TECHNICAL NOTE:
Edinburgh Airport new SIDs ACP – noise contours for final routes

Introduction

ERCD was commissioned by NATS to produce noise contours for the Edinburgh Airport ACP. The final set of proposed Standard Instrument Departure (SID) routes for the ACP is shown in **Figure 1**. NATS advised that all the new routes would be implemented in a single phase in February 2019. Two average summer day Leq contour sets, plotted from 51-72 dBA at 3 dB intervals, were therefore generated:

- 2019 – ACP implementation of all new SIDs; and
- 2024 – 5-year forecast from ACP implementation.

SEL footprints were also produced for the aircraft types Boeing 737-800 and Airbus A330 (the most frequent and noisiest types respectively at night) on each SID route available to jets, and for the large twin-turboprop aircraft type on two of the Runway 24 routes as requested by NATS.

Methodology

Edinburgh Airport's definitions of 'day' and 'night' are 0600-2300 and 2300-0600 (local time) respectively. In addition, 'peak' hours are defined as 0600-1000. The standard Leq definitions are 0700-2300 for day and 2300-0700 for night (local time).

There will be restrictions to the usage of the proposed SIDs, which have been accounted for in the Leq contours, as follows:

- **EVTOL1C** is restricted to use by turboprops during peak hours. Outside peak hours (i.e. 1000-2300 for the Leq day), turboprop movements follow the route ARLER1C;
- **ARLER1C** is used by jets and turboprops over the 24-hour period;
- **MAVIX1C** is available to jets only, over the 24-hour period;
- **LIKLA1C** is only available to transatlantic jets during the day;
- **GRICE4C** is available to all aircraft types over the 24-hour period;
- **VOSNE1C** is restricted to use by jets during peak hours. Outside peak hours, jets were assumed to use ARLER1C instead;
- **EMJEE1D** is restricted to use by jets during the day period (i.e. 0700-2300 in the Leq day period);

- **GRICE5D** is available to all aircraft types over the 24-hour period;

- **VOSNE1D** is restricted to use by jets but is available over the 24-hour period;

- **KRAGY1D** is used by turboprops during the daytime period.

The numbers of each aircraft type operating within the Leq daytime period on each route were derived from a combination of: (a) 2016 movement data supplied by NATS, which included the departure time for each flight, (b) ACP SID distribution statistics supplied by NATS, and (c) the above SID route restrictions.

The following traffic growth figures as supplied by NATS were modelled:

- 2016 to 2019 (ACP implementation year) = 2016 + 7.4%;
- 2016 to 2024 (ACP implementation + 5 years) = 2016 + 20.0%.

The contours were produced using the noise model ANCON (v2.3). NATS provided flight track coordinates for each of the proposed SIDs. Lateral spreads reflecting RNAV routes were modelled. 'Straight-in' arrival tracks for Runway 06/24 were assumed.

All flight profiles of height, speed and thrust were based on proxy 2015 data from Gatwick as they would be representative of operations at Edinburgh Airport.

The effects of the surrounding topography were modelled using *Meridian 2 Gridded Heights* terrain data obtained from Ordnance Survey.

As implementation of the airspace change is planned for 2019, it was deemed appropriate to use a long-term average runway split for the Leq contours. Based on the available data (for a 6-year period), the average split was 70% west / 30% east. The same runway split was also assumed for the 2024 forecast contours.

Results

Leq contours

The 51-72 dBA contours for the two daytime Leq scenarios are shown in **Figures 2 & 3**. Estimates of the area, population and households within the contours, using an updated 2016 population database (based on the 2011 Census) supplied by CACI Ltd, are given in **Tables 1 & 2**.

SEL footprints

The 80 and 90 dBA SEL footprints for the Boeing 737-800 (ANCON type 'B738'), for Runway 24 and Runway 06 routes separately, are shown in **Figures 4 & 5** respectively. Estimates of the area, population and households within the footprints are given in **Table 3**.

The 80 and 90 dBA SEL footprints for the Airbus A330 (ANCON type 'EA33'), for Runway 24 and Runway 06 routes separately, are shown in **Figures 6 & 7** respectively. Estimates of the area, population and households within the footprints are given in **Table 4**.

The 80 and 90 dBA SEL footprints for the large twin-turboprop (ANCON type 'LTT') for two of the Runway 24 routes are shown in **Figure 8**. Estimates of the area, population and households within the footprints are given in **Table 5**.

ERCD
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Table 1 Edinburgh 2019 summer day Leq contours with ACP implementation - area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 51	60.5	32,200	13,300
> 54	33.1	9,800	4,100
> 57	18.2	4,100	1,800
> 60	9.9	2,100	900
> 63	5.5	400	200
> 66	3.1	200	100
> 69	1.8	< 100	< 100
> 72	1.0	0	0

Table 2 Edinburgh 2024 summer day Leq contours (ACP implementation + 5 years) - area, population and household estimates

Leq (dBA)	Area (km^2)	Population	Households
> 51	67.0	36,700	15,300
> 54	36.4	12,800	5,400
> 57	20.1	4,300	1,900
> 60	10.9	2,700	1,200
> 63	6.0	400	200
> 66	3.4	300	100
> 69	1.9	< 100	< 100
> 72	1.1	0	0

Note: Populations and households are given to the nearest 100. The population database used is a 2016 update of the 2011 Census supplied by CACI Ltd.

Table 3 Boeing 737-800 (B738) SEL footprints for proposed SID routes - area, population and household estimates

SID	Runway	SEL (dBA)	Area (km^2)	Population	Households
ARLER1C	24	> 80	27.3	12,800	5,400
ARLER1C	24	> 90	4.7	500	200
MAVIX1C	24	> 80	27.4	12,200	5,000
MAVIX1C	24	> 90	4.7	500	200
LIKLA1C	24	> 80	27.6	6,600	2,800
LIKLA1C	24	> 90	4.7	500	200
GRICE4C	24	> 80	26.4	6,100	2,800
GRICE4C	24	> 90	4.7	500	200
VOSNE1C	24	> 80	26.6	4,800	2,200
VOSNE1C	24	> 90	4.7	500	200
EMJEE1D	06	> 80	25.6	3,700	1,600
EMJEE1D	06	> 90	4.7	100	< 100
GRICE5D	06	> 80	25.3	3,700	1,600
GRICE5D	06	> 90	4.7	100	< 100
VOSNE1D	06	> 80	25.1	3,500	1,500
VOSNE1D	06	> 90	4.7	100	< 100
KRAGY1D	06	> 80	25.2	3,900	1,700
KRAGY1D	06	> 90	4.7	100	< 100

Note: Populations and households are given to the nearest 100. The population database used is a 2016 update of the 2011 Census supplied by CACI Ltd.

Table 4 Airbus A330 (EA33) SEL footprints for proposed SID routes - area, population and household estimates

SID	Runway	SEL (dBA)	Area (km^2)	Population	Households
ARLER1C	24	> 80	56.2	39,800	16,700
ARLER1C	24	> 90	8.6	700	300
MAVIX1C	24	> 80	55.0	50,300	21,200
MAVIX1C	24	> 90	8.6	700	300
LIKLA1C	24	> 80	55.1	16,200	7,000
LIKLA1C	24	> 90	8.6	700	300
GRICE4C	24	> 80	50.7	8,800	4,100
GRICE4C	24	> 90	8.6	700	300
VOSNE1C	24	> 80	51.1	12,500	5,700
VOSNE1C	24	> 90	8.6	800	300
EMJEE1D	06	> 80	51.5	18,900	8,100
EMJEE1D	06	> 90	8.2	300	100
GRICE5D	06	> 80	53.7	9,300	3,900
GRICE5D	06	> 90	8.2	300	100
VOSNE1D	06	> 80	50.9	6,800	2,900
VOSNE1D	06	> 90	8.2	300	100
KRAGY1D	06	> 80	50.9	7,000	3,000
KRAGY1D	06	> 90	8.2	300	100

Note: Populations and households are given to the nearest 100. The population database used is a 2016 update of the 2011 Census supplied by CACI Ltd.

Table 5 Large twin-turboprop (LTT) SEL footprints for proposed SID routes - area, population and household estimates

SID	Runway	SEL (dBA)	Area (km^2)	Population	Households
EVTOL1C	24	> 80	3.9	300	100
EVTOL1C	24	> 90	0.4	0	0
GRICE4C	24	> 80	3.9	300	100
GRICE4C	24	> 90	0.4	0	0

Note: Populations and households are given to the nearest 100. The population database used is a 2016 update of the 2011 Census supplied by CACI Ltd.

Figure 1 Edinburgh Airport ACP SID final proposed routes

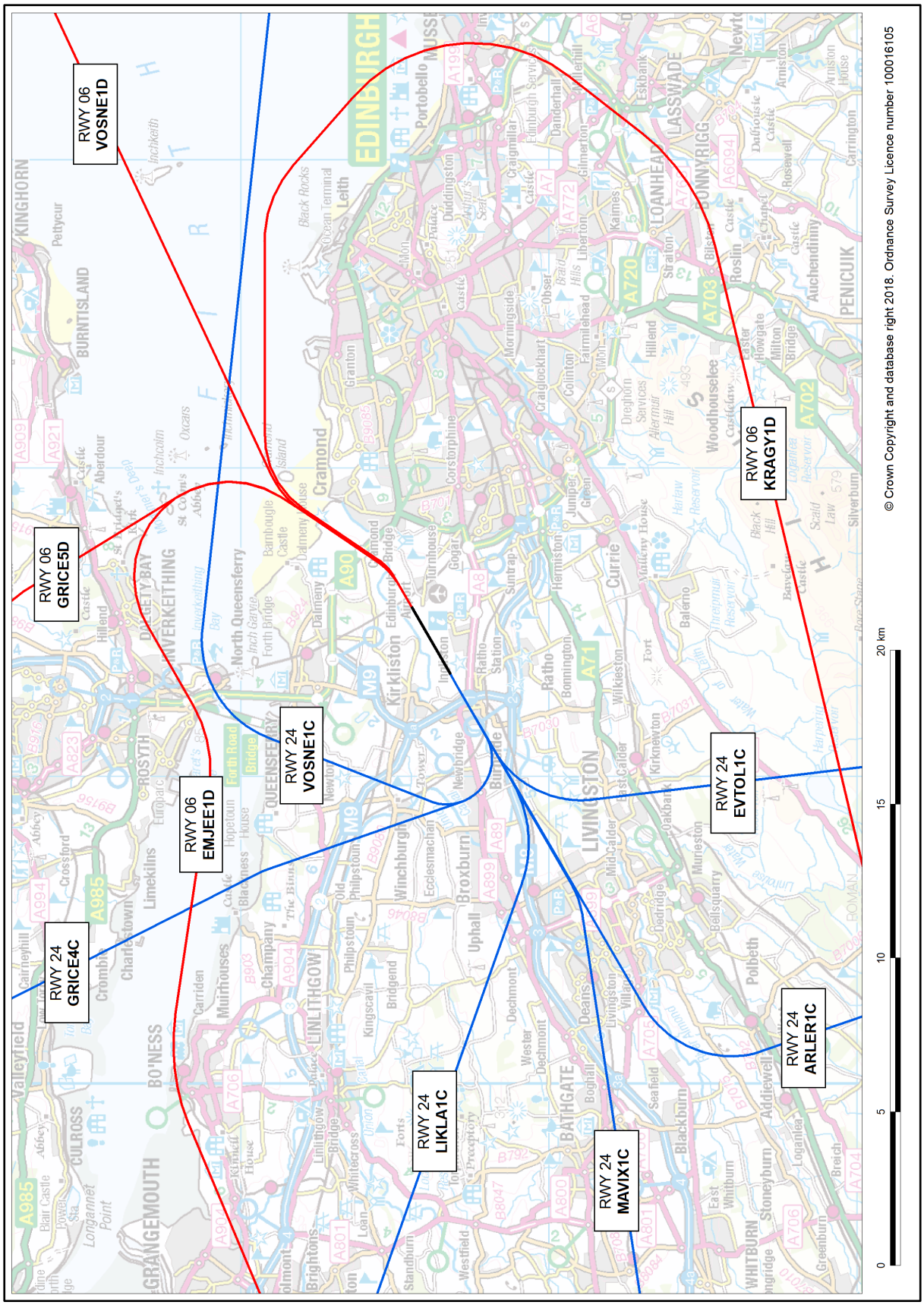

Figure 2 Edinburgh 2019 average summer day (70% W / 30% E) 51-72 dBA Leq noise contours – with ACP implementation

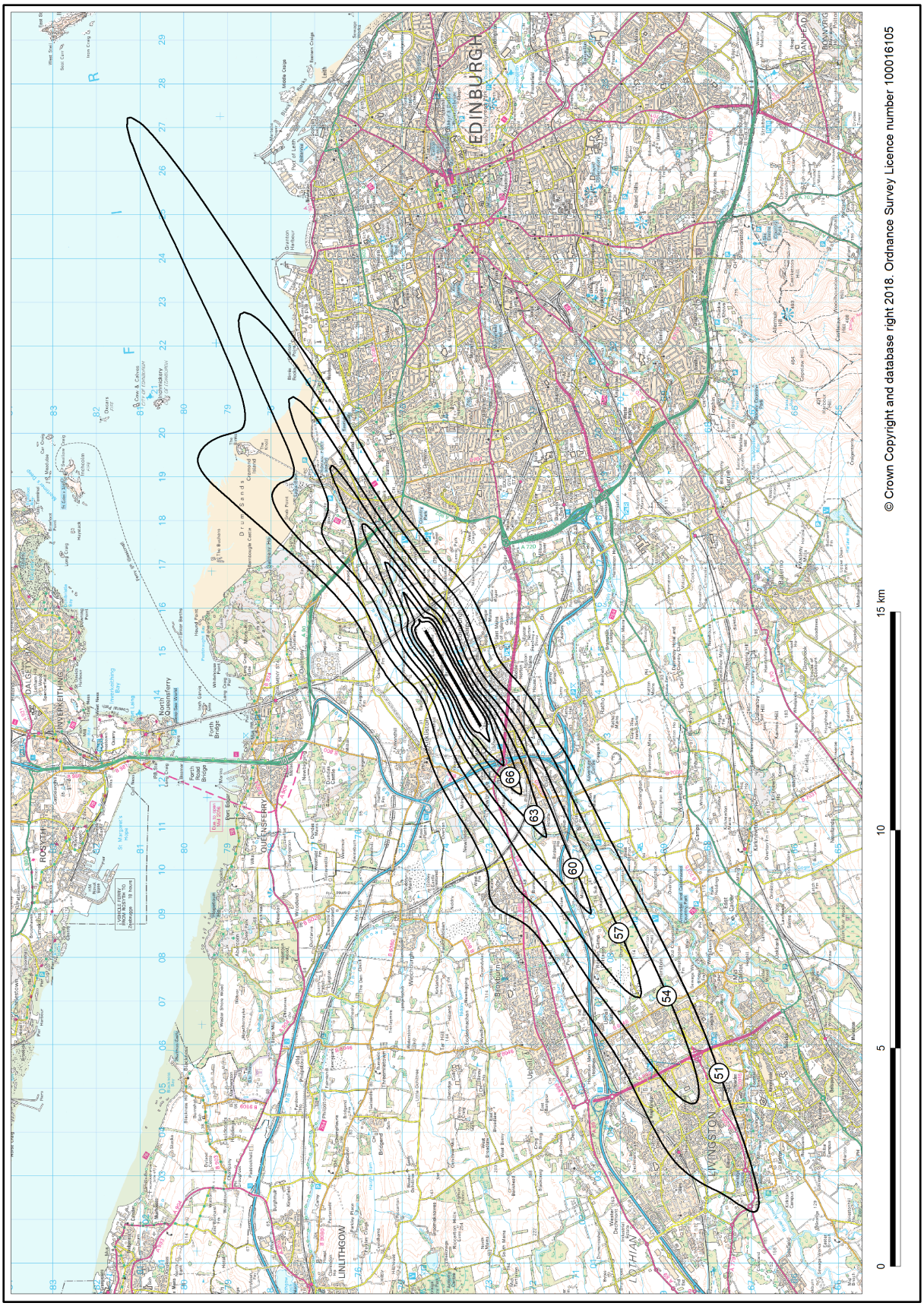

Figure 3 Edinburgh 2024 average summer day (70% W / 30% E) 51-72 dBA Leq noise contours – ACP implementation + 5 years

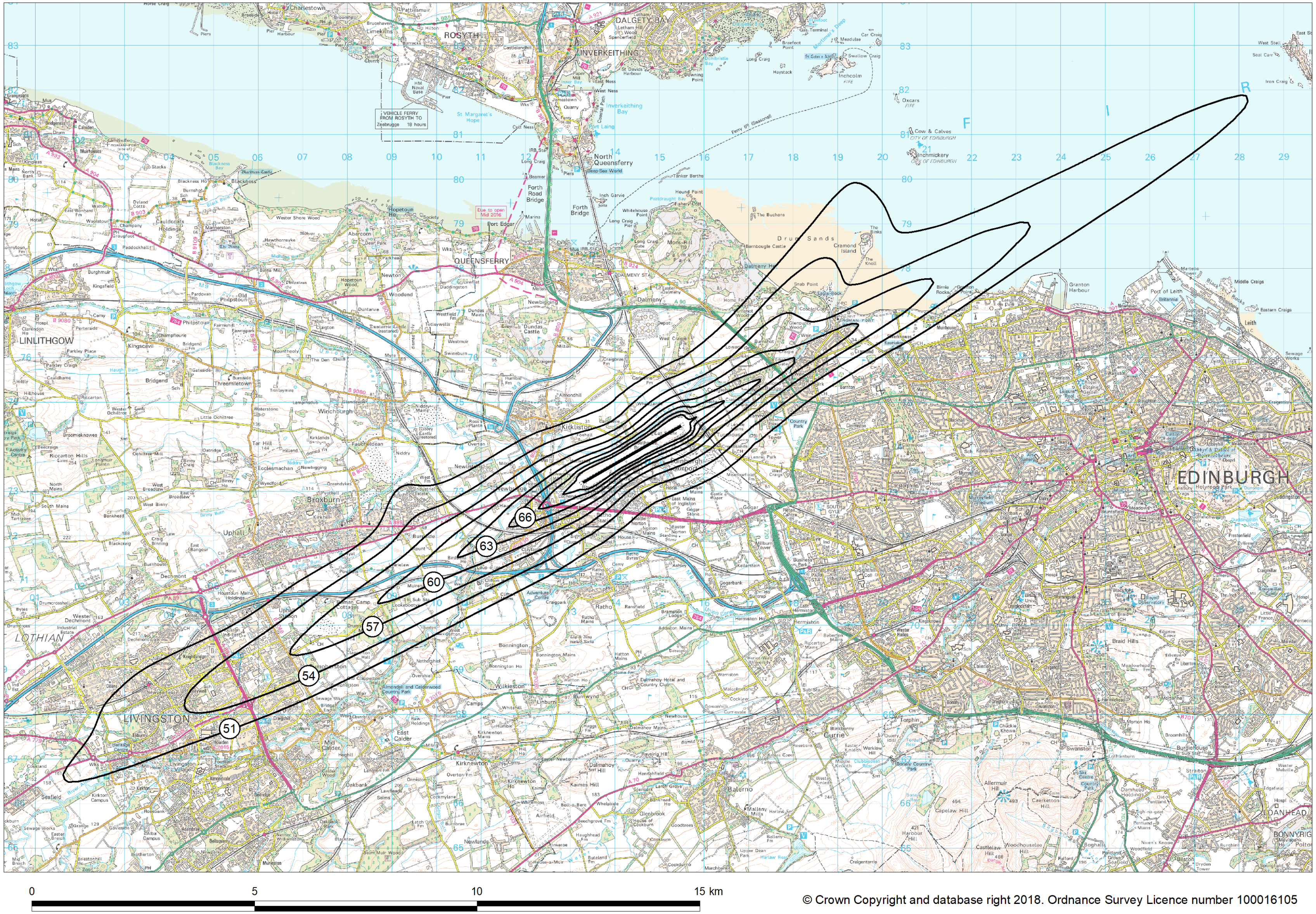

Figure 4 Boeing 737-800 (B738) departure SEL footprints for proposed Runway 24 ACP SID routes

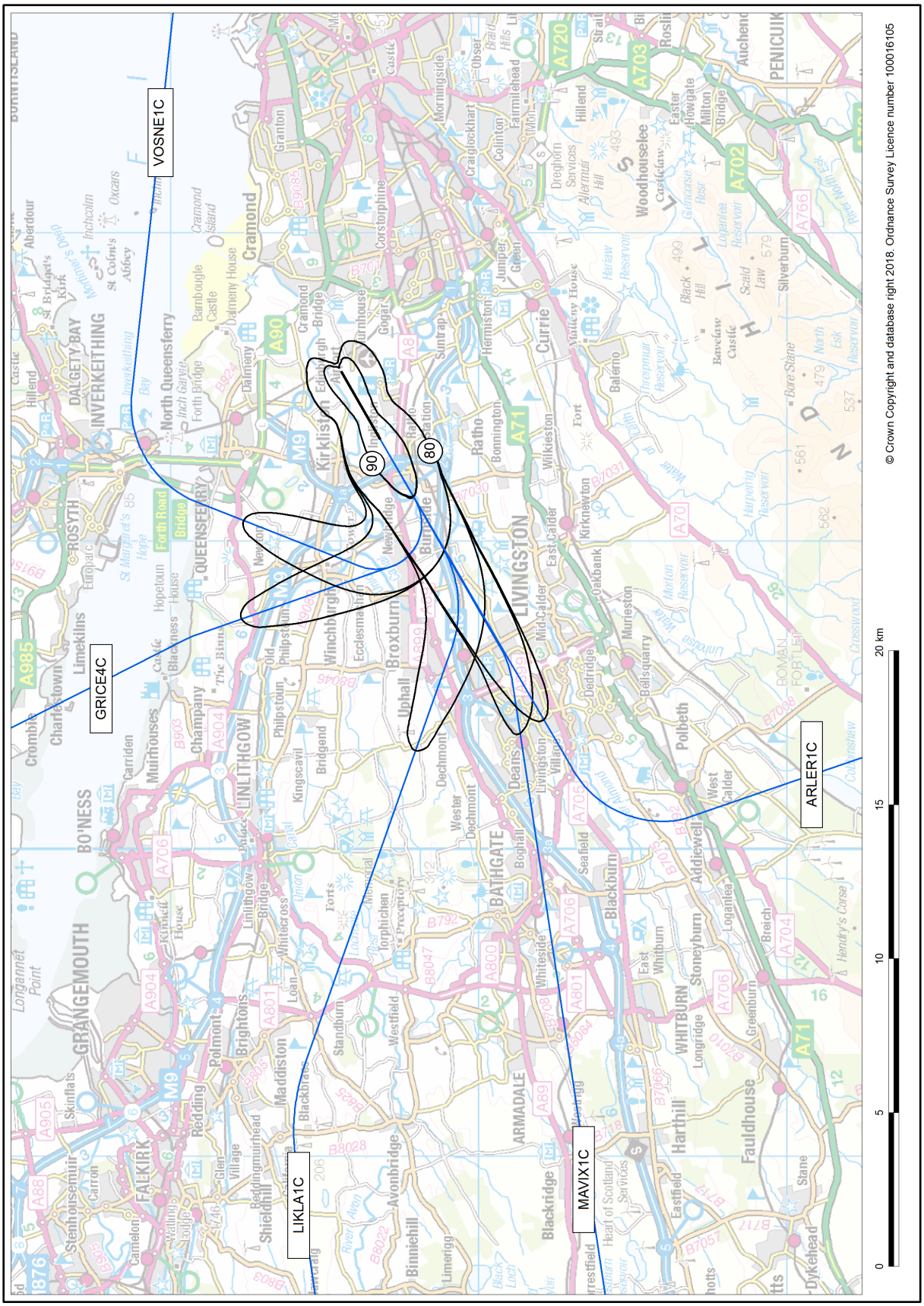

Figure 5 Boeing 737-800 (B738) departure SEL footprints for proposed Runway 06 ACP SID routes

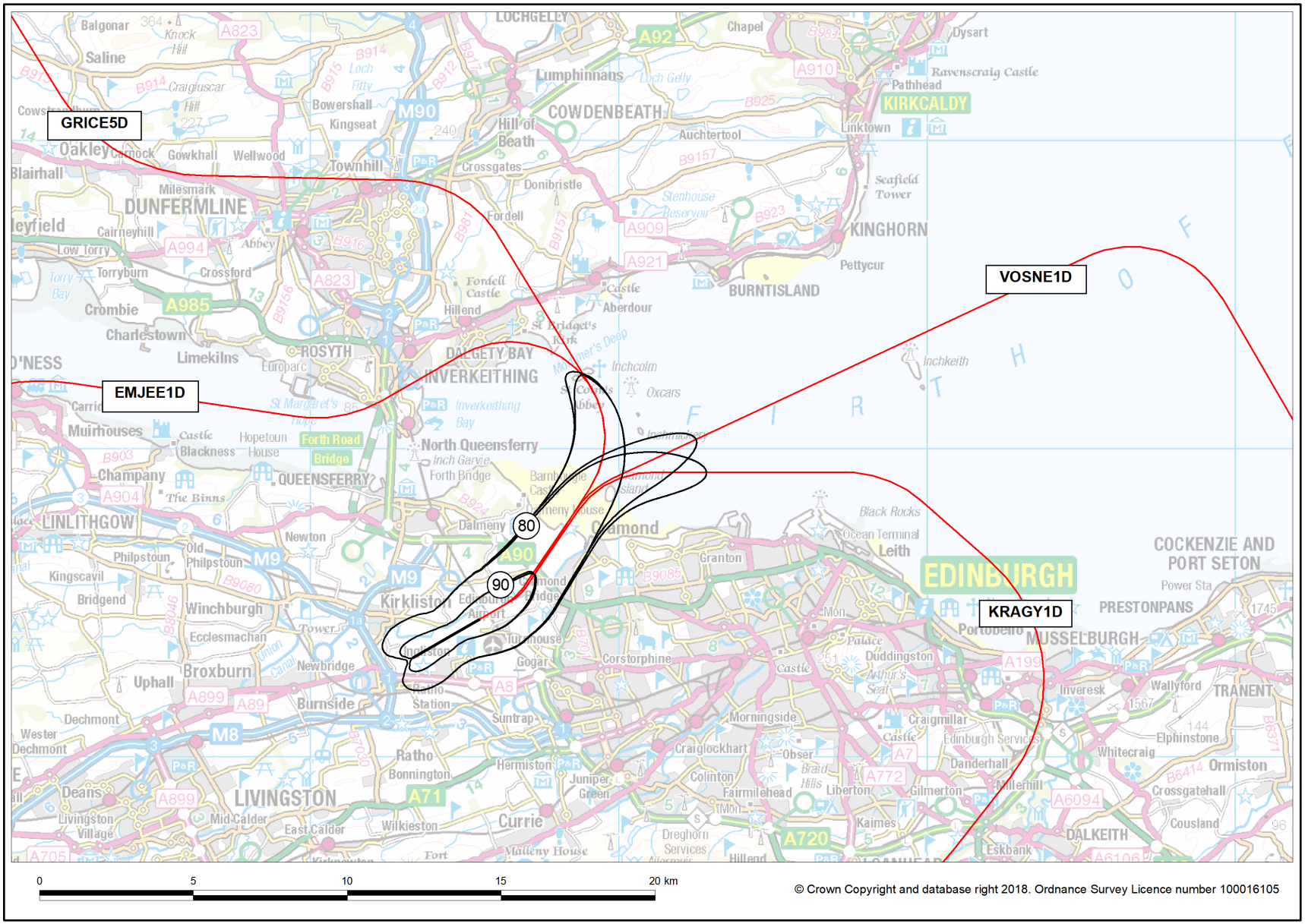

Figure 6 Airbus A330 (EA33) departure SEL footprints for proposed Runway 24 ACP SID routes

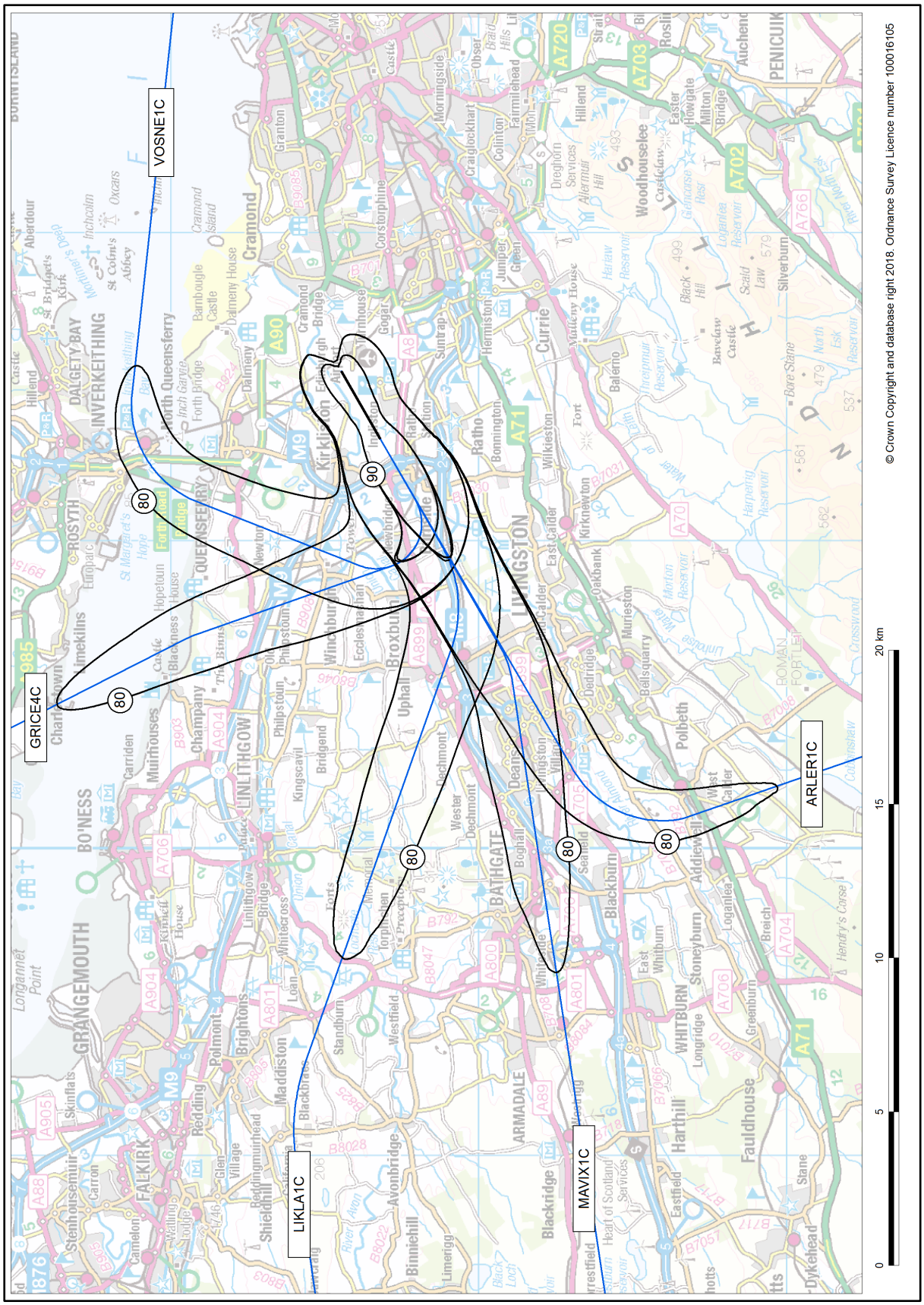

Figure 7 Airbus A330 (EA33) departure SEL footprints for proposed Runway 06 ACP SID routes

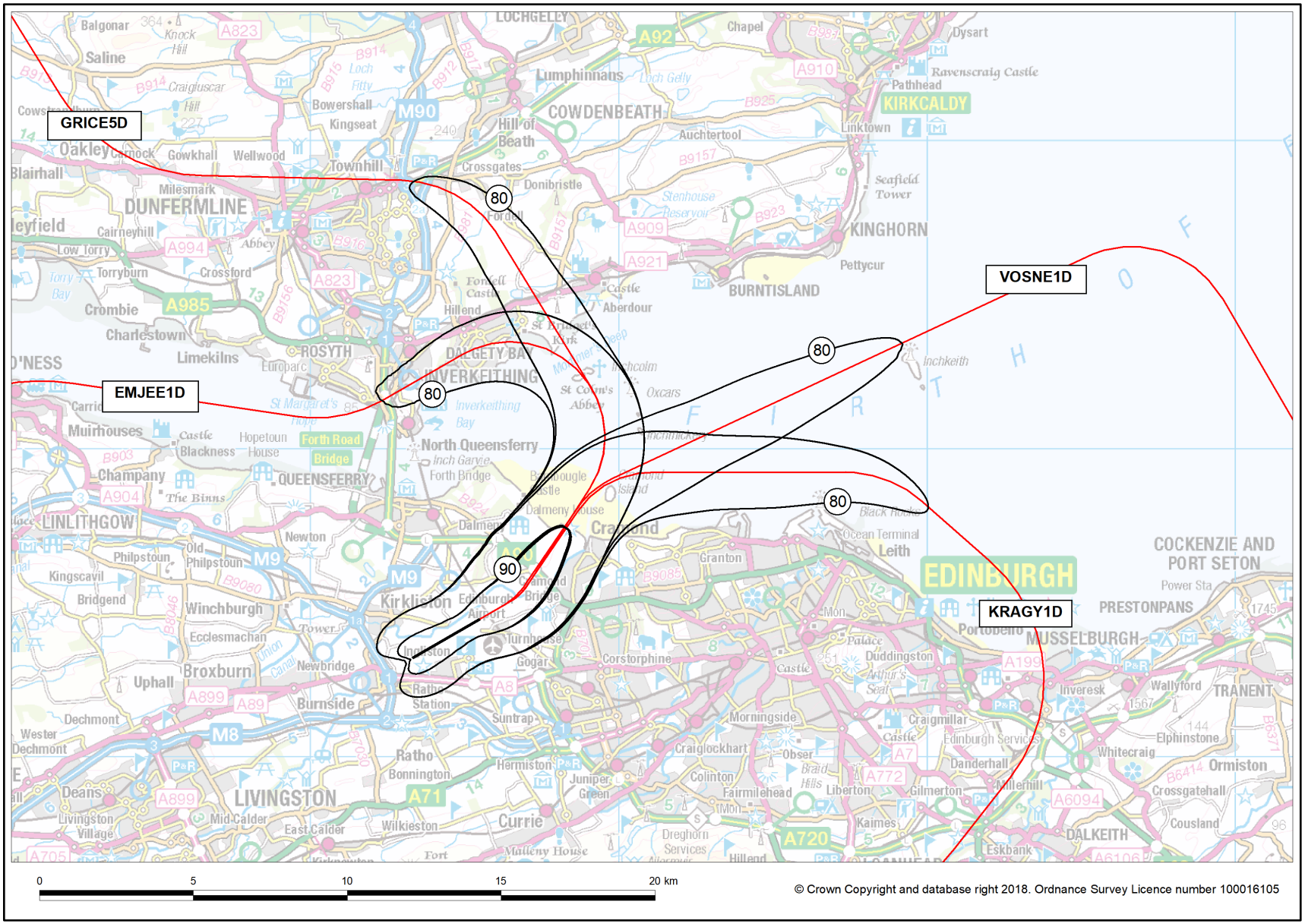

Figure 8 Large twin-turboprop (LTT) departure SEL footprints for proposed Runway 24 ACP SID routes