisting over 105 000 features

- In QGIS, From the Processing Toolbox, the tool ***Delete duplicate geometries,*** was run. This procedure reduced the number of features from 105 000 to approximately 17 000

- In this project, a maximum distance is set to 200 kilometers. A new column for calculating the length was added to the attribute table, whereafter the length for each line was calculated with the tool ***Field calculator***

- All objects with a maximum distance of 200 km were selected and exported as a new layer

3) Categorization of airports by degree of urbanization

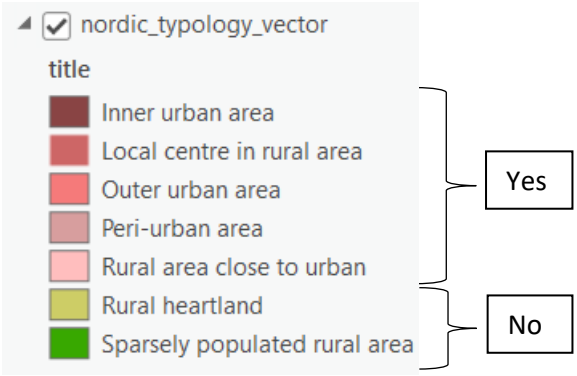
We categorized airports by their location using the *New Nordic urban-rural typology*

- A vector layer with *New Nordic urban-rural typology* was first imported

- To categorize all airports, the tool ***Spatial join*** was used I GISPro with the airport point layer. The function ***WITHIN*** was selected, where a feature in the join layer is matched if a target feature is within them.

  Output: New layer where all the ariports was matched with the degree of urbanization, on a scale from 1 to 7

- The attribute table was exported to excel, where the airports were re-categorized into two classes. The top five classes of urbanization were classed as urban (=yes) and the bottom two classes were categorized as rural (=no).



4) Selection of routes based on airport classification

- In Excel, the routes' start-ICAO and end-ICAO was code by the degree of urbanization (yes or no) through the tool ***VLookup***

- A new column was made were the start- and end typology was combined: Yes_Yes, Yes_No, No_Yes and No_No.

- The Typology Excell sheet was joined with line layer *Routes_max200km*

All routes with typology Yes_Yes= Urban to urban routes
All routes with typology No_No= Rural to rural routes
Routes with either typology Yes_No or No_Yes= Urban to rural routes

- All *Urban to rural* routes were selected with the tool ***Select by attribute*** in GISPro
- All *Urban-to-urban* routes crossing water were selected with the tool ***Select*** in GISPro

Otuput: Sample of 426 routes.

5) Travel time calculations

- All routs that was possible to commute with train in maximum 2,5 hours were filtered out. For the remaining routes, a comparison was made between total travel time if going by electric aviation versus going by car or public transportation. All travel times were obtained from Google Maps.

- *Travel times for car and public transport*: The travel times was measured from a central area (like the central station) in the associated town to the departure airport, to the corresponding area for the destination airport.

- *Travel times for electric aviation*: Travel time by car from the central area to the departure airport, as well as from the destination airport to the central area were collected. Total time in airport was added (75 minutes in total) as well as the travel time for the flight (300 km/h).
  Formula*:*
  Car from central location to departure airport+ time in airport+ time in air+ car from destination airport to central location.

- If travel time by car *and* travel time by public transportation exceed 1,5 times the travel time by electric aviation= travel time benefit if implementing electric aviation

- Output: 203 routes with travel time benefit if implementing electric aviation