7. The CAA needs to see feedback from the regular operators concerning flyability of the SIDs. We therefore ask that you pass the following questions to members of the FLOPSC. Responses should be returned by you with the GAL PIR submission.

a. How do crews receive RNAV SID clearances – are they via ATC or datalink?

[redacted] Normally datalink but voice can be used.

[redacted] Both. Most aircraft are ACARS equipped.

[redacted] My crew receive clearances by ACARS very successfully and if the system is not working for whatever reason then from ATC by VHF freq.

[redacted] Both.

[redacted] We use datalink clearances.

[redacted] The A330 by PDC and currently the others by ATC.

b. Comment on the lateral track keeping and report any anomalous behaviour.

[redacted] has observed many variations of track keeping anomaly depending on wind direction. The worst deviations have occurred with strong Southerly or South Westerly winds – (see report enclosed in folder.)

[redacted] No reports in the last three months (sent on 19th November 2014).

[redacted] I have found that there is a so far unexplainable problem with the way the FMS draws the arc around the 180' turn on the CLN3X and the SAM3Z. We are struggling to come up with anything concrete as to why the FMS draws these arcs too wide and overshoots the track outbound of the second waypoints on the SID. However, after carrying out extensive experimentation and observation on these SIDs I have asked all pilots to input the speeds around the 180' turn at a slower 190Kts. By doing this the system is much more likely to calculate the arc at a smaller radius and therefore complying with the track outbound of KKN09 on the SAM3Z and KKN06 on the CLN 3X even with a strong tailwind around the turn. The existence of a SW wind on CLN and a SE wind on the SAM make it more problematic to comply with the initial turn on these SIDs. Observing aircraft on the Casper noise monitoring website [redacted] and I are noticing a considerable improvement. The aircraft is perfectly capable of making these turns but there appears to be something in the coding that is causing it to go for the MAX220Kts and the MAX250Kts as a target and not a Max speed. I think it is to do with the prioritisation of the different elements of the SID i.e. acceleration to max spd rather than compliance with out bound track from a waypoint and then flying at low angle of bank. Also not scheduling the next waypoint fully in the calculation until passing the preceding waypoint. This points me towards the [redacted] coding.

[redacted] Due to the age of the INS/IRS's on an aircraft and depending on the time since they were last calibrated, the SID flown will differ between aircraft as the INS/IRS's use a variation programme to convert a true heading, back into a magnetic heading. This is then interfaced with the

FMC/FMS, that should have it's Navigation Database updated every 28 days. To identify any track differences flown on a SID, will require radar tracking.

[redacted] In general our track keeping has been good, with significant improvement on pre-PRNAV implementation. We have had only a number of deviations, usually due to strong winds affecting the flight path or when there has been an FMS position update error.

[redacted] No reports.

c. Comment on the use of speed constraints in the SID designs – are they working or causing conflict with SOPs?

[redacted] There is no conflict with SOP. Some heavier flights have to manoeuvre with slats extended but that is acceptable.

[redacted] Speed constraints have worked well.

[redacted] See above.

[redacted] They are working.

[redacted] The speed constraints don't cause the 737 an issue as we can fly 220kts clean at any weight. On a heavy Airbus, they have to delay their clean aircraft configuration due to the 220kts restriction. 777 has the same issues. So SIDs like the BOGNA with speed restrictions to the 1st segment are not helpful and prevent the SOP of cleaning up.

[redacted] For heavy A321, the 08SAM departures require speed intervention as the flap clean speed is too high for design – nothing new but requires briefing.

d. Comment on the vertical profiles of the SIDs – are they working or causing conflict with SOPs?

[redacted] There is no conflict.

[redacted] Yes the constraints are working fine and do not conflict with our SOPs.

[redacted] Vertical constraints can be quite tight to comply with, that is the very first ones after take-off of 2500' at first waypoint on extended RWY CL. Departing with an average to heavy weight aircraft we are just making the 2500' abeam the first waypoint as we "fly-by". By requesting crews to make the 190Kts max speed up to abeam the second waypoint as above we kill two birds with one stone by causing good climb rate and more easy compliance with the height restriction. I don't want to give the crews more points to implement than I need to and have found that this 190Kts speed restriction covers both issues, lateral and vertical compliance.

[redacted] They are working.

[redacted] No issues that I can think of.

[redacted] No conflicts, vertical speed intervention required on occasion, particularly with light aircraft to avoid TCAS conflict, but this is no different to conventional departures.

e. What noise abatement procedure (NADP) is being employed when flying the SID's?

[redacted] NADP2. Our procedure is to set climb thrust and to commence acceleration at 1000ft agl.

[redacted] policy is to fly NADP2 unless specific requirement from the AIP requires otherwise.

[redacted] I believe we are complying with minimum noise requirements without flying any specific NADP but pilots being aware that they are likely to be too heavy to reach the 2500' restriction fly ICAO NADP1. I appreciate the 2500' restriction is certainly detailed on the SID for noise.

[redacted] NAPD2

[redacted] No noise abatement procedure on our short haul or on the 777, I believe.

[redacted] NADP2

Further – are there any flyability issues with the SIDs which you are aware of?

[redacted] I attach our review of some of the occasions when things have gone wrong in the P-RNAV SIDs. In summary, we believe that the use of so many waypoints close together, in an effort to replicate the conventional SID, results in our FMS struggling to recalculate the flight path. This is exacerbated whenever we have a strong wind gradient from the South or South West. The Airbus performance tool also confirms that the distance between waypoints is inadequate when we experience high groundspeed due to tailwind component.

Design options that we believe would work better are RNP-1 with RF, or fewer waypoints but a wrap-around turn based on an intercept to a course to the next fix e.g. remove KKN06 from the DVR1X departure (this is actually how our overlay of the conventional procedure is coded in the FMS).

The review contains one flight (9th Jan 2015) where our crew maintained a lower speed (185 kts) to assure track keeping but this resulted in the following aircraft catching up with them. This technique is not unreasonable as the current procedure only stipulates maximum speeds.

I have discussed some of this with the CAA Airspace team already as part of other workgroup activity in which I am engaged.

[redacted] Not that I am aware of.

[redacted] There is no issue with SOP and crew coordination as we are well trained in the flying of RNAV SIDs and STARS are very accustomed to using them.

[redacted] No.

[redacted] Any SID with a low platform altitude is more awkward. The Southampton SIDs off 08R is an example.

[redacted] No issues.