Bickerdike Allen Partners
Architecture
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DUBLIN AIRPORT NORTH RUNWAY RELEVANT ACTION APPLICATION

NOISE INFORMATION – ANCA REQUEST FEBRUARY 2021

Report to

daa plc
Old Central Terminal Building
Dublin Airport
Co Dublin
Ireland

A11267_19_RP035_3.0
June 2021

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REVISION HISTORY

Revision	Details
1.0	Initial draft for client review.
2.0	Updated draft with completed tables of movements.
3.0	Final

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1.0 INTRODUCTION

An application for planning permission ref. F20A/0668 was lodged by Tom Phillips & Associates on behalf of the Dublin Airport Authority (daa) on 18th December 2020. The proposed development comprised the taking of a 'relevant action' only within the meaning of Section 34C(a) of the Planning and Development Act 2000, as amended, at Dublin Airport, Co. Dublin.

The proposed relevant action related to the night-time use of the runway system at Dublin Airport. It involves the amendment of the operating restriction set out in condition no. 3(d) and the replacement of the operating restriction in condition no. 5 of the North Runway Planning Permission (Fingal County Council Reg. Ref. No. F04A/1755; ABP Ref. No. PL0GF.217429 as amended by Fingal County Council F19A/0023, ABP Ref. No. ABP-305289-19), as well as proposing new noise mitigation measures.

The Application was referred to the Aircraft Noise Competent Authority (ANCA) and is being assessed by them. ANCA are now proceeding to adopt a Noise Abatement Objective (NAO) for the airport and apply the Balanced Approach of the International Civil Aviation Organization.

In their letter of 24th February 2021 (Ref: ANCA-F20A/0668-D01) ANCA gave their Direction 01 in relation to the planning application. This was for the provision of information and was set out in Appendix A to the letter.

daa have sought to respond to this request and have sought clarification from ANCA on certain aspects. While doing so daa have also sought to account for the ongoing Covid pandemic with updated forecasts for the short and longer term and also take on board pertinent 3rd party submissions. These have led to the production of updated forecasts for 2022 and 2025, and additional details of how the runways are expected to be used. In addition, forecasts for the years 2030, 2035 and 2040 have also been produced.

This report details the additional noise information, and the details of its derivation. The report is based on that submitted with the application titled *Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment* (Ref: A11267_12_RP032_3.0) dated November 2020.

Section 2.0 summarises comments on the application including the ANCA request and the subsequent clarifications. Section 3.0 discusses the updated forecasts, with Section 4.0 detailing the scenarios that are considered.

Section 5.0 details the noise modelling methodology used and the population and demographics assessment methodology. The resulting information is introduced in Section 6.0.

A glossary of acoustic terminology is contained in Appendix 1.

Appendix 2 gives details on noise modelling methodology including that used in relation to population and demographics. Figures A2.1 and A2.2 referred to in this appendix are unaltered from the November 2020 report and so have not been included.

Appendix 3 contains details of the resulting noise contour plots. The numerical results are contained in a completed version of the draft template which was provided by the Aircraft Noise Competent Authority (ANCA) (Doc Ref: A11267_19_CA434_4.0 ANCA Reporting Template 2021 Update). Also included in the template are the results for the years 2018 and 2019.

2.0 COMMENTS ON THE APPPLICAITON

2.1 Aircraft Noise Competent Authority (ANCA)

In their letter of 24th February 2021 (Ref: ANCA-F20A/0668-D01) ANCA gave their Direction 01 in relation to the planning application. This was for the provision of information and was set out in Appendix A to the letter.

The appendix set out several overarching information requests followed by four tables of information requests. The first overarching request is given below and relates to noise information for the years 2030, 2035 and 2040. For each year information is sought for two situations, one with the existing 32mppa passenger cap and one without it. Such information has been provided, although it should be noted that the application made by daa does not seek to alter the existing 32mppa passenger cap.

A) Noise and other environmental forecasts for additional assessment years and scenarios are requested with relation to the following:

- Extension of the analysis for all scenarios inclusive of the 32mppa passenger cap to cover:
  - 'unconstrained forecasts' (without North Runway Condition 5, with annual passenger cap) for 2030, 2035 and 2040; and
  - 'constrained forecasts' (with North Runway Condition 5, with annual passenger cap) extended to include outputs for 2030, 2035 and 2040.
- Extension of the analysis for all forecasts excluding the 32mppa passenger cap (i.e., growth potential) to cover:
  - 'unconstrained forecasts' (without North Runway Condition 5, with annual passenger cap) for 2030, 2035 and 2040; and
  - 'constrained forecasts' (with North Runway Condition 5, with annual passenger cap) extended to include outputs for 2030, 2035 and 2040.

- The Applicant should provide noise forecasts for the scenarios and situations described within the Application and consider providing further information in relation to the following preferential runway usage scenarios:
  - No use of the North Runway between 2300 and 0600 i.e., use only between the hour 0600-0700; and
  - Use of the North Runway allied to a quota for North Runway use in the periods 2300 to 2330 and 0600 to 0700

daa sought clarification on the request from ANCA including overarching request A). In their letter of 16th April 2021 (Ref: ANCA-F20A/0668-D01) ANCA advised that it is noise-related information, not other environmental information, that is required in the first instance. They also clarified the scenarios for which the noise information is sought, as copied below.

For the following:

- Scenarios 01 to 10 as covered within the 598 Assessment attached to the Application;
- A scenario with Condition 3d in place and without Condition 5;
- A scenario with Condition 5 in place and without Condition 3d;
- A scenario without Condition 5 and with Condition 3d replaced with:
  - the North Runway shall not be used for take-off or landings between 2300hrs and 0600hrs
- A scenario replacing Condition 5 and Condition 3d with:
  - A total noise quota for the night (2300-0700) at the airport;
  - Associated noise quotas for the periods 2300hrs to 2330hrs, and 0500hrs to 0700hrs for use of the North Runway; and
  - the North Runway shall not be used for take-off or landings between 2330hrs and 0500hrs.

Should any of the additional scenarios requested be unattainable the reasons for this should be clearly described.

2.2 Fingal County Council (FCC)

In their response to the application FCC also sought the inclusion of a longer-term scenario.

It is noted that airport operations are shown to be still recovering from COVID-19 implications in 2022 and that normal (post-COVID-19) operations are not expected to return until 2025 at the earliest. Therefore, in order to gain a fuller understanding of the characteristics and likely significant impacts of the proposed changes over time, and in keeping with the requirements of Annex IV (5) of the EIA Directive and standard assessment practice, the assessments presented in the EIAR should also provide for a longer-term scenario (i.e. 10 or 15 years post opening year scenario (2022).

It is proposed that the 2035 scenario will satisfy this request, the year falling between the two given as examples by FCC.

2.3 Irish Aviation Authority (IAA)

The IAA response to the application stresses the importance of using both runways for departures between 06.00-08.00.

It is considered essential to use both runways for departure between the hours of 06:00 to 08:00 (local time), due to the demand for the first wave of departures to take off from Dublin during this period. The

They also state that they do *not anticipate the use of both runways concurrently during the defined night period (potentially 00:01 – 05:59 local) and that Runway 28L (South Runway) will be the preferred runway during this time*.

3.0 LATEST FORECASTS

Using more recent Dublin airport forecasts, Mott MacDonald have prepared the requested set of forecast scenarios . These comprise updated forecasts for 2022 and 2025 which reflect the ongoing Covid pandemic, and forecasts for 2030, 2035 and 2040. For the years post 2025 there are two sets of forecasts, one set where the existing 32mppa passenger cap remains in place, and one where it is removed. Up to and including 2025 the forecast activity does not exceed the passenger cap so does not influence the forecast activity.

In addition to considering the different years and the presence or not of the passenger cap, the forecasts also consider various runway and movement restrictions at night. These include the presence or not of condition no. 3(d) of the North Runway Planning Permission, in addition to forecasts for scenarios put forward by ANCA.

Due to the implications of condition no. 5, which restricts activity to 65 movements per night, all the forecast except one assume that it is not in place. The one forecast where it is in place is that for the existing situation where no use of the North Runway is permitted. This is because if the airport is limited to 65 movements per night there would be no need to use the North Runway in the night period.

Further details of the forecasts and their derivation are contained in the Mott MacDonald report *Dublin Airport Operating Restrictions Quantification of Impacts on Future Growth Updated analysis in response to the ANCA RFI* dated *May 2021 – version 1.2 (Final)*.

4.0 SCENARIOS CONSIDERED

4.1 Regulation 598/2014 (Aircraft Noise Regulation) Assessment

Under the Aircraft Noise (Dublin Airport) Regulation Act 2019 (‘the Act’, S.I. No. 12 of 2019) for which ANCA is the Competent Authority, ANCA has defined:

- a ‘situation’ to represent the historic, current and future noise conditions that would prevail in the absence of development or changes to the existing consents.
- a ‘forecast without new measures’ to represent the situation which would prevail as a result of development proposals but without any noise-related action. This should be representative of an unconstrained / unrestrictive operation.
- a ‘forecast including additional measures’ to represent the noise conditions that would arise from any development proposals inclusive of specific or combinations of noise mitigation measures.

Consequently, the report *Noise Information for the Regulation 598/2014 (Aircraft Noise Regulation) Assessment* (Ref: A11267_12_RP032_3.0) dated November 2020, submitted with the application for planning permission ref. F20A/0668, included a set four 'situations' that have either occurred, those in 2018 and 2019, or will occur in the future, in 2022 and 2025, with no changes to the existing consents.

There was also a 'forecast without new measures' scenario, for 2025, which considered the situation as a result of the development proposals but without any noise-related action. This considered a future with the North Runway operating without Conditions 3(d) and 5 in place.

The final set of scenarios were for forecasts including additional measures. The initial set of these to be developed consider the situation without Condition 5 in place, as it is the most onerous of the operating restrictions, and with alternatives to Condition 3 (d). In effect this sought to see if the unconstrained forecast activity could be accommodated with the use of preferential runways while meeting a candidate Noise Abatement Objective (NAO).

The scenarios considered are listed in Table 1 with a description of the runway use. In this it should be noted that:

- South Runway is the existing main runway which is aligned approximately east west
- Cross runway is the existing runway aligned approximate north-west south-east
- 10R refers to movements on the South Runway heading in an easterly direction
- 28L refers to movements on the South Runway heading in a westerly direction
- 10L refers to movements on the North Runway heading in an easterly direction
- 28R refers to movements on the North Runway heading in a westerly direction

For all of the future scenarios except those which are of the Situation type, the measures in place are those currently in place with the addition of a noise insulation programme with eligibility based on 55 dB L_{night}. A noise quota is also proposed for these scenarios to control the total noise at night.

Table 1: **Scenarios Considered by CEA**

Scenario Type	Scenario Description	Runway Use Description
Situation	2018 Situation	South Runway preferred. Cross runway used for capacity and when wind dictates
Situation	2019 Situation	South Runway preferred. Cross runway used for capacity and when wind dictates
Situation	2022 Forecast Situation Scenario 01	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only
Forecast including additional measures	2022 Forecast with Runway use Scenario 02	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway preferred 00:00-06:00. Otherwise as day.
Situation	2025 Forecast Situation Scenario 01	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only
Forecast including additional measures	2025 Forecast with Runway use Scenario 02	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway preferred 00:00-06:00. Otherwise as day.
Forecast including additional measures	2025 Forecast with Runway use Scenario 03	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - same as day
Forecast including additional measures	2025 Forecast with Runway use Scenario 04	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - 10L and 28L preferred for departures, 10R and 28R preferred for arrivals (i.e. opposite to day). Cross runway only used when wind dictates
Forecast including additional measures	2025 Forecast with Runway use Scenario 05	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - alternate between Runway use Scenarios 03 and 04
Forecast without new measures	2025 Forecast without any measures Scenario 06	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - no restrictions. Departures modelled as using north or south runway depending on destination. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2025 Forecast with Runway use Scenario 07	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as using north or south runway depending on destination. Arrivals modelled as per day unless runway capacity exceeded
Forecast including additional measures	2025 Forecast with Runway use Scenario 08	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as per day. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2025 Forecast with Runway use Scenario 09	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - North Runway preferred 00:00-06:00. Otherwise as day.
Forecast including additional measures	2025 Forecast with Runway use Scenario 10	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - alternate between Runway use Scenarios 02 and 09

4.2 ANCA REQUEST FEBRUARY 2021

The ANCA request sought, in addition to Scenarios 01 to 10 from the earlier submission, four additional scenarios. The first retains the restriction of no use of the North Runway (NR) during the hours of 23.00-07.00 but dispenses with the restriction on the number of movements at night. This has been modelled using a dedicated forecast and is denoted Scenario 11.

The second scenario from ANCA has no restriction on the use of the NR during the hours of 23.00-07.00 but keeps the restriction of 65 on the number of movements at night. Due to this movement limit it is not envisaged that under this scenario two runways would be required at night, with all the activity likely to be on the existing runway. This scenario is therefore a duplicate of Scenario 01 and does not require additional modelling.

The third scenario from ANCA has the restriction of no use of the NR during the hours 23.00-06.00 but no restriction on the number of movements at night. This has been modelled using a dedicated forecast and has been denoted Scenario 12.

The fourth scenario from ANCA has the restriction of no use of the NR during the hours of 23.30-05.00 and proposes to replace the restriction on the number of movements at night with quota count for the airport and a quota count for NR operations. Although a quota count just related to NR operations was thought to be too difficult to administer and so was not considered further, one for the airport as a whole for the 2300-0700 period is presented in the Anderson Acoustics report *Dublin Airport Developing a Proposed Annual Night Quota – RFI update*. This has been determined using the historical QC/ATM for 2018 and a target QC/ATM for future years using the forecast activity and as such does not further constrain the forecast. This scenario has therefore been modelled using the same forecast as Scenario 12, as no flights are expected to have to be re-timed and has been denoted Scenario 13.

All of Scenarios 01 to 13 have the existing 32mppa passenger cap in place and have been modelled for 2025 using the latest forecasts. As part of this and to allow for the IAA advice that it is important to use both runways for departures between 06.00-08.00, in all except Scenario 01 both runways are used for departures during that period.

While for 2025 it was considered important to model all the previous Scenarios 01 to 10 with the latest forecast, to allow comparison with the earlier submission, for 2022 a reduced set of scenarios has been modelled. This includes Scenarios 11 to 13 from the ANCA request but excludes Scenarios 04, 05, 09 and 10.

There seems no intention or desire to have the NR as the main runway through the night, either from the daa, IAA who advise the South Runway will be the preferred runway during much of the night, or ANCA based on their request. Scenario 04 therefore seems highly unlikely to be

the preferred scenario given it has the NR preferred for departures to the east and for arrivals from the east throughout the night. Consequently, it has not been modelled except for 2025. This also removes Scenario 05 as that involves the alternation of Scenario 04 with Scenario 03.

For the same reason Scenario 09 which has the NR preferred from 00.00-06.00 seems highly unlikely to be the preferred scenario so has not been modelled except for 2025. This also removes Scenario 10 which involves the alternation of Scenario 02 with Scenario 09.

For 2030, 2035 and 2040 the scenarios modelled for 2022 have been modelled, as the reasons for excluding some of the original scenarios remain applicable. However additional scenarios have also been modelled which do not have the existing 32mppa passenger cap in place. These have a scenario number 13 higher than the comparable scenario with the cap in place, so for example Scenario 01 and Scenario 14 have the same runway and night movement restrictions, as do Scenario 13 and Scenario 26.

The scenarios considered for 2022 are listed in Table 2 with a description of the runway use.

Table 2: **Scenarios Considered for 2022**

Scenario Type	Scenario Description	Runway Use Description
Situation	2022 Forecast Situation Scenario 01	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only
Forecast including additional measures	2022 Forecast with Runway use Scenario 02	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway preferred 00:00-06:00. Otherwise as day.
Forecast including additional measures	2022 Forecast with Runway use Scenario 03	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - same as day
Forecast without new measures	2022 Forecast without any measures Scenario 06	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - no restrictions. Departures modelled as using north or south runway depending on destination. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2022 Forecast with Runway use Scenario 07	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as using north or south runway depending on destination. Arrivals modelled as per day unless runway capacity exceeded
Forecast including additional measures	2022 Forecast with Runway use Scenario 08	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as per day. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2022 Forecast with Runway use Scenario 11	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only.
Forecast including additional measures	2022 Forecast with Runway use Scenario 12	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only 23:00-06:00.
Forecast including additional measures	2022 Forecast with Runway use Scenario 13	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only 23:30-05:00.

The scenarios considered for 2025 are listed in Table 3 with a description of the runway use.

Table 3: **Scenarios Considered for 2025**

Scenario Type	Scenario Description	Runway Use Description
Situation	2025 Forecast Situation Scenario 01	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only
Forecast including additional measures	2025 Forecast with Runway use Scenario 02	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway preferred 00:00-06:00. Otherwise as day.
Forecast including additional measures	2025 Forecast with Runway use Scenario 03	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - same as day
Forecast including additional measures	2025 Forecast with Runway use Scenario 04	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - 10L and 28L preferred for departures, 10R and 28R preferred for arrivals (i.e. opposite to day). Cross runway only used when wind dictates
Forecast including additional measures	2025 Forecast with Runway use Scenario 05	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - alternate between Runway use Scenarios 03 and 04
Forecast without new measures	2025 Forecast without any measures Scenario 06	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - no restrictions. Departures modelled as using north or south runway depending on destination. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2025 Forecast with Runway use Scenario 07	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as using north or south runway depending on destination. Arrivals modelled as per day unless runway capacity exceeded
Forecast including additional measures	2025 Forecast with Runway use Scenario 08	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as per day. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2025 Forecast with Runway use Scenario 09	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - North Runway preferred 00:00-06:00. Otherwise as day.
Forecast including additional measures	2025 Forecast with Runway use Scenario 10	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - alternate between Runway use Scenarios 02 and 09
Forecast including additional measures	2025 Forecast with Runway use Scenario 11	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only.
Forecast including additional measures	2025 Forecast with Runway use Scenario 12	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only 23:00-06:00.
Forecast including additional measures	2025 Forecast with Runway use Scenario 13	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only 23:30-05:00.

The scenarios considered for 2030 are those listed in Table 4. For 2035 and 2040 the same scenarios as for 2030 were modelled subject to the change in year.

Table 4: **Scenarios Considered for 2030**

Scenario Type[1]	Scenario Description	Runway Use Description
Situation	2030 Forecast Situation Scenario 01 Scenario 14	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only
Forecast including additional measures	2030 Forecast with Runway use Scenario 02 Scenario 15	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway preferred 00:00-06:00. Otherwise as day.
Forecast including additional measures	2030 Forecast with Runway use Scenario 03 Scenario 16	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - same as day
Forecast without new measures	2030 Forecast without any measures Scenario 06 Scenario 19	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - no restrictions. Departures modelled as using north or south runway depending on destination. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2030 Forecast with Runway use Scenario 07 Scenario 20	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as using north or south runway depending on destination. Arrivals modelled as per day unless runway capacity exceeded
Forecast including additional measures	2030 Forecast with Runway use Scenario 08 Scenario 21	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - departures modelled as per day. Arrivals modelled as 50/50 split between runways unless runway capacity exceeded
Forecast including additional measures	2030 Forecast with Runway use Scenario 11 Scenario 24	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only.
Forecast including additional measures	2030 Forecast with Runway use Scenario 12 Scenario 25	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only 23:00-06:00.
Forecast including additional measures	2030 Forecast with Runway use Scenario 13 Scenario 26	Day - 10R and 28R preferred for departures, 10L and 28L preferred for arrivals. Cross runway only used when wind dictates Night - South Runway only 23:30-05:00.

[1] Scenario type strictly only applies to Scenarios 01 to 13 as Scenarios 14 to 26 do not relate to the application.

5.0 NOISE MODELLING, POPULATION AND DEMOGRAPHICS ASSESSMENT METHODOLOGY

The noise modelling methodology utilises a noise model, the Federal Aviation Authority Aviation Environmental Design Tool (AEDT) version 2d SP2, which is compliant with *ECAC.CEAC Doc 29 4th Edition Report on Standard Method of Computing Noise Contours around Civil Airports* and with *EU Commission Directive 2015/996 Establishing common noise assessment methods according to Directive 2002/49/EC of the European Parliament and of the Council*. The model has been used with forecast movement information provided by Mott MacDonald.

Existing dwelling data has been acquired from GeoDirectory. An assessment of permitted but not yet built dwellings has been carried out. Population data has been estimated using the average dwelling occupancy by small area. This has been obtained for 2016 based on Census data from the Central Statistics Office. An assessment of zoned land has also been undertaken which identified a number of areas designated for residential use. For those not contained in the existing or permitted dwellings an average density of 35 dwellings per hectare and 3 people per dwelling has been assumed.

Further details of the noise modelling and population and demographics assessment methodology are contained in Appendix 2.

6.0 NOISE INFORMATION

The completed dataset for the scenarios is contained in the document reference: A11267_19_CA434_4.0 ANCA Reporting Template 2021 Update. Figures 001 to 224 in Appendix 3 contains the noise contour plots for the L_{den} and L_{night} noise indicators for all of the scenarios. Also included are the noise contour plots for the L_{day}, $L_{evening}$ and $L_{Aeq,16h}$ noise indicators for selected scenarios, which between them represent the remainder due to common activity.

Nick Williams
for Bickerdike Allen Partners LLP

David Charles
Partner

APPENDIX 1
GLOSSARY OF ACOUSTIC AND AVIATION TERMS

Sound

Sound is a form of energy that is transmitted away from its source through a medium such as air by longitudinal pressure waves. The human ear can detect the small changes in pressure associated with sound and this manifests as the sense of hearing.

The Decibel, dB

The decibel (dB) is the unit used to describe the magnitude of sound. It is a logarithmic ratio between a measured level and a reference level, typically sound pressure level against a reference pressure level of 20 µPa.

The decibel scale effectively compresses a wide range of values to a more manageable range of numbers; the threshold of hearing occurs at approximately 0 dB (corresponding to the reference value of 20 µPa) and the threshold of pain is around 120 dB (corresponding to a value of 20 Pa).

The sound energy radiated by a source can also be expressed in decibels. The sound power is a measure of the total sound energy radiated by a source per second, in Watts (W). The sound power level L_w is expressed in decibels, referenced to 10-12 Watts.

Frequency, Hz

Frequency is equivalent to musical pitch. It is the rate of vibration of the air molecules that transmit the sound and is measured as the number of cycles per second or Hertz (Hz).

The human ear is sensitive to sound in the range 20 Hz to 20 kHz. This frequency range is normally divided up into discrete bands for engineering use. The most common are octave bands, in which the upper limiting frequency for any band is twice the lower limiting frequency, and one-third octave bands, in which each octave band is further divided into three. The bands are named by their centre frequency value.

A-weighting

The sensitivity of the human ear is frequency dependent. Mid-frequency sound tends to be perceived as louder than very low- or high-frequency sound even when the decibel values are equal. Sound levels are therefore often frequency weighted to give an overall single figure value in dB(A) that accounts for the response of the human ear at different frequencies.

Ambient Noise

Ambient noise, usually expressed using the $L_{Aeq,T}$ metric, is commonly understood to include all sound at any particular site over a defined period of time, regardless of whether the sound is actually defined as noise.

Background Noise

Background noise, usually expressed using the $L_{A90,T}$ metric, is the steady sound attributable to less prominent and mostly distant sound sources above which clearly identifiable specific noise sources intrude.

Sound Transmission in the Open Air

Most sources of sound can be characterised as a single point in space. Sound energy is radiated out in all directions and spreads over the surface area of a sphere centred on the point. The area of a sphere is proportional to the square of the radius, so the sound energy is inversely proportional to the square of the radius. This is the inverse square law. In decibel terms, for each doubling of distance from a point source the sound pressure level is reduced by 6 dB.

Road traffic noise is a notable exception to this rule, as it approximates to a line source. The sound energy radiated is inversely proportional to the area of a cylinder centred on the line. In decibel terms, every time the distance from a line source is doubled, the sound pressure level is reduced by 3 dB.

Factors Affecting Sound Transmission in the Open Air

Reflection

When sound waves encounter a hard surface, such as concrete, brickwork, glass, timber, or plasterboard, they are reflected from it. As a result, the sound pressure level measured immediately in front of a building façade is approximately 3 dB higher than it would be in the absence of the façade.

Screening

If a solid screen is introduced between a source and receiver, interrupting the sound path, a reduction in sound level is experienced. Although this reduction is limited by diffraction of the sound around the edges of the screen, it can still provide valuable noise attenuation. For example, a timber boarded fence built next to a motorway can reduce noise levels on the land immediately beyond by around 10 dB. The best results are obtained when a screen is situated close to the source or close to the receiver.

Meteorological Effects

Temperature and wind gradients affect noise transmission, especially over large distances. The wind effects range from increasing the level by typically 2 dB downwind, to reducing it by typically 10 dB upwind – or even more in extreme conditions. Temperature and wind gradients are variable and difficult to predict.

Noise Metrics

Where noise levels vary with time, it is necessary to express the results of a measurement over a period of time in statistical terms. Some commonly used descriptors follow.

$L_{Aeq,T}$

$L_{Aeq,T}$, or the equivalent continuous A-weighted sound pressure level, is the most widely used noise metric. It is an energy average and is defined as the level of a notional sound which would deliver the same A-weighted sound energy as the actual variable sound over a defined period of time, T.

$L_{Aeq,16h}$ and $L_{Aeq,8h}$ are commonly used to describe the daytime period (07:00 to 23:00) and night-time period (23:00 to 07:00) respectively. In the context of aircraft noise, these are typically averaged over the summer period (92 days from June 16th to September 15th inclusive) and are referred to as the summer day and summer night values.

L_{den}

L_{den}, or the day-evening-night noise indicator, is a long-term average (usually annual in the context of aircraft noise) 24 hour $L_{Aeq,T}$ value where a 10 dB penalty is applied to noise at night and a 5 dB penalty is applied to noise in the evening. It is defined by the following formula:

$$L_{den} = 10 \times Log\left(\frac{12}{24} \times 10^{\left(\frac{L_{day}}{10}\right)} + \frac{4}{24} \times 10^{\left(\frac{L_{eve}+5}{10}\right)} + \frac{8}{24} \times 10^{\left(\frac{L_{night}+10}{10}\right)}\right)$$

Where:

L_{day} is the A-weighted long-term average sound level for the 12 hour daytime period (07:00 to 19:00),

L_{eve} is the A-weighted long-term average sound level for the 4 hour evening period (19:00 to 23:00), and

L_{night} is the A-weighted long-term average sound level for the 8 hour night-time period (23:00 to 07:00).

Aviation Terms

ANCA

ANCA, the Aircraft Noise Competent Authority, is the body responsible for ensuring that noise generated by aircraft activity at Dublin Airport is assessed in accordance with EU and Irish legislation.

FAA

The Federal Aviation Administration (FAA) is the regulatory body for civil aviation in the United States. The FAA produces AEDT, the industry standard modelling software for aircraft noise.

AEDT

The Aviation Environmental Design Tool (AEDT) is the industry standard software for the evaluation of aircraft noise in the vicinity of airports based on aircraft type, operation, route, flight profile and terrain.

NMT

A noise monitoring terminal (NMT) is a fixed or mobile station with the appropriate instrumentation to measure aircraft noise in the vicinity of an airport on a long-term basis.

NFTMS

A noise and flight track monitoring system (NFTMS) comprises a network of NMTs that record and correlate noise data with individual flights by use of other airport logged flight telemetry, such as radar data.

Start of roll

The position on a runway where aircraft commence their take-off procedure.

Runway arrival threshold

The beginning of the portion of the runway usable for landing.

APPENDIX 2

NOISE MODELLING, POPULATION AND DEMOGRAPHICS ASSESSMENT METHODOLOGY

A2.1 DETAILED NOISE MODELLING METHODOLOGY

This section describes the modelling methodology for the air noise predictions. It firstly details the scenarios that have been considered and presents summaries of the aircraft movements. It then sets out the methodology and the assumptions used in the prediction of airborne aircraft noise levels and the production of noise contours. The methodology used to assess the number of people and dwellings within the contours in described in Section A2.2.

Scenarios Considered

The scenarios considered fall into seventeen groups; these are:

- 2022 Forecast Situation
- 2022 Forecast with Runway use
- 2022 Forecast without any measures
- 2025 Forecast Situation
- 2025 Forecast with Runway use
- 2025 Forecast without any measures
- 2030 Forecast Situation
- 2030 Forecast with Runway use
- 2030 Forecast without any measures
- 2030 Forecast with Passenger Cap removed
- 2035 Forecast Situation
- 2035 Forecast with Runway use
- 2035 Forecast without any measures
- 2035 Forecast with Passenger Cap removed
- 2040 Forecast Situation
- 2040 Forecast with Runway use
- 2040 Forecast without any measures
- 2040 Forecast with Passenger Cap removed

The Forecast Situation scenarios are based on the forecast aircraft movements with the conditions attached to the North Runway Permission, i.e. with no use of the North Runway at night and aircraft movements limited to 65/night.

The Forecast with Runway use and Forecast without any measures scenarios are based on the forecast aircraft movements with the North Runway Permission conditions removed.

Due to the profound impact on the aviation industry worldwide of the Covid-19 pandemic, activity is now forecast to reach 32 mppa by 2025, so the presence of Condition 3 of the Terminal 2 Permission (which limits Dublin Airport to 32 mppa) has no effect in 2022 and 2025. Beyond 2025 greater activity is forecast to occur if the condition was removed. This is modelled under the Forecast with Passenger Cap removed scenarios in the years 2030, 2035, and 2040.

Aircraft Movements

The annual day, evening and night movements and summer day and night movements are given in the tables below by aircraft type for each of these scenarios. Aircraft types with a small number of movements have been grouped under "Other".

Table A2.1: 2022 Forecast Situation Movements – Scenario 01

Aircraft Type	*2022 Forecast Situation Movements – Scenario 01*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	300	0	90	0
Airbus A319	1,502	300	0	541	0
Airbus A320	25,537	6,910	4,507	9,737	1,352
Airbus A320neo	1,502	901	0	721	0
Airbus A321	4,807	0	601	1,443	180
Airbus A321neo	1,502	300	601	541	180
Airbus A330	9,314	0	300	2,795	90
Airbus A330neo	0	0	0	0	0
Airbus A350	0	0	0	0	0
ATR 72	14,721	2,103	601	5,049	180
Boeing 737-400	0	601	1,202	180	361
Boeing 737-700	0	0	0	0	0
Boeing 737-800	38,456	17,125	5,107	16,680	1,533
Boeing 737 MAX	2,403	1,202	0	1,082	0
Boeing 767	300	601	901	270	270
Boeing 777	300	601	300	270	90
Boeing 777X	0	0	0	0	0
Boeing 787	4,206	0	601	1,262	180
Bombardier CS300	1,202	0	0	361	0
Bombardier Dash 8	1,202	601	0	541	0
Embraer E190/195	5,107	2,103	601	2,164	180
Embraer E190-E2	0	0	0	0	0
Other	3,605	1,202	0	1443	0
Total	**115,668**	**34,851**	**15,322**	**45,170**	**4,598**

Table A2.2: 2022 Forecast with Runway use and Forecast without any measures movements

Aircraft Type	*2022 Forecast with Runway use & Forecast without any measures movements*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	300	0	90	0
Airbus A319	1,502	300	0	541	0
Airbus A320	27,036	6,609	6,609	10,098	1,984
Airbus A320neo	1,502	901	0	721	0
Airbus A321	5,107	300	1,202	1,623	361
Airbus A321neo	1,202	300	901	451	270
Airbus A330	8,111	0	1,502	2,434	451
Airbus A330neo	0	0	0	0	0
Airbus A350	0	0	0	0	0
ATR 72	14,119	2,103	1,202	4,869	361
Boeing 737-400	0	601	1,202	180	361
Boeing 737-700	0	0	0	0	0
Boeing 737-800	41,155	15,921	9,012	17,130	2,705
Boeing 737 MAX	2,403	1,202	0	1082	0
Boeing 767	300	601	901	270	270
Boeing 777	0	601	601	180	180
Boeing 777X	0	0	0	0	0
Boeing 787	3,905	0	901	1,172	270
Bombardier CS300	1,202	0	0	361	0
Bombardier Dash 8	1,202	601	0	541	0
Embraer E190/195	4,806	2,403	601	2,164	180
Embraer E190-E2	0	0	0	0	0
Other	3,605	1,202	0	1,443	0
Total	**117,158**	**33,946**	**24,633**	**45,350**	**7,393**

Table A2.3: 2025 Forecast Situation Movements – Scenario 01

Aircraft Type	*2025 Forecast Situation Movements – Scenario 01*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	651	0	0	180	0
Airbus A320	34,162	8,134	5,206	11,721	1,443
Airbus A320neo	11,387	3,254	976	4,057	270
Airbus A321	651	0	0	180	0
Airbus A321neo	5,531	325	1,301	1,623	361
Airbus A330	11,062	325	651	3,156	180
Airbus A330neo	2,603	0	0	721	0
Airbus A350	651	0	0	180	0
ATR 72	15,942	2,277	651	5,049	180
Boeing 737-400	0	0	651	0	180
Boeing 737-700	325	325	0	180	0
Boeing 737-800	46,200	18,545	7,483	17,942	2,074
Boeing 737 MAX	10,737	4,880	0	4,328	0
Boeing 767	325	651	976	270	270
Boeing 777	325	0	325	90	90
Boeing 777X	651	651	0	361	0
Boeing 787	6,507	0	651	1,803	180
Bombardier CS300	1,301	0	0	361	0
Bombardier Dash 8	2,603	651	0	902	0
Embraer E190/195	6,832	2,277	651	2,524	180
Embraer E190-E2	0	0	0	0	0
Other	5,206	1,301	0	1,803	0
Total	**163,653**	**43,598**	**19,521**	**57,432**	**5,410**

Table A2.4: 2025 Forecast with Runway use (Except Scenario 11) and Forecast without any measures movements

Aircraft Type	*2025 Forecast with Runway use (Except Scenario 11) & Forecast without any measures movements*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	651	0	0	180	0
Airbus A320	34,488	7,809	7,809	11,721	2,164
Airbus A320neo	11,062	3,254	1,301	3,967	361
Airbus A321	651	0	0	180	0
Airbus A321neo	5,531	651	2,277	1,713	631
Airbus A330	10,086	325	1,627	2,885	451
Airbus A330neo	2,277	0	325	631	90
Airbus A350	325	0	325	90	90
ATR 72	15,292	2,277	1,301	4,869	361
Boeing 737-400	0	0	651	0	180
Boeing 737-700	325	325	0	180	0
Boeing 737-800	49,454	16,268	13,014	18,212	3,606
Boeing 737 MAX	10,086	4,230	0	3,967	0
Boeing 767	325	651	976	270	270
Boeing 777	0	0	651	0	180
Boeing 777X	651	651	0	361	0
Boeing 787	6,182	0	976	1,713	270
Bombardier CS300	1,301	0	0	361	0
Bombardier Dash 8	2,603	651	0	902	0
Embraer E190/195	6,507	2,603	651	2,524	180
Embraer E190-E2	0	0	0	0	0
Other	5,206	1,301	0	1,803	0
Total	**163,003**	**40,995**	**31,885**	**56,530**	**8,836**

Table A2.5: 2025 Forecast with Runway use – Scenario 11

Aircraft Type	*2025 Forecast with Runway use – Scenario 11*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	649	0	0	180	0
Airbus A320	35,691	7,787	7,787	12,048	2,158
Airbus A320neo	10,058	2,596	973	3,507	270
Airbus A321	649	0	0	180	0
Airbus A321neo	5,516	649	2,271	1,708	629
Airbus A330	10,058	324	1,622	2,877	450
Airbus A330neo	2,271	0	324	629	90
Airbus A350	324	0	324	90	90
ATR 72	15,250	2,271	1,298	4,855	360
Boeing 737-400	0	0	649	0	180
Boeing 737-700	324	324	0	180	0
Boeing 737-800	48,993	17,196	12,329	18,342	3,417
Boeing 737 MAX	10,707	4,867	0	4,316	0
Boeing 767	324	649	973	270	270
Boeing 777	0	0	649	0	180
Boeing 777X	649	649	0	360	0
Boeing 787	6,165	0	973	1,708	270
Bombardier CS300	1,298	0	0	360	0
Bombardier Dash 8	2,596	649	0	899	0
Embraer E190/195	6,489	2,596	649	2,518	180
Embraer E190-E2	0	0	0	0	0
Other	5,191	1,298	0	1,798	0
Total	**163,203**	**41,855**	**30,824**	**56,824**	**8,542**

Table A2.6: 2030 Forecast Situation Movements – Scenario 01

Aircraft Type	*2030 Forecast Situation Movements – Scenario 01*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	651	0	0	180	0
Airbus A320	25,378	6,182	3,904	8,746	1,082
Airbus A320neo	22,124	5,856	2,277	7,754	631
Airbus A321	651	0	0	180	0
Airbus A321neo	8,459	651	1,301	2,524	361
Airbus A330	9,761	325	651	2,795	180
Airbus A330neo	3,254	0	0	902	0
Airbus A350	651	0	0	180	0
ATR 72	15,942	2,277	651	5,049	180
Boeing 737-400	0	0	651	0	180
Boeing 737-700	325	325	0	180	0
Boeing 737-800	22,775	13,340	4,230	10,008	1,172
Boeing 737 MAX	37,416	10,086	3,254	13,163	902
Boeing 767	325	651	976	270	270
Boeing 777	325	0	325	90	90
Boeing 777X	651	651	0	361	0
Boeing 787	7,158	0	651	1,984	180
Bombardier CS300	1,952	0	0	541	0
Bombardier Dash 8	2,603	651	0	902	0
Embraer E190/195	651	0	0	180	0
Embraer E190-E2	6,182	2,277	651	2,344	180
Other	4,555	1,301	0	1,623	0
Total	**171,787**	**44,574**	**19,521**	**59,956**	**5,410**

Table A2.7: 2030 Forecast with Runway use and Forecast without any measures movements

Aircraft Type	*2030 Forecast with Runway use & Forecast without any measures movements*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	651	0	0	180	0
Airbus A320	25,703	5,856	6,507	8,746	1,803
Airbus A320neo	20,497	5,206	2,603	7,123	721
Airbus A321	651	0	0	180	0
Airbus A321neo	5,531	651	2,277	1,713	631
Airbus A330	8,785	325	1,627	2,524	451
Airbus A330neo	2,928	0	325	811	90
Airbus A350	325	0	325	90	90
ATR 72	15,292	2,277	1,301	4,869	361
Boeing 737-400	0	0	651	0	180
Boeing 737-700	325	325	0	180	0
Boeing 737-800	24,076	11,387	6,832	9,827	1,893
Boeing 737 MAX	35,464	9,110	6,182	12,352	1,713
Boeing 767	325	651	976	270	270
Boeing 777	0	0	651	0	180
Boeing 777X	651	651	0	361	0
Boeing 787	6,832	0	976	1,893	270
Bombardier CS300	1,301	0	0	361	0
Bombardier Dash 8	2,603	651	0	902	0
Embraer E190/195	651	0	0	180	0
Embraer E190-E2	5,856	2,603	651	2,344	180
Other	4,555	1,301	0	1,623	0
Total	**163,003**	**40,995**	**31,885**	**56,530**	**8,836**

Table A2.8: 2030 Forecast with Passenger Cap Removed – Scenario 14

Aircraft Type	*2030 Forecast with Passenger Cap Removed – Scenario 14*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	1,276	0	0	361	0
Airbus A320	25,522	6,061	3,828	8,926	1,082
Airbus A320neo	22,970	5,742	2,233	8,114	631
Airbus A321	638	0	0	180	0
Airbus A321neo	13,718	957	1,276	4,147	361
Airbus A330	10,209	319	638	2,975	180
Airbus A330neo	3,828	0	0	1,082	0
Airbus A350	638	0	0	180	0
ATR 72	17,865	2,552	638	5,770	180
Boeing 737-400	0	0	638	0	180
Boeing 737-700	319	319	0	180	0
Boeing 737-800	24,884	13,080	4,147	10,729	1,172
Boeing 737 MAX	40,835	10,209	3,190	14,426	902
Boeing 767	319	638	957	270	270
Boeing 777	319	0	319	90	90
Boeing 777X	1,276	638	0	541	0
Boeing 787	8,295	0	638	2,344	180
Bombardier CS300	1,914	0	0	541	0
Bombardier Dash 8	4,466	1,276	0	1,623	0
Embraer E190/195	638	0	0	180	0
Embraer E190-E2	6,061	2,233	638	2,344	180
Other	4,466	1,276	0	1,623	0
Total	**190,457**	**45,301**	**19,141**	**66,628**	**5,410**

Table A2.9: 2030 Forecast with Passenger Cap Removed (Except Scenarios 14 and 24)

Aircraft Type	*2030 Forecast with Passenger Cap Removed (Except Scenarios 14 and 24)*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	1,276	0	0	361	0
Airbus A320	27,117	5,742	6,380	9,286	1,803
Airbus A320neo	22,651	5,742	2,552	8,024	721
Airbus A321	638	0	0	180	0
Airbus A321neo	13,718	957	4,466	4,147	1,262
Airbus A330	9,252	319	1,595	2,705	451
Airbus A330neo	3,509	0	319	992	90
Airbus A350	319	0	319	90	90
ATR 72	17,227	2,552	1,276	5,590	361
Boeing 737-400	0	638	638	180	180
Boeing 737-700	319	319	0	180	0
Boeing 737-800	26,479	12,123	7,338	10,909	2,074
Boeing 737 MAX	45,301	10,528	7,976	15,778	2,254
Boeing 767	319	638	957	270	270
Boeing 777	0	0	638	0	180
Boeing 777X	1,276	638	0	541	0
Boeing 787	7,657	0	1,276	2,164	361
Bombardier CS300	1,914	0	0	541	0
Bombardier Dash 8	4,466	1,276	0	1,623	0
Embraer E190/195	638	0	0	180	0
Embraer E190-E2	5,742	2,552	638	2,344	180
Other	4,466	1,276	0	1,623	0
Total	**194,285**	**45,301**	**36,369**	**67,710**	**10,278**

Table A2.10: 2030 Forecast with Passenger Cap Removed – Scenario 24

Aircraft Type	*2030 Forecast with Passenger Cap Removed – Scenario 24*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	1,276	0	0	361	0
Airbus A320	27,117	5,742	6,380	9,286	1,803
Airbus A320neo	22,651	5,742	2,552	8,024	721
Airbus A321	638	0	0	180	0
Airbus A321neo	12,761	957	3,509	3,877	992
Airbus A330	9,252	319	1,595	2,705	451
Airbus A330neo	3,509	0	319	992	90
Airbus A350	319	0	319	90	90
ATR 72	17,227	2,552	1,276	5,590	361
Boeing 737-400	0	638	638	180	180
Boeing 737-700	319	319	0	180	0
Boeing 737-800	26,798	12,123	7,019	11,000	1,984
Boeing 737 MAX	44,663	10,528	7,019	15,598	1,984
Boeing 767	319	638	957	270	270
Boeing 777	0	0	638	0	180
Boeing 777X	1,276	638	0	541	0
Boeing 787	7,657	0	1,276	2,164	361
Bombardier CS300	1,914	0	0	541	0
Bombardier Dash 8	4,466	1,276	0	1,623	0
Embraer E190/195	638	0	0	180	0
Embraer E190-E2	5,742	2,552	638	2,344	180
Other	4,466	1,276	0	1,623	0
Total	**193,009**	**45,301**	**34,135**	**67,350**	**9,647**

Table A2.11: 2035 Forecast Situation Movements – Scenario 01

Aircraft Type	*2035 Forecast Situation Movements – Scenario 01*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	651	0	0	180	0
Airbus A320	17,895	4,555	2,277	6,221	631
Airbus A320neo	29,933	7,809	3,904	10,459	1,082
Airbus A321	651	0	0	180	0
Airbus A321neo	8,459	651	1,301	2,524	361
Airbus A330	6,182	325	325	1,803	90
Airbus A330neo	6,182	0	325	1,713	90
Airbus A350	651	0	0	180	0
ATR 72	15,942	2,277	651	5,049	180
Boeing 737-400	0	0	651	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	5531	4,880	1,301	2,885	361
Boeing 737 MAX	54,660	18,545	6,182	20,286	1,713
Boeing 767	325	651	976	270	270
Boeing 777	325	0	325	90	90
Boeing 777X	651	651	0	361	0
Boeing 787	7,809	0	651	2,164	180
Bombardier CS300	1,952	0	0	541	0
Bombardier Dash 8	2,603	651	0	902	0
Embraer E190/195	651	0	0	180	0
Embraer E190-E2	6,182	2,277	651	2,344	180
Other	4,555	1,301	0	1,623	0
Total	**171,787**	**44,574**	**19,521**	**59,956**	**5,410**

Table A2.12: 2035 Forecast with Runway use and Forecast without any measures movements

Aircraft Type	*2035 Forecast with Runway use & Forecast without any measures movements*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	651	0	0	180	0
Airbus A320	16.593	4.230	3.904	5.770	1,082
Airbus A320neo	29.607	6.832	5.206	10.098	1,443
Airbus A321	651	0	0	180	0
Airbus A321neo	5.531	651	2.277	1.713	631
Airbus A330	5.206	325	1.301	1.533	361
Airbus A330neo	5.856	0	651	1.623	180
Airbus A350	325	0	325	90	90
ATR 72	15.292	2.277	1.301	4.869	361
Boeing 737-400	0	0	651	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	5.531	4.230	1.301	2.705	361
Boeing 737 MAX	54.334	16.593	11.713	19.655	3,246
Boeing 767	325	651	976	270	270
Boeing 777	0	0	651	0	180
Boeing 777X	651	651	0	361	0
Boeing 787	7.483	0	976	2.074	270
Bombardier CS300	1.301	0	0	361	0
Bombardier Dash 8	2.603	651	0	902	0
Embraer E190/195	651	0	0	180	0
Embraer E190-E2	5.856	2.603	651	2.344	180
Other	4.555	1.301	0	1.623	0
Total	**163.003**	**40.995**	**31.885**	**56.530**	**8,836**

Table A2.13: 2035 Forecast with Passenger Cap Removed – Scenario 14

Aircraft Type	*2035 Forecast with Passenger Cap Removed – Scenario 14*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	628	0	0	180	0
Airbus A320	17,270	4,396	2,198	6,221	631
Airbus A320neo	32,656	7,536	3,768	11,540	1,082
Airbus A321	628	0	0	180	0
Airbus A321neo	17,898	1,570	1,256	5,590	361
Airbus A330	5,966	314	314	1,803	90
Airbus A330neo	7,850	0	314	2,254	90
Airbus A350	628	0	0	180	0
ATR 72	17,584	2,512	628	5,770	180
Boeing 737-400	0	0	628	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	6,594	4,710	1,256	3,246	361
Boeing 737 MAX	70,022	20,410	5,966	25,966	1,713
Boeing 767	314	628	942	270	270
Boeing 777	314	0	314	90	90
Boeing 777X	1,256	628	0	541	0
Boeing 787	9,420	0	628	2,705	180
Bombardier CS300	1,884	0	0	541	0
Bombardier Dash 8	5,024	1,256	0	1,803	0
Embraer E190/195	628	0	0	180	0
Embraer E190-E2	5,966	2,198	628	2,344	180
Other	4,396	1,256	0	1,623	0
Total	**206,926**	**47,414**	**18,840**	**73,030**	**5,410**

Table A2.14: 2035 Forecast with Passenger Cap Removed (Except Scenarios 14 and 24)

Aircraft Type	*2035 Forecast with Passenger Cap Removed (Except Scenarios 14 and 24)*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	628	0	0	180	0
Airbus A320	17,270	4,082	3,768	6,131	1,082
Airbus A320neo	34,226	7,850	5,652	12,081	1,623
Airbus A321	628	0	0	180	0
Airbus A321neo	18,212	1,570	5,338	5,680	1,533
Airbus A330	5,024	314	1,256	1,533	361
Airbus A330neo	7,536	0	628	2,164	180
Airbus A350	314	0	314	90	90
ATR 72	16,956	2,512	1,256	5,590	361
Boeing 737-400	0	0	628	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	6,594	5,338	1,256	3,426	361
Boeing 737 MAX	75,988	19,154	16,014	27,318	4,598
Boeing 767	314	628	942	270	270
Boeing 777	0	0	628	0	180
Boeing 777X	1,256	628	0	541	0
Boeing 787	8,792	0	1,256	2,524	361
Bombardier CS300	1,884	0	0	541	0
Bombardier Dash 8	5,024	1,256	0	1,803	0
Embraer E190/195	628	0	0	180	0
Embraer E190-E2	5,652	2,512	628	2,344	180
Other	4,396	1,256	628	1,623	180
Total	**211,322**	**47,100**	**40,192**	**74,202**	**11,540**

Table A2.15: 2035 Forecast with Passenger Cap Removed – Scenario 24

Aircraft Type	*2030 Forecast with Passenger Cap Removed – Scenario 24*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	628	0	0	180	0
Airbus A320	17,270	4,082	3,768	6,131	1,082
Airbus A320neo	33,912	7,536	5,024	11,901	1,443
Airbus A321	628	0	0	180	0
Airbus A321neo	17,270	1,570	3,768	5,410	1,082
Airbus A330	5,024	314	1,256	1,533	361
Airbus A330neo	7,536	0	628	2,164	180
Airbus A350	314	0	314	90	90
ATR 72	16,956	2,512	1,256	5,590	361
Boeing 737-400	0	0	628	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	6,594	5,338	1,256	3,426	361
Boeing 737 MAX	75,674	19,154	13,816	27,228	3,967
Boeing 767	314	628	942	270	270
Boeing 777	0	0	628	0	180
Boeing 777X	1,256	628	0	541	0
Boeing 787	8,792	0	1,256	2,524	361
Bombardier CS300	1,884	0	0	541	0
Bombardier Dash 8	5,024	1,256	0	1,803	0
Embraer E190/195	628	0	0	180	0
Embraer E190-E2	5,652	2,512	628	2,344	180
Other	4,396	1,256	628	1,623	180
Total	**209,752**	**46,786**	**35,796**	**73,661**	**10,278**

Table A2.16: 2040 Forecast Situation Movements – Scenario 01

Aircraft Type	*2040 Forecast Situation Movements – Scenario 01*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	0	0	0	0	0
Airbus A320	2,603	325	325	811	90
Airbus A320neo	45,875	12,038	5,856	16,048	1,623
Airbus A321	0	0	0	0	0
Airbus A321neo	8,459	651	1,301	2,524	361
Airbus A330	1,301	325	0	451	0
Airbus A330neo	11,062	0	651	3,065	180
Airbus A350	651	0	0	180	0
ATR 72	15,942	2,277	651	5,049	180
Boeing 737-400	0	0	651	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	1,301	651	651	541	180
Boeing 737 MAX	59,540	22,775	6,832	22,810	1,893
Boeing 767	325	651	976	270	270
Boeing 777	325	0	325	90	90
Boeing 777X	651	651	0	361	0
Boeing 787	7,809	0	651	2,164	180
Bombardier CS300	1,952	0	0	541	0
Bombardier Dash 8	2,603	651	0	902	0
Embraer E190/195	651	0	0	180	0
Embraer E190-E2	6,182	2,277	651	2,344	180
Other	4,555	1,301	0	1,623	0
Total	**171,787**	**44,574**	**19,521**	**59,956**	**5,410**

Table A2.17: 2040 Forecast with Runway use and Forecast without any measures movements

Aircraft Type	*2040 Forecast with Runway use & Forecast without any measures movements*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	0	0	0	0	0
Airbus A320	1,301	325	325	451	90
Airbus A320neo	45,550	10,737	8,785	15,598	2,434
Airbus A321	0	0	0	0	0
Airbus A321neo	5,,531	651	2,277	1,713	631
Airbus A330	1,301	325	0	451	0
Airbus A330neo	9,761	0	1,952	2,705	541
Airbus A350	325	0	325	90	90
ATR 72	15,292	2,277	1,301	4,869	361
Boeing 737-400	0	0	651	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	1,301	651	651	541	180
Boeing 737 MAX	59,215	20,172	12,363	21,999	3,426
Boeing 767	325	651	976	270	270
Boeing 777	0	0	651	0	180
Boeing 777X	651	651	0	361	0
Boeing 787	7,483	0	976	2,074	270
Bombardier CS300	1,301	0	0	361	0
Bombardier Dash 8	2,603	651	0	902	0
Embraer E190/195	651	0	0	180	0
Embraer E190-E2	5,856	2,603	651	2,344	180
Other	4,555	1,301	0	1,623	0
Total	**163,003**	**40,995**	**31,885**	**56,530**	**8,836**

Table A2.18: 2040 Forecast with Passenger Cap Removed – Scenario 14

Aircraft Type	*2040 Forecast with Passenger Cap Removed – Scenario 14*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	626	0	0	180	0
Airbus A320	3,129	313	313	992	90
Airbus A320neo	50,380	11,578	5,633	17,852	1,623
Airbus A321	0	0	0	0	0
Airbus A321neo	19,401	1,878	1,252	6,131	361
Airbus A330	1,252	313	0	451	0
Airbus A330neo	13,768	0	626	3,967	180
Airbus A350	626	0	0	180	0
ATR 72	17,523	2,503	626	5,770	180
Boeing 737-400	0	0	626	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	1,878	626	626	721	180
Boeing 737 MAX	81,046	25,346	6,571	30,654	1,893
Boeing 767	313	626	939	270	270
Boeing 777	313	0	313	90	90
Boeing 777X	1,252	626	0	541	0
Boeing 787	10,639	0	626	3,065	180
Bombardier CS300	1,878	626	0	721	0
Bombardier Dash 8	5,633	1,252	0	1,984	0
Embraer E190/195	626	0	0	180	0
Embraer E190-E2	5,945	2,190	626	2,344	180
Other	4,381	1,252	0	1,623	0
Total	**220,608**	**49,128**	**18,775**	**77,718**	**5,410**

Table A2.19: 2040 Forecast with Passenger Cap Removed (Except Scenarios 14 and 24)

Aircraft Type	*2040 Forecast with Passenger Cap Removed (Except Scenarios 14 and 24)*				
	Annual			*92-Day Summer*	
	Day 07h-19h	*Evening 19h-23h*	*Night 23h-07h*	*Day 07h-23h*	*Night 23h-07h*
Airbus A306	0	0	0	0	0
Airbus A319	626	0	0	180	0
Airbus A320	3,129	313	313	992	90
Airbus A320neo	52,570	11,891	10,013	18,573	2,885
Airbus A321	0	0	0	0	0
Airbus A321neo	20,027	1,565	6,258	6,221	1,803
Airbus A330	1252	313	0	451	0
Airbus A330neo	12,517	0	1,878	3,606	541
Airbus A350	313	0	313	90	90
ATR 72	16,898	2,503	1,252	5,590	361
Boeing 737-400	0	0	626	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	1,878	1,252	626	902	180
Boeing 737 MAX	87,304	24,095	17,523	32,097	5,049
Boeing 767	313	626	939	270	270
Boeing 777	0	0	626	0	180
Boeing 777X	1,252	626	0	541	0
Boeing 787	9,700	0	1,565	2,795	451
Bombardier CS300	1,878	313	313	631	90
Bombardier Dash 8	5,633	1,252	0	1,984	0
Embraer E190/195	626	0	0	180	0
Embraer E190-E2	5,633	2,503	626	2,344	180
Other	4,381	1,252	626	1,623	180
Total	**225.928**	**48,502**	**43,496**	**79,070**	**12,532**

Table A2.20: 2040 Forecast with Passenger Cap Removed – Scenario 24

Aircraft Type	2040 Forecast with Passenger Cap Removed – Scenario 24				
	Annual			92-Day Summer	
	Day 07h-19h	Evening 19h-23h	Night 23h-07h	Day 07h-23h	Night 23h-07h
Airbus A306	0	0	0	0	0
Airbus A319	626	0	0	180	0
Airbus A320	3,129	313	313	992	90
Airbus A320neo	52,258	11,578	9,388	18,393	2,705
Airbus A321	0	0	0	0	0
Airbus A321neo	18,775	1565	4,068	5,860	1,172
Airbus A330	1,252	313	0	451	0
Airbus A330neo	12,517	0	1,878	3,606	541
Airbus A350	313	0	313	90	90
ATR 72	16,898	2,503	1,252	5,590	361
Boeing 737-400	0	0	626	0	180
Boeing 737-700	0	0	0	0	0
Boeing 737-800	1,878	1,252	626	902	180
Boeing 737 MAX	86,992	24,095	14,707	32,007	4,238
Boeing 767	313	626	939	270	270
Boeing 777	0	0	626	0	180
Boeing 777X	1,252	626	0	541	0
Boeing 787	9,700	0	1,565	2,795	451
Bombardier CS300	1,878	313	313	631	90
Bombardier Dash 8	5,633	1,252	0	1,984	0
Embraer E190/195	626	0	0	180	0
Embraer E190-E2	5,633	2,503	626	2,344	180
Other	4,381	1,252	626	1,623	180
Total	**224,050**	**48,190**	**37,863**	**78,439**	**10,909**

Noise Modelling Software

The noise modelling utilises the Federal Aviation Authority Aviation Environmental Design Tool (AEDT) version 2d SP2, which is compliant with *ECAC.CEAC Doc 29 4th Edition Report on Standard Method of Computing Noise Contours around Civil Airports* and with *EU Commission Directive 2015/996 Establishing common noise assessment methods according to Directive 2002/49/EC of the European Parliament and of the Council*. This was the latest version of the software when the assessment work began.

The AEDT software evaluates aircraft noise in the vicinity of airports using flight track information, aircraft fleet mix, aircraft profiles and terrain. The AEDT software is used to produce noise exposure contours as well as predict noise levels at specific user-defined sites. For Dublin Airport the input data has comprised:

- physical details of the airport, both current and future,
- the topography of the surrounding area,
- the aircraft movements themselves,
- the routes flown by the aircraft movements,
- the procedures used by the aircraft movements,
- dwelling, population and community building data.

Study Area

The study area is based on the largest extent of likely impacts due to air noise, i.e. the lowest value noise contours assessed for each metric. The extents of the study are contained within an area that extends 53 km to the west, 49 km to the east, 32 km to the north and 20 km to the south of the centre of the existing main runway at Dublin Airport. Figure A2.1 shows the study area.

AEDT Study

The AEDT default weather settings for Dublin Airport and all-soft ground lateral attenuation have been used. The directivity effects of aircraft bank angle have been allowed for in accordance with EU Directive 2015/996.

Terrain data has been acquired for the study area. This was provided by emapsite in the form of a Digital Terrain Model dataset and has been incorporated within the noise model.

Airport Layout

The current airfield layout including runways and taxiways is shown on the AIP Ireland Aerodrome Chart[1]. This information has been used with a construction drawing for the North Runway supplied by daa to locate the Dublin Airport runways in the model.

[1] EIDW AD 2.24-1, dated 28 March 2019, http://iaip.iaa.ie/iaip/IAIP_Frame_CD.htm

Aircraft Movements

The AEDT software includes noise information for many common aircraft types, but it does not include every aircraft type. Therefore, the actual and forecast aircraft types need to be mapped to aircraft types in the AEDT software. For most aircraft, substitutions are proposed by the AEDT software or the ANP database[2] where a similar alternative aircraft type is used to model the actual type. For larger aircraft this generally does not involve a change but for the smaller aircraft, and in particular the general aviation aircraft, some substitutions occur. Where the AEDT and ANP databases have no guidance, an aircraft type has been assigned based on the aircraft size and engine details.

This is in accordance with EU Directive 2015/996 which states that "The ANP database provided in Appendix I covers most existing aircraft types. For aircraft types or variants for which data are not currently listed, they can best be represented by data for other, normally similar, aircraft that are listed."

Helicopters and military aircraft have been excluded from this assessment as they perform less than 1% of the aircraft movements at Dublin Airport and therefore do not materially contribute to the noise contours. They have historically been excluded from aircraft noise contours produced for Dublin Airport.

This is in accordance with EU Directive 2015/996 which states "Where noise generating activities associated with airport operations do not contribute materially to the overall population exposure to aircraft noise and associated noise contours, they may be excluded. These activities include: helicopters, taxiing, engine testing and use of auxiliary power-units."

Runway Usage

Once the North Runway is operational the cross runway (16/34) will continue to be used, however only for essential use (e.g. when there are strong crosswinds) as stated in Condition 4 of the North Runway Permission. Specifically, for the purposes of noise modelling the future usage of the cross runway is assumed to be 1% of aircraft movements, with the remaining 99% of movements on the two main runways. 0.75% of aircraft movements are forecast to use Runway 16 with the remaining 0.25% on Runway 34.

The modelled future runway usage over a given year is summarised in Table A2.21 below, based on the average runway usage over a recent 10 year period and allowing for the expected reduction in cross runway usage.

[2] Aircraft Noise and Performance Database, https://www.aircraftnoisemodel.org

Table A2.21: Future Runway Usage

Runway	*Arrivals*	*Departures*
10L/10R	29%	29%
28L/28R	70%	70%
16	0.75%	0.75%
34	0.25%	0.25%

Once the North Runway is operational Dublin Airport will operate during the daytime (07:00 – 23:00) in accordance with Conditions 3a-3c per the mode of operation Option 7b, as detailed in the Environmental Impact Statement Addendum, Section 16 as received by the planning authority on the 9th day of August, 2005. This provides that:

a. "the parallel runways (10R-28L and 10L-28R) shall be used in preference to the cross runway, 16-34,

b. when winds are westerly, Runway 28L shall be preferred for arriving aircraft. Either Runway 28L or 28R shall be used for departing aircraft as determined by air traffic control,

c. when winds are easterly, either Runway 10L or 10R as determined by air traffic control shall be preferred for arriving aircraft. Runway 10R shall be preferred for departing aircraft,

except in cases of safety, maintenance considerations, exceptional air traffic conditions, adverse weather, technical faults in air traffic control systems or declared emergencies at other airports."

In practice it is expected that, unless capacity requires mixed mode, the runways will operate in segregated mode during the daytime with arrivals using either Runway 10L or Runway 28L and departures using either Runway 10R or Runway 28R depending on wind direction.

Any movements by Code F aircraft are an exception to this, as they will always use the North Runway. It is also proposed that departures by Category A & B aircraft heading south during westerly operations will use the South Runway, and those heading north during easterly operations will use the North Runway.

A method of determining mixed mode runway usage on the main runways (North and South) for modelling purposes has been developed. The modelled runway usage has been determined on an hourly basis.

Most of the time the runways will operate in segregated mode, i.e. one runway for all arrivals, the other for all departures. However, there will be occasions during peak hours when runways will need to operate in some degree of mixed mode, i.e. both runways used simultaneously for arrivals and/or departures. The change from segregated to mixed mode and back to segregated mode will be determined by air traffic control (ATC) and once changed to a particular mode the airport is likely to operate in that mode for at least two hours.

Given the IAA response to the application, which stresses the importance of using both runways for departures between 06.00-08.00 this has been allowed for in all the scenarios except those where the North Runway is not used at night, and those for 2022 as the forecast activity is noticeably less than occurred in 2018.

For the remaining hours the method assumes activity switches from segregated mode to mixed mode where activity is such that any of the three following single runway capacity limits are exceeded:

i. More than 35 arrivals in one hour.
ii. More than 44 departures in one hour.
iii. More than 48 movements (combined arrivals and departures) on one runway in one hour.

In mixed mode, where each individual runway handles both arrivals and departures, departures will operate using the compass departure principle. This means that if a departure is using a route that turns to the north then the North Runway will be used, and conversely if it is using a route that turns to the south, the South Runway will be used.

For westerly operations when in mixed mode as few arrivals as possible will use 28R, while not exceeding the single runway capacity limit of 48 combined arrivals and departures on runway 28L. For easterly operations when in mixed mode as few arrivals as possible will use 10R, while not exceeding the single runway capacity limit of 48 combined arrivals and departures on runway 10L.

When using the North Runway most aircraft will not use the full length on departure, and instead join the runway from the 1st intermediate taxiway. The exceptions are Code E and Code F aircraft, which will typically use the full runway length. All departures on the existing South Runway are assumed to use the full runway length.

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2022 is shown in Table A2.22 and Table A2.23 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.24 and Table A2.25.

Table A2.22: Typical Busy Day Runway Usage By Hour – 2022 Westerly Operations

Hour	*2022 Forecast Situation*		*2022 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2022 Forecast with Runway use Scenario 11*	
	28L (South)	*28R (North)*	*28L (South)*	*28R (North)*	*28L (South)*	*28R (North)*
00:00-00:59	6	0	9 in total		9 in total	
01:00-01:59	5	0	6 in total		6 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	5	0	7 in total		7 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	16	0	30 in total		30 in total	
07:00-07:59	16	37	9	32	9	32
08:00-08:59	19	11	19	11	19	11
09:00-09:59	17	12	16	14	16	14
10:00-10:59	11	13	11	12	11	12
11:00-11:59	11	13	12	14	12	14
12:00-12:59	24	10	24	10	24	10
13:00-13:59	12	18	16	18	16	18
14:00-14:59	16	13	15	15	15	15
15:00-15:59	11	20	13	21	13	21
16:00-16:59	22	14	22	16	22	16
17:00-17:59	16	18	18	16	18	16
18:00-18:59	16	15	15	21	15	21
19:00-19:59	20	15	20	17	20	17
20:00-20:59	9	17	11	17	11	17
21:00-21:59	14	7	12	9	12	9
22:00-22:59	28	6	22	5	22	5
23:00-23:59	6	0	17 in total		17 in total	

Table A2.23: Typical Busy Day Runway Usage By Hour – 2022 Easterly Operations

Hour	*2022 Forecast Situation*		*2022 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2022 Forecast with Runway use Scenario 11*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	6	0	9 in total		9 in total	
01:00-01:59	5	0	6 in total		6 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	5	0	7 in total		7 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	16	0	30 in total		30 in total	
07:00-07:59	33	20	28	13	28	13
08:00-08:59	10	20	10	20	10	20
09:00-09:59	11	18	13	17	13	17
10:00-10:59	9	15	8	15	8	15
11:00-11:59	15	9	16	10	16	10
12:00-12:59	11	23	11	23	11	23
13:00-13:59	15	15	16	18	16	18
14:00-14:59	13	16	14	16	14	16
15:00-15:59	17	14	18	16	18	16
16:00-16:59	14	22	16	22	16	22
17:00-17:59	20	14	18	16	18	16
18:00-18:59	13	18	19	17	19	17
19:00-19:59	13	22	15	22	15	22
20:00-20:59	17	9	17	11	17	11
21:00-21:59	8	13	10	11	10	11
22:00-22:59	6	28	5	22	5	22
23:00-23:59	6	0	17 in total		17 in total	

Table A2.24: Typical Busy Day Runway Usage By Night Hour – 2022 Westerly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	9	0	8	1	4	5	8	1
01:00-01:59	6	0	6	0	3	3	6	0
02:00-02:59	3	0	3	0	1.5	1.5	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	7	0	6	1	3	4	6	1
05:00-05:59	10	0	6	4	5	5	8	2
06:00-06:59	2	28	2	28	17.5	12.5	18	12
23:00-23:59	17	0	17	0	8.5	8.5	17	0

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	4	5	9	0	9	0	9	0
01:00-01:59	3	3	6	0	6	0	6	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3	4	7	0	7	0	7	0
05:00-05:59	3	7	10	0	10	0	6	4
06:00-06:59	1.5	28.5	30	0	2	28	2	28
23:00-23:59	8.5	8.5	17	0	17	0	17	0

Table A2.25: Typical Busy Day Runway Usage By Night Hour – 2022 Easterly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	9	0	1	8	4	5	0	9
01:00-01:59	6	0	0	6	3	3	0	6
02:00-02:59	3	0	0	3	1.5	1.5	0	3
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	7	0	0	7	3	4	0	7
05:00-05:59	10	0	4	6	5	5	2	8
06:00-06:59	28	2	28	2	17.5	12.5	17	13
23:00-23:59	0	17	0	17	8.5	8.5	0	17

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	5	4	9	0	9	0	9	0
01:00-01:59	3	3	6	0	6	0	6	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3	4	7	0	7	0	7	0
05:00-05:59	7	3	10	0	10	0	4	6
06:00-06:59	28.5	1.5	30	0	28	2	28	2
23:00-23:59	8.5	8.5	17	0	17	0	5	12

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2025 is shown in Table A2.26 and Table A2.27 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.28 and Table A2.29.

Table A2.26: Typical Busy Day Runway Usage By Hour – 2025 Westerly Operations

Hour	2025 Forecast Situation		2025 Forecast Without Any Measures & Forecast with Runway use Scenarios 02 – 10, 12 & 13		2025 Forecast with Runway use Scenario 11	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		35 in total	
07:00-07:59	40	29	29	22	14	38
08:00-08:59	25	8	22	12	22	12
09:00-09:59	26	14	24	17	25	18
10:00-10:59	18	21	18	18	19	19
11:00-11:59	20	19	20	19	20	19
12:00-12:59	28	22	28	23	27	24
13:00-13:59	15	22	19	21	19	21
14:00-14:59	19	18	20	20	20	19
15:00-15:59	14	21	15	23	14	23
16:00-16:59	25	19	25	20	25	20
17:00-17:59	20	19	22	20	22	18
18:00-18:59	21	20	20	24	20	25
19:00-19:59	23	20	20	22	22	23
20:00-20:59	10	20	12	18	11	18
21:00-21:59	16	8	14	9	15	9
22:00-22:59	31	6	26	5	25	6
23:00-23:59	9	0	19 in total		17 in total	

Table A2.27: Typical Busy Day Runway Usage By Hour – 2025 Easterly Operations

Hour	*2025 Forecast Situation*		*2025 Forecast Without Any Measures & Forecast with Runway use Scenarios 02 – 10, 12 & 13*		*2025 Forecast with Runway use Scenario 11*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		35 in total	
07:00-07:59	43	26	16	35	34	18
08:00-08:59	12	21	12	22	12	22
09:00-09:59	13	27	16	25	17	26
10:00-10:59	17	22	14	22	15	23
11:00-11:59	21	18	21	18	21	18
12:00-12:59	22	28	23	28	24	27
13:00-13:59	19	18	19	21	19	21
14:00-14:59	18	19	19	21	18	21
15:00-15:59	18	17	20	18	20	17
16:00-16:59	19	25	20	25	20	25
17:00-17:59	21	18	22	20	20	20
18:00-18:59	18	23	22	22	23	22
19:00-19:59	18	25	20	22	21	24
20:00-20:59	20	10	18	12	18	11
21:00-21:59	9	15	10	13	10	14
22:00-22:59	6	31	5	26	6	25
23:00-23:59	9	0	19 in total		17 in total	

Table A2.28: Typical Busy Day Runway Usage By Night Hour – 2025 Westerly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 04		Forecast with Runway use Scenario 05	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	12	0	10	2	2	10	6	6
01:00-01:59	9	0	9	0	0	9	4.5	4.5
02:00-02:59	3	0	3	0	0	3	1.5	1.5
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	7	1	0	8	3.5	4.5
05:00-05:59	10	0	6	4	4	6	5	5
06:00-06:59	22	15	22	15	20	17	21	16
23:00-23:59	18	1	18	1	1	18	9.5	9.5

Hour	Forecast without any measures Scenario 06		Forecast with Runway use Scenario 07		Forecast with Runway use Scenario 08		Forecast with Runway use Scenario 09	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	5	7	10	2	5	7	0	12
01:00-01:59	4.5	4.5	9	0	4.5	4.5	0	9
02:00-02:59	1.5	1.5	3	0	1.5	1.5	0	3
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	7	1	3.5	4.5	0	8
05:00-05:59	5	5	8	2	3	7	0	10
06:00-06:59	21	16	22	15	21	16	22	15
23:00-23:59	9	10	18	1	9	10	18	1

Hour	Forecast without any measures Scenario 10		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	2.5	9.5	13	0	12	0	12	0
01:00-01:59	2.25	6.75	9	0	9	0	9	0
02:00-02:59	0.75	2.25	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	1.75	6.25	8	0	8	0	8	0
05:00-05:59	1.5	7.5	10	0	10	0	6	4
06:00-06:59	21.5	15.5	35	0	22	15	22	15
23:00-23:59	13.5	5.5	17	0	19	0	18	1

Table A2.29: Typical Busy Day Runway Usage By Night Hour – 2025 Easterly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 04		Forecast with Runway use Scenario 05	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	12	0	2	10	10	2	6	6
01:00-01:59	9	0	0	9	9	0	4.5	4.5
02:00-02:59	3	0	0	3	3	0	1.5	1.5
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	0	8	7	1	3.5	4.5
05:00-05:59	10	0	4	6	6	4	5	5
06:00-06:59	20	17	20	17	22	15	21	16
23:00-23:59	1	18	1	18	18	1	9.5	9.5

Hour	Forecast without any measures Scenario 06		Forecast with Runway use Scenario 07		Forecast with Runway use Scenario 08		Forecast with Runway use Scenario 09	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	5	7	0	12	7	5	0	12
01:00-01:59	4.5	4.5	0	9	4.5	4.5	0	9
02:00-02:59	1.5	1.5	0	3	1.5	1.5	0	3
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	0	8	3.5	4.5	0	8
05:00-05:59	5	5	2	8	7	3	0	10
06:00-06:59	21	16	20	17	21	16	20	17
23:00-23:59	9	10	0	19	10	9	1	18

Hour	Forecast without any measures Scenario 10		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	3.5	8.5	13	0	12	0	12	0
01:00-01:59	2.25	6.75	9	0	9	0	9	0
02:00-02:59	0.75	2.25	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	1.75	6.25	8	0	8	0	8	0
05:00-05:59	3.5	6.5	10	0	10	0	4	6
06:00-06:59	20.5	16.5	35	0	20	17	20	17
23:00-23:59	5.5	13.5	17	0	19	0	6	13

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2030 with the existing passenger cap is shown in Table A2.30 and Table A2.31 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.32 and Table A2.33.

Table A2.30: Typical Busy Day Runway Usage By Hour – 2030 Westerly Operations

Hour	*2030 Forecast Situation*		*2030 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2030 Forecast with Runway use Scenario 11*	
	28L (South)	*28R (North)*	*28L (South)*	*28R (North)*	*28L (South)*	*28R (North)*
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		37 in total	
07:00-07:59	46	30	29	22	13	38
08:00-08:59	27	9	22	12	22	12
09:00-09:59	26	15	24	17	24	17
10:00-10:59	19	21	18	18	18	18
11:00-11:59	20	19	20	19	20	18
12:00-12:59	29	24	28	23	28	24
13:00-13:59	16	23	19	21	19	21
14:00-14:59	19	19	20	20	20	20
15:00-15:59	14	21	15	23	14	23
16:00-16:59	27	19	25	20	26	20
17:00-17:59	22	20	22	20	22	19
18:00-18:59	21	22	20	24	20	25
19:00-19:59	24	20	20	22	20	22
20:00-20:59	10	21	12	18	11	18
21:00-21:59	16	8	14	9	15	8
22:00-22:59	32	6	26	5	26	6
23:00-23:59	9	0	19 in total		18 in total	

Table A2.31: Typical Busy Day Runway Usage By Hour – 2030 Easterly Operations

Hour	*2030 Forecast Situation*		*2030 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2030 Forecast with Runway use Scenario 11*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		37 in total	
07:00-07:59	28	48	16	35	34	17
08:00-08:59	5	31	12	22	12	22
09:00-09:59	14	27	16	25	16	25
10:00-10:59	17	23	14	22	14	22
11:00-11:59	21	18	21	18	20	18
12:00-12:59	24	29	23	28	24	28
13:00-13:59	20	19	19	21	19	21
14:00-14:59	19	19	19	21	19	21
15:00-15:59	18	17	20	18	20	17
16:00-16:59	19	27	20	25	20	26
17:00-17:59	22	20	22	20	21	20
18:00-18:59	20	23	22	22	23	22
19:00-19:59	18	26	20	22	20	22
20:00-20:59	21	10	18	12	18	11
21:00-21:59	9	15	10	13	9	14
22:00-22:59	6	32	5	26	6	26
23:00-23:59	9	0	19 in total		18 in total	

Table A2.32: Typical Busy Day Runway Usage By Night Hour – 2030 Westerly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	12	0	10	2	5	7	10	2
01:00-01:59	9	0	9	0	4.5	4.5	9	0
02:00-02:59	3	0	3	0	1.5	1.5	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	7	1	3.5	4.5	7	1
05:00-05:59	10	0	6	4	5	5	8	2
06:00-06:59	22	15	22	15	21	16	22	15
23:00-23:59	18	1	18	1	9	10	18	1

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	5	7	13	0	12	0	12	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	8	0	8	0	8	0
05:00-05:59	3	7	10	0	10	0	6	4
06:00-06:59	21	16	37	0	22	15	22	15
23:00-23:59	9	10	18	0	19	0	18	1

Table A2.33: Typical Busy Day Runway Usage By Night Hour – 2030 Easterly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	12	0	2	10	5	7	0	12
01:00-01:59	9	0	0	9	4.5	4.5	0	9
02:00-02:59	3	0	0	3	1.5	1.5	0	3
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	0	8	3.5	4.5	0	8
05:00-05:59	10	0	4	6	5	5	2	8
06:00-06:59	20	17	20	17	21	16	0	12
23:00-23:59	1	18	1	18	9	10	0	19

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	7	5	13	0	12	0	12	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	8	0	8	0	8	0
05:00-05:59	7	3	10	0	10	0	4	6
06:00-06:59	21	16	37	0	20	17	20	17
23:00-23:59	10	9	18	0	19	0	6	13

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2030 without the existing passenger cap is shown in Table A2.34 and Table A2.35 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.36 and Table A2.37.

Table A2.34: Typical Busy Day Runway Usage By Hour – 2030 with Passenger Cap Removed Westerly Operations

Hour	*2030 Forecast Situation*		*2030 Forecast Without Any Measures & Forecast with Runway use Scenarios 15, 16, 19 – 21, 25 & 26*		*2030 Forecast with Runway use Scenario 24*	
	28L (South)	*28R (North)*	*28L (South)*	*28R (North)*	*28L (South)*	*28R (North)*
00:00-00:59	7	0	13 in total		14 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	9 in total		9 in total	
05:00-05:59	11	0	13 in total		13 in total	
06:00-06:59	17	0	43 in total		38 in total	
07:00-07:59	48	35	36	25	36	26
08:00-08:59	30	10	27	15	31	11
09:00-09:59	30	19	28	22	28	22
10:00-10:59	22	25	28	23	24	23
11:00-11:59	25	23	24	24	25	23
12:00-12:59	30	27	32	28	31	29
13:00-13:59	20	24	25	24	25	24
14:00-14:59	25	20	25	24	25	24
15:00-15:59	15	28	16	30	15	30
16:00-16:59	29	21	30	22	31	22
17:00-17:59	23	20	26	23	26	21
18:00-18:59	24	24	23	29	23	30
19:00-19:59	24	22	23	26	23	26
20:00-20:59	11	21	13	20	12	20
21:00-21:59	18	8	17	10	18	9
22:00-22:59	32	6	27	6	27	7
23:00-23:59	9	0	24 in total		21 in total	

Table A2.35: Typical Busy Day Runway Usage By Hour – 2030 with Passenger Cap Removed Easterly Operations

Hour	*2030 Forecast Situation*		*2030 Forecast Without Any Measures & Forecast with Runway use Scenarios 15, 16, 19 – 21, 25 & 26*		*2030 Forecast with Runway use Scenario 24*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	7	0	13 in total		14 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	9 in total		9 in total	
05:00-05:59	11	0	13 in total		13 in total	
06:00-06:59	17	0	43 in total		38 in total	
07:00-07:59	35	48	19	42	19	43
08:00-08:59	5	35	15	27	5	37
09:00-09:59	18	31	21	29	21	29
10:00-10:59	21	26	19	32	19	28
11:00-11:59	24	24	25	23	24	24
12:00-12:59	28	29	29	31	30	30
13:00-13:59	21	23	22	27	22	27
14:00-14:59	20	25	22	27	22	27
15:00-15:59	23	20	26	20	26	19
16:00-16:59	21	29	22	30	22	31
17:00-17:59	23	20	26	23	24	23
18:00-18:59	21	27	26	26	27	26
19:00-19:59	20	26	24	25	24	25
20:00-20:59	21	11	20	13	20	12
21:00-21:59	10	16	12	15	11	16
22:00-22:59	6	32	6	27	7	27
23:00-23:59	9	0	24 in total		21 in total	

Table A2.36: Typical Busy Day Runway Usage By Night Hour – 2030 with Passenger Cap Removed Westerly Operations

Hour	Forecast with Runway use Scenario 15		Forecast with Runway use Scenario 16		Forecast Without Any Measures Scenario 19		Forecast with Runway use Scenario 20	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	13	0	11	2	5.5	7.5	11	2
01:00-01:59	9	0	9	0	4.5	4.5	9	0
02:00-02:59	3	0	3	0	1.5	1.5	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	9	0	8	1	4	5	8	1
05:00-05:59	13	0	9	4	6.5	6.5	11	2
06:00-06:59	26	17	26	17	25	18	26	17
23:00-23:59	23	1	23	1	11.5	12.5	23	1

Hour	Forecast without any measures Scenario 21		Forecast with Runway use Scenario 24		Forecast with Runway use Scenario 25		Forecast with Runway use Scenario 26	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	5.5	7.5	14	0	13	0	13	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	4	5	9	0	9	0	9	0
05:00-05:59	4.5	8.5	13	0	13	0	9	4
06:00-06:59	25	18	38	0	26	17	26	17
23:00-23:59	11.5	12.5	21	0	24	0	23	1

Table A2.37: Typical Busy Day Runway Usage By Night Hour – 2030 with Passenger Cap Removed Easterly Operations

Hour	Forecast with Runway use Scenario 15		Forecast with Runway use Scenario 16		Forecast Without Any Measures Scenario 19		Forecast with Runway use Scenario 20	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	13	0	2	11	5.5	7.5	0	13
01:00-01:59	9	0	0	9	4.5	4.5	0	9
02:00-02:59	3	0	0	3	1.5	1.5	0	3
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	9	0	0	9	4	5	0	9
05:00-05:59	13	0	4	9	6.5	6.5	2	11
06:00-06:59	24	19	24	19	25	18	24	19
23:00-23:59	1	23	1	23	11.5	12.5	0	24

Hour	Forecast without any measures Scenario 21		Forecast with Runway use Scenario 24		Forecast with Runway use Scenario 25		Forecast with Runway use Scenario 26	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	7.5	5.5	14	0	13	0	13	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	4	5	9	0	9	0	9	0
05:00-05:59	8.5	4.5	13	0	13	0	4	9
06:00-06:59	25	18	38	0	24	19	24	19
23:00-23:59	12.5	11.5	21	0	24	0	8	16

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2035 with the existing passenger cap is shown in Table A2.38 and Table A2.39 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.40 and Table A2.41.

Table A2.38: Typical Busy Day Runway Usage By Hour – 2035 Westerly Operations

Hour	*2035 Forecast Situation*		*2035 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2035 Forecast with Runway use Scenario 11*	
	28L (South)	*28R (North)*	*28L (South)*	*28R (North)*	*28L (South)*	*28R (North)*
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		37 in total	
07:00-07:59	46	30	29	22	13	38
08:00-08:59	27	9	22	12	22	12
09:00-09:59	26	15	24	17	24	17
10:00-10:59	19	21	18	18	18	18
11:00-11:59	20	19	20	19	20	18
12:00-12:59	29	24	28	23	28	24
13:00-13:59	16	23	19	21	19	21
14:00-14:59	19	19	20	20	20	20
15:00-15:59	14	21	15	23	14	23
16:00-16:59	27	19	25	20	26	20
17:00-17:59	22	20	22	20	22	19
18:00-18:59	21	22	20	24	20	25
19:00-19:59	24	20	20	22	20	22
20:00-20:59	10	21	12	18	11	18
21:00-21:59	16	8	14	9	15	8
22:00-22:59	32	6	26	5	26	6
23:00-23:59	9	0	19 in total		18 in total	

Table A2.39: Typical Busy Day Runway Usage By Hour – 2035 Easterly Operations

Hour	*2035 Forecast Situation*		*2035 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2035 Forecast with Runway use Scenario 11*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		37 in total	
07:00-07:59	28	48	16	35	34	17
08:00-08:59	5	31	12	22	12	22
09:00-09:59	14	27	16	25	16	25
10:00-10:59	17	23	14	22	14	22
11:00-11:59	21	18	21	18	20	18
12:00-12:59	24	29	23	28	24	28
13:00-13:59	20	19	19	21	19	21
14:00-14:59	19	19	19	21	19	21
15:00-15:59	18	17	20	18	20	17
16:00-16:59	19	27	20	25	20	26
17:00-17:59	22	20	22	20	21	20
18:00-18:59	20	23	22	22	23	22
19:00-19:59	18	26	20	22	20	22
20:00-20:59	21	10	18	12	18	11
21:00-21:59	9	15	10	13	9	14
22:00-22:59	6	32	5	26	6	26
23:00-23:59	9	0	19 in total		18 in total	

Table A2.40: Typical Busy Day Runway Usage By Night Hour – 2035 Westerly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	12	0	10	2	5	7	10	2
01:00-01:59	9	0	9	0	4.5	4.5	9	0
02:00-02:59	3	0	3	0	1.5	1.5	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	7	1	3.5	4.5	7	1
05:00-05:59	10	0	6	4	5	5	8	2
06:00-06:59	22	15	22	15	21	16	22	15
23:00-23:59	18	1	18	1	9	10	18	1

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	5	7	13	0	12	0	12	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	8	0	8	0	8	0
05:00-05:59	3	7	10	0	10	0	6	4
06:00-06:59	21	16	37	0	22	15	22	15
23:00-23:59	9	10	18	0	19	0	18	1

Table A2.41: Typical Busy Day Runway Usage By Night Hour – 2035 Easterly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	12	0	2	10	5	7	0	12
01:00-01:59	9	0	0	9	4.5	4.5	0	9
02:00-02:59	3	0	0	3	1.5	1.5	0	3
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	0	8	3.5	4.5	0	8
05:00-05:59	10	0	4	6	5	5	2	8
06:00-06:59	20	17	20	17	21	16	20	17
23:00-23:59	1	18	1	18	9	10	0	19

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	7	5	13	0	12	0	12	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	8	0	8	0	8	0
05:00-05:59	7	3	10	0	10	0	4	6
06:00-06:59	21	16	37	0	20	17	20	17
23:00-23:59	10	9	18	0	19	0	6	13

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2035 without the existing passenger cap is shown in Table A2.42 and Table A2.43 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.44 and Table A2.45.

Table A2.42: Typical Busy Day Runway Usage By Hour – 2035 with Passenger Cap Removed Westerly Operations

Hour	*2035 Forecast Situation*		*2035 Forecast Without Any Measures & Forecast with Runway use Scenarios 15, 16, 19 – 21, 25 & 26*		*2035 Forecast with Runway use Scenario 24*	
	28L (South)	*28R (North)*	*28L (South)*	*28R (North)*	*28L (South)*	*28R (North)*
00:00-00:59	7	0	15 in total		14 in total	
01:00-01:59	8	0	10 in total		10 in total	
02:00-02:59	2	0	4 in total		4 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	10 in total		9 in total	
05:00-05:59	11	0	15 in total		15 in total	
06:00-06:59	17	0	47 in total		38 in total	
07:00-07:59	48	39	37	27	37	28
08:00-08:59	34	10	31	16	35	12
09:00-09:59	31	23	29	25	29	25
10:00-10:59	24	28	30	26	26	26
11:00-11:59	30	24	30	26	31	25
12:00-12:59	35	32	36	33	35	34
13:00-13:59	23	26	28	26	28	26
14:00-14:59	28	23	28	28	28	28
15:00-15:59	17	32	18	34	17	34
16:00-16:59	32	22	33	23	34	23
17:00-17:59	24	23	27	26	27	24
18:00-18:59	25	26	25	31	24	32
19:00-19:59	24	23	23	28	23	27
20:00-20:59	13	21	15	20	14	20
21:00-21:59	19	9	18	11	19	10
22:00-22:59	35	7	28	7	28	8
23:00-23:59	9	0	27 in total		24 in total	

Table A2.43: Typical Busy Day Runway Usage By Hour – 2035 with Passenger Cap Removed Easterly Operations

Hour	*2035 Forecast Situation*		*2035 Forecast Without Any Measures & Forecast with Runway use Scenarios 15, 16, 19 – 21, 25 & 26*		*2035 Forecast with Runway use Scenario 24*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	7	0	15 in total		14 in total	
01:00-01:59	8	0	10 in total		10 in total	
02:00-02:59	2	0	4 in total		4 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	10 in total		9 in total	
05:00-05:59	11	0	15 in total		15 in total	
06:00-06:59	17	0	47 in total		38 in total	
07:00-07:59	39	48	19	45	19	46
08:00-08:59	5	39	16	31	5	42
09:00-09:59	22	32	24	30	24	30
10:00-10:59	24	28	22	34	22	30
11:00-11:59	25	29	27	29	26	30
12:00-12:59	34	33	35	34	36	33
13:00-13:59	23	26	24	30	24	30
14:00-14:59	23	28	26	30	26	30
15:00-15:59	27	22	30	22	30	21
16:00-16:59	22	32	23	33	23	34
17:00-17:59	26	21	29	24	27	24
18:00-18:59	23	28	28	28	29	27
19:00-19:59	21	26	26	25	25	25
20:00-20:59	21	13	20	15	20	14
21:00-21:59	11	17	13	16	12	17
22:00-22:59	7	35	7	28	8	28
23:00-23:59	9	0	27 in total		24 in total	

Table A2.44: Typical Busy Day Runway Usage By Night Hour – 2035 with Passenger Cap Removed Westerly Operations

Hour	Forecast with Runway use Scenario 15		Forecast with Runway use Scenario 16		Forecast Without Any Measures Scenario 19		Forecast with Runway use Scenario 20	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	15	0	13	2	6.5	8.5	13	2
01:00-01:59	10	0	10	0	5	5	10	0
02:00-02:59	4	0	3	1	1.5	2.5	3	1
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	10	0	9	1	4.5	5.5	9	1
05:00-05:59	15	0	11	4	7.5	7.5	13	2
06:00-06:59	27	20	27	20	26	21	27	20
23:00-23:59	26	1	26	1	13	14	26	1

Hour	Forecast without any measures Scenario 21		Forecast with Runway use Scenario 24		Forecast with Runway use Scenario 25		Forecast with Runway use Scenario 26	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	6.5	8.5	14	0	15	0	15	0
01:00-01:59	5	5	10	0	10	0	10	0
02:00-02:59	1.5	2.5	4	0	4	0	4	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	4.5	5.5	9	0	10	0	10	0
05:00-05:59	5.5	9.5	15	0	15	0	11	4
06:00-06:59	26	21	38	0	27	20	27	20
23:00-23:59	13	14	24	0	27	0	26	1

Table A2.45: Typical Busy Day Runway Usage By Night Hour – 2035 with Passenger Cap Removed Easterly Operations

Hour	Forecast with Runway use Scenario 15		Forecast with Runway use Scenario 16		Forecast Without Any Measures Scenario 19		Forecast with Runway use Scenario 20	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	15	0	2	13	6.5	8.5	0	15
01:00-01:59	10	0	0	10	5	5	0	10
02:00-02:59	4	0	0	4	1.5	2.5	0	4
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	10	0	0	10	4.5	5.5	0	10
05:00-05:59	15	0	4	11	7.5	7.5	2	13
06:00-06:59	25	22	25	22	26	21	25	22
23:00-23:59	1	26	1	26	13	14	0	27

Hour	Forecast without any measures Scenario 21		Forecast with Runway use Scenario 24		Forecast with Runway use Scenario 25		Forecast with Runway use Scenario 26	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	8.5	6.5	14	0	15	0	15	0
01:00-01:59	5	5	10	0	10	0	10	0
02:00-02:59	1.5	2.5	4	0	4	0	4	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	4.5	5.5	9	0	10	0	10	0
05:00-05:59	9.5	5.5	15	0	15	0	4	11
06:00-06:59	26	21	38	0	25	22	25	22
23:00-23:59	14	13	24	0	27	0	11	16

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2040 with the existing passenger cap is shown in Table A2.46 and Table A2.47 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.48 and Table A2.49.

Table A2.46: Typical Busy Day Runway Usage By Hour – 2040 Westerly Operations

Hour	*2040 Forecast Situation*		*2040 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2040 Forecast with Runway use Scenario 11*	
	28L (South)	*28R (North)*	*28L (South)*	*28R (North)*	*28L (South)*	*28R (North)*
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		37 in total	
07:00-07:59	46	30	29	22	13	38
08:00-08:59	27	9	22	12	22	12
09:00-09:59	26	15	24	17	24	17
10:00-10:59	19	21	18	18	18	18
11:00-11:59	20	19	20	19	20	18
12:00-12:59	29	24	28	23	28	24
13:00-13:59	16	23	19	21	19	21
14:00-14:59	19	19	20	20	20	20
15:00-15:59	14	21	15	23	14	23
16:00-16:59	27	19	25	20	26	20
17:00-17:59	22	20	22	20	22	19
18:00-18:59	21	22	20	24	20	25
19:00-19:59	24	20	20	22	20	22
20:00-20:59	10	21	12	18	11	18
21:00-21:59	16	8	14	9	15	8
22:00-22:59	32	6	26	5	26	6
23:00-23:59	9	0	19 in total		18 in total	

Table A2.47: Typical Busy Day Runway Usage By Hour – 2040 Easterly Operations

Hour	*2040 Forecast Situation*		*2040 Forecast Without Any Measures & Forecast with Runway use Scenarios 02, 03, 06 – 08, 12 & 13*		*2040 Forecast with Runway use Scenario 11*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	7	0	12 in total		13 in total	
01:00-01:59	8	0	9 in total		9 in total	
02:00-02:59	2	0	3 in total		3 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	8 in total		8 in total	
05:00-05:59	11	0	10 in total		10 in total	
06:00-06:59	17	0	37 in total		37 in total	
07:00-07:59	28	48	16	35	34	17
08:00-08:59	5	31	12	22	12	22
09:00-09:59	14	27	16	25	16	25
10:00-10:59	17	23	14	22	14	22
11:00-11:59	21	18	21	18	20	18
12:00-12:59	24	29	23	28	24	28
13:00-13:59	20	19	19	21	19	21
14:00-14:59	19	19	19	21	19	21
15:00-15:59	18	17	20	18	20	17
16:00-16:59	19	27	20	25	20	26
17:00-17:59	22	20	22	20	21	20
18:00-18:59	20	23	22	22	23	22
19:00-19:59	18	26	20	22	20	22
20:00-20:59	21	10	18	12	18	11
21:00-21:59	9	15	10	13	9	14
22:00-22:59	6	32	5	26	6	26
23:00-23:59	9	0	19 in total		18 in total	

Table A2.48: Typical Busy Day Runway Usage By Night Hour – 2040 Westerly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	12	0	10	2	5	7	10	2
01:00-01:59	9	0	9	0	4.5	4.5	9	0
02:00-02:59	3	0	3	0	1.5	1.5	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	7	1	3.5	4.5	7	1
05:00-05:59	10	0	6	4	5	5	8	2
06:00-06:59	22	15	22	15	21	16	22	15
23:00-23:59	18	1	18	1	9	10	18	1

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	5	7	13	0	12	0	12	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	8	0	8	0	8	0
05:00-05:59	3	7	10	0	10	0	6	4
06:00-06:59	21	16	37	0	22	15	22	15
23:00-23:59	9	10	18	0	19	0	18	1

Table A2.49: Typical Busy Day Runway Usage By Night Hour – 2040 Easterly Operations

Hour	Forecast with Runway use Scenario 02		Forecast with Runway use Scenario 03		Forecast Without Any Measures Scenario 06		Forecast with Runway use Scenario 07	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	12	0	2	10	5	7	0	12
01:00-01:59	9	0	0	9	4.5	4.5	0	9
02:00-02:59	3	0	0	3	1.5	1.5	0	3
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	8	0	0	8	3.5	4.5	0	8
05:00-05:59	10	0	4	6	5	5	2	8
06:00-06:59	20	17	20	17	21	16	20	17
23:00-23:59	1	18	1	18	9	10	0	19

Hour	Forecast without any measures Scenario 08		Forecast with Runway use Scenario 11		Forecast with Runway use Scenario 12		Forecast with Runway use Scenario 13	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	7	5	13	0	12	0	12	0
01:00-01:59	4.5	4.5	9	0	9	0	9	0
02:00-02:59	1.5	1.5	3	0	3	0	3	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	3.5	4.5	8	0	8	0	8	0
05:00-05:59	7	3	10	0	10	0	4	6
06:00-06:59	21	16	37	0	20	17	20	17
23:00-23:59	10	9	18	0	19	0	6	13

The resulting runway usage by hour for each scenario, on a typical busy day for both easterly and westerly operations in 2040 without the existing passenger cap is shown in Table A2.50 and Table A2.51 respectively. For the night-time period further information is given for the Forecast with Runway use scenarios in addition to the Forecast without any measures scenario in Table A2.52 and Table A2.53.

Table A2.50: Typical Busy Day Runway Usage By Hour – 2040 with Passenger Cap Removed Westerly Operations

Hour	*2040 Forecast Situation*		*2040 Forecast Without Any Measures & Forecast with Runway use Scenarios 15, 16, 19 – 21, 25 & 26*		*2040 Forecast with Runway use Scenario 24*	
	28L (South)	*28R (North)*	*28L (South)*	*28R (North)*	*28L (South)*	*28R (North)*
00:00-00:59	7	0	15 in total		14 in total	
01:00-01:59	8	0	11 in total		11 in total	
02:00-02:59	2	0	4 in total		4 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	10 in total		9 in total	
05:00-05:59	11	0	17 in total		16 in total	
06:00-06:59	17	0	51 in total		40 in total	
07:00-07:59	48	43	39	29	39	30
08:00-08:59	36	11	32	17	37	12
09:00-09:59	44	17	35	27	35	27
10:00-10:59	24	31	31	29	27	28
11:00-11:59	32	27	32	29	33	28
12:00-12:59	36	35	37	36	36	37
13:00-13:59	25	26	30	26	30	26
14:00-14:59	33	26	33	31	33	31
15:00-15:59	18	35	19	38	18	38
16:00-16:59	34	24	35	25	36	25
17:00-17:59	24	25	27	29	27	27
18:00-18:59	25	26	25	31	24	32
19:00-19:59	25	23	23	28	23	27
20:00-20:59	13	21	16	20	15	20
21:00-21:59	24	7	20	12	21	11
22:00-22:59	38	6	29	7	29	8
23:00-23:59	9	0	31 in total		27 in total	

Table A2.51: Typical Busy Day Runway Usage By Hour – 2040 with Passenger Cap Removed Easterly Operations

Hour	*2040 Forecast Situation*		*2040 Forecast Without Any Measures & Forecast with Runway use Scenarios 15, 16, 19 – 21, 25 & 26*		*2040 Forecast with Runway use Scenario 24*	
	10R (South)	*10L (North)*	*10R (South)*	*10L (North)*	*10R (South)*	*10L (North)*
00:00-00:59	7	0	15 in total		14 in total	
01:00-01:59	8	0	11 in total		11 in total	
02:00-02:59	2	0	4 in total		4 in total	
03:00-03:59	0	0	0 in total		0 in total	
04:00-04:59	6	0	10 in total		9 in total	
05:00-05:59	11	0	17 in total		16 in total	
06:00-06:59	17	0	51 in total		40 in total	
07:00-07:59	43	48	20	48	21	48
08:00-08:59	6	41	17	32	6	43
09:00-09:59	13	48	26	36	26	36
10:00-10:59	27	28	25	35	24	31
11:00-11:59	28	31	30	31	29	32
12:00-12:59	36	35	37	36	38	35
13:00-13:59	23	28	24	32	24	32
14:00-14:59	26	33	29	35	29	35
15:00-15:59	30	23	34	23	34	22
16:00-16:59	24	34	25	35	25	36
17:00-17:59	28	21	32	24	30	24
18:00-18:59	23	28	28	28	29	27
19:00-19:59	21	27	26	25	25	25
20:00-20:59	21	13	20	16	20	15
21:00-21:59	5	26	14	18	13	19
22:00-22:59	4	40	7	29	8	29
23:00-23:59	9	0	31 in total		27 in total	

Table A2.52: Typical Busy Day Runway Usage By Night Hour – 2040 with Passenger Cap Removed Westerly Operations

Hour	Forecast with Runway use Scenario 15		Forecast with Runway use Scenario 16		Forecast Without Any Measures Scenario 19		Forecast with Runway use Scenario 20	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	15	0	13	2	6.5	8.5	13	2
01:00-01:59	11	0	11	0	5.5	5.5	11	0
02:00-02:59	4	0	3	1	1.5	2.5	3	1
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	10	0	9	1	4.5	5.5	9	1
05:00-05:59	17	0	12	5	9	8	15	2
06:00-06:59	29	22	29	22	27.5	23.5	29	22
23:00-23:59	29	2	29	2	14.5	16.5	29	2

Hour	Forecast without any measures Scenario 21		Forecast with Runway use Scenario 24		Forecast with Runway use Scenario 25		Forecast with Runway use Scenario 26	
	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)	28L (South)	28R (North)
00:00-00:59	6.5	8.5	14	0	15	0	15	0
01:00-01:59	5.5	5.5	11	0	11	0	11	0
02:00-02:59	1.5	2.5	4	0	4	0	4	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	4.5	5.5	9	0	10	0	10	0
05:00-05:59	6	11	16	0	17	0	12	5
06:00-06:59	27.5	23.5	40	0	29	22	29	22
23:00-23:59	14.5	16.5	27	0	31	0	29	2

Table A2.53: Typical Busy Day Runway Usage By Night Hour – 2040 with Passenger Cap Removed Easterly Operations

Hour	Forecast with Runway use Scenario 15		Forecast with Runway use Scenario 16		Forecast Without Any Measures Scenario 19		Forecast with Runway use Scenario 20	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	15	0	2	13	6.5	8.5	0	15
01:00-01:59	11	0	0	11	5.5	5.5	0	11
02:00-02:59	4	0	0	4	1.5	2.5	0	4
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	10	0	0	10	4.5	5.5	0	10
05:00-05:59	17	0	5	12	9	8	3	14
06:00-06:59	26	25	26	25	27.5	23.5	26	25
23:00-23:59	2	29	2	29	14.5	16.5	0	31

Hour	Forecast without any measures Scenario 21		Forecast with Runway use Scenario 24		Forecast with Runway use Scenario 25		Forecast with Runway use Scenario 26	
	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)	10R (South)	10L (North)
00:00-00:59	8.5	6.5	14	0	15	0	15	0
01:00-01:59	5.5	5.5	11	0	11	0	11	0
02:00-02:59	1.5	2.5	4	0	4	0	4	0
03:00-03:59	0	0	0	0	0	0	0	0
04:00-04:59	4.5	5.5	9	0	10	0	10	0
05:00-05:59	11	6	16	0	17	0	5	12
06:00-06:59	27.5	23.5	40	0	26	25	26	25
23:00-23:59	16.5	14.5	27	0	31	0	14	17

Flight Routes

Flight routes refer to the ground tracks followed by aircraft. In practice every aircraft follows a slightly different route, depending on the weather conditions and aircraft characteristics. For modelling purposes, it is typically considered sufficient to model each distinct route using what is known as a backbone track, as well as a number of sub-tracks either side of the backbone tracks to represent the variation in actual routes flown.

This approach is in accordance with EU Directive 2015/996 which states that "It is common practice to treat the data for a single route as a sample from a single population; i.e. to be represented by one backbone track and one set of dispersed subtracks."

This approach has the benefit of reducing the complexity of the noise model without significantly affecting its accuracy, as well as enabling the current and future operations to be modelled on the same basis.

Flight Roues – Current Situation

For the cross runway straight arrival routes have been used with a set of modelled departure routes for Category A & B and Category C & D aircraft, which have been developed based on the published SIDs.

For the main runway, based on an analysis of radar data in 2018, approaching aircraft are generally lined up with the extended centreline of the runway at least 17 km from the runway threshold. Consequently, the main runway approach routes have been modelled as straight out to this point. Before this point arrivals are modelled using 7 routes which cover the broad swathe of directions that the arriving aircraft approach from. Flights have been equally distributed between the 7 routes. The modelled current arrival routes are shown in pink on Figure A2.2.

For departures on the current main runway (10/28), that will be known as 10R/28L in the future, the current routes used vary with aircraft type and destination.

Category A & B aircraft, which are predominantly turboprops such as the ATR 72, are not required by the IAA to remain within the existing environmental corridors to the same extent as the larger jet aircraft types. They therefore commonly turn off the extended runway centreline to the north or south shortly after the end of the runway. A review of radar tracks for recent activity has resulted in a set of routes for these aircraft types shown in red on Figure A2.2.

Currently the airport has a total of 11 Standard Instrument Departure (SID) routes for westerly operations and 10 for easterly operations, although in both cases a number are initially the same until after they have left the study area. Given this similarity, for noise modelling purposes a set of seven initial departure routes have been created from the western end and four initial departure routes from the eastern end. Table A2.54 shows which route has been used to model each SID and gives the initial direction of the routes.

Table A2.54: Departure Routes Used to Model SIDs

SID	Modelled Route		Initial Direction
	Westerly Operations	Easterly Operations	
BAMLI	ROTEV	ROTEV	North
BEPAN	NEPOD	NEPOD	South
DEXEN	DEXEN	DEXEN	East
INKUR	INKUR	ROTEV	West
LIFFY	LIFFY	LIFFY	East
OLONO	NEPOD	NEPOD	South
PELIG[1]	PELIG	-	West
PESIT	NEPOD	NEPOD	South
NEVRI	ROTEV	ROTEV	North
ROTEV	ROTEV	ROTEV	North
SUROX	SUROX	ROTEV	North

[1] Westerly Operations Only

For Category C & D aircraft, which are jet engined aircraft, these routes have been supplemented for departures to the west by routes that turn earlier, although not as early as Category A & B aircraft routes. This assumption originally arose from a detailed review of 2010 radar data and has been confirmed as remaining appropriate by a review of recent radar data. These reviews found that many of the Category C & D on runway 28 actually performed their initial turn earlier than described by the SIDs. This is because after reaching an altitude of 3000 ft, they are vectored off by ATC. Two additional 'Early Turn' routes were therefore created for each route with initial turns to the north, south, or east, i.e. the ROTEV, NEPOD, LIFFY and DEXEN routes. Traffic has been distributed equally between the three turning points, i.e. the two early turns and the SID, for each route.

The modelled current Category C & D routes are shown in blue on Figure A2.2.

Flight Routes – North Runway Airport Layout

Due to the expected reduction in the use of the cross runway in the future, the areas exposed to the minimum noise levels of interest do not reach the point where aircraft turn off the extended runway centreline. Straight arrival and departure routes have therefore been used for the cross runway in the interests of reducing the complexity of the model.

Arrival routes for the existing South Runway have been modelled as the same as the current routes. Arrival routes have been created for the North Runway which replicate those for the South Runway. The modelled arrival routes based on the future North Runway airport layout are shown on Figures A2.3 and A2.4.

Once the North Runway is in use Category A & B aircraft will continue to turn off the extended runway centreline shortly after the end of the runway, however they will not be allowed to turn across the other runway, i.e. they cannot turn north off the south runway and vice versa. A new set of departure routes has therefore been developed for Category A & B aircraft. From the southern runway this replicates the current routes, but with no turns to the north. For the North Runway the routes have been designed to replicate the current routes as closely as possible but with no turns to the south as shown in Figures A2.3 and A2.4.

For Category C & D aircraft a number of the modelled routes have been used to represent more than one of the SIDs, so combining the traffic on some of the SIDs onto a single modelled route. The departure routes to the west are supplemented by early turn routes, similar to the current routes.

In order to achieve a safe minimum separation between departures and arrivals performing a go around and based on public consultation a subsequent detailed safety assessment by the Air Traffic Service Provider a course divergence of at least 30° is required. As the runways are parallel this necessitated an early turn by departures from the North Runway.

An analysis was undertaken to determine the best initial turn angles taking into account the resulting noise, and the local community was consulted on the options. The analysis concluded that that for departures to the west there were limited differences between the various turn angle options, but an initial turn of 15° or 30° to the north was favourable in terms of the overall numbers of sensitive receptors under the flight path. This was supplemented with a 75° initial turn for departures heading to the north or west off North Runway in westerly departures. For departures to the east an initial turn of 15° to the north was the most favourable option. The public consultation resulted in the 15°/75° divergence to the west off North Runway and 15° to the east going forward for further analysis.

The subsequent detailed airspace design indicated that 30° was required when departing off North Runway to the west in order to allow for safety requirements associated with potential missed approaches/ go arounds. The final set of divergence was therefore selected to be 30° and 75° to the west and 15° to the east. .

A set of departure routes from the North Runway was then developed that replicated the current routes as closely as possible, while allowing for these initial turns. The result is routes with an early turn to the north. When heading east all of the routes turn 15° at 1.06nm from the end of the runway. When heading to the west the routes to DEXEN, INKUR, NEPOD, PELIG and SUROX turn 30°, while those to ABBEY and ROTEV turn 75°, all at 1.18nm from the end of the runway.

The departures on the South Runway continue along the extended runway centreline before turning.

The modelled current Category C & D routes are shown in blue on Figures A2.3 and A2.4.

This approach is in accordance with EU Directive 2015/996 which states that “In many cases is not possible to model flight paths on the basis of radar data — because the necessary resources are not available or because the scenario is a future one for which there are no relevant radar data. In the absence of radar data, or when its use is inappropriate, it is necessary to estimate the flight paths on the basis of operational guidance material”.

Dispersion

Aircraft on departure are allocated a route to follow. In practice, this route is not followed precisely by all aircraft allocated to this route. The actual pattern of departing aircraft is dispersed about the route’s centreline. The degree of dispersion is normally a function of the distance travelled by an aircraft along the route after take-off and also on the form of the route.

When considering many departures, it is commonly found that the spread of aircraft approximates to a "normal distribution" pattern, the shape or spread of which will vary with distance along the route. A simplified mathematical model can be adopted to represent a normal distribution of events, based on standard deviations. EU Directive 2015/996 advises the use of seven "dispersed" tracks associated with each departure route, these comprise the Centreline of each route and the three Sub Tracks either side.

The allocation of movements to each track for this assessment was as follows:

- 28.2% of departures along the Centreline;
- 22.2% of departures along each of the two inner Sub Tracks either side of the Centreline and offset by a distance of 0.71 standard deviation;
- 10.6% of departures along each of the 2nd pair of Sub Tracks either side of the Centreline and offset by a distance of 1.43 standard deviation;
- 3.1% of departures along each of the two outer Sub Tracks either side of the Centreline and offset by a distance of 2.14 standard deviations.

This dispersion model has been applied with a departure offset profile, which comprises the standard deviations of the magnitude of the dispersion for lengths of straight and curved track. These have been determined from a detailed analysis of radar tracks for operations in 2016 at Dublin. Operations in 2018 have been reviewed and found to follow a similar distribution.

Route Usage

The actual aircraft movement logs for years that have already occurred provide destination airports for each departure movement. This has been combined with an assessment that has been carried out of which departure route is used for each destination which utilise the direction it is from Dublin.

The forecasts for future years generally include departure route information for each movement, which has been used. Where departure route information is not available, a departure route has been assigned based on the destination airport.

Flight Profiles

Arrival Profiles

The standard arrival profiles for many of the aircraft in the AEDT database include level sections. An analysis of radar data found these do not occur at Dublin, therefore 3 degree continuous descent approach profiles have been created and used for all aircraft types.

Departure Profiles

For the most common aircraft, based on confidential information provided by airlines, custom "USER" profiles have been created that more closely replicate the procedures used by aircraft departing from Dublin Airport. These profiles broadly replicate NADP2 procedures with a lower initial thrust than maximum on takeoff.

The AEDT departure profiles for many of the aircraft in the AEDT database finish at 10,000 ft. To allow predictions over the whole of the study area these profiles have been extended to 30,000 ft or for certain aircraft the maximum altitude AEDT calculates to be achievable for the particular aircraft type. These user-defined profiles have been denoted "30KFT".

This approach is in line with EU Directive 2015/996 which advises that "Caution must be exercised before adopting default procedural steps provided in the ANP database (customarily assumed when actual procedures are not known). These are standardised procedures that are widely followed but which may or may not be used by operators in particular cases".

Stage Lengths

For departure movements the AEDT software offers a number of flight profiles for most aircraft types, and in particular for the larger aircraft types. These relate to different departure weights which are greatly affected by the length of the flight, and consequently the fuel load. In the AEDT software this is referred to as the stage length and is in increments of 500 nm up to 1,500 nm and then in increments of 1,000 nm. The AEDT software assumes all aircraft take off with a full passenger load irrespective of stage length. As the stage length increases the aircraft has to depart with greater fuel and so its flight profile is slightly lower than when a shorter stage length is flown.

For some of the aircraft types, in particular the smaller aircraft, only one stage length is available in the AEDT software. For the remainder a stage length was chosen based on the distance to the destination airport.

This approach complies with EU Directive 2015/996 which states that "Vertical dispersion is usually represented satisfactorily by accounting for the effects of varying aircraft weights on the vertical profiles."

AEDT Validation

Results from the Dublin Airport Noise and Track Keeping (NTK) system have been used for noise validation purposes. Specifically, the results from Noise Monitoring Terminals (NMTs) 1, 2 and 20 between January and December 2018 have been used.

The noise levels from the monitors are automatically correlated with aircraft movements using the radar track keeping system and the average determined by aircraft type and operation. A number of parameters are measured by the system, for this validation the Sound Exposure Level (SEL) of the individual aircraft movements has been used.

To take into account the measured levels the AEDT software has been used to predict the level at the NMT locations using the recommended AEDT aircraft type. This has been compared to the measured averages for the aircraft types when separately arriving and departing. Where the differences between the measured and predicted results were found to be significant then adjustments were made to the modelling to minimise differences. This was done by adjusting the AEDT NPD data for the modelled aircraft types so that the movement-weighted average modelled noise levels at the NMTs matched the measured level noise level.

Seventeen aircraft have had modifications made to their arrival and departure noise assumptions. The modifications are detailed in Table A2.55 below.

Table A2.55: Modifications to AEDT Default Assumptions

Aircraft Type	Arrivals		Departures		
	AEDT Type	Adjustment (dB)	AEDT Type	Profile	Adjustment (dB)
A306	A300-622R	-3.1	A300-622R	30KFT	+0.6
A319	A319-131	-1.4	A319-131	30KFT	+0.9
A320	A320-211	-0.7	A320-211	USER	-1.3
A320neo	A320-211	-2.0	A320-211	USER	-3.2
A321	A321-232	-0.4	A321-232	USER	-0.5
A332	A330-301	-1.3	A330-301	30KFT	-1.1
A333	A330-301	-1.1	A330-301	30KFT	-0.8
ATR72	SD330	+1.5	SD330	30KFT [2]	+0.1[3]
B734	737400	+0.4	737400	30KFT	-0.1
B738	737800	-2.7	737800	USER	-1.2
B738MAX	7878max	-3.0	7378max	USER	-1.5
B752	757RR	-0.4	757RR	30KFT	-2.3
B772	777200	+0.2	777200	30KFT	+1.5
B773	777300	-0.8	777300	30KFT	-2.4
B787	7878R	-0.3	7878R	30KFT	+0.1
E190	EMB190	-0.8	EMB190	30KFT	+0.5
RJ85	BAE146	-3.3	BAE146	30KFT [2]	-1.6
DH4[1]	SD330	0	DHC6	30KFT [2]	0

[1] The DH4 type was not validated due to insufficient results. The modelled AEDT types are based on BAP's experience of this aircraft at other airports where it operates more frequently, as the default AEDT suggested type of DHC830 typically leads to significant under-prediction of noise levels.

[2] Maximum altitude limited to AEDT calculated max for the AEDT type.

[3] This aircraft does not routinely depart over NMT20 as it turns before reaching it, validation has therefore been based solely on measured results from NMTs 1 & 2.

These modifications achieve a better correlation between predicted and measured noise at the airport, resulting in differences between predicted and measured levels of less than 1 dB at each of the three NMTs. The exception is the RJ85 which has a difference between modelled noise levels and measured noise levels at NMT20 of more than 2 dB. For this aircraft NMT20 correlates fewer departures than NMT2. It is possible that NMT20 is only recording the loudest departures by this aircraft, resulting in an average measured level that is not representative.

This is in line with EU Directive 2015/996, which requires that "All input values affecting the emission level of a source, including the position of the source, shall be determined with at least the accuracy corresponding to an uncertainty of ± 2dB(A) in the emission level of the source".

Performance of Modernised Aircraft Types

The degree of expected improvement in noise levels for the recently introduced and future aircraft types in the forecasts which are not contained within the AEDT model are given below in Table A2.56 for arrivals and departures. The expected improvement in noise levels is based on a comparison with either the current generation aircraft that is being directly replaced, or the most similar aircraft type available in AEDT.

The expected changes in noise levels are based on the differences in average certification noise levels between the current and modernised aircraft types from the *EASA Approved Noise Levels database*[3] where available. For aircraft whose certification noise levels were not available the assumptions have been based on the assumptions used by the ERCD for the Airports Commission (2014)[4].

Table A2.56: Expected Change in Noise Levels between Current and Modernised Aircraft Types

Current Aircraft Type	*Modernised Aircraft Type*	*Expected Change in Noise Levels between Current and Modernised Aircraft Types (dB)*	
		Arrival	*Departure*
737700	Bombardier CS300	-3.4	-4.3
Airbus A321	Airbus A321neo	-2.4	-5.4
Airbus A321	Airbus A321LR[1]	-2.4	-5.4
Airbus A330-300	Airbus A330-900neo	-1.1	-4.8
Airbus A330-300	Airbus A350-900	-3.0	-7.5
Boeing 777-300	Boeing 777X[2]	-0.8	-3.8
Embraer E190	Embraer E190-E2	-1.9	-6.2

[1] Based on A321neo certification noise levels
[2] Based on ERCD assumptions

[3] https://www.easa.europa.eu/easa-and-you/environment/easa-certification-noise-levels
[4] https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/389579/noise_methodology_addendum.pdf

A2.2 DETAILED POPULATION AND DEMOGRAPHICS ASSESSMENT METHODOLOGY

Dwelling data has been acquired from GeoDirectory for 2019 Q2, which was the latest available dataset when the assessment work began.

An assessment of not yet built dwellings, which have already been granted planning permission, has been carried out. This has utilised information on permitted developments provided by Tom Phillips and Associates (TPA) which has been compared to the data from GeoDirectory, as a number of the developments are progressing on site. This resulted in a separate permitted dwellings database.

Population data has been estimated using the average dwelling occupancy by small area. This has been obtained for 2016 based on Census data from the Central Statistics Office[5]. It has then been determined into which of the small areas each of the dwellings falls, based upon which they have been assigned the average dwelling occupancy for the area. This approach is in line with that used for the last round of Noise Mapping.

An assessment of zoned land has also been undertaken. This identified a number of areas which are designated for residential use. Some of these already contain existing or permitted dwellings and so are included in those datasets. The remaining areas have been assumed to have future developments with an average density of 35 dwellings per hectare and 3 people per dwelling. The dwelling density is based on a recent planning history search for the various sites and relevant local area plans. 3 people per dwelling is a conservative estimate based on the 2016 Census data, which found an average occupancy of a little under 3 people per dwelling for the study area.

Each dwelling and community building has been included in the AEDT model as a receptor. A representative set of receptors has been created for each permitted development and zoned land area based on site plans and other publicly available information. Noise levels have been predicted at each of these receptor locations.

[5] http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/Define.asp?maintable=EP008

APPENDIX 3

NOISE CONTOUR PLOTS

A3.1 NOISE CONTOUR PLOTS

The following noise contour plots are included below:

Forecast Noise Contours - 2022

Figure 001 2022 Forecast Situation Scenario 01 - L_{den}
Figure 002 2022 Forecast Situation Scenario 01 - L_{night}
Figure 003 2022 Forecast Situation Scenario 01 - L_{day}
Figure 004 2022 Forecast Situation Scenario 01 - $L_{evening}$
Figure 005 2022 Forecast Situation Scenario 01 - $L_{Aeq,16h}$
Figure 006 2022 Forecast with Runway use Scenario 02 - L_{den}
Figure 007 2022 Forecast with Runway use Scenario 02 - L_{night}
Figure 008 2022 Forecast Situation Scenario 02 - L_{day}
Figure 009 2022 Forecast Situation Scenario 02 - $L_{evening}$
Figure 010 2022 Forecast Situation Scenario 02 - $L_{Aeq,16h}$
Figure 011 2022 Forecast with Runway use Scenario 03 - L_{den}
Figure 012 2022 Forecast with Runway use Scenario 03 - L_{night}
Figure 013 2022 2025 Forecast without any measures Scenario 06 - L_{den}
Figure 014 2022 2025 Forecast without any measures Scenario 06 - L_{night}
Figure 015 2022 Forecast with Runway use Scenario 07 - L_{den}
Figure 016 2022 Forecast with Runway use Scenario 07 - L_{night}
Figure 017 2022 Forecast with Runway use Scenario 08 - L_{den}
Figure 018 2022 Forecast with Runway use Scenario 08 - L_{night}
Figure 019 2022 Forecast with Runway use Scenario 11 - L_{den}
Figure 020 2022 Forecast with Runway use Scenario 11 - L_{night}
Figure 021 2022 Forecast Situation Scenario 11 - L_{day}
Figure 022 2022 Forecast Situation Scenario 11 - $L_{evening}$
Figure 023 2022 Forecast Situation Scenario 11 - $L_{Aeq,16h}$
Figure 024 2022 Forecast with Runway use Scenario 12 - L_{den}
Figure 025 2022 Forecast with Runway use Scenario 12 - L_{night}
Figure 026 2022 Forecast with Runway use Scenario 13 - L_{den}
Figure 027 2022 Forecast with Runway use Scenario 13 - L_{night}

Forecast Noise Contours - 2025

Figure 028 2025 Forecast Situation Scenario 01 - L_{den}
Figure 029 2025 Forecast Situation Scenario 01 - L_{night}
Figure 030 2025 Forecast Situation Scenario 01 - L_{day}
Figure 031 2025 Forecast Situation Scenario 01 - $L_{evening}$
Figure 032 2025 Forecast Situation Scenario 01 - $L_{Aeq,16h}$

Forecast Noise Contours - 2030

Forecast Noise Contours - 2035

Forecast Noise Contours - 2040