Title of Airspace Change Proposal	**London Stansted Airport: Departure Route Proposal**
Change Sponsor	**NATS**
SARG Project Leader	[redacted]
Case Study commencement date	**01/05/2015**
Case Study report as at	**22/09/2015**
Report Reference	**SARG/ERCD/AG/Stansted LAMP1A V 2.3**

Instructions

In providing a response for each question, please ensure that the 'Status' column is completed using the following options:

- **Yes**
- **No**
- **Partially**
- **N/A**

To aid the SARG Project Leader's efficient Project Management it may be useful that each question is also highlighted accordingly to illustrate what is resolved (Green), **not resolved** (Amber) or **not compliant** (Red) as part of the SARG Project Leader's efficient project management.

1. Introduction

This report describes the environmental considerations relevant to NATS's proposal to switch daytime (0600-2300) departing traffic from the constrained DET SIDs (for both runways 04 and 22) onto the less constrained CLN SIDs and provide an en-route link so that traffic can be directed into European airspace as before. The proposal is one of five modules proposed as part of the London Airspace Management Programme (LAMP) Phase 1A.

The Airspace Change Proposal (ACP) has been submitted by the sponsor, NATS and is supported by Stansted Airport Limited.

This assessment is based upon information presented in the proposal document entitled "LAMP Phase 1A Airspace Change Proposal - Module A, London Stansted Airport: Departure Route Proposal – Issue 2.1, February 2015", plus associated supporting material, consultation material and subsequent information received as the result of queries raised with the sponsor following submission of the ACP.

2.	Guidance to the CAA	Status
2.1	**Is the proposal consistent with Government policy and/or guidance from Government to the CAA?**	Yes

Guidance issued to the Civil Aviation Authority[1] sets out a framework for the environmental objectives that the CAA must consider when assessing airspace change proposals. In addition to these objectives, there may be other legitimate operational objectives, such as the overriding need to maintain an acceptable level of air safety, the desire for sustainable development or to enhance the overall efficiency of the UK airspace network, which need to be considered alongside these environmental objectives. The Government looks to the CAA to determine the most appropriate balance between these competing characteristics.

Flights over National Parks and AONBs are not prohibited by legislation[2] as a general prohibition against over-flights would be impractical. Government policy focuses on minimising the over-flight of more densely populated areas below 7,000 feet (amsl), but balances this with CO_2 emissions between 4,000 and 7,000 feet (amsl). However, where it is practical to avoid over-flight of National Parks and AONBs below 7,000 feet (amsl), the Guidance asks that the CAA encourages this.

[1] DfT, Guidance to the Civil Aviation Authority on Environmental Objectives Relating to the Exercise of its Air Navigation Functions, January 2014

[2] National Parks and Access to the Countryside Act 1949, National Parks (Scotland) Act 2000, and "Duties on relevant authorities to have regard to the purposes of National Parks, Areas of Outstanding Natural Beauty (AONBs) and the Norfolk and Suffolk Broads Guidance Note", Defra 2005.

3.	Rationale for the Proposed Change	Status
3.1	Does the rationale for the ACP include environmental reasons?	Yes

The rationale for the change is to improve the fuel efficiency of departures that used the DET SIDs, which direct aircraft south-south-east towards Kent, across the London Terminal Manoeuvring Area (LTMA) interacting with crossing traffic inbound to London Heathrow, London City and London Gatwick airports. In order to free up airspace to enable the expeditious flow of traffic and safely deconflict these crossing interactions, DET departures are held at 5,000 feet at no more than 250 kt airspeed, delaying climb to cruise altitude and resulting in increased fuel used and more CO_2 emissions than if they had a more efficient climb profile.

4.	Nature of the Proposed Change	Status
4.1	Is it clear how the proposed change will operate, and therefore what the likely environmental impacts will be?	Yes

As both the DET and CLN SIDs exist today, it is clear what the expected flight profiles and ground tracks are for aircraft operating on these SIDs. The impact of an individual flight on a given SID will not change, however, there will be decreased use of the DET SID and increased use of the CLN SID during the daytime. At night time (2300-0600) the DET SID will continue to be used as today.

4.2	Have alternative options been considered, and have the environmental impact of each alternative been assessed?	Partially

In the Consultation Feedback report, the sponsor considered more complex options that included the realignment of the CLN SIDs. It concluded, however, that these would be much more complex, have implications for other airspace users, take longer to implement and delay realisation of fuel and CO_2 savings. It therefore considered the only viable option to be the proposal to switch the traffic from the DET to the CLN SIDs. This is reasonable.

In addition, as part of its assessment of the proposal, the CAA asked the sponsor if any other options had been considered and discounted before selecting the switch of traffic from the DET SIDs to the CLN SIDs. A summary of the reply and the options considered are noted below:

- The objective is to improve environmental and operational efficiency for Stansted DET departures and to enable the Point Merge at London City Airport. The proposal seeks to do this by changing the use of existing SIDS; any alternative approach would have involved redesigning SIDs, changing NPRs and their swathes, and therefore changing the populations overflown – potentially introducing new areas. Changes to SID alignments were therefore discarded as generic concept at the outset.

- Use of the CPT SID and new routes to west of London were not considered on the basis of the route mileage to go west then all the way back to the east.
- A direct route between CLN and KONAN to reduce mileage was considered, however this was not possible because of an interaction with Gatwick arrivals.
- The "do nothing" option was also considered. The current operation could be maintained however the benefits for the Stansted operations described in the proposal would not be realised. To "do nothing" It would also prevent the implementation of LAMP Phase 1A changes for London City (without creating added complexity and controller workload). The sponsor therefore discarded the do nothing option.

5.	Noise	Status
5.1	**Has the noise impact been adequately assessed?**	Yes

Yes, NATS has generated 16 hour Leq noise contours (the standard UK aircraft noise indicator) showing the change in noise exposure associated with the switch in traffic from the DET SID to the CLN SID. The analysis was undertaken for two scenarios:

i) 2012 traffic uplifted 20% to reflect a 2016 timeframe
ii) 2012 traffic uplifted 40% to reflect a 2020 timeframe

For noise levels above 63 dBA Leq 16hr, the initial portion of both the DET and CLN SIDs are the same and thus the switch of SID has no effect on the position of aircraft or noise exposure. Further out from the airport, at noise exposure levels below 63 dBA Leq 16hr, the DET and CLN SIDs begin to diverge. At noise exposure levels of 57 dBA Leq 16hr, the SIDs remain sufficiently close to each other that maximum noise changes do not exceed 1 dB.

No SEL footprint analysis has been undertaken as the proposal relates to the daytime only and will have no impact between 2300-0600. Between 0600-0700 the sponsor estimates that approximately six DET departures per hour would switch to the CLN SIDs. However, as SEL footprints portray the noise from a single flight, and this proposal does not change any aircraft tracks close to the airport, the switch of flights in this hour would have no impact on the existing SEL footprints.

The DET and CLN SIDs continue to diverge beyond the 57 dBA Leq 16hr noise contour and thus increases and decreases in noise will occur of more than 1 dB. At some point, where overall noise exposure levels are below 57dBA Leq 16hr yet traffic is below 7,000ft, noise

levels are forecast to increase by a maximum of just over 3dB, based on the fact that the proposed change is not forecast to cause more than just over a two-fold increase in traffic on the CLN SIDs. Although the maximum increase is forecast to be just over 3dB, since this will occur at noise exposure levels below 57 dBA Leq 16hr, in accordance with the Government's Aviation Policy Framework this change is not considered to represent a significant adverse impact..

In addition to the noise contour analysis competed in accordance with CAP 725, the sponsor has also undertaken an assessment of the number people expected to be overflown less and more often up to 4,000 feet as a result of the proposal (Consultation document appendix H). The analysis shows that the greatest change is associated with the 04 CLN SID. However, the sponsor subsequently highlighted that this SID is used less frequently than the 22 CLN SID. Due to prevailing wind direction, the 04 CLN SID is used approximately 30% of the time (29% based on 20-year average), whereas the 22 CLN SID is used 70% of the time. After accounting for this, it demonstrated that similar numbers of people would be expected to experience increases and decreases in the numbers of overflights. We support this finding.

The 2014 Air Navigation Guidance requires CAA to strike a balance between noise and CO_2 emissions for airspace where aircraft are between 4,000 and 7,000 feet. There, are however, no established ways to objectively quantify and balance noise and CO_2 emission changes, thus we must take a qualitative approach. In its consultation the sponsor highlights that the core objective is to enable continuous climb to those aircraft that are routinely held at 5,000 feet on the DET SID. It therefore follows that the proposal will reduce the time aircraft are between 4,000 and 7,000 feet and therefore result in a net reduction in noise exposure in this altitude band. Due to displacement of traffic from the DET SID to the CLN SID there will nevertheless be areas that experience noise increases for aircraft altitudes between 4,000 and 7,000 feet.

5.2	**Has the noise impact been adequately presented in the consultation and the submitted proposal?**	Yes

Yes, changes in noise exposure contours are presented overlaid on OS maps and changes in populations exposed are reported in tabular form.

6.	**Emissions**	**Status**
6.1	**Has the impact on CO_2 emissions been adequately assessed?**	Yes

Yes, CO_2 emissions have been assessed in detail using the outputs from fast-time simulations to provide aircraft flight trajectories for fuel burn calculation using NATS's KERMIT fuel burn. The assessment is based on an aircraft's height, speed and phase of flight and takes into

account the full flight in order to capture that aircraft switched to the CLN SID will climb to cruise altitude more rapidly (due to less time spent in level flight at low altitude) and then spend longer in cruising flight, where an aircraft is operating most efficiently. Fuel savings, however, occur in UK airspace and a result of continuous climb to cruise altitude.

NATS estimate that the fuel savings per flight will be in the range of 120-205 kg, the variation being principally dependent on the size and type of aircraft, the runway direction used. Flights departing runway 22 on the CLN SID having a 2 nm longer track distance that reduces some of the fuel savings associated with the more efficient climb profile. In contrast, departures from runway 04 benefit from both a reduction in track distance flown of approximately 6nm and a more efficient departure climb profile, giving larger fuel savings.

In aggregating the savings, NATS adopted conservative values of 100-200 kg, and has taken account of the approximately 10 percent of flights on the DET SID that are given an efficient departure climb profile on a tactical basis. The aggregated annual fuel savings are estimated to be in the range of 2,000-4,000 tonnes (2012 +20% traffic) and 2,300-4,700 tonnes (2012 +40% traffic), which are consistent with the per flight savings and the number of flights on DET SID that would benefit from the change of SID. These equate to CO_2 savings of 6,400-12,700 tonnes (2012 +20%) and 7,400-14,900 tonnes (2012 +40%) respectively.

Using EUROCONTROL's BADA aircraft fuel burn calculation model and independent information on the number of aircraft operating on the DET SID we find fuel savings at the lower end of NATS's estimates, the principle difference being that NATS's estimates assumed a 50/50 split of operations between runways 04 and 22, whereas the the long-term 20 year average is 29%/71%. The sponsor subsequently reflected a 30/70 split in runway usage in the updated fuel and CO_2 assessment it prepared as part of the Bridging ACP.

6.2	**Has the impact on CO_2 emissions impact been adequately presented in the consultation and the submitted proposal?**	Yes

Yes, the consultation document explains how the traffic interactions reduce the efficiency of the DET SID and increase fuel burn and CO_2 emissions. By switching departing traffic to the CLN SID, more efficient flight profiles lead to savings in fuel burn and CO_2 emissions compared to the inefficient DET SID.

7.	Local Air Quality	Status
7.1	**Has the impact on Local Air Quality been adequately assessed?**	Yes

The proposal is not linked to any anticipated changes in traffic volumes, nor would it result in any changes to the location of aircraft below 1,000ft, thus it is not predicted to have any impact on local air quality.

Equally, there is no Air Quality Management Area close to the airport or beneath the initial flight path. For these reasons, the proposal is very unlikely to have any adverse impact upon local air quality and on that basis no assessment has been undertaken. This is reasonable based on the circumstances of this proposal.

7.2	**Has the impact on Local Air Quality been adequately presented in the consultation and the submitted proposal?**	Yes

Both the consultation and the proposal consider the impact upon local air quality, and conclude that no adverse impact is likely and therefore that no assessment is necessary. As noted in 7.1 above, this is an adequate and reasonable approach for addressing the local air quality impact for this proposal.

8.	**Tranquillity**	**Status**
8.1	**Has the impact on tranquillity been adequately considered?**	Yes

Yes – this is covered further under Section 12.1 below, but in brief the sponsor has adequately considered the possible impact upon tranquillity.

8.2	**Has the impact on tranquillity been adequately presented in the consultation and the submitted proposal?**	Yes

Yes – this is covered further under Section 12.1 below, but in brief the sponsor's consultation adequately considered the possible impact upon tranquillity.

9.	**Visual Intrusion**	**Status**
9.1	**Has the impact of visual intrusion been adequately considered?**	Yes

Yes – this is covered alongside tranquillity and impact on Areas of Outstanding Natural Beauty. Since the proposal increases the height between 4,000 and 7,000 feet, the sponsor proposes that the proposal will have a net reduction on visual intrusion. We consider this to be a reasonable conclusion.

9.2	Has the impact of visual intrusion been adequately presented in the consultation and the submitted proposal?	Yes

Yes – the sponsor presents maps showing the area where aircraft will no longer be flying between 4,000 and 7,000 feet on the DET SID.

10.	Biodiversity	Status
10.1	Has the impact upon biodiversity been adequately considered?	No

No – however the proposal is unlikely to have any impact on biodiversity.

10.2	Has the impact upon biodiversity been adequately presented in the consultation and the submitted proposal?	No

No – see above.

11.	Continuous Descent Approaches	Status
11.1	Has the implementation of, or greater use of, CDAs been considered?	No

No – the proposal only affects departures and so will have no effect on the use of CDAs.

12.	Impacts Upon National Parks and/or AONBs	Status
12.1	Does the proposed change have an impact upon any National Parks or Areas of Outstanding Natural Beauty (AONBs)?	Yes

Yes, there will be an impact but this is expected to be a positive impact. The proposal would avoid aircraft on the DET SIDs overflying the Kent Downs AONB. Although the CLN SIDs are nearby the Dedham Vale and Suffolk Coast and Heaths AONBs, the proposal would not lead to any overflight and thus there would be a net decrease in overflight of AONBs associated with the proposal.

13.	Traffic Forecasts	Status

13.1	Have traffic forecasts been provided, are they reasonable, and have these been used to reflect the future impact of the proposal?	Yes

Yes, the assessment considered the impact of the proposal alongside forecast growth of 20 and 40 percent respectively, representing 2016 and 2020 timeframes. The forecasts are not direct scaling of the current fleet, reflecting some anticipated changes in airlines and aircraft types.

14.	Consultation	Status
14.1	If undertaken, has evidence of non-aviation stakeholder consultation been provided?	Yes

Yes, a joint consultation was prepared by the sponsor, NATS and Stansted Airport Ltd. The consultation was primarily undertaken through the Stansted Airport Consultative Committee (STACC), however it was published and available for members of the public and interested parties to respond to. The Sponsor provided a consultation feedback report summarising numbers of organisations and individuals who responded to the consultation and the themes on which they responded.

14.2	Has account been taken of the results of the environmental factors raised by consultees or has evidence been provided to indicate why this has not been possible?	Yes

The predominant theme raised by consultees was noise and tranquillity concerns. Whilst many of these were from areas under the CLN SIDs that will be overflown more often, a number of responses were from locations not overflown by the CLN SIDs. Within the noise and tranquillity concerns were requests to amend the ground track of the CLN SIDs to avoid specific individual locations. The Sponsor makes the case that this would have significantly added to the complexity of the proposal and therefore deemed it out of scope, but does offer that the case for amending the CLN SIDs ground tracks will be considered at Phase 2 of the London Airspace Management Programme (LAMP).

With regard to the CO_2 emissions saving, several consultees challenged the rationale in the context of it being reported by some stakeholders that the savings amounted to around 1% of the airport emissions. The sponsor clarified that the emissions savings represent around 6% of the total emissions for the flights affected by the proposed change. The sponsor goes on to explain that the savings occur only on the portion of the flight in UK airspace, which would be a much higher percentage, though it is difficult to precisely quantify this, thus they estimated absolute rather than relative savings. This approach is reasonable and the sponsor has openly acknowledged the issue.

15.	Compliance with CAP 725	Status
15.1	**Have all environmental assessment requirements specified in CAP 725 been met, where applicable?**	Yes

Yes.

16.	Other Aspects	Status
16.1	**Are there any other aspects of the ACP, that have not already been addressed in this report, that may have a bearing on the environmental impact?**	No

No.

17.	Recommendations	Status
17.1	**Are there any recommendations for the Post-Implementation Review?**	Yes

Yes – Although the proposal is to transfer traffic from one existing SID to another existing one, where the expected grounds track to be flown are unlikely to differ significant from those already flown, the proposal acknowledges that it will increase the track distance flown for runway 22 departures. The actual track distance increase may be mitigated by tactical vectoring between BRAIN and Clacton when departures are expected to be vectored off the CLN SID towards ABTUM and KONAN. It is therefore recommended that the track distance flown by runway 22 departures is monitored for comparison against the current 22 DET SID for input to the Post Implementation Review.

18.	Government Approval	Status
18.1	**Is the approval of the Secretary of State for Transport required in respect of the environmental impact of the airspace change proposal?**	No

It is the CAA's view that the proposal does not lead to significant detrimental impact on the environment – the proposal provides a net reduction in CO_2 emissions. Whilst this is achieved at the consequence of noise being displaced from one SID to another, having considered the noise levels and the magnitude of the changes, our view is that these effects are not significant.

19.	Conclusions	
19.1	Can an overall environmental benefit be demonstrated (or justified/supported)?	Yes

Yes – the proposal will generate fuel and CO_2 savings, whilst resulting in no significant adverse aircraft noise impacts.

Outstanding Issues		
Serial	**Issue**	**Action Required**

Additional Compliance Requirements (to be satisfied by Change Sponsor)	
Serial	**Requirement**

Environmental Assessment Sign-off/Approvals			
	Name	**Signature**	**Date**
Environmental Assessment completed by (ERCD representative)			22 September 2015
Environmental Assessment approved by (Head of ERCD)			22 September 2015

Appendix 1 – Fuel & CO_2 Assessment for LAMP Phase 1 A

Explanatory notes on CO_2 assessment methodology

All figures in the following tables represent the change when compared with a "do nothing" scenario, with all other things being equal. They do not represent an absolute reduction.

The figures represent a fuel saving unless they are expressed as a negative (which represents a fuel increase).

The assessment method used for the LAMP Phase 1A CO_2 estimates calculated both an "enabled" fuel burn figure (which reflected the impact based solely of the theoretical flight-planned routes) and an "adjusted" fuel burn figure which sought to make an adjustment to reflect the fact that many aircraft fly routes that are shorter than their flight-planned routes because they are tactically vectored by Air Traffic Control.

Consultation for the various LAMP Phase 1A elements was undertaken by different sponsors depending upon the nature of the change (NATS, Stansted Airport, Gatwick Airport and London City Airport). However, not all elements that were consulted upon were progressed to become a formal Airspace Change Proposal. In particular, the majority of changes consulted upon in relation to aircraft operating at Gatwick Airport were not progressed and did not feature in the CO_2 assessment that was submitted to the CAA, other than some high-level changes for arrivals (the TIMBA STARs).

In addition to considering NATS' assumptions and methodology for its CO_2 analysis, in terms of assessing the adequacy of the resulting estimates, the impacts attributable to the Stansted Airport elements (Module A) were checked for reasonableness by the CAA. This determined that the sponsor's estimates were reasonable and was therefore used as an indicator that the estimates for the other Modules were also likely to be reasonable.

Key points from the Bridging ACP document:

The following points help to explain the methodology adopted by NATS to estimate the system-wide impacts on CO_2 emissions.

- The CO_2 emissions report is a full system analysis covering all of the LAMP Phase 1A modules. It was completed in January 2015 and is based on real time simulation modelling, taking into account the final proposed design both in terms of routes and procedural flight levels. It therefore represents the most up to date and complete analysis of the expected fuel and CO_2 impact of the Airspace Change Proposal (ACP) and supersedes analyses undertaken by the sponsors during the design process.
- The report estimates that in 2016 the change would result in enabled fuel savings of 15,600 tonnes, rising to 18,200 tonnes by 2020. This is an 'enabled' fuel benefit, which is a measure of the difference that the proposal will make to the "trip fuel" that airlines will plan for.

- In the current operation aircraft are tactically vectored by Air Traffic Control for reasons of safety and efficiency. This occurs in today's airspace and would also occur in the future.
- Tactical vectoring means that not all trip fuel that airlines load onto a flight is used, because the distance actually flown is usually less than that planned for. As CO_2 is only generated from fuel which is burnt, this can mean that the enabled fuel benefit is likely to overestimate the CO_2 benefit if a straight conversion from the enabled fuel is undertaken. Therefore the report describes and applies a method for adjusting the results to avoid, as far as is practicable, overestimating actual fuel burn and therefore CO_2.
- NATS, as the sponsor, recognises that there are elements of the fuel and CO_2 assessment methodologies that remain subject to assumptions, in particular when translating enabled fuel reduction into actual CO_2 reduction. It took account of these factors as far as possible, and therefore reduced the CO_2 benefits on the basis of a comparison of modelled and actual fuel for today's traffic. This comparison indicated that a reduction of 21% to reflect the difference between enabled fuel and actual fuel was reasonable.
- The adjusted CO_2 estimate was a 39,400 tonne saving in 2016; rising to 46,000 by 2020 (this is adjusted down by 21% from the equivalent 'enabled' benefit).
- However, the dynamic nature of the air traffic environment both in terms of day-to-day operation and the long term effects of increasing traffic and technological advancement, mean that a degree of uncertainty remains and to account for this uncertainty NATS applied a range to the reported results in the ACP.
- The lower end of the range was not scientifically derived; it is simply 50% of the calculated value. However, it was NATS' view based upon its own operational and analytical experts that, as the calculated value represents "as close an approximation to the required adjustment as can be achieved, and then the lower end of the range more than covers the remaining uncertainty, and presents a sufficient benefit contributing to the overall justification for change."
- When applying this lower limit of 50%, the range of CO_2 reductions estimated by NATS for the entirety of LAMP Phase 1A are:
    - For 2016 = 19,000 to 40,000 tonnes
    - For 2020 = 23,000 to 46,000 tonnes
- It was noted that within the overall result there were some specific routes for which there will be a negative fuel/CO_2 impact, i.e. an increase. However, because these are the less-frequently-used routes, the net negative CO_2 impact is negligible when taken in the context of the overall estimated system benefit that is derived from the combined impacts of the LAMP Phase 1A modules.

Predicted Annual Saving on Fuel (2016) – tonnes

		Consultation	Module ACP	Bridging ACP (Table 52 – "Enabled" Fuel)	Bridging ACP (revised for runway split – Table 52 – "Enabled" Fuel)[1]	Further adjustment by CAA ("Enabled" Fuel)
Module A - Stansted	Base case	2,000-4,000	2,000-4,000	5,131	4,271	4,298
Module B – London City Replications	Base case	0	0	0[2]	0[2]	0[2]
Module C – London City Network (plus Gatwick & Southend)	Base case	Part E = 2,500-5,000 for LCY Additional 5% for Biggin Hill = 125-250 (same figures quoted in Part F and Part G) No CO_2 assessment for Southend, therefore no benefit claimed in consultation but negligible impact expected.	No figures stated – but cross-reference to the figures in the Bridging ACP	LCY = 4,632 Gatwick (TIMBA STARs) & Southend = 4,229 **Total = 8,861[2]** (no separate figures for Biggin Hill)	LCY = 4,136 Gatwick (TIMBA STARs) & Southend = 3,980 **Total = 8,116[2]** (no separate figures for Biggin Hill)	LCY = 4,082 Gatwick (TIMBA STARs) & Southend = 3,959 **Total = 8,041[2]** (no separate figures for Biggin Hill)
Module D – Luton & Northolt	Base case	No consultation undertaken	No figures stated – but cross-reference to the figures in the Bridging ACP	1,854	1,836	1,815
Module E – South Coast (Farnborough, Southampton, Bournemouth)	Base case	Figures for 2015: Farnborough = -1,400 Southampton = -102 Bournemouth = -9	-248	-248	-252	-265
Total	**Base case**	**3,114-7,739**	**7,835-9,835**	**15,598**	**13,971**	**13,889**

[1] The original assessment presented in the Bridging ACP had assumed a simple runway usage of 50/50. This was subsequently revised during the CAA's consideration of the LAMP Phase 1A proposals to a more realistic 70 westerly/30 easterly runway usage, and the CO_2 assessment was modified by the sponsor to reflect this.

[2] The CO_2 impacts from London City that are reported in the Bridging ACP do not distinguish between those from the Replications (Module B) or the Network (Module C) and so the entire figure for London City is reflected in this table as being Module C.

Predicted Annual Saving on Fuel (2020) – tonnes

		Consultation	Module ACP	Bridging ACP (Table 52 – "Enabled" Fuel))	Bridging ACP (revised for runway split – Table 52 – "Enabled" Fuel)[1]	Further adjustment by CAA ("Enabled" Fuel)
Module A - Stansted	Base case	2,300-4,700	2,300-4,700	5,941	4,970	4,932
Module B – London City Replications	Base case	0	0	0[2]	0[2]	0[2]
Module C – London City Network (plus Gatwick & Southend)	Base case	Part E = 3,000-5,900 for LCY Additional 5% for Biggin Hill = 150-295 (same figures quoted in Part F) Part G= 2,900-5,800 for LCY No CO_2 assessment for Southend, therefore no benefit claimed in consultation but negligible impact expected.	No figures stated – but cross-reference to the figures in the Bridging ACP	LCY = 6,255 Gatwick (TIMBA STARs) & Southend = 4,252 **Total = 10,507[2]** (no separate figures for Biggin Hill)	LCY = 5,648 Gatwick (TIMBA STARs) & Southend = 4,381 **Total = 10,029[2]** (no separate figures for Biggin Hill)	LCY = 5,514 Gatwick (TIMBA STARs) & Southend = 4,356 **Total = 9,870[2]** (no separate figures for Biggin Hill)
Module D – Luton & Northolt	Base case	No consultation undertaken	No figures stated – but cross-reference to the figures in the Bridging ACP	2,177	2,156	2,170
Module E – South Coast (Farnborough, Southampton, Bournemouth)	Base case	Figures for 2019: Farnborough = -1,700 Southampton = -113 Bournemouth = -10	-400	-399	-402	-418
Total	**Base case**	**3,627-9,072**	**8,329-10,729**	**18,226**	**16,753**	**16,554**

[1] The original assessment presented in the Bridging ACP had assumed a simple runway usage of 50/50. This was subsequently revised during the CAA's consideration of the LAMP Phase 1A proposals to a more realistic 70 westerly/30 easterly runway usage, and the CO_2 assessment was modified by the sponsor to reflect this.

[2] The CO_2 impacts from London City that are reported in the Bridging ACP do not distinguish between those from the Replications (Module B) or the Network (Module C) and so the entire figure for London City is reflected in this table as being Module C.

Bridging ACP – Total Estimated CO_2 Reduction (tonnes)

These CO_2 figures are taken or derived from the Bridging ACP submitted to the CAA as part of LAMP Phase 1A Airspace Change proposal.

The "revised" figures represent the revision made by the sponsor to switch from a 50/50 runway usage assumption to a 70/30 usage assumption.

The "CAA adjusted" figures represents small adjustments made for roundings and other small inconsistencies in calculation.

A conversion figure of 3.18 has been used to convert fuel into CO_2 .

			2016	2020
Based on Estimated Enabled Fuel Saving	Base case	original proposal	49,600	57,962
		revised proposal	44,428	53,278
		CAA adjusted total	44,167	52,642
	High case	original proposal	55,314	62,566
		revised proposal	49,662	57,488
		CAA adjusted total	-	-
Based on Estimated Actual Fuel Saving (i.e. adjusted for a 21% reduction from Enabled)	Base case	original proposal	39,368	46,006
		revised proposal	35,263	42,287
		CAA adjusted total	**34,892**	**41,587**
	High case	original proposal	43,903	49,659
		revised proposal	39,418	45,629
		CAA adjusted total	-	-

Based on the above results, we would conclude that the approximate annual benefit (i.e. reduction when compared with a "Do Nothing" scenario) in CO_2 emissions as a result of the combined LAMP Phase 1A changes would be approximately **34,900 tonnes of CO_2 in 2016 and 41,600 tonnes in 2020**.

In acknowledging the fact that these estimates incorporate a number of assumptions derived from operational experience, NATS proposed a range of CO_2 impacts which set the lower limit at 50% of the derived estimate. (See the methodology notes at the start of this Appendix.) Applying the same 50% reduction to the figures in the table above in order to obtain a range, the result is:

- For 2016 = 17,450 to 34,900 tonnes of CO_2 saved
- For 2020 = 20,800 to 41,600 tonnes of CO_2 saved

If this lower limit was used as a pessimistic assumption for the estimated CO_2 saving, then the combined LAMP Phase 1A changes would be approximately **17,450 tonnes of CO_2 in 2016 and 20,800 tonnes in 2020**.