Annex B to CAP 1984. Newcastle GIRLI 1Y, GIRLI 1T and GIRLI 3X SIDs Track Analysis Review.

INTRODUCTION

1. Before reading this analysis of the data provided, it is recommended that readers first read the Newcastle Airport Consultation document and the Newcastle Airport Airspace Change Proposal (ACP) and CAP 1984, on the CAA website, which references this analysis.

2. To enable the CAA to conduct the PIR analysis, the change sponsor provided traffic pattern plots for a number of periods (2-week periods in February, May, August and November of the relevant years) before and after implementation. These periods are considered to provide a proportionate and satisfactory spread of data, given the intent of the review. The GIRLI 1Y and GIRLI 1T SIDs were implemented on 8 Jan 2015, the GIRLI 3X SID was implemented 27 Apr 2017.

3. The CAA's focus has been to analyse traffic patterns after implementation of the P-RNAV (RNAV1) SIDs to see if the implementation of the SID procedures, met the purpose and intent of the ACP, which was that '…*SIDs must replicate the tracks that departing aircraft fly now*'…and that as a result of aircraft flying a P-RNAV SID, that it would '…*mean that the spread of aircraft on departure will be reduced*'. Therefore, the intent in the design of the SIDs was to concentrate departures as close to the nominal centre line of the vectors used by ATC prior to the SIDs.

4. The dispersion plots (Traffic dispersion V2) show the total number of aircraft departing off either runway, with the overlays of the SID nominal tracks/swathes for the 2014 data. The nominal tracks/swathe overlays and totals as written on the slides have typo errors and have not been considered as relevant. The ACP's intent was to replicate the pre-SID departure tracks, therefore the concentration and dispersal of tracks from 2014, are considered as the baseline on which to draw a post implementation comparison. The dispersion plots post implementation includes nominal tracks/swathes. However, in order to consider the dispersion before the SIDs and following the implementation of the SIDs, Map 1 and Map 2 (both at Appendix A) will be used to show the main road junctions (labelled) defined as a guide for comparison against the same roads that can be seen on the presented Maps. This will offer a clearer and more defined means of comparison pre and post SID implementation, by breaking down each SID route into relevant and consistent segments.

5. The CAA considers that the sample of traffic patterns are consistent with the traffic patterns throughout the year, where seasonal variations with stronger winds and higher temperatures may result in some variations in certain phases of the departures procedure; for example, stronger winds from the west may result in aircraft, departing from RWY 25, to turn later after passing the first waypoint on the GIRLI 3X SID. Given the possibility for variations, the CAA has only considered the data as presented in order to reach a conclusion.

6. Whilst all data provided by Newcastle International Airport Limited (NIAL) for the PIR is available on the CAA Website , the following data samples have been used within this review and used to inform the conclusions:

(1) Track density/dispersion plots (v1,v2) – NIAL presented two versions of these slides; v2 was used as the baseline. The slides will be referred to by their dates and slide number for both the 2014 data and the 2017/18 data as each slide shows the total number of aircraft and not just those flying a SID.

(2) Aircraft track plots (v3 Track plots by aircraft type 2014, 2017/2018, updated traffic dispersion) show the 5 main types of RNAV1 equipped aircraft that departed from Newcastle over the corresponding periods, with SID nominal track swathes. NIAL submitted a v3 following requests for clarification from the CAA with regard to the earlier versions. Some of the earlier versions showed departures which were not flying the corresponding SID. The earlier versions can be used to show where these suitably equipped aircraft also route when not flying the SID, such as being vectored (Aircraft track plots v2). The v3 plots (2014, 2017/2018) will be used to make comparisons in order to show the 5 main types of RNAV1 equipped aircraft that departed from Newcastle over the corresponding periods performed following the introduction of the SIDs.

(3) Additional vertical track plots (GIRLI 3X). These plots have been used to show how quickly aircraft climb while using the GIRLI 3X SID. The additional vertical plots for the GIRLI 3X were requested in order to show that the vertical profile for this SID, has been flown correctly as it has a fly-over waypoint (FOWP), NTW02. The slides unfortunately had some typos (within powerpoint) and did not always correlate with the figures/dates presented in the v3 of the dispersion plots. Clarification was requested from NIAL and the CAA received a confirmation email that the data was correct but that some of the totals had been typed incorrectly on some of the vertical profile slides. However, the CAA has been able to conclude that the data shows that the 5 main aircraft types flying the GIRLI 3X, as presented, have all exceeded the requisite level constraint (+1100ft) by NTW02.

(4) The Traffic Figures Slides confirm the ACP's intent, which was not to increase traffic, '*Newcastle International Airport's Airspace Change Proposal for P-RNAV SIDs is not based on increased traffic forecasts, nor are traffic levels expected to increase as a direct result*' (ACP page 21). The slides show that aircraft movements have actually dropped from 2014-2018 by 9%. The Utilisation (v2) slides show that between 95-96% of suitably equipped departures utilise the SIDs.

(5) The FMS Explanation and Route Deviation Explanation slides have been provided by NIAL in order to offer explanations as to why an aircraft might not fly a SID in the same way every time. The CAA analysis does not offer explanations if it appears that an aircraft has not flown the SID as expected; the data is considered to offer an acceptable spread from which the CAA draws its conclusions.

(6) Other presentations including the Departure Route Update (NIA1), Route Deviation and Airline plots have been considered for contextual purposes but have not been considered relevant to the PIR track analysis, as they do not provide data that is relevant to addressing if the SIDs meet the intent of the ACP. The slides labelled 'Corrections and Clarification (July 2020)' were submitted by NIAL to explain some of the anomalies in the earlier presented slides.

ABBREVIATIONS/TERMINOLOGY

7. In this review, we refer to a number of technical aspects relating to the design of the arrival and departure procedures; to aid understanding, we have attempted to explain these terms in a non- technical manner and abbreviations:

amsl
Above mean sea level

AIP Chart
These are the published SID procedures in the UK Aeronautical Information Publication (AIP).

DER
Departure End of Runway. For aeroplanes the SID begins at the DER, which is the end of the area declared suitable for take-off.

FMS
Flight Management System

IFPs
Instrument Flight Procedures

Navaid
Navigation aid

NM
Nautical mile. Equivalent to 1.852 km.

NPR
A Noise Preferential Route (NPR) is a path for aircraft to take until they reach a specific release altitude. Once an aircraft reaches the NPR release altitude, Air Traffic Control (ATC) can instruct the aircraft to turn onto a more direct heading to its destination, this is called vectoring, which, may take the aircraft outside the NPR corridor (normally defined as a swathe for track keeping monitoring purposes). There may be occasions where it is necessary for safety reasons (e.g. to avoid severe weather conditions) for ATC to vector aircraft off NPRs below the release altitude.

The NPRs at Newcastle are not declared under a s106 agreement.

Track to Fix (TF)
A TF leg is defined as a geodesic path between two fixes (waypoints). It is the preferred leg type in RNAV Terminal Procedures that are not

using ground based navigational aid (navaid) references. The TF defines a great circle track over the ground between two known database fixes. The first fix is either the previous leg termination or an initial fix leg.

Track to Fix (TF) Leg

Area Navigation (RNAV) and (P-RNAV)

Area navigation is a method of navigation which permits aircraft operation on a desired flight path without constraints of ground-based navigation aids. Area navigation is an enabler for Performance-based navigation (PBN), which is defined as a type of area navigation (RNAV) in which the navigation performance requirements are prescribed in navigation specifications. The 'P' in P-RNAV stands for precision.

RNAV-1 (P-RNAV)
RNAV-1 is a navigation specification, which is defined as a set of aircraft and aircrew requirements needed to support PBN operations on the Newcastle SIDs. This navigation specification requires a minimum lateral track accuracy of +/- 1nm for 95% of the time.

Runway extended centreline
The runway extended centreline is an imaginary line that continues (extends) from the physical centreline of the runway

Standard Instrument Departure (SID)
A SID is as a designated instrument departure route linking an aerodrome, or a specified runway at an aerodrome, with a specified significant point, normally on a designated ATS route.

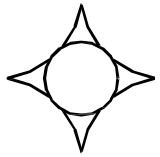
SID Nominal Track (NT)
The SID nominal track is the intended centreline track as shown on the procedure chart. The adherence to this published nominal track will vary in accordance with how the procedure has been designed and the speed at which it is flown, the type of waypoints used, and external factors effecting an aircraft's ground speed e.g. wind conditions.

Track Concentration
Is where the tracks over the ground are concentrated on predictable flight tracks. Concentration of tracks can allow for noise sensitive areas to be avoided but it is not always possible to avoid all sensitive areas.

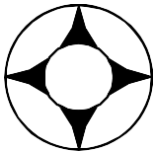
Track Dispersion
Is where the flight tracks over the ground of a procedure are varied due to the use of path terminator, differing aircraft types, standard operating procedures (SOPs) used by aircraft operators and wind conditions. Track dispersion typically spreads the noise over a wider area.

Vectoring
There may be occasions where it is necessary for ATC to vector aircraft off NPRs and onto a more direct heading. Typically, departures that are vectored by ATC tend to be dictated by the need to integrate Luton departures with other traffic.

WP Flyby (FBWP)
Waypoint flyby means that the aircraft will anticipate the turn before the waypoint to allow tangential interception of the next segment of the procedure. The faster the aircraft is travelling towards the FB WP, the further the aircraft will be from the FB WP before it commences the turn. Conversely, the slower the aircraft is travelling towards the FB WP, the closer the aircraft will be to the WP before it commences the turn (see below for chart symbol).



WP Flyover (FOWP)
Waypoint flyover means that the aircraft will fly over the position of the waypoint before turning to intercept the next segment of the procedure (see below for chart symbol).



GUIDE TO INTERPRETING TRACK DISPERSION AND DENSITY DIAGRAMS

8. Attached to this document (via Links to the CAA Website) are the track dispersion and density plots which have been provided by NIAL.

9. Where relevant, the track analysis review is described using references to locations shown on Map1 and Map2 in Appendix A, which the CAA consider to be the critical sections of the SID procedures.

Track Dispersion Diagrams

10. The track dispersion diagrams portray aircraft ground tracks on a map. Tracks are overlaid upon each other, such that if many tracks are overlaid on top of each other, individual tracks may no longer be visible. They are useful for illustrating the dispersion of the traffic pattern but are not always useful for determining the density of tracks.

Track Density Diagrams

11. Track density diagrams portray the density of flight tracks using a colour code to indicate differing densities of flight tracks. They are sometimes referred to as “heat plot” diagrams. Whilst they can be used to illustrate traffic dispersion, they are most useful for illustrating how traffic is concentrated along a route. The dispersion plots (labelled by NIAL) also show density and include every departure from Newcastle Airport during the requested periods.

GUIDE TO READING THE CAA REVIEW OF TRACK ANALYSIS

SID TRACK PLOTS

12. Tables 1-4 show the CAA's GIRLI 1T, GIRLI 1Y and GIRLI 3X SID Track Analysis Review. For each Table there is a plain English qualitative analysis of density/dispersion pre vs post implementation, and approximate altitudes for aircraft types using the SIDs post implementation. For analysis purposes, we have divided the track analysis into a number of segments; this is shown in Column 2 and is relevant to the westerly SIDs (1Y and 3X) and easterly for the 1T.

- **Column 1** shows the **CAA Web Link** to the relevant powerpoint presentation on the CAA Website.

- **Column 2** describes the relevant segments of the SIDs, with an approximate geographical description and/or location relative to the RNAV-1 waypoint. For the westerly SIDs the segments will be:

  A – DER to NTW02 (FOWP), **B** – NTW02 to 2nd segment marker on Map1, **C** – 2nd segment marker to a perpendicular line running east to west through NTS08 (NTS08 is described as the terminator for both SIDs during this analysis).

  For the GIRLI 1T the segments will be:

  X – DER to Intersection of A189, A190 and B1321, **Y** - Intersection of A189, A190 and B1321 to 2nd segment marker (2nm wide) on Map2, **Z** – 2nd segment marker to NTS12. (NTE05 is a fly-by waypoint so will be interpreted slightly differently by each aircraft)

- **Column 3** will identify the design path terminator used in the analysis for the segments and not the path terminator for the SID itself. (ie NITUD is relevant for GIRLI 3X)

- **Column 4** describes qualitatively, the traffic pattern before the change (i.e. traffic pattern while vectoring within the Nominal NPR). It also gives the number of aircraft (from the slide) and slide number in the presentation.

- **Column 5** is a qualitative description of the new RNAV-1 SID traffic pattern. It also gives the number of aircraft and the slide number in the presentation.

- **Column 6** is a qualitative comparison of the new RNAV-1 SID flown by the 5 types vs the pre-SID vectoring.

- **Column 7** indicates whether the expected track pattern has been achieved.

- **Column 8** indicates, based on the data presented, whether the departure procedure is being flown correctly by the aircraft as designed and whether the design is considered acceptable.

DEPARTURE PROCEDURES TRACK ANALYSIS

EXTRACTS FROM CONSULTATION DOCUMENT – DESCRIPTION OF TRAFFIC PATTERN BEFORE THE CHANGE AND EXPECTED TRAFFIC PATTERN ONCE RNAV-1 SIDs ARE INTRODUCED

JANUARY 2014 STAKEHOLDER CONSULTATION DOCUMENT PAGE 1:

'*Departure routes: When an aircraft departs from Newcastle it will follow one of a number of routes depending on which runway is in use and the aircraft's destination. The airport operates from one runway but using both directions. Runway 25 refers to westerly departures and runway 07 easterly departures, with runway 25 being the predominant choice due to typical weather conditions at Newcastle.*

At present Air Traffic Control (ATC) instruct pilots on routes in the form of a heading and altitude to fly to. We propose to introduce published P-RNAV Standard Instrument Departures (SIDs) and Omni-directional departures (Omnis) that will replicate the departure tracks that aircraft currently fly, but with greater accuracy.

All proposed P-RNAV SIDs and Omni-directional departures will be contained within the current operational routes, which are referred to as Noise Preferential Routes (NPRs), until reaching an altitude of 4000 feet. NPRs were set by Newcastle Airport and are intended to ensure departing aircraft avoid centres of population as far as possible. Once an aircraft has reached the top of the NPR it will continue to follow the SID/Omni until it joins an airway (in the case of a SID) or leaves controlled airspace (in the case of the Omni).'

It was pointed out, at the time, to NIAL that NPRs did not have an altitude ceiling (4000ft); however, this statement makes it clear that the SIDs were intended to replicate the departure profiles as flown in 2013-2014.

JANUARY 2014 STAKEHOLDER CONSULTATION DOCUMENT (Page 4) DESCRIPTION OF SIDs:

Route 1 (GIRLI 3X)

This is a P-RNAV SID departing from Runway 25 at Newcastle and routeing, as now, between the villages of Heddon-on-the-Wall and Throckley before joining the airway to the southwest. This route will be flown when the gliding site at Currock Hill is not active.

Route 2 (GIRLI 1Y)

This is a P-RNAV SID departing from Runway 25 at Newcastle and routeing, as now, between the villages of Heddon-on-the-Wall and Throckley and then avoiding the Currock Hill gliding site before joining the airway to the southwest. This route will be flown when the gliding site at Currock Hill is active.

Route 4 (GIRLI 1T)

This is a P-RNAV SID departing runway 07 at Newcastle and routeing, as now, straight ahead to a distance of 3.5 miles from the end of the runway before turning southwest to join the airway.

Table 1 – CAA Track Analysis of the Total Track Dispersion/Density Plots (Traffic dispersion v2) - Track Density Plots – all departures for Easterly departures an GIRLI 1T defined in segments X, Y and Z

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	Post implementation of new RNAV-1 SID, total traffic pattern (Col 5)	Comparison of the new RNAV-1 SID flown by the 5 types including the vertical profile vs the pre-implementation (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Notes: 1. The GIRLI 1T has been designed with a FBWP that means aircraft should turn before it; the aircrafts speed/wind will cause some variance in the turn. 2. Prior to the implementation of the SIDs controllers would have given vectors. 3. All nautical mile (nm) measurements are (+/- 5%) due to the graphic resolutions. 4. Totals on slides are not considered relevant.							
Dispersion v2	X		Slide 4: 3/2/14 – 17/2/14 Departures climb straight ahead forming a concentrated traffic pattern along the runway extended centreline. There is then rapid dispersion north of the extended runway centreline and slight dispersion to the south.	Slide 17: 5/2/18-18/2/18 The traffic pattern is now much more concentrated with dispersion commencing to the south (right turn) at approx. 0.6nm before the end of this segment. Other tracks maintaining an approx..0.5nm swathe.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	Post implementation of new RNAV-1 SID, total traffic pattern (Col 5)	Comparison of the new RNAV-1 SID flown by the 5 types including the vertical profile vs the pre-implementation (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Dispersion v2	Y		Slide 4: 3/2/14 – 17/2/14 The dispersion in the second segment can be described as chaotic with a approx. 2.7nm spread of traffic turning to the SW.	Slide 17: 5/2/18-18/2/18 The majority of tracks disperse up to approx. 0.7nm before re-concentrating into an approx. 0.3nm southerly swathe. There appear to be 3 vectored tracks to the south.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A
Dispersion v2	Z	NTS12	Slide 4: 3/2/14 – 17/2/14 The dispersion in the third segment can be described as chaotic with aircraft appearing to be vectored over a 90 degree arc.	Slide 17: 5/2/18-18/2/18 The majority of southerly traffic maintains concentration until the path terminator.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A
Dispersion v2	X		Slide 5: 5/5/14 – 18/5/14 The dispersion in this segment is minimal initially. There appears to be a few tracks that turn early to the south or south east. A very slight dispersion also occurs to the north.	Slide 14: 8/5/17 – 21/5/17 Much more concentrated With only a few tracks outside the swathe as presented.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	Post implementation of new RNAV-1 SID, total traffic pattern (Col 5)	Comparison of the new RNAV-1 SID flown by the 5 types including the vertical profile vs the pre-implementation (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Dispersion v2	Y		Slide 5: 5/5/14 – 18/5/14 The dispersion in this segment starts to widen with a clear loss of concentration along the nominal centreline.	Slide 14: 8/5/17 – 21/5/17 There is slightly less initial dispersion, and a clear concentration of traffic following the anticipated SID. The three clear branches indicate the SID and possible VFR traffic or vectoring.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A
Dispersion v2	Z	NTS12	Slide 5: 5/5/14 – 18/5/14 The dispersion in this segment starts to widen beyond approx. 5nm before spreading to a chaotic, approx. 90deg swathe to the south and south east. This indicates a possible mix VFR departures and vectoring.	Slide 14: 8/5/17 – 21/5/17 There is a continued concentration in this segment along the nominal centreline. There is a slight swathe to the north east and to the south east, which would indicate some vectoring and VFR departures.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	Post implementation of new RNAV-1 SID, total traffic pattern (Col 5)	Comparison of the new RNAV-1 SID vertical profile with the pre-implementation Conventional SID (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Dispersion v2	X		Slide 6: 4/8/14 – 18/5/14 The dispersion in this segment is minimal, with a few tracks turning south early.	Slide 15: 7/8/17 – 20/8/17 There is much greater concentration, with the exception of one track plot turning south early.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A
Dispersion v2	Y		Slide 6: 4/8/14 – 18/5/14 There is some concentration turning south east and some maintaining north east. There is also a less dense spread of tracks turning south.	Slide 15: 7/8/17 – 20/8/17 There is a greater concentration as expected, with only a very slight dispersion to the south. A small number of tracks head north east.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A
Dispersion v2	Z	NTS12	Slide 6: 4/8/14 – 18/5/14 There is dispersion over approximately 6nm from south west to south east.	Slide 15: 7/8/17 – 20/8/17 A greater concentration along the expected centreline of the SID track. There are some tracks dispersing out to the south east and west, but nothing significant.	N/A	Yes, it can be seen that there is greater density along what would be the anticipated SID track.	N/A

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID vertical profile with the pre-implementation Conventional SID (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Dispersion v2	X		Slide 7: 3/11/14 – 16/11/14 There is general concentration, and some slight dispersion to the north. A few tracks turn south very early.	Slide 16: 6/11/14 – 19/11/14 One departure; appears to be VFR.	N/A	Cannot draw a reasonable conclusion due to lack of data.	N/A
Dispersion v2	Y		Slide 7: 3/11/14 – 16/11/14 Any concentration ends in this segment, with traffic also dispersing to the north east.	Slide 16: 6/11/14 – 19/11/14 One departure; appears to be VFR.	N/A	Cannot draw a reasonable conclusion due to lack of data.	N/A
Dispersion v2	Z	NTS12	Slide 7: 3/11/14 – 16/11/14 There is significant dispersion over a wide area from the south east to the south west.	Slide 16: 6/11/14 – 19/11/14 One departure; appears to be VFR.	N/A	Cannot draw a reasonable conclusion due to lack of data.	N/A

Table 2 – CAA Track Analysis of the Total Track Dispersion/Density Plots (Traffic dispersion v2) - Track Density Plots – all Westerly departures for the GIRLI 3X and GIRLI 1Y defined in segments A, B and C

Notes:
1 – The dispersion figures/swathes are the same for both the presented sets of slides, as they show all departures off the westerly runway, so 2014 (pre GIRLI 1Y) will be compared to 2017/2018 for both the westerly SIDs. The Dispersion diagrams for both GIRLI 3X and GIRLI 1Y are the same, despite the typo total errors on the slides; it is the concentration and dispersion that are being compared.
2 – The controllers would have endeavoured to vector aircraft between Throckley (THRY) and Heddon-on-the-Wall (HOTW) prior to the SIDs.
3 - All nautical mile (nm) measurements are (+/- 5%) due to graphics resolution.
4 - Totals on slides are accepted to be inaccurate and not considered relevant

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	**Segment / Stage / Phase of SID & Waypoint** (Col 2)	**Path Terminator Employed** (Col 3)	**Pre-implementation Traffic pattern** (Col 4)	**New RNAV-1 SID traffic pattern** (Col 5)	**Comparison of the new RNAV-1 SID vertical profile with the pre-implementation Conventional SID** (Col 6)	**Expected traffic pattern achieved?** (Col 7)	**SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable?** (Col 8)
Dispersion v2	A		**Slide 9: 3/2/14 – 16/12/14** There is significant concentration initially, but this begins to peak slightly south of the nominal centreline at the end of the segment.	**Slide 22/27: 5/2/18 – 18/2/18** Much greater concentration and high density in this segment, with very slight dispersion to the south; the southerly dispersion is low density.	N/A	Yes, it appears that there is greater density in this segment.	N/A
Dispersion v2	B		**Slide 9: 3/2/14 – 16/12/14** Concentration remains generally tight and as such most of the traffic routes between THTY and HOTW. The general dispersion is approx. 2nm, with low density at the edges. Overall density is low.	**Slide 22/27: 5/2/18 – 18/2/18** The greatest concentration makes the NTW02 and as such the density and concentration remains high between THRY and HOTW. Slight exceptions are slight dispersion approx. 2nm west 0.5nm to the east, low density in these areas.	N/A	Yes, there is slight dispersion after the NTW02, however, the greatest density is between THRY and HOTW.	N/A

Dispersion v2	C	NTS08	**Slide 9: 3/2/14 – 16/12/14** The concentration reduces significantly, with most traffic heading south west as expected. There is more of a chaotic spread to the south east, with an approx. 8nm spread to the south in general. Low density.	**Slide 22/27: 5/2/18 – 18/2/18** The concentration and high density in this segment, is along the anticipated GIRLI 3X route. The majority of the dispersion heads out to the south east but the density is low. Some tracks appear to follow the GIRLI 1Y route as there is a concentration as expected.	N/A	Yes, aircraft appear to be most dense along the anticipated SID routes.	N/A

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID vertical profile with the pre-implementation Conventional SID (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Dispersion v2	A		Slide 10: 5/5/14 – 18/5/14 There is significant concentration and high density, but slightly to the south of the nominal centreline. Dispersion is slightly to the south but lower density.	Slide 19/24: 8/5/17 – 21/5/17 There is significant concentration and density along the nominal centreline to the NTW02, slight low-density dispersion to the south. One anomalous track turns south very early.	N/A	Yes, it would appear that aircraft are most dense along the anticipated SID route.	N/A
Dispersion v2	B		Slide 10: 5/5/14 – 18/5/14 Concentration and density remain greatest between THRY and HOTW. Some dispersion begins to the south, turning over THRY, but is lower density. The swathe opens up to approx. 3nm.	Slide 19/24: 8/5/17 – 21/5/17 The concentration opens slightly (approx. 1nm), but density remains high until just before then end of this segment. Some traffic turns south, possibly on the GIRLY 1Y. Much lower density concentrations to the west and south east over THRY.	N/A	Yes, there is some anticipated dispersion once aircraft pass the NTW02, but then there is high density between THRY and HOTW.	N/A
Dispersion v2	C	NTS08	Slide 10: 5/5/14 – 18/5/14 The concentration is greatest along the anticipated route to GIRLI. There is a wide but low density swathe to the south east, with some low density concentration directly south.	Slide 19/24: 8/5/17 – 21/5/17 Greatest concentration, as expected along the anticipated GIRLI 3X route. Some dispersion to form a new concentration along the anticipated GIRLI 1Y. Very low density dispersion, predominantly south east.	N/A	Yes, it would appear that aircraft are most dense along the anticipated SID route.	N/A

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID vertical profile with the pre-implementation Conventional SID (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Dispersion v2	A		Slide 11: 4/8/14 – 17/8/14 There is high density and concentration initially, but with some less dense spread to the south, and a possible anomalous track that turns very sharply to the south east. Overall, slightly south of the nominal centreline.	Slide 20/25: 7/8/17 – 20/8/17 Extreme concentration with very high density. Very slight spread of very low density up to approx. 0.3 nm north.	N/A	Yes. aircraft appear more concentrated with high density along the anticipated SID route.	N/A
Dispersion v2	B		Slide 11: 4/8/14 – 17/8/14 Concentration remains focused through THRY and HOTW with much less density spreading up to a mile either side of the centreline of the concentration.	Slide 20/25: 7/8/17 – 20/8/17 The concentration remains and density is high between THRY and HOTW, with the exception of a >11 density swathe passing slightly west and overhead HOTW. There is chaotic low density spread out to the south west and south east.	N/A	Yes, there is the expected slight dispersion following the NTW02. Aircraft appear to be following the anticipated SID routes with the highest density between THRY and HOTW.	N/A
Dispersion v2	C	NTS08	Slide 11: 4/8/14 – 17/8/14 The concentration widens and density declines along the anticipated route to GIRLI, with some much less dense spreading up to approx. 5nm south east.	Slide 20/25: 7/8/17 – 20/8/17 Greatest concentration and high density remains along the route to GIRLI, with a slightly higher density, but highly concentrated 'fork' that appears to follow the GIRLI 1Y as anticipated. Some low density, low concentration spread the south east.	N/A	Yes, there is convergence and greatest concentration/density as aircraft appear to fly the latter segment of the SIDs as anticipated.	N/A

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID vertical profile with the pre-implementation Conventional SID (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Dispersion v2	A		Slide 12: 3/11/14 - 16/11/14 There is dense concentration, but it is slightly to the south of the nominal runway centreline. There is less dense spread approx. 0.3nm either side of the main concentration.	Slide 21/26: 6/11/17 – 1911/17 Extreme concentration and density of traffic with low density spread very slightly to the south.	N/A	Yes, aircraft appear more concentrated with greater density.	N/A
Dispersion v2	B		Slide 12: 3/11/14 - 16/11/14 There is dense concentration, but it is slightly to the south of the nominal runway centreline, There is less dense spread approx. 0.3nm either side of the main concentration.	Slide 21/26: 6/11/17 – 1911/17 Concentration remains tight with the highest density between THRY and HOTW. The highest density is very slightly further west. Some low density spreads further west, that turn south.	N/A	Yes, there is the anticipated slight dispersion following the NTS02. The greatest density of aircraft follows the anticipated SID routes, between THRY and HOTW.	N/A
Dispersion v2	C	NTS08	Slide 12: 3/11/14 - 16/11/14 There is dense concentration, but it is slightly to the south of the nominal runway centreline, There is less dense spread approx. 0.3nm either side of the main concentration.	Slide 21/26: 6/11/17 – 1911/17 Concentration remains high on the route as anticipated to GIRLI, with a high concentration appearing to follow the GIRLI 1Y. There is a similar density spread that breaks south of THRY, but re-joins the main swathe further to the south.	N/A	Yes, the density and concentration appear to follow the anticipated SID routes.	N/A

Table 3 – Updated Track Dispersion Plot by aircraft type Comparison (V3, 5 main types) – Pre SID (2014) v GIRLI 1T (2017/2018)

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Comparison of 5 main types flying the GIRLI 1T between 2014 and 2017/2018. Notes: 1. The time periods will be compared per aircraft type, so all five main types will be considered per SID; the totals on the slides are considered as correct. **2.** All nautical mile (nm) measurements are (+/- 5%) due to the graphics. 3. A total of 264 aircraft flew the SID. .							
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	NTS12	3/2/14 – 17/2/14, Slide 44 (0 TRACKS), Airbus 319	5/2/18 – 19/2/18, Slide 47 (0 TRACKS), Airbus 319	Unable to carry out comparison.	N/A	N/A
2014 Track Plots 2017/2018 Track Plots	**X**		5/5/14 – 19/5/14, SLIDE 45 (10 TRACKS), Airbus 319 Concentration of aircraft, with one track exception.	8/5/17 – 22/5/17, Slide 44 (42 TRACKS), Airbus 319 Much greater concentration.	Arguably very similar.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Y**		5/5/14 – 19/5/14, SLIDE 45 (10 TRACKS), Airbus 319 Concentration of aircraft, with on track exception.	8/5/17 – 22/5/17, Slide 44 (42 TRACKS), Airbus 319 All aircraft flying in swathe as pre-SIDs and reaching >3001ft	Given the difference in aircraft numbers, the SID is being flown very closely to pre-SID vectoring.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	5/5/14 – 19/5/14, SLIDE 45 (10 TRACKS), Airbus 319 It can be seen that aircraft disperse rapidly.	8/5/17 – 22/5/17, Slide 44 (42 TRACKS), Airbus 319 All aircraft except one follow the SID centreline closely.	The SID concentrates traffic as anticipated.	Yes; all aircraft are still within tolerance.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X**		4/8/14 – 18/8/14, Slide 46 (21 TRACKS), Airbus 319 Very good concentration of aircraft.	7/8/17 – 21/8/17, Slide 45 (21 TRACKS), Airbus 319 Very good concentration of aircraft.	Arguably very similar; no discernible differences.	Yes	Yes and acceptable

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**Y**		4/8/14 – 18/8/14, Slide 46 (21 TRACKS), Airbus 319 Main swathe of aircraft are fairly concentrated in the turn with 3 exceptions going wide to the east.	7/8/17 – 21/8/17, Slide 45 (21 TRACKS), Airbus 319 Swathe of aircraft turn and widen in similar swathe to 2014; however, there is convergence and all reach >3001ft.	The SID re-concentrates the aircraft following the turn. There are no wider tracks like the pre-SID vectoring.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	4/8/14 – 18/8/14, Slide 46 (21 TRACKS), Airbus 319 There is a chaotic spread across the south and south west.	7/8/17 – 21/8/17, Slide 45 (21 TRACKS), Airbus 319 All aircraft converge on the SID route with the exception of one track.	The aircraft that fly the SID are much more concentrated than pre-SID.	Yes; one track turns south west slightly early but is still within tolerance.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	N/A	3/11/14 – 17/11/14, Slide 47 (7 TRACKS), Airbus 319	6/11/17 –20/11/17, Slide 46 (0 TRACKS), Airbus 319	Unable to compare due to 0 tracks in Nov 17.	N/A	N/A
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	N/A	3/2/14 – 17/2/14, Slide 48 (0 TRACKS), Airbus 320	5/2/18 – 19/2/18, Slide 51 (1 TRACK), Airbus 320 Aircraft flies the SID as expected.	Only 1 A320 flew in 2018 period so unable to compare.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X**		5/5/14 – 19/5/14, Slide 49 (6 TRACKS), Airbus 320 Very good concentration.	8/5/17 – 22/5/17, Slide 48 1T (24 TRACK), Airbus 320 Very good concentration, as expected.	Arguably very similar, no discernible difference.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**Y**		5/5/14 – 19/5/14, Slide 49 (6 TRACKS), Airbus 320 Aircraft are vectored as expected, with some dispersion.	8/5/17 – 22/5/17, Slide 48 1T (24 TRACK), Airbus 320 Some dispersion, but as expected in the turn. All aircraft reach >3001ft.	The dispersion is arguably very similar, however, there are more aircraft flying the SID so there is greater concentration in the turn.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	5/5/14 – 19/5/14, Slide 49 (6 TRACKS), Airbus 320 There is greater dispersion and some aircraft turner sooner to the south west.	8/5/17 – 22/5/17, Slide 48 1T (24 TRACK), Airbus 320 Slightly greater dispersion than expected with one track appearing to leave the SID before the path terminator.	Aircraft are much more concentrated along the SID, despite the dispersion.	Yes; still with in tolerances, except one track which appears to leave the SID early.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X**		4/8/14 – 18/8/14, Slide 50 (16 TRACKS), Airbus 320 Very slight dispersion from one track; generally concentrated.	7/8/17 – 21/8/17, Slide 49 (13 TRACKS), Airbus 320 Very good concentration.	Arguably very similar; however, aircraft flying the SID were less dispersed.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Y**		4/8/14 – 18/8/14, Slide 50 (16 TRACKS), Airbus 320 Generally vectored as expected with two anomalous wider tracks, one north, one south.	7/8/17 – 21/8/17, Slide 49 (13 TRACKS), Airbus 320 A fairly tight swathe with all aircraft reaching >3001ft.	Very similar with regard to the main swathes; aircraft flying the SID are slightly more concentrated than before.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	4/8/14 – 18/8/14, Slide 50 (16 TRACKS), Airbus 320 Much greater dispersion with the two anomalous tracks going wide; a chaotic spread to the south west.	7/8/17 – 21/8/17, Slide 49 (13 TRACKS), Airbus 320 Convergence and great concentration of aircraft.	The aircraft flying the SID are more concentrated than pre-SID.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre-implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	N/A	3/11/14 – 17/11/14, Slide 51 (10 TRACKS), Airbus 320	6/11/17 –20/11/17, Slide 50 (0 TRACKS), Airbus 320	Unable to compare due to 0 tracks in Nov 14 and 17.	N/A	N/A
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	N/A	3/2/14 – 17/2/14, Slide 52 (0 TRACKS), Boeing 737-800	5/2/18 – 19/2/18, Slide 55 (4 TRACKS), Boeing 737-800 All four aircraft fly each segment as expected all >3001ft in segment **Y**.	Unable to compare; however, those flying the SID in 2018 are flying as expected.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X**		5/5/14 – 19/5/14, Slide 53 (2 TRACKS), Boeing 737-800 Aircraft are concentrated as expected.	8/5/17 – 22/5/17, Slide 52 (61 TRACKS), Boeing 737-800 Good concentration as expected in this segment.	No discernible difference.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Y**		5/5/14 – 19/5/14, Slide 53 (2 TRACKS), Boeing 737-800 Aircraft fly as expected.	8/5/17 – 22/5/17, Slide 52 (61 TRACKS), Boeing 737-800 Generally acceptable dispersion in the turn; 2 tracks go approx. 0.5 nm wider than expected. All aircraft >3001ft in this segment.	The vast majority of the aircraft fly as anticipated and are similar to pre-SID; however, the two wider tracks do start to converge as the pre-SID aircraft did.	Yes; however, 2 tracks could have been tighter but were still within tolerance; the majority of aircraft flew as expected.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	5/5/14 – 19/5/14, Slide 53 (2 TRACKS), Boeing 737-800 Some dispersion in the turn but get back on track by the end of the segment.	8/5/17 – 22/5/17, Slide 52 (61 TRACKS), Boeing 737-800 There is some very slight dispersion to the east. The 2 tracks do converge before the end of the segment; 2 others disperse south west slightly early.	All but one aircraft have converged into the third segment as expected. There are 2 tracks that appear to turn south west early off the SID.	Yes; again the majority of the aircraft fly the SID as expected, with 2 tracks dispersing south west slightly early, but still within tolerance.	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic pattern (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**X**		4/8/14 – 18/8/14, Slide 54 (6 TRACKS), Boeing 737-800 Very concentrated.	7/8/17 – 21/8/17, Slide 53 (33 TRACKS), Boeing 737-800 Very concentrated.	No discernible difference.	Yes.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Y**		4/8/14 – 18/8/14, Slide 54 (6 TRACKS), Boeing 737-800 The aircraft disperse over approx. 1nm in this segment.	7/8/17 – 21/8/17, Slide 53 (33 TRACKS), Boeing 737-800 There is one track that turns sooner than expected. All other aircraft diverge as expected. All aircraft >3001ft.	Aircraft flying the SID diverge as expected in the turn, with the exception of one track. However, the overall concentration is better than pre-SID.	Yes; however, there is one track that is slightly out of tolerance in the turn.	Yes; however, there is one track that turns early. Design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	4/8/14 – 18/8/14, Slide 54 (6 TRACKS), Boeing 737-800 Continued dispersion over at least approx. 4nm.	7/8/17 – 21/8/17, Slide 53 (33 TRACKS), Boeing 737-800 Rapid convergence to a concentration along the expected SID route.	The single track that flew much tighter in segment Y converges as expected. All other tracks fly the expected SID route.	Yes.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	NTS12	3/11/14 – 17/11/14, Slide 55 (6 TRACKS), Boeing 737-800 Initially aircraft are vectored tightly, but then diverge up to approx. 1.5nm.	6/11/17 –20/11/17, Slide 54 (0 TRACKS), Boeing 737-800	Unable to compare as 0 tracks flew in 2017.	N/A	N/A
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	NTS12	3/2/14 – 17/2/14, Slide 56 (0 TRACKS), Boeing 737-300	5/2/18 – 19/2/18, Slide 59 (1 TRACK), Airbus 321 The aircraft flies the SID as expected across all three segments reaching >3001ft in segment Y.	Unable to compare due to 0 tracks on 2014; however, the aircraft that flew the SID tracked as expected.	Yes.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X**		5/5/14 – 19/5/14, Slide 57 (5 TRACKS), Boeing 737-300 Some slight dispersion to the north.	8/5/17 – 22/5/17, Slide 56 (15 TRACKS), Boeing 737-300 Generally good concentration with anticipated slight dispersion to the south.	Aircraft are flying the SID as expected, with good concentration along the route in this segment.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	Y		5/5/14 – 19/5/14, Slide 57 (5 TRACKS), Boeing 737-300 The aircraft disperse over approx. 1nm and do not converge.	8/5/17 – 22/5/17, Slide 56 (15 TRACKS), Boeing 737-300 The majority of tracks diverge (less than approx. 1nm) as expected and then converge. There are two tracks that go very wide. All aircraft >3001ft.	It is clear that those aircraft flying the SID correctly diverge and converge as expected in the turn. However, there are 2 clear track plots that go wider and similar to pre-SID vectoring.	The majority of aircraft fly the SID as expected in this segment. The 2 tracks that go wide are still within tolerance within this segment but do not fly as expected.	Yes. Despite the 2 track plots, the SID is still flown as designed, by the majority of aircraft in this segment. The design is acceptable.
2014 Track Plots 2017/2018 Track Plots	Z	NTS12	5/5/14 – 19/5/14, Slide 57 (5 TRACKS), Boeing 737-300 The aircraft tracks spread out and do not converge.	8/5/17 – 22/5/17, Slide 56 (15 TRACKS), Boeing 737-300 The tracks converge tightly to concentrate along the SID route. Some cross or turn to the south east early. One track is outside the expected swathe.	The majority of tracks fly this segment as expected and concentrate far greater than pre-SID. However, there appears to be 3 tracks that turn earlier to the south west at the end of the segment.	Yes, for the majority of aircraft. However, the track plot that goes wide to the east is not as expected and is not within tolerance.	Yes; However, one track is out of the accepted tolerance. The tracks that turn early to the south west are still acceptable given the height of the aircraft. The design is acceptable.
2014 Track Plots 2017/2018 Track Plots	X		4/8/14 – 18/8/14, Slide 58 (8 TRACKS), Boeing 737-300 Slight dispersion to the north can be seen.	7/8/17 – 21/8/17, Slide 57 (11 TRACKS), Boeing 737-300 Very concentrated in this segment, with expected slight dispersion south as expected.	Aircraft flying the SID are far more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	Y		4/8/14 – 18/8/14, Slide 58 (8 TRACKS), Boeing 737-300 Dispersion up to approx. 1nm to the east; no concentration.	7/8/17 – 21/8/17, Slide 57 (11 TRACKS), Boeing 737-300 Considerable concentration in this segment. All aircraft >3001ft.	Far greater concentration in this segment with all aircraft fly the SID as expected.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	Z	NTS12	4/8/14 – 18/8/14, Slide 58 (8 TRACKS), Boeing 737-300 Chaotic spread of tracks with no convergence.	7/8/17 – 21/8/17, Slide 57 (11 TRACKS), Boeing 737-300 All tracks converge with one exception that turns slightly early off this segment.	The majority of aircraft fly this segment as expected with greater convergence along the anticipated SID route.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	NTS12	3/11/14 – 17/11/14, Slide 59 (3 TRACKS), Boeing 737-300 Aircraft are vectored and disperse accordingly.	6/11/17 –20/11/17, Slide 58 (0 TRACKS), Boeing 737-300	Unable to compare as 0 tracks flew in 2017.	N/A	N/A
2014 Track Plots 2017/2018 Track Plots	**X**		3/2/14 – 17/2/14, Slide 60 (3 TRACKS), Dash 8 Delta All tracks are north of the rwy centreline.	5/2/18 – 19/2/18, Slide 63 (1 TRACK), Dash 8 Delta Very close to the SID route as expected.	Aircraft flies this segment as expected; much closer to the rwy centreline than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Y**		3/2/14 – 17/2/14, Slide 60 (3 TRACKS), Dash 8 Delta All tracks turn south very early in this segment resulting in them being further east.	5/2/18 – 19/2/18, Slide 63 (1 TRACK), Dash 8 Delta The aircraft turns as expected meeting the SID route as expected. The aircraft >3001ft in this segment.	The aircraft flies the SID as expected, going further to the west when compared to pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	3/2/14 – 17/2/14, Slide 60 (3 TRACKS), Dash 8 Delta The aircraft turn very quickly south east and fly much closer to Newcastle.	5/2/18 – 19/2/18, Slide 63 (1 TRACK), Dash 8 Delta The aircraft follows the SID route as expected.	The aircraft flies the SID as expected avoiding flying over Newcastle.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X**		5/5/14 – 19/5/14, Slide 61 (6 TRACKS), Dash 8 Delta Two tracks disperse to the north. The others concentrate along the centreline.	8/5/17 – 22/5/17, Slide 60 (26 TRACKS), Dash 8 Delta There is greater dispersion to the south than expected, but most concentration is as expected. One track is slightly further south than expected.	With the exception of one track, the majority of aircraft fly the SID as expected, resulting in no dispersion to the north.	Yes	Yes; despite some dispersion to the south the SID is flown within tolerance in this segment. Yes acceptable.
2014 Track Plots 2017/2018 Track Plots	**Y**		5/5/14 – 19/5/14, Slide 61 (6 TRACKS), Dash 8 Delta There is some concentration in this segment with the exception of one track which goes very wide.	8/5/17 – 22/5/17, Slide 60 (26 TRACKS), Dash 8 Delta There is slight dispersion in this segment with no convergence. The aircraft do fly the SID as expected. All aircraft >3001ft.	The aircraft flying the SID are more concentrated despite the dispersion and fly as expected.	Yes	Yes, there is some dispersion in the turn, but it is within tolerance. The design is acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	5/5/14 – 19/5/14, Slide 61 (6 TRACKS), Dash 8 Delta Some convergence in this segment, but some tracks turn south west early.	8/5/17 – 22/5/17, Slide 60 (26 TRACKS), Dash 8 Delta Convergence begins to occur in this segment resulting in the majority of tracks flying as expected. One track turns south west early.	The aircraft flying the SID generally fly as expected, resulting in concentration along the route when compared to pre-SID. One track turns south west early.	Yes	Yes, despite the one track that turns south west early the SID is still being flown as expected. The design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**X**		4/8/14 – 18/8/14, Slide 62 (6 TRACKS), Dash 8 Delta Some slight dispersion north and south of the centreline.	7/8/17 – 21/8/17, Slide 61 (11 TRACKS), Dash 8 Delta The majority of tracks slightly disperse to the south, with one track going further south than expected but still within tolerance.	The majority of aircraft fly the SID as expected, however, the dispersion to the south is slightly greater than expected but still compares favourably.	Yes, but there is one track that routes slightly further south than expected.	The SID is flown as expected by the majority of the aircraft. The design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**Y**		4/8/14 – 18/8/14, Slide 62 (6 TRACKS), Dash 8 Delta A rapid dispersion and tracks turning to the south west.	7/8/17 – 21/8/17, Slide 61 (11 TRACKS), Dash 8 Delta Acceptable concentration in this segment with aircraft flying as expected. All aircraft >3001ft.	The aircraft flying the SID are more concentrated and fly within the expected swathe.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**Z**	NTS12	4/8/14 – 18/8/14, Slide 62 (6 TRACKS), Dash 8 Delta All tracks continue south east and towards Newcastle.	7/8/17 – 21/8/17, Slide 61 (11 TRACKS), Dash 8 Delta There is convergence with all tracks flying the segment of the SID as expected.	The aircraft on the SID converge much more than pre-SID along the route and do not turn early to GIRLI.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**X, Y and Z**	NTS12	3/11/14 – 17/11/14, Slide 63 (5 TRACKS), Dash 8 Delta	6/11/17 –20/11/17, Slide 62 (0 TRACKS), Dash 8 Delta	Unable to compare as 0 tracks flew in 2017.	N/A	N/A

Table 4 – Updated Track Dispersion Plot by aircraft type Comparison (V3, 5 main types) - Pre SID (August 2014) v GIRLI 1Y RNAV-1 SID (2017/2018)

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Comparison of vectoring in 2014 with RNAV-1 SID in May, Aug Nov 2017 and Feb 2018. Notes: 1. The time periods will be compared per aircraft type, so all five main types will be considered per SID; the totals on the slides are considered as correct. 2. All nautical mile (nm) measurements are (+/- 5%) due to the graphics. 3. The intent of this SID was for it to be used to avoid Currock Hill Gliding Site, when the site was active. 4. A total of 117 aircraft flew the SID.							
2014 Track Plots 2017/2018 Track Plots	**A, B and C**	NTS08	3/2/14 – 17/2/14, Slide 23 (0 TRACKS), Airbus 319 No tracks flew in this period.	5/2/18 – 19/2/18, Slide 26 (19 TRACKS), Airbus 319 All three segments are considered; excellent concentration and all aircraft are >3001ft in segment B.	N/A	Yes, the aircraft appear to concentrate along the SID route.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 24 (13 TRACKS), Airbus 319 Mostly concentrated along the centreline; some slight dispersion to the north.	8/5/17 – 22/5/17, Slide 23 (11 TRACKS), Airbus 319 Extremely concentrated in this segment.	The tracks on the SID are far more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 24 (13 TRACKS), Airbus 319 Aircraft turn south early and disperse up to approx. 0.5nm. Routing over THRY; do not >3001ft. One anomalous track.	8/5/17 – 22/5/17, Slide 23 (11 TRACKS), Airbus 319 Extreme concentration and all tracks route between HOTW and THRY. All >3001ft in this segment.	The tracks remain concentrated and turn along the SID route as expected, when compared with the dispersion of vectoring. All tracks route between THRY and HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 24 (13 TRACKS), Airbus 319 The majority of tracks are vectored to NTS08 and remain slightly dispersed.	8/5/17 – 22/5/17, Slide 23 (11 TRACKS), Airbus 319 The concentration remains along the route with one track turning slight early to the south west. Aircraft climb as expected.	The tracks remain concentrated along the SID route, unlike the dispersion of vectoring.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 25 (4 TRACKS), Airbus 319 Good concentration along this segment.	7/8/17 – 21/8/17, Slide 24 (9 TRACKS), Airbus 319 Excellent concentration.	Aircraft flying the SID are more concentrated than the vectoring.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 25 (4 TRACKS), Airbus 319 All tracks turn early and disperse over THRY.	7/8/17 – 21/8/17, Slide 24 (9 TRACKS), Airbus 319 Concentration remains with tracks just reaching >3001ft at the end of this segment.	Aircraft are much more concentrated than vectoring and avoid THRY and HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 25 (4 TRACKS), Airbus 319 The dispersion continues, but still remains acceptable in terms of avoiding the gliding site.	7/8/17 – 21/8/17, Slide 24 (9 TRACKS), Airbus 319 Concentration remains along the SID route. Aircraft climb as expected.	The aircraft flying the SID are much more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 26 (2 TRACKS), Airbus 319 The tracks are concentrated, but one turns late.	6/11/17 –20/11/17, Slide 25 (6 TRACKS), Airbus 319 All tracks are concentrated and fly as expected.	No discernible difference in this segment.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 26 (2 TRACKS), Airbus 319 Both tracks are dispersed with one routing overhead THRY.	6/11/17 –20/11/17, Slide 25 (6 TRACKS), Airbus 319 Concentration is good in the turn with aircraft reaching >3001ft just after this segment.	The aircraft flying the SID are much more concentrated and all route between THRY and HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 26 (2 TRACKS), Airbus 319 Aircraft remain apart but do avoid the gliding site.	6/11/17 –20/11/17, Slide 25 (6 TRACKS), Airbus 319 Aircraft climb slightly slower, but still acceptable and remain concentrated along SID route.	The aircraft on the SID are concentrated and fly as expected.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A, B and C**	NTS08	3/2/14 – 17/2/14, Slide 27 (0 TRACKS), Airbus 320	5/2/18 – 19/2/18, Slide 30 (0 TRACKS), Airbus 320	N/A	N/A	N/A
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 28 (14 TRACKS), Airbus 320 Initial concentration with some tracks starting to turn south west early and disperse.	8/5/17 – 22/5/17, Slide 27 (4 TRACKS), Airbus 320 Good concentration.	Aircraft are much more concentrated while on the SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 28 (14 TRACKS), Airbus 320 All but one track disperses over THRY and head south.	8/5/17 – 22/5/17, Slide 27 (4 TRACKS), Airbus 320 Concentration remains tight but aircraft turn very slightly later and do not all make >3001ft.	The aircraft on the SID all avoid THRY and HOTW. Concentration is much greater. The slight delay in turning is still better than the vectoring as there is no dispersion.	Yes; despite the late turning of tracks all aircraft are within tolerance.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 28 (14 TRACKS), Airbus 320 Dispersion continues to the south; however, aircraft still remain clear of the gliding site.	8/5/17 – 22/5/17, Slide 27 (4 TRACKS), Airbus 320 Concentration gets tighter as aircraft converge. Most aircraft climb well, with one exception <5000ft.	The aircraft on the SID are much more concentrated than those being vectored.	Yes; there is a slow climber, but the aircraft fly the segment within tolerance.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 29 (8 TRACKS), Airbus 320 Generally good concentration with some slight early turning to the south west.	7/8/17 – 21/8/17, Slide 28 (2 TRACKS), Airbus 320 Excellent concentration.	The aircraft on the SID are more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 29 (8 TRACKS), Airbus 320 Dispersion starts in this segment and with two clear swathes forming. Most aircraft route over THRY.	7/8/17 – 21/8/17, Slide 28 (2 TRACKS), Airbus 320 The aircraft turn slowly and although concentrated, get slightly closer to HOTW. They are <3000ft in this segment.	The aircraft on the SID are more concentrated but turn slightly later getting slightly closer to HOTW than the vectored aircraft.	Yes; despite being further to the west, the aircraft on the SID fly within tolerance.	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 29 (8 TRACKS), Airbus 320 There is no further dispersion, with some aircraft converging towards NTS08.	7/8/17 – 21/8/17, Slide 28 (2 TRACKS), Airbus 320 The two tracks remain concentrated and reach >5000ft just before NTS08.	The aircraft flying the SID are much more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 30 (2 TRACKS), Airbus 320 Only 2 tracks, good concentration.	6/11/17 –20/11/17, Slide 29 (3 TRACKS), Airbus 320 Good concentration.	No discernible difference.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 30 (2 TRACKS), Airbus 320 Concentration remains, but much earlier turn resulting in flight over THRY.	6/11/17 –20/11/17, Slide 29 (3 TRACKS), Airbus 320 Some slight dispersion in the turn, with all tracks turning slightly later.	Similar concentration, however, the aircraft on the SID turn later, avoid THRY and get closer to HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 30 (2 TRACKS), Airbus 320 Concentration remains with aircraft routing south and avoiding the gliding site.	6/11/17 –20/11/17, Slide 29 (3 TRACKS), Airbus 320 Convergence occurs with all but one aircraft >4000ft in this segment.	The aircraft on the SID are converging along the SID route and as such are further west initially.	Yes	Yes; however, one aircraft appears to be below 4000ft by NTS 08. The design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**A, B and C**	NTS08	3/2/14 – 17/2/14, Slide 31 (0 TRACKS), Boeing 737-800 N/A	5/2/18 – 19/2/18, Slide 34 (5 TRACKS), Boeing 737-800 There is good concentration initially. However, one track turns slightly early leading to dispersion. This track does not converge on the SID route.	Unable to make a comparison.	One aircraft does not fly the SID as expected. It still routes between THRY and HOTW but does not converge towards NTS 08. However, all the aircraft are still within the accepted tolerances.	Most of the aircraft fly as expected; the other aircraft is still within acceptable tolerances, but it does not fly the SID as expected. SID design is acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 32 (7 TRACKS), Boeing 737-800 Initial concentration leads to early dispersion to the south.	8/5/17 – 22/5/17, Slide 31 (17 TRACKS), Boeing 737-800 Excellent concentration along centreline.	The aircraft flying the SID are more concentrated, and they do not turn south early.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 32 (7 TRACKS), Boeing 737-800 Dispersion occurs up to approx. 1nm with aircraft routing over THRY.	8/5/17 – 22/5/17, Slide 31 (17 TRACKS), Boeing 737-800 Good concentration with most tracks reaching >3000ft. All tracks between THRY and HOTW.	The aircraft flying the SID are much more concentrate but do turner closer to HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 32 (7 TRACKS), Boeing 737-800 Dispersion remains to NTS08.	8/5/17 – 22/5/17, Slide 31 (17 TRACKS), Boeing 737-800 One track disperses further west but does converge in this segment. All other aircraft maintain concentration.	The aircraft flying the SID are far more concentrated. Despite one track getting close to HOTW, the track does return to the SID route.	Yes, the aircraft are still within acceptable tolerances.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 33 (3 TRACKS), Boeing 737-800 Initially good concentration, however, the aircraft start to turn south in this segment.	7/8/17 – 21/8/17, Slide 32 (11 TRACKS), Boeing 737-800 Excellent concentration in this segment.	The aircraft flying the SID are concentrated along the centreline and do not turn in this segment.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 33 (3 TRACKS), Boeing 737-800 Two of the tracks turn over THRY in this segment with some slight dispersion.	7/8/17 – 21/8/17, Slide 32 (11 TRACKS), Boeing 737-800 There is good concentration on the turn; all aircraft are between HOTW and THRY.	The aircraft on the SID are far more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 33 (3 TRACKS), Boeing 737-800 The aircraft remain dispersed, but do not disperse any further.	7/8/17 – 21/8/17, Slide 32 (11 TRACKS), Boeing 737-800 Concentration remains good, with all aircraft reaching >5000ft.	The aircraft on the SID are much more concentrated and climb quicker.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 34 (2 TRACKS), Boeing 737-800 Only 2 aircraft, one turns slightly early, the other flies the segment similar to the SID.	6/11/17 –20/11/17, Slide 33 (6 TRACKS), Boeing 737-800 Excellent concentration.	The aircraft on the SID are more concentrated and do not turn early.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 34 (2 TRACKS), Boeing 737-800 One aircraft routes over THRY the other turns south.	6/11/17 –20/11/17, Slide 33 (6 TRACKS), Boeing 737-800 All aircraft turn between HOTW and THRY. Concentration remains.	The aircraft on the SID are more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 34 (2 TRACKS), Boeing 737-800 The two aircraft do begin to converge towards NTS08.	6/11/17 –20/11/17, Slide 33 (6 TRACKS), Boeing 737-800 Convergence occurs in this segment before slight divergence at the end. All are >5000ft.	The aircraft on the SID converge and diverge at the end of the segment towards GIRLI. They all climb quicker than pre-SID tracks.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A, B and C**	NTS08	3/2/14 – 17/2/14, Slide 35 (0 TRACKS), Boeing 737-300	5/2/18 – 19/2/18, Slide 38 (3 TRACKS), Airbus 321 The three aircraft flying the SID are concentrated along the route and climb as expected.	N/A	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 36 (5 TRACKS), Boeing 737-300 Good concentration initially one track turns south west at the end of this segment.	8/5/17 – 22/5/17, Slide 35 (2 TRACKS), Boeing 737-300 Both tracks are concentrated along centreline.	Aircraft on the SID do not turn as early, but initial concentration is the same.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 36 (5 TRACKS), Boeing 737-300 There is dispersion up to approx. 0.5nm; aircraft turn south over THRY.	8/5/17 – 22/5/17, Slide 35 (2 TRACKS), Boeing 737-300 Both tracks remain concentrated in the turn and reach >3000ft.	The two aircraft on the SID are far more concentrated and avoid THRY and HOTW.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 36 (5 TRACKS), Boeing 737-300 Dispersion remains but does not increase; aircraft avoid the gliding site.	8/5/17 – 22/5/17, Slide 35 (2 TRACKS), Boeing 737-300 Both aircraft remain concentrated and climb accordingly to NTS08.	The aircraft on the SID are concentrated along the route, there is no dispersion.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 37 (7 TRACKS), Boeing 737-300 Good concentration initially, some tracks start to turn south west at the end of this segment.	7/8/17 – 21/8/17, Slide 36 (4 TRACKS), Boeing 737-300 Very good concentration along centreline.	There is no discernible difference initially; the aircraft on the SID maintain the route in this segment.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 37 (7 TRACKS), Boeing 737-300 The tracks disperse up to approx. 0.5nm all over THRY.	7/8/17 – 21/8/17, Slide 36 (4 TRACKS), Boeing 737-300 The aircraft turn slightly late but remain concentrated and reach >3000ft. Route between THRY and HOTW.	The aircraft on the SID are far more concentrated and climb much quicker.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 37 (7 TRACKS), Boeing 737-300 The dispersion remains the same for most of the segment, with some convergence at the end.	7/8/17 – 21/8/17, Slide 36 (4 TRACKS), Boeing 737-300 There is very slight dispersion to the west, but convergence towards the end of the segment.	The aircraft on the SID are concentrated close to the SID route.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A, B and C**	NTS08	3/11/14 – 17/11/14, Slide 38 (0 TRACKS), Boeing 737-300	6/11/17 –20/11/17, GIRLI 1Y (3 TRACKS), Boeing 737-300 The three aircraft that fly the SID fly it very accurately all reaching >3000ft at or close to the end of segment B.	N/A	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A, B and C**	NTS08	3/2/14 – 17/2/14, Slide 39 (0 TRACKS), Dash 8 Delta	5/2/18 – 19/2/18, Slide 42 (4 TRACKS), Dash 8 Delta There are 3 aircraft that fly the SID as expected in all segments. 1 aircraft does not fly the SID as expected. All route between THRY and HOTW.	N/A	Three of the tracks show the aircraft flying the SID as expected with aircraft reaching >3000ft by the end of segment B into C. The track that does not fly the SID goes very wide to the west but still within acceptable tolerances.	All the aircraft fly the SID within acceptable tolerance. However, one aircraft does go much wider than expected. SID design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 40 (7 TRACKS), Dash 8 Delta There is some dispersion in this segment slightly north and south.	8/5/17 – 22/5/17, Slide 39 (5 TRACKS), Dash 8 Delta There is some dispersion in this segment, but it is slight.	The aircraft flying the SID are concentrated for longer then when vectored.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 40 (7 TRACKS), Dash 8 Delta The aircraft continue to disperse, up to approx. 0.5nm and head over THRY.	8/5/17 – 22/5/17, Slide 39 (5 TRACKS), Dash 8 Delta The aircraft remain concentrated but turn slightly later resulting in a slight westerly dispersion.	The aircraft on the SID are far more concentrated and still head between THRY and HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 40 (7 TRACKS), Dash 8 Delta The dispersion widens out to >1nm, with one track going west, before converging.	8/5/17 – 22/5/17, Slide 39 (5 TRACKS), Dash 8 Delta The slight dispersion ends as all tracks converge to NTS08. Aircraft are >3000ft early in this segment.	The aircraft on the SID are far more concentrated close to the expected route.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 41 (3 TRACKS), Dash 8 Delta The aircraft are reasonably concentrated with a slight turn south at the end of the segment.	7/8/17 – 21/8/17, Slide 40 (1 TRACK), Dash 8 Delta The aircraft flies the segment along the centreline of the SID route.	The aircraft on the SID does not turn south early in this segment.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 41 (3 TRACKS), Dash 8 Delta The aircraft disperse with one going wide to the west and two turning south over THRY.	7/8/17 – 21/8/17, Slide 40 (1 TRACK), Dash 8 Delta The aircraft turns slowly and is slightly closer to HOTW at the end of this segment; it is also >3000ft.	The aircraft flies the SID acceptably in this segment but does turn slightly later than expected, when compared to pre-SID.	Yes	Yes and acceptable

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 41 (3 TRACKS), Dash 8 Delta Two of the aircraft remain concentrated to NTS08, the other remains slightly wide.	7/8/17 – 21/8/17, Slide 40 (1 TRACK), Dash 8 Delta The aircraft remains close to the SID route.	The aircraft on the SID flies it as expected, with very slight dispersion to the west.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 42 (4 TRACKS), Dash 8 Delta Some slight dispersion north and south in this segment.	6/11/17 –20/11/17, Slide 41 (2 TRACKS), Dash 8 Delta There is reasonable concertation between the 2 aircraft in this segment.	The aircraft on the SID are concentrated as expected.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 42 (4 TRACKS), Dash 8 Delta Some dispersion occurs, with aircraft splitting south and south west.	6/11/17 –20/11/17, Slide 41 (2 TRACKS), Dash 8 Delta The aircraft turn as expected and route between THRY and HOTW. They are >3000ft.	The aircraft on the SID are concentrated and turn as expected, slightly further to the west than pre-SID.	Yes	Yes and acceptable
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 42 (4 TRACKS), Dash 8 Delta All tracks remain dispersed but turn/route to NTS08.	6/11/17 –20/11/17, Slide 41 (2 TRACKS), Dash 8 Delta The 2 aircraft are slightly off the route in this segment but still fly it as expected.	The aircraft on the SID are far more concentrated closer to the route.	Yes	Yes and acceptable.

Table 5 – Updated Track Dispersion Plot by aircraft type Comparison (V3, 5 main types) - Pre SID (August 2014) v GIRLI 3X RNAV-1 SID (2017/2018)

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
Comparison of vectoring in 2014 with RNAV-1 SID in May, Aug Nov 2017 and Feb 2018. Notes: 1. The time periods will be compared per aircraft type, so all five main types will be considered per SID; the totals on the slides are considered as correct. 2. All nautical mile (nm) measurements are (+/- 5%) due to the graphics. 3. A total of 1218 aircraft flew the SID.							
2014 Track Plots 2017/2018 Track Plots	**A**		3/2/14 – 17/2/14, Slide 2 (14 TRACKS), Airbus 319 Good concentration with some dispersion to the south.	5/2/18 – 19/2/18, Slide 5 (107 TRACKS), Airbus 319 Good concentration with slight dispersion to the north.	Aircraft flying the SID are more concentrated to the north of the centreline.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/2/14 – 17/2/14, Slide 2 (14 TRACKS), Airbus 319 There is some slight dispersion, but the aircraft do route between THRY and HOTW.	5/2/18 – 19/2/18, Slide 5 (107 TRACKS), Airbus 319 The concentration remains until the turn is complete when dispersion occurs with aircraft closer to HOTW. Approx.50% of aircraft >3000ft in this segment.	There is slight dispersion from aircraft flying the SID and the swathe is slightly further west however, it is concentrated and still routes all tracks between HOTW and THRY.	Yes; NTW02 is a flyover WP (FOWP), so aircraft will disperse slightly in the turn; they are all within the acceptable tolerance.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/2/14 – 17/2/14, Slide 2 (14 TRACKS), Airbus 319 The aircraft continue to disperse in this segment to >1nm but in the correct direction.	5/2/18 – 19/2/18, Slide 5 (107 TRACKS), Airbus 319 The aircraft start to converge in this segment and fly closer to the route centreline.	The aircraft on the SID are much more concentrated than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 3 (75 TRACKS), Airbus 319 Some slight dispersion north and south in this segment but still well concentrated.	8/5/17 – 22/5/17, Slide 2 (60 TRACKS), Airbus 319 There is good concentration in this segment.	The aircraft flying the SID are more concentrated than pre-SID.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	B		5/5/14 – 19/5/14, Slide 3 (75 TRACKS), Airbus 319 There is rapid dispersion out to approx. 1.3nm, the majority of tracks route between THRY and HOTW, but some go over HOTW.	8/5/17 – 22/5/17, Slide 2 (60 TRACKS), Airbus 319 There is very slight dispersion in the turn, but concentration remains between THRY and HOTW. Approx. 50% >3000ft in this segment.	The aircraft flying the SID are far more concentrated and climb quicker than pre-SID, but still route between THRY and HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	C	NTS08	5/5/14 – 19/5/14, Slide 3 (75 TRACKS), Airbus 319 The dispersion continues in this segment out to approx. 2nm. All aircraft track south west.	8/5/17 – 22/5/17, Slide 2 (60 TRACKS), Airbus 319 All aircraft converge and then start to diverge at the end of the segment. All aircraft >5000ft by the end.	The aircraft flying the SID are far more concentrated than pre-SID.	Yes the dispersion to the west is as a result of the FOWP; the aircraft converge except for one track that goes slightly east before turning back west.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	A		4/8/14 – 18/8/14, Slide 4 (81 TRACKS), Airbus 319 Slightly greater dispersion to the south in this segment, but still well concentrated.	7/8/17 – 21/8/17, Slide 3 (87 TRACKS), Airbus 319 Excellent concentration in this segment.	The aircraft flying the SID are far more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	B		4/8/14 – 18/8/14, Slide 4 (81 TRACKS), Airbus 319 There is dispersion out to approx.1nm; most aircraft route between THRY and HOTW. A few aircraft route over HOTW.	7/8/17 – 21/8/17, Slide 3 (87 TRACKS), Airbus 319 There is slight dispersion in the turn but concentration remains between THRY and HOTW. Approx. 50% >3000ft in this segment.	The aircraft flying the SID are more concentrated and climb quicker, but still route between THRY and HOTW.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	C	NTS08	4/8/14 – 18/8/14, Slide 4 (81 TRACKS), Airbus 319 The dispersion continues to the south west out to approx. 2.5nm.	7/8/17 – 21/8/17, Slide 3 (87 TRACKS), Airbus 319 The aircraft rapidly converge in this segment and concentrate closer to the route centreline.	The aircraft flying the SID are far more concentrated than pre-SID.	Yes; the dispersion to the west is as a result of the FOWP.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	A		3/11/14 – 17/11/14, Slide 5 (68 TRACKS), Airbus 319 There are 2 distinct swathes, with most traffic concentrated along the centreline. The other swathe has turn sough slightly early.	6/11/17 –20/11/17, Slide 4 (69 TRACKS), Airbus 319 There is excellent concentration in this segment.	The aircraft flying the SID are much more concentrated; there is only one swathe.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 5 (68 TRACKS), Airbus 319 The 2 swathes converge to form a concentration of tracks routing between HOTW and THRY. There is one track that routes slight further west.	6/11/17 –20/11/17, Slide 4 (69 TRACKS), Airbus 319 There is some slight dispersion in the turn, but all tracks are concentrated between HOTW and THRY. Most aircraft >3000ft in this segment.	The aircraft on the SID are slightly more concentrated in the turn but disperse slightly towards the west at the end of the segment. Aircraft are still between HOTW and THRY.	Yes; the dispersion to the west is as a result of the FOWP.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 5 (68 TRACKS), Airbus 319 The swathe dispersion grows in this segment out to >1nm but routes to the south west as intended.	6/11/17 –20/11/17, Slide 4 (69 TRACKS), Airbus 319 There is convergence in this segment, before some divergence out to just under 1nm. Four tracks appear to turn early to GIRLI.	The converging of tracks concentrates aircraft initially on the SID, with the majority following the SID route. The concentration is still greater on the SID when compared to pre-SID.	Yes; the few aircraft that turn off slightly early are all above 5000ft before appearing to turn early for GIRLI.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		3/2/14 – 17/2/14, Slide 6 (18 TRACKS), Airbus 320 There is good concentration in this segment; some very slight dispersion south.	5/2/18 – 19/2/18, Slide 9 (48 TRACKS), Airbus 320 There is excellent concentration in this segment.	There is no discernible difference in terms of concentration; the aircraft on the SID do not turn early.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/2/14 – 17/2/14, Slide 6 (18 TRACKS), Airbus 320 Dispersion begins in the turn; one track goes very slightly wide, but all tracks route between HOTW and THRY.	5/2/18 – 19/2/18, Slide 9 (48 TRACKS), Airbus 320 Dispersion begins in the turn and is approx. 0.7nm at its peak. All aircraft route between THRY and HOTW and approx. 50% >3000ft.	The aircraft on the SID are similarly dispersed to pre-SID. The SID swathe is very slightly further west.	Yes; the dispersion to the west is as a result of the FOWP. Aircraft are still between HOTW and THRY.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/2/14 – 17/2/14, Slide 6 (18 TRACKS), Airbus 320 Dispersion continues in this segment out to >1nm, but all tracks continue south west.	5/2/18 – 19/2/18, Slide 9 (48 TRACKS), Airbus 320 The majority of aircraft converge in this segment towards the route centreline. All >5000ft.	The aircraft on the SID converge and concentrate more than pre-SID.	Yes; there is one track that remains wide, but still within tolerances.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 7 (61 TRACKS), Airbus 320 Generally good concentration with some slight dispersion south; two tracks turn south west early	8/5/17 – 22/5/17, Slide 6 (42 TRACKS), Airbus 320 Excellent concentration in this segment.	The aircraft flying the SID are much more concentrated than pre-SID.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 7 (61 TRACKS), Airbus 320 There is dispersion out to 1nm wide with some tracks routing over THRY. Majority of aircraft between HOTW and THRY.	8/5/17 – 22/5/17, Slide 6 (42 TRACKS), Airbus 320 Dispersion begins in the turn but is approx. .0.6nm wide. Approx. 25% aircraft >3000ft. All aircraft between THRY and HOTW.	The aircraft on the SID are more concentrated than pre-SID, but the swathe is slightly further west.	Yes; the dispersion to the west is as a result of the FOWP.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 7 (61 TRACKS), Airbus 320 Dispersion continues with aircraft routing south west. The swathe widens to almost approx. 3nm.	8/5/17 – 22/5/17, Slide 6 (42 TRACKS), Airbus 320 The aircraft all converge in this segment towards the route centreline. All aircraft >4000ft.	The aircraft on the SID are much more concentrated than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 8 (76 TRACKS), Airbus 320 Majority of aircraft are concentrated however 2 tracks turn south and south west early.	7/8/17 – 21/8/17, Slide 7 (30 TRACKS), Airbus 320 Excellent concentration in this segment.	The aircraft flying the SID are more concentrated than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 8 (76 TRACKS), Airbus 320 The swathe disperses out to approx. 1.5nm. One track goes wide over HOTW and a few fly over THRY.	7/8/17 – 21/8/17, Slide 7 (30 TRACKS), Airbus 320 The majority of aircraft slightly disperse and turn between THRY and HOTW. Two tracks turn slightly wider. Only one track is >3000ft.	The majority of aircraft on the SID are concentrated to less than approx. 0.3nm. The two aircraft that go wider are still more concentrated than pre-SID.	Yes; the dispersion to the west is as a result of the FOWP.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 8 (76 TRACKS), Airbus 320 The dispersion continues in this segment with the swathe getting up to approx. 2nm wide.	7/8/17 – 21/8/17, Slide 7 (30 TRACKS), Airbus 320 All aircraft converge in this segment to concentrate close to the route centreline. One track turns to GIRLI early. All now >4000ft.	The aircraft on the SID are far more concentrated than pre-SID.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 9 (40 TRACKS), Airbus 320 The majority of aircraft are concentrated in this segment with track turning south west early.	6/11/17 –20/11/17, Slide 8 (52 TRACKS), Airbus 320 Excellent concentration in this segment.	The aircraft flying the SID are more concentrated than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 9 (40 TRACKS), Airbus 320 Very good concentration in this segment with some very slight dispersion in the swathe; all tracks route between THRY and HOTW.	6/11/17 –20/11/17, Slide 8 (52 TRACKS), Airbus 320 There is some dispersion in the turn with approx. 40% >3000ft. All aircraft route between HOTW and THRY.	The aircraft on the SID disperse very slightly more than pre-SID.	Yes; the dispersion to the west is as a result of the FOWP..	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 9 (40 TRACKS), Airbus 320 The dispersion continues south west with the swathe widening to approx. 2nm.	6/11/17 –20/11/17, Slide 8 (52 TRACKS), Airbus 320 The aircraft converge towards the route centreline; 2 tracks turn off the SID slightly early. All >4000ft.	The aircraft on the SID concentrate more than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		3/2/14 – 17/2/14, Slide 10 (20 TRACKS), Boeing 737-800 Some slight dispersion at the end of this segment.	5/2/18 – 19/2/18, Slide 13 (71 TRACKS), Boeing 737-800 Excellent concentration.	The aircraft on the SID are more concentrated in this segment than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/2/14 – 17/2/14, Slide 10 (20 TRACKS), Boeing 737-800 There is some dispersion in this segment with 2 tracks going slightly wider east and west. Most aircraft between THRY and HOTW.	5/2/18 – 19/2/18, Slide 13 (71 TRACKS), Boeing 737-800 There is dispersion in the turn to approx. 0.7nm. All tracks route between THRY and HOTW. Approx. 20%>3000ft.	The aircraft on the SID are slightly more concentrated than pre-SID; however, there is dispersion towards THRY.	Yes; the dispersion to the west is as a result of the FOWP.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/2/14 – 17/2/14, Slide 10 (20 TRACKS), Boeing 737-800 The dispersion continues with the swathe widening to approx. 2nm.	5/2/18 – 19/2/18, Slide 13 (71 TRACKS), Boeing 737-800 There is some convergence in this segment with all aircraft within approx. 0.7nm of the route centreline. All aircraft >4000ft.	The aircraft on the SID are far more concentrated than pre-SID; however, there is some dispersion from the route centreline.	Yes	Yes and acceptable.

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2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 11 (46 TRACKS), Boeing 737-800 Slight dispersion in this segment with one track turning south west early.	8/5/17 – 22/5/17, Slide 10 (111 TRACKS), Boeing 737-800 Excellent concentration in this segment.	The aircraft flying the SID are far more concentrated than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 11 (46 TRACKS), Boeing 737-800 The dispersion widens out to approx. 0.8nm all but one aircraft route between THRY and HOTW.	8/5/17 – 22/5/17, Slide 10 (111 TRACKS), Boeing 737-800 There is dispersion in the turn out to approx. 0.5nm. All aircraft between THRY and HOTW. Most <3000ft.	The aircraft on the SID are more concentrated despite the dispersion in the turn.	Yes; the dispersion to the west is as a result of the FOWP.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 11 (46 TRACKS), Boeing 737-800 The swathe widens further out to approx. 1.8nm. All aircraft route south west.	8/5/17 – 22/5/17, Slide 10 (111 TRACKS), Boeing 737-800 2 distinct swathes form at the start of this segment. One converges along the route centreline and one starts to disperse.	There is similar dispersion with aircraft flying the SID to pre-SID due to a number of aircraft leaving the SID as they reach altitude >5000ft.	Initially yes; however, the dispersion towards the end of the SID indicates possible vectoring.	Yes, despite the aircraft turning early to the south west. Yes the design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 12 (46 TRACKS), Boeing 737-800 There is very good concentration in this segment.	7/8/17 – 21/8/17, Slide 11 (189 TRACKS), Boeing 737-800 Excellent concentration in this segment.	The aircraft on the SID are slightly more concentrated than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 12 (46 TRACKS), Boeing 737-800 The aircraft disperse to the south west out to almost 1nm; there is slight dispersion over THRY.	7/8/17 – 21/8/17, Slide 11 (189 TRACKS), Boeing 737-800 There is dispersion in the turn out to approx.0.7nm. All aircraft are between THRY and HOTW. Most <3000ft.	The aircraft on the SID are more concentrated in the turn but follow a very similar swathe to the pre-SID.	Yes; the dispersion to the west is as a result of the FOWP..	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 12 (46 TRACKS), Boeing 737-800 Dispersion continues with the swathe widening to >1nm. All aircraft route south west.	7/8/17 – 21/8/17, Slide 11 (189 TRACKS), Boeing 737-800 There is a slight split in the swathes, which results in concentration slightly east and to the west of the route centreline. Convergence occurs later; all aircraft are >4000ft in this segment.	The aircraft on the SID, despite breaking in to two concentrated swathes, are more concentrated and closer to the route centreline than pre-SID.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 13 (29 TRACKS), Boeing 737-800 There is excellent concentration in this segment.	6/11/17 –20/11/17, Slide 12 (82 TRACKS), Boeing 737-800 There is excellent concentration in this segment.	There is little discernible difference.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 13 (29 TRACKS), Boeing 737-800 There is dispersion with one track going wide to the west. A few aircraft route over HOTW.	6/11/17 –20/11/17, Slide 12 (82 TRACKS), Boeing 737-800 There is dispersion in this segment, but all tracks route between THRY and HOTW. Most <3000ft.	The aircraft on the SID are more concentrated in this segment but do not go as far west as pre-SID.	Yes; the dispersion to the west is as a result of the FOWP.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 13 (29 TRACKS), Boeing 737-800 All aircraft continue to disperse to the south west with the swathe widening >1nm.	6/11/17 –20/11/17, Slide 12 (82 TRACKS), Boeing 737-800 The aircraft split into two concentrated swathes; one slightly east of the route centreline the other to the west; there is convergence later. All aircraft >4000ft.	The aircraft on the SID are more concentrated than pre-SID despite the swathe splitting.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		3/2/14 – 17/2/14, Slide 14 (3 TRACKS), Boeing 737-300 There is excellent concentration.	5/2/18 – 19/2/18, Slide 17 (23 TRACKS), Airbus 321 There is good concentration, with very slight dispersion north of the centreline.	There are more aircraft on the SID and the concentration is similar, just slightly to the north.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/2/14 – 17/2/14, Slide 14 (3 TRACKS), Boeing 737-300 The three aircraft remain concentrated between THRY and HOTW.	5/2/18 – 19/2/18, Slide 17 (23 TRACKS), Airbus 321 The slight dispersion continues in the turn; all aircraft are concentrated between THRY and HOTW. 50% are >3000ft.	The aircraft on the SID are concentrated in the turn. They route similarly to pre-SID tracks.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/2/14 – 17/2/14, Slide 14 (3 TRACKS), Boeing 737-300 There is some dispersion between the aircraft; they route approx. 1nm from the route centreline.	5/2/18 – 19/2/18, Slide 17 (23 TRACKS), Airbus 321 There is slightly more dispersion early in this segment but convergence closer to the route centreline and concentration later. All >4000ft.	The aircraft on the SID form a slightly wider swathe due to more aircraft; however, they do concentrate and route much closer to the route centreline.	Yes	Yes and acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A**		5/5/14 – 19/5/14, Slide 15 (45 TRACKS), Boeing 737-300 The concentration is good with some slight dispersion to the south.	8/5/17 – 22/5/17, Slide 14 (23 TRACKS), Boeing 737-300 Concentration is excellent.	The aircraft flying the SID do not disperse and are more concentrated than pre-SID vectoring.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		5/5/14 – 19/5/14, Slide 15 (45 TRACKS), Boeing 737-300 The dispersion widens to approx.0.5nm; 3 tracks route very wide to the west over HOTW.	8/5/17 – 22/5/17, Slide 14 (23 TRACKS), Boeing 737-300 The concentration remains very good in the turn; all aircraft are between THRY and HOTW, most aircraft are >3000ft in this segment.	The aircraft flying the SID are much more concentrated than pre-SID.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	5/5/14 – 19/5/14, Slide 15 (45 TRACKS), Boeing 737-300 The aircraft continue to disperse out to approx.1nm. with all tracks routing south west.	8/5/17 – 22/5/17, Slide 14 (23 TRACKS), Boeing 737-300 The aircraft remain concentrated the swathe gets closer to the route centreline.	The aircraft on the SID are much more concentrated and are with approx. 0.5nm of the route centreline.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		4/8/14 – 18/8/14, Slide 16 (74 TRACKS), Boeing 737-300 Initial concentration leads to dispersion to the south.	7/8/17 – 21/8/17, Slide 15 (51 TRACKS), Boeing 737-300 Concentration is excellent.	The aircraft flying the SID are much more concentrated than pre-SID vectoring.	Yes	Yes and acceptable
2014 Track Plots 2017/2018 Track Plots	**B**		4/8/14 – 18/8/14, Slide 16 (74 TRACKS), Boeing 737-300 Dispersion widens to approx.1nm with aircraft over THRY and very close to HOTW.	7/8/17 – 21/8/17, Slide 15 (51 TRACKS), Boeing 737-300 The swathe is concentrated and slightly dispersed to the west; all aircraft route between THRY and HOTW. Most >3000ft.	The aircraft flying the SID are far more concentrated than pre-SID and avoid THRY and HOTW.	Yes; however, the dispersion to the west is as a result of the FOWP	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	4/8/14 – 18/8/14, Slide 16 (74 TRACKS), Boeing 737-300 The swathe widens to >2nm. All aircraft route south west.	7/8/17 – 21/8/17, Slide 15 (51 TRACKS), Boeing 737-300 The aircraft concentrate even more before some slight dispersion at the end of the segment.	The aircraft are much more concentrated and converge towards the route centreline.	Yes	Yes and acceptable.

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2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 17 (21 TRACKS), Boeing 737-300 There is some dispersion in this sector with aircraft going slightly wider north and south.	6/11/17 –20/11/17, Slide 16 (13 TRACKS), Boeing 737-300 There is some very slight dispersion early on, but the aircraft converge at the end of the segment.	The aircraft on the SID are much more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 17 (21 TRACKS), Boeing 737-300 Dispersion continues in the turn out to >0.5nm; all aircraft are between THRY and HOTW.	6/11/17 –20/11/17, Slide 16 (13 TRACKS), Boeing 737-300 There is some very slight dispersion in the turn out to the west; the swathe is concentrated. Most aircraft >3000ft.	The aircraft on the SID are much more concentrated than pre-SID and still route between THRY and HOTW.	Yes; however, the dispersion to the west is as a result of the FOWP	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 17 (21 TRACKS), Boeing 737-300 Dispersion continues out to approx. 2nm. All aircraft route to the south west.	6/11/17 –20/11/17, Slide 16 (13 TRACKS), Boeing 737-300 The swathe converges in this segment towards the route centreline; one track diverges south.	The aircraft are far more concentrated on the SID and are within 0.5nm of the route centreline.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**A**		3/2/14 – 17/2/14, Slide 18 (24 TRACKS), Dash 8 Delta There is some dispersion north and south.	5/2/18 – 19/2/18, Slide 21 (44 TRACKS), Dash 8 Delta Concentration is good except for one track that is approx.0.3nm south.	Apart from the one aircraft the those flying the SID are slightly more concentrated than pre-SID.	Yes except for one aircraft.	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/2/14 – 17/2/14, Slide 18 (24 TRACKS), Dash 8 Delta The swathe widens to approx.1nm. The western edge is very close to HOTW.	5/2/18 – 19/2/18, Slide 21 (44 TRACKS), Dash 8 Delta The swathe continues to disperse slightly with traffic getting very close to HOTW. Nearly all aircraft >3000ft.	The aircraft flying the SID are much more concentrated in the turn. The anomalous aircraft converges from the south. The swathe is further west than pre-SID.	Partial; the Dash 8 is s turboprop aircraft, so the dispersion is expected to be further to the west after the FOWP. However, some aircraft get close to HOTW.	Yes for the majority of aircraft. Just at the end of this segment aircraft fly to far to the west. Yes the design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/2/14 – 17/2/14, Slide 18 (24 TRACKS), Dash 8 Delta The dispersion continues out to approx. 1.5nm. All aircraft route south west.	5/2/18 – 19/2/18, Slide 21 (44 TRACKS), Dash 8 Delta Two swathes form that are concentrated, with the majority converging towards the route centreline. The other swathe remains wide.	The majority of the aircraft flying the SID are more concentrated; however, there are number of aircraft that fly up to approx.1nm from the route centreline and the dispersion is further west.	Partial; the Dash 8 is s turboprop. However, not all the aircraft fly within tolerance.	Partially; the SID does not appear to have been flown correctly by all aircraft in this segment. Yes the design is acceptable

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	A		5/5/14 – 19/5/14, Slide 19 (16 TRACKS), Dash 8 Delta Concentration is very good in this segment. Some slight dispersion south.	8/5/17 – 22/5/17, Slide 18 (29 TRACKS), Dash 8 Delta Concentration is very good in this segment.	The concentration is very similar. The aircraft flying the SID are slightly more evenly spread.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	B		5/5/14 – 19/5/14, Slide 19 (16 TRACKS), Dash 8 Delta Some dispersion occurs in the turn, but the aircraft remain between THRY and HOTW.	8/5/17 – 22/5/17, Slide 18 (29 TRACKS), Dash 8 Delta Some slight dispersion occurs but approx.30% of aircraft go wide over HOTW. The majority are >3000ft.	The aircraft flying the SID appear to go further west than expected. This results in approx. 30% flying over HOTW.	Partial; the Dash 8 is s turboprop aircraft, so the dispersion is expected to be further to the west after the FOWP. However, some aircraft fly over HOTW which is not within tolerance.	Partially; the SID does not appear to have been flown correctly by all aircraft in this segment. Yes the design is acceptable.
2014 Track Plots 2017/2018 Track Plots	C	NTS08	5/5/14 – 19/5/14, Slide 19 (16 TRACKS), Dash 8 Delta There is further dispersion in this segment as the swathe widens to approx. 1.2nm. All aircraft route south west.	8/5/17 – 22/5/17, Slide 18 (29 TRACKS), Dash 8 Delta Two distinct swathes form with approx. 50% of aircraft converging towards the route centreline and the other swathe converging later in the segment.	The aircraft flying the SID are more concentrated despite the 2 swathes; approx. 50% of the aircraft on the SID are further west that pre-SID vectoring.	Partial; the Dash 8 is s turboprop aircraft. Not all the aircraft fly within accepted tolerance.	Partially; the SID does not appear to have been flown correctly by all aircraft in this segment. Yes the design is acceptable.
2014 Track Plots 2017/2018 Track Plots	A		4/8/14 – 18/8/14, Slide 20 (25 TRACKS), Dash 8 Delta Concentration is good, with some very slight dispersion south.	7/8/17 – 21/8/17, Slide 19 (45 TRACKS), Dash 8 Delta Concentration is good.	The aircraft flying the SID are slightly more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	B		4/8/14 – 18/8/14, Slide 20 (25 TRACKS), Dash 8 Delta The aircraft disperse out to approx.0.7nm but remain between THRY and HOTW.	7/8/17 – 21/8/17, Slide 19 (45 TRACKS), Dash 8 Delta Concentration remains; the swathe disperses west and routes over HOTW. The majority are >3000ft.	The aircraft flying the SID are slightly more concentrated; however, approx. 25% of the aircraft route over HOTW.	Partial; the Dash 8 is s turboprop aircraft, so the dispersion is expected to be further to the west after the FOWP. However, some aircraft fly over HOTW which is not within tolerance	Partially; the SID does not appear to have been flown correctly by all aircraft in this segment. Yes the design is acceptable.
2014 Track Plots 2017/2018 Track Plots	C	NTS08	4/8/14 – 18/8/14, Slide 20 (25 TRACKS), Dash 8 Delta The dispersion continues to the south west with the swathe widening to approx.1.2nm.	7/8/17 – 21/8/17, Slide 19 (45 TRACKS), Dash 8 Delta The swathe splits into 2 concentrations; approx. 50% converge towards the route centreline and the rest maintain 1nm away.	The aircraft flying the SID are more concentrated despite the 2 swathes; approx. 50% of the aircraft on the SID are further west that pre-SID vectoring.	Partial; the Dash 8 is s turboprop aircraft. However, this segment is not flown within tolerance by all the aircraft.	Partially; the SID does not appear to have been flown correctly by all aircraft in this segment Yes the design is acceptable.

CAA Web Ref Procedure & AIP Chart Ref (Col 1)	Segment / Stage / Phase of SID & Waypoint (Col 2)	Path Terminator Employed (Col 3)	Pre-implementation Traffic (Col 4)	New RNAV-1 SID traffic pattern (Col 5)	Comparison of the new RNAV-1 SID with the pre- implementation vectoring (Col 6)	Expected traffic pattern achieved? (Col 7)	SID Flown As designed (Yes/No)? SID Design Acceptable/Not-Acceptable? (Col 8)
2014 Track Plots 2017/2018 Track Plots	**A**		3/11/14 – 17/11/14, Slide 21 (27 TRACKS), Dash 8 Delta There is some dispersion north and south in this segment out to approx. 0.2nm.	6/11/17 –20/11/17, Slide 20 (42 TRACKS), Dash 8 Delta There is some dispersion north and south in this segment approx. 0.2nm to the north.	The aircraft flying the SID are slightly more concentrated.	Yes	Yes and acceptable.
2014 Track Plots 2017/2018 Track Plots	**B**		3/11/14 – 17/11/14, Slide 21 (27 TRACKS), Dash 8 Delta There is further dispersion to the west; the swathe is approx. 0.6nm. A few aircraft route over HOTW.	6/11/17 –20/11/17, Slide 20 (42 TRACKS), Dash 8 Delta There is dispersion in the turn, but the majority of aircraft concentrate between HOTW and THRY. There a few aircraft that route to the west over HOTW. Majority of aircraft >3000ft.	The majority of aircraft flying the SID are more concentrated; however, there a few aircraft that route wide to the west; there appear to be more aircraft on the SID that fly over HOTW when compared to pre-SID vectoring.	Partial; the Dash 8 is s turboprop aircraft, so the dispersion is expected to be further to the west after the FOWP. However, some aircraft fly over HOTW, which is not within accepted tolerance.	Partially; the SID does not appear to have been flown correctly by all aircraft in this segment. Yes the design is acceptable.
2014 Track Plots 2017/2018 Track Plots	**C**	NTS08	3/11/14 – 17/11/14, Slide 21 (27 TRACKS), Dash 8 Delta Dispersion continues out to approx. 3nm from the route centreline. The swathe widens and the aircraft route to the south west.	6/11/17 –20/11/17, Slide 20 (42 TRACKS), Dash 8 Delta The majority of aircraft converge towards the route centreline with a small concentrated swathe maintaining to the west.	The aircraft flying the SID are more concentrated despite the 2 swathes; approx. 75% of the aircraft on the SID are closer to the nominal route centreline than pre-SID vectoring.	Partial; the Dash 8 is s turboprop aircraft. However, not all the aircraft fly the segment within accepted tolerance.	Partially; the SID does not appear to have been flown correctly by all aircraft in this segment. Yes the design is acceptable.

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CONCLUSIONS FROM CAA TRACK ANALYSIS

Table 6 – Conclusion of CAA Track Analysis of the Total Track Dispersion Plots (Traffic dispersion v2) CAA Track Analysis of the Total Track - Conclusions from CAA Track Analysis

Westerly/Easterly Vectoring/SID Monthly period comparison	**Intended Conclusion –** the aim of the ACP was for aircraft to fly the SIDs along the same vectored route(s) which had been used prior to the introduction of the SIDs (replicate). It was accepted that as a consequence of doing this, aircraft on the SID would be more concentrated. Given that the vectoring causes dispersion, replication has been considered to be within tolerances where concentration has occurred within 1nm of the nominal route centreline.	**Recommendations (if any)**
Easterly Vectoring/SID Feb 14 v Feb 18	It can be seen that the departing traffic density was greatest along the SID route following its introduction, so this indicates that the introduction of the SID has achieved the aim of the ACP.	N/A.
Easterly Vectoring/SID May 14 v May 17	It can be seen that the departing traffic was most dense along the anticipated SID route, and mirrors density in the same direction pre-SID; this indicates that the introduction of the SID has achieved the aim of the ACP.	N/A
Easterly Vectoring/SID Aug 14 v Aug 17	It can be seen that the departing traffic density was greatest along the anticipated SID route, and mirrors density in the same direction pre-SID; this indicates that the introduction of the SID has achieved the aim of the ACP.	N/A
Easterly Vectoring/SID Nov 14 v Nov 17	Unable to draw a conclusion due to only one track being flown in 2017.	N/A.
Westerly Vectoring/SID Feb 14 v Feb 18	It can be seen that the departing traffic density was greatest along the SID route(s) (there is density along the GIRLI 1Y route also) following their introduction. This indicates that the introduction of the westerly SIDs has achieved the aim of the ACP.	N/A
Westerly Vectoring/SID May 14 v May 17	It can be seen that the departing traffic density was greatest along the SID route(s) (there is density along the GIRLI 1Y route also) following their introduction. This indicates that the introduction of the westerly SIDs has achieved the aim of the ACP.	N/A
Westerly Vectoring/SID Aug 14 v Aug 17	It can be seen that the departing traffic density was greatest along the SID route(s) (there is density along the GIRLI 1Y route also) following their introduction. This indicates that the introduction of the westerly SIDs has achieved the aim of the ACP.	N/A
Westerly Vectoring/SID Nov 14 v Nov 17	It can be seen that the departing traffic density was greatest along the SID route(s) (there is density along the GIRLI 1Y route also) following their introduction. This indicates that the introduction of the westerly SIDs has achieved the aim of the ACP.	N/A

Table 7 – Conclusion of CAA Track Analysis of the Updated Track Dispersion Plot by aircraft type Comparison (V3, 5 main types) – Pre SID (2014) v GIRLI 1T (2017/2018)

Easterly Vectoring/GIRLI 1T Monthly period comparison	**Intended Conclusion –** the aim of the ACP was for aircraft to fly the SIDs along the same vectored route(s) which had been used prior to the introduction of the SIDs (replicate). It was accepted that as a consequence of doing this, aircraft on the SID would be more concentrated. Given that the vectoring causes dispersion, replication has been considered to be within tolerances where concentration has occurred within 1nm of the nominal route centreline. It can be seen that all aircraft climbed as expected, with all tracks >4000ft by WP NTS12.	**Recommendations (if any)**
Easterly Vectoring/SID Feb 14 v Feb 18	The aircraft that do fly this SID during this period all fly it as expected. There was little to compare with the pre-SID periods, possibly due to the weather in Feb 2014.	N/A.
Easterly Vectoring/SID May 14 v May 17	The majority of aircraft that fly the SID during this period fly it as expected and concentrate themselves, as anticipated by the ACP, along the pre-SID vectored routes. There are few anomalous tracks, most notably B737-300s (slide 56) that appear to fly the SID very wide, with one track plot just outside the accepted tolerance. However, given that the majority are will within tolerance we can conclude that overall the SID is being flown as expected and is achieving the intent of the ACP.	N/A
Easterly Vectoring/SID Aug 14 v Aug 17	The aircraft flying the SID in August 17 are generally far more concentrated than pre-SID vectoring. All the aircraft fly within the tolerances expected, except one B737-800 (Slide 53) which turns slightly early. Aircraft flying this SID will turn according to the speed they reach; faster aircraft will turn sooner and slightly further from the FBWP. Overall the SID is still being flown as expected and is achieving the intent of the ACP.	N/A
Easterly Vectoring/SID Nov 14 v Nov 17	Unable to draw a conclusion as zero aircraft flew the SID during this period.	N/A.

Table 8 – Conclusion of CAA Track Analysis of the Updated Track Dispersion Plot by aircraft type Comparison (V3, 5 main types) – Pre SID (2014) v GIRLI 1Y (2017/2018)

Westerly Vectoring/GIRLI 1Y Monthly period comparison	**Intended Conclusion –** the aim of the ACP was for aircraft to fly the SIDs along the same vectored route(s) which had been used prior to the introduction of the SIDs (replicate). It was accepted that as a consequence of doing this, aircraft on the SID would be more concentrated. Given that the vectoring causes dispersion, replication has been considered to be within tolerances where concentration has occurred within 1nm of the nominal route centreline. It can be seen that all aircraft climbed as expected except for one A320 that does not reach 4000ft by WP NTS08.	**Recommendations (if any)**
Westerly Vectoring/SID Feb 14 v Feb 18	Zero aircraft flew during the Feb 14 period, so a comparison cannot be made. However, the analysis of the data for the aircraft that flew the SID in Feb 17 show that it was flown within tolerance and as expected for the majority of aircraft. All aircraft were between THRY and HOTW. Slide 34 shows one B737-800 that appears not to fly the SID as expected and slide 42 shows a Dash 8 that flies the SID quite wide. Both aircraft are still within acceptable tolerances. The SID is still being flown as expected and is meeting the intent of the ACP.	N/A.
Westerly Vectoring/SID May 14 v May 17	All the aircraft that fly the SID during this period do so well within the acceptable tolerances. The SID is being flown as expected and is meeting the intent of the ACP.	N/A
Westerly Vectoring/SID Aug 14 v Aug 17	All the aircraft that fly the SID during this period do so well within the acceptable tolerances. The SID is being flown as expected and is meeting the intent of the ACP.	N/A
Westerly Vectoring/SID Nov 14 v Nov 17	The aircraft flying the SID in this period are far more concentrated and fly the procedure well within the expected tolerances. The SID is being flown as expected and is meeting the intent of the ACP. However, one A320 does not climb as expected.	N/A.

Table 9 – Conclusion of CAA Track Analysis of the Updated Track Dispersion Plot by aircraft type Comparison (V3, 5 main types) – Pre SID (2014) v GIRLI 3X (2017/2018)

Westerly Vectoring/GIRLI 3X Monthly period comparison	**Intended Conclusion –** the aim of the ACP was for aircraft to fly the SIDs along the same vectored route(s) which had been used prior to the introduction of the SIDs (replicate). It was accepted that as a consequence of doing this, aircraft on the SID would be more concentrated. Given that the vectoring causes dispersion, replication has been considered to be within tolerances where concentration has occurred within 1nm of the nominal route centreline. The vertical track plots (GIRLI 3X) were considered relevant for this SID only, as the FOWP has a minimum altitude (the other SIDs do not); the data presented confirms that all the aircraft flying the SID were at or above the requisite altitude of 1100ft QNH. It can be seen that aircraft climb, beyond the FOWP, as expected.	**Recommendations (if any)**
Westerly Vectoring/SID Feb 14 v Feb 18	There is a slight shift to the west for the swathes of aircraft that fly the SID during this period which is expected due to the FOWP and still with in tolerance; all aircraft initially route between THRY and HOTW. However, sometimes some of the Dash 8 aircraft go beyond the edge of the expected tolerance for the SID procedure in segment B and C. Slide 21 shows that some Dash 8 aircraft route overhead HOTW. The other four types all fly with in the expected tolerances and concentrate aircraft along the rest of the SID route as intended by the ACP.	NIAL must brief Dash 8 Operators on the requirement to avoid overflight of HOTW.
Westerly Vectoring/SID May 14 v May 17	The routing of tracks for all types in segments A and B are similar for aircraft flying the SID when compared to pre-SID vectoring, but with more concentration, especially in segment A. Despite the FOWP creating slight dispersion to the west, the SID is being flown as intended by the ACP with all aircraft, apart from some Dash 8's, concentrating between THRY and HOTW. In segment B into C, some of the Dash 8 aircraft fly further to the west than expected and are outside acceptable tolerances, which continues for some of segment C. Some of the B737-800s disperse from the SID early in segment C as they reach altitude >5000ft; however, the majority of aircraft fly segment C as expected. Other than some of the Dash 8 aircraft, it can be seen that the SID is being flown as expected and meeting the intent of the ACP.	NIAL must brief Dash 8 Operators on the requirement to avoid overflight of HOTW.
Westerly Vectoring/SID Aug 14 v Aug 17	The routing of tracks for all types in segments A and B are similar for aircraft flying the SID when compared to pre-SID routings, however, there is more concentration, overall, in both segments. Despite the FOWP creating slight dispersion to the west, the SID is being flown as intended by the ACP with all aircraft, apart from some Dash 8s, concentrating between THRY and HOTW. The swathe of Dash 8's splits from segment B into C resulting in a number of Dash 8s remaining wide of the intended SID route, flying over HOTW and not within expected tolerances. In conclusion, other than some of the Dash 8 aircraft, it can be seen that the SID is being flown as expected and meeting the intent of the ACP.	NIAL must brief Dash 8 Operators on the requirement to avoid overflight of HOTW.
Westerly Vectoring/SID Nov 14 v Nov 17	The routing of tracks for all types in segments A and B are similar for aircraft flying the SID when compared to pre-SID vectoring, however, there is more concentration, overall, in both segments. Despite the FOWP creating slight dispersion to the west, the SID is being flown as intended by the ACP with all aircraft, apart from some Dash 8s, concentrating between THRY and HOTW. The Dash 8s disperse further to the west from segment B into C during this period than previous periods. A number of Dash 8s fly over HOTW and are beyond the expected tolerances. There is some convergence from the Dash 8s during this period, in segment C; however, a proportion remain outside the expected tolerances. In summary, despite a number of Dash 8s not flying the SID as expected, overall it can be seen that the SID is being flown as expected and meeting the intent of the ACP.	NIAL must brief Dash 8 Operators on the requirement to avoid overflight of HOTW.

Table 10 – Overall Conclusion of CAA Track Analysis on NIAL SIDs GIRLI 1T, GIRLI 1Y and GIRLI 3X

Intended Conclusion - The aim of the ACP was for aircraft to fly the SIDs along the same vectored route(s) which had been used prior to the introduction of the SIDs (replicate) (the **ACPs Aim**)**.** It was accepted that as a consequence of doing this, aircraft on the SID would be more concentrated. Given that the vectoring causes dispersion, replication has been considered within tolerances where concentration has occurred within 1nm of the nominal route centreline.	**Recommendations (if any)**
It cannot be accurately calculated due to the way in which the data is presented (as expected); however, a fair estimate would be that approx. 50 aircraft (mostly Dash 8s) are in the category of 'not flying the SID as expected and/or are out of tolerance'. As a percentage of the total of 1599 aircraft (top 5 RNAV1 equipped) that flew the SIDs during the data analysis periods, this is approximately 3%. It is clear from this that the vast majority of aircraft have flown the SIDs as expected. Not all aircraft will fly a SID exactly the same every time, so the fact that the data shows variances would be expected. Where the aircraft are outside tolerances, there may be acceptable and reasonable explanations as to why an unexpected/incorrect flight profile has occurred. It is not appropriate however, for this PIR is to provide hypothesis on flight variations. The PIR simply serves to highlight these variations in order to assess whether the ACPs aim has been met. It is therefore reasonable, given all the analysis above, to conclude that the SIDs are sufficiently aligned to the ACPs aim.	NIAL must brief Dash 8 Operators on the requirement to avoid overflight of HOTW.

ppendix A – Map 1

Appendix A – Map2

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