Title of Airspace Change Proposal	**London City Network – Module C of London Airspace Management Programme (LAMP) Phase 1A**
Change Sponsor	**NATS Enroute Ltd**
SARG Project Leader	[redacted]
Case Study commencement date	**17 Feb 2015**
Case Study report as at	**21 Aug 2015**
Report Reference	**SARG/ERCD/AG/London City Network LAMPV3.1**

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 proposal to introduce changes above 4,000ft for arrivals and departures for London City Airport, plus subsequent changes to certain arrivals for Biggin Hill, Gatwick and Southend airports.

The key objective is to implement a Point Merge system for London City arrivals, and to enable more efficient departures for airport.

The Airspace Change Proposal (ACP) has been submitted by NATS Enroute Ltd and it forms Module C of Phase 1A of the London Airspace Management Programme (LAMP).

This assessment is based upon information presented in the proposal document entitled "LAMP Phase 1A, Airspace Change Proposal – Module C, London City Network Changes" (Issue 2.0, March 2015), plus associated consultation material and subsequent information received (from either the sponsor or NATS) 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 sets[1] 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 objective of this Module of the LAMP Phase 1A ACP is to "introduce a new, more efficient, system of RNAV routes to replace the current conventional procedures." The proposed changes aim to deliver "improved systemisation on the network, leading to more predictable flight trajectories that will deliver optimised descent and ascent flight profiles and reductions in the number of track miles flown, generating environmental benefits, principally through reducing noise exposure, fuel consumption and carbon emissions".

The changes seek to improve environmental and operational efficiency for London City arrivals, and its departures to the south by improving approach sequencing through the implementation of an RNAV1 "Point Merge" system with dedicated contingency holds over the sea, and realigned RNAV1 SIDs heading towards DVR and LYD. To achieve this, changes are also proposed for some Biggin Hill arrivals which share the London City arrival route structures for flight planning purposes, and also for Gatwick and Southend STARs that cross the area of the proposed Point Merge structure.

In particular, the following extracts from the proposal provide greater detail:

- "The proposed point merge structure over the Thames Estuary would provide a more systemised method for sequencing the inbound aircraft with greater accuracy. At the same time this will position the flights over water, and hence reduce the noise impact on the population of Kent."
- "Vectoring by ATC will only necessary for sequencing (using the Point Merge features) and for giving shortcuts, when traffic levels permit. At the network level the new RNAV arrivals & departure procedures will enable the ATC network to operate more efficiently, in a much more systemised manner."
- "The RNAV replication of the lower altitude portions (below 4,000ft) of the conventional procedures, enables the higher level network to be seamlessly linked to the airport by contiguous procedures. This permits the many benefits of RNAV for the higher altitude portions to be secured, whilst keeping the changes in the noise-sensitive lower altitude portions to an absolute minimum." [The replication of London City routes below 4,000ft are addressed in Module B, which has its' own CAA Annex E report.]
- "The improved systemisation of the network, combined with the RNAV replication of the portions below 4,000ft, enables environmental benefits such as facilitating improved descent profiles, reducing track mileage through more efficient sequencing using point merge."
- "The introduction of RNAV1 procedures is further justified by the requirement to conform to European legal requirements and proposed CAA mandates as detailed below. Approximately 70% of aircraft flying from London City are equipped to fly RNAV routes; the remainder still rely on conventional navigation. We therefore propose to accommodate aircraft which are not capable of using RNAV1, until such time as RNAV1 is fully adopted. The CAA is planning to mandate that from 9th November 2017 an RNAV1 operations approval or equivalent

authorisation is required for all IFR GAT flights inbound and outbound to/from the major London airports. Furthermore all airports in the London area must replace conventional procedures by November 2019. After implementation of the RNAV routes at London City (planned for December 2015) the majority of those aircraft which are approved for RNAV1 will use the new routes. There will then be a transitional period to 2017, where the remaining airlines progressively transition to full RNAV1 operations. The conventional procedures will be withdrawn after November 2019."

Altitude-based priorities for environmental impacts

Whilst the consultation document makes it clear that the 2002 version of the DfT's Air Navigation Guidance was the extant basis for developing the airspace change proposals, it also adds further detail about the priorities used in that development. These are copied below and they closely mirror the altitude-based priorities that were set out in the 2014 version of the Air Navigation Guidance (published 8 Jan 2014).

- in low altitude airspace below 4,000ft, the priority should be to minimise aviation noise impact, and the number of people on the ground significantly affected by it
- in intermediate airspace from 4,000ft to 7,000ft, the focus should continue to be minimising the impact of aviation noise, but this should be balanced with the need for an efficient flow of traffic that minimises emissions
- in network airspace above 7,000ft, the priority is efficiency, and to minimise the global environmental impact of aviation (i.e. CO_2)
- where practicable, and without a significant detrimental effect on efficiency or noise impact on populated areas, air routes below 7,000ft should be avoided over Areas of Outstanding Natural Beauty (AONBs) or National Parks
- where two options are similar in terms of their effect on densely populated areas, the value of maintaining legacy arrangements should be taken into consideration

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

The sponsor sets out the aim of this set of changes in the proposal document as follows:

- "The proposed changes described herein, are to portions of the London City Airport and Biggin Hill arrival and departure routes above 4,000ft. Fifteen new STARs and six new arrival transitions will be introduced to facilitate RNAV1 arrival connectivity between the enroute airway structure and London City and Biggin Hill Airports. Five STARs to Gatwick will be realigned, and seven new STARs to Southend Airport will be introduced.

- Six SIDs from London City are replicated along their entire length, ending at CLN, BPK and CPT VORs. For departures to the south, the six conventional SIDs to SAM, DVR & LYD are replaced by two RNAV SIDs to EKNIV."

One of the intended benefits is to reduce the need for "low-level" flying by arriving aircraft over parts of Kent and Essex. In this instance, "low-level" is 3000-4,000ft. This flying results from the need to sequence arriving aircraft which means that they are often vectored by Air Traffic Control (ATC). The sponsor explains that this method is ad-hoc, and techniques can vary between ATC watches and individual controllers. This introduces complexity which limits the system's maximum capacity, and can result in delays when traffic levels are high.

In detail:

- For arrivals at London City Airport the proposed design is based on a Point Merge structure positioned over the Thames Estuary. This will be used to sequence the arrivals to the airport. New contingency holds will be introduced at OKVAP (to the south, over the English Channel), GODLU (near Dover) and JACKO (to the north over the English Channel). Fifteen new STARs and six new arrival transitions will be introduced to facilitate RNAV1 arrival connectivity between the enroute airway structure and the airport. There are six STARs from the north, entering the point merge via JACKO, and nine from the south entering the point merge via GODLU.
- It is proposed that Biggin Hill airport arrivals will also use the same STARs and Point Merge system.
- For departures from London City Airport, the proposed RNAV1 SIDs are replications of the existing conventional SIDs up to the points defined in the LAMP ACP Module B (London City RNAV Replications). Six SIDs are replicated along their entire length, ending at CLN, BPK and CPT VORs. For departures to the south, the six conventional SIDs to SAM, DVR & LYD are replaced by two RNAV SIDs to EKNIV; Module B of the LAMP Phase 1A covers their replication up to 4000ft, while the realignment of the tail from 4,000ft upwards is covered in this Module.
- Five TIMBA STARs to Gatwick are also subject to change and new STARs are introduced for Southend from the South and East.

Changes to the extent of controlled airspace (CAS) are required over the Thames Estuary to accommodate the Point Merge structure for arrivals, and requires the lowering of the CAS base in some areas. The sponsor has also taken the opportunity to review existing CAS and as a consequence proposes to raise the base in another area, and also simplify boundaries in a further area. Whilst much of these changes to CAS occur over the sea, there is a sliver for Point Merge arrivals that lowers CAS from FL65 to 5,500ft over Kent (see Area C in Figure 6 in the proposal document) and in particular an area of the Kent Downs AONB.

Not all aircraft operating at London City Airport are RNAV1 capable, and so the conventional procedures will remain available for use for those aircraft/crews that are not RNAV1 equipped/certified. ATC will be aware of traffic that is not RNAV1 capable and this traffic will be

sequenced accordingly, using ATC vectoring. The aircraft will be vectored along the same tracks as the RNAV traffic (with slightly broader tolerances) and will be manually merged into the sequence of other arriving aircraft.

Tactical Usage

The sponsor explains that:

- In practice, flights on all of the STARs will often be under tactical control. This will lead to a spread of traffic around the promulgated routes. Tactical intervention is expected to lessen as a result of RNAV, however, interaction with other flights will mean that tactical intervention on STARs will still be commonplace. Particularly in the time period before the rest of the TMA is modernised to the RNAV1 standard.
- To maximise efficiency, flights will often be tactically vectored direct from the holding points to the merge point. In the case of the GODLU hold this would take London City arriving traffic across Kent to the Thames Estuary.
- While Biggin Hill arrivals will flight plan via the Point Merge system, they may often be given direct routes from the southern hold towards Biggin; therefore covering a broad swathe over Kent. The sponsor advises that this is effectively no change from the tactical routings used today. London City flights may occasionally also be given similar direct routes; however this would not normally be expected.

Consultation Documents

The consultation used a number of documents (and Appendices), in order to reflect the different elements of the change.

- Part A – Introduction
- Part B – Proposed changes in the vicinity of Gatwick Airport below 4,000ft
- Part C – Proposed changes to London Gatwick Routes between 4,000ft and 7,000ft over parts of Hampshire, Sussex, Surrey and Kent
- Part D – Proposed changes to London Gatwick Routes above 7,000ft over parts of Hampshire, Sussex, Surrey and Kent.
- Part E – Proposed changes to London City and Biggin Hill Routes between 4,000ft and 7,000ft over parts of Essex and Kent.
- Part F – Proposed changes to London City, London Biggin Hill and London Southend Routes above 7,000ft over parts of Kent, Essex and Suffolk.
- Part G – Justification and Further Detail for Proposed Changes including Effects on Aviation

The proposed changes within Parts B, C & D were not progressed following consultation, and so only Parts A, E, F & G are relevant for this report.

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

Options were considered and these took account of environmental factors.

The option to "do nothing" and maintain the current conventional SIDs and arrival transitions would work in the short term. However, doing nothing would not enable the improvements set out in Section 3 above, and would not fulfil the mandate for the introduction of RNAV procedures, which has to be complied with by 2019. Therefore, to enable a benefit now and to comply with the upcoming regulatory mandate, the 'do nothing' option was discounted by the sponsor.

Part of the rationale for discounting the "Do Nothing" option was that it would not deliver environmental benefits. In addition, the development of the final design following the consultation took account of environmental factors when considering consultees' feedback. In broad terms, options for the network design balanced environmental factors in accordance with the altitude-based priorities (noted in 3.1 above) such that CO_2 benefits were the key objective for aircraft above 7,000ft whilst noise impacts were taken into account below 7,000ft where possible.

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

In the consultation document, the sponsor explained that it was unable to model and portray noise contours (L_{eq}) and noise footprints (SEL) even though these are normally a requirement specified in CAP725 because at that stage there were no defined centrelines/tracks with which to model either contours or footprints (they cannot be calculated from a consultation swathe). The sponsor acknowledged and accepted that if the final design that was submitted to the CAA changed the shape of a noise contour or footprint they would initiate further public consultation covering areas affected by the newly measured impacts.

The final designs (as submitted in the proposal) are such that they would have no impact upon either the L_{eq} contours or the SEL footprints at London City Airport. In the case of L_{eq} contours, they are not required for the proposed changes submitted in this Module as the changes are all above 4,000ft (aircraft at that height and above would not have any impact upon a 57 dBA L_{eq} contour).

SEL footprints would normally be required (under CAP725) because some of the changes are below 7,000ft and within 25km of an airport. However 80dBA SEL footprints were not produced. Prior to consultation the CAA agreed with the sponsor that the "proposed corridor" (consultation swathe) diagrams, could be used as an alternative to 80dBA SEL footprints, and the final designs as submitted to the CAA have not changed the impacts from those portrayed in the consultation by these swathes.

L_{max} data was presented in the consultation documents to illustrate the maximum noise impact of a typical over-flight at various heights. This information was accompanied by:

- Estimates of the maximum number of aircraft that could be overhead (as an hourly average). These estimates are a pessimistic prediction as it is unlikely that all affected flights would be directly above the same locations.
- The percentage of aircraft that are represented by the most frequent aircraft type and the noisiest type.
- Comparative noise levels for a range of other non-aviation noises, e.g. a busy road.

(An example of a table used in the consultation material.)

Aircraft type	% of flights	7,000-8,000ft	11,000-12,000ft	15,000-16,000ft
Typical Departure E190/E170[28]	29.1	56 dBA	<55dBA	<55dBA
Noisiest Departure A318	1.5	58-59dBA	56dBA	<55dBA

Table F5: Typical Noise (L_{max}) at various heights[29]

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

In the consultation, the sponsor explained that no definite routes had been finalised (routes would be finalised once consultation feedback was considered) and therefore the nature of the presented noise information reflected that a route could potentially be within a broad area (or "swathe"). The aim of the information was for readers to understand the potential impact if a route was placed anywhere within the portrayed swathe. The swathes also portrayed the altitude bands for aircraft within the swathe. To this end, information on the scale of the potential noise impact was presented alongside or within the maps that illustrated the swathes, as outlined above in Section 5.1.

No 80 SEL footprints were presented – instead, as agreed with the CAA prior to consultation, swathe diagrams/maps (as noted above) were used to illustrate potential noise levels and likely areas in which routes would be located. This conveyed similar information without having to restrict options for the location of the final routes.

CAP725 requires that 90 SEL footprints are provided if a proposal makes changes to aircraft routes below 7,000ft and within 25km of the airport. However, if a sponsor can adequately demonstrate that despite falling within these criteria their proposed change will have no impact upon the 90 SEL footprints then it is acceptable and reasonable to forego the need to produce such footprints. In the case of this Module, the sponsor has provided such evidence, making a case that this proposal would only change routes far beyond the likely boundary of a 90 SEL footprint – for both departures and arrivals.

The proposal document itself says very little about the noise impacts other than to confirm why L_{eq} contours were not required, and to explain why the swathes used in the consultation are alternatives for the SEL footprints, but it does cross-refer to the accompanying Consultation Design & Feedback Report which sets out the considerations made in finalising a network design.

Key points from "Design Report Following Consultation Feedback on Route Network (above 4,000ft) over Sussex, Essex and Kent"

- The title fails to mention Suffolk, though flights over that county are considered in the report.
- The report confirms that the changes at Gatwick which were contained within the consultation are not proceeding at this time.
- Emphasises that the design as a whole, and the benefits had to be considered in addition to individual elements.
- The implementation of Point Merge would mean that arrivals that currently fly at lower altitudes over parts of east London, Essex and Kent would instead be positioned in an orderly stream coming in over the Thames Estuary. This would keep the arrivals higher for longer, and reduce the time currently spent by arrivals overflying populated areas at low altitudes. Aircraft arriving at the outer arc of Point Merge will be at 9,000ft or above.
- Two new holds - one over the sea to the north of Point Merge, the other to the south of Point Merge, over the Eastern coast of Kent in the vicinity of Dover. Aircraft using this hold would circle at 10,000ft or above; this is compared to today's practice of absorbing delay by extending flight paths at 3,000-4,000ft over East London and neighbouring parts of Essex and Kent. This hold cannot be moved further south or east due to a possible conflict with a French/Belgian military zone, and to move it north east would increase the track mileage for arrivals (as this traffic is above 7,000ft, the priority environmental impact is to minimise fuel burn and CO_2 emissions).
- The route from the western apex of the Point Merge towards the airport keeps aircraft over the water rather than land for as long as possible and will reduce the volume of traffic that currently arrives over southeast Essex and over Kent.
- London City Arrivals from the North - the issue of arrivals from the north over Suffolk and particularly Dedham Vale, Stour and Orwell is detailed in Appendix 2 of this report. The conclusion is that whilst consideration has been given to avoiding the AONBs in this area to the greatest extent possible, the expectation is that this proposal will result in an average of two additional aircraft per hour over this vicinity, at typical heights of 12,000ft. Any noise impact at from these aircraft will not be significant, though they may be perceptible by some individuals on the ground.
- London City Arrivals from the South - this traffic currently follows a track that passes Folkestone, Ashford and Maidstone, roughly tracking the south western boundary of the Kent Downs AONB. Flights on this route are descending towards 3,000-4,000ft where they are often required to fly extended tracks in order to wait for a landing slot. Flights on the proposed route would be much higher over Kent, typically at 12,000ft and always above 10,000ft. Arrivals from the south would cross the coastline in the vicinity of Dover and head to the Point Merge system via the new southern hold. Arrivals on the lesser used route from the west would follow a track from the Maidstone area to join the main flow from the south near Dover, also typically at 12,000ft. As a result of these changes the Kent Downs AONB and the towns

along its fringe should experience a reduction in lower altitude overflights. Aircraft may occasionally be given direct routes by air traffic controllers, similar to those used today – this is more likely for Biggin Hill arrivals.

- London City Departures - The proposal includes changes above 4,000ft on the London City Airport departure routes to the south and south east that exit UK airspace via Kent. The proposal would not change Biggin Hill departures. Because of the proximity of Heathrow, London City departures to the south and south east initially turn north on take-off. They then turn east to cross the M25 in the vicinity of Junctions 28 and 29. From here they turn towards the south east in a broad swathe. Today, these departures are generally held at low altitudes, below 7,000ft, until they have crossed the Thames Estuary. This is because they are beneath a stream of Stansted departures also heading south east. As a separate part of LAMP Phase 1A NATS is removing this Stansted traffic flow (Module A) so that instead of passing over the London City arrivals and over the Thames Estuary, they would fly east and turn south much later. This would allow the London City departures to climb higher whilst over Essex. This earlier climb is not only good for reducing local impact (e.g. noise), it is also vital to enable them to climb to at least 7,000ft so they can cross the Point Merge system for arrivals descending along the Thames Estuary. In order to ensure that all flights have time to make 7,000ft before making the turn south, the new route would have to track further east than today. The route overflies the southern edge of Brentwood; an alignment further south was not possible because the eastbound segment cannot be positioned pointing towards the arrivals that will be descending along the estuary. On passing Brentwood, the route has been positioned to best avoid direct overflight of populated areas, i.e. south of Billericay and Wickford, north of Basildon and west of Rayleigh. All flights would be above 7,000ft by the turn south over Canvey Island. This new route is designed to ensure the system is safe for the slowest climbing aircraft. In reality, most aircraft would reach 7,000ft earlier, at which point they may be turned south east. This would result in a broad swathe, much as today, albeit higher and shifted slightly to the east.
- Gatwick Arrivals - traffic from the east currently follows a route that brings it from the Thames Estuary towards Maidstone, from where it turn south to join the existing Gatwick hold at 7,000ft. This route would be too close to the proposed route structure for the London City and Biggin Hill arrivals, and so the proposal seeks to realign this Gatwick arrival route so that it turns away from the Point Merge at an earlier point. This also means the route is more direct and can stay higher for longer making it more fuel efficient. Aircraft on the proposed route would typically be around 13,000ft, descending to 7,000ft by the hold. This traffic currently crosses both the Kent Downs and High Weald AONBs, and will continue to do so but would be shifted further eastwards and would typically be higher than today.
- Southend Arrivals – this traffic from the south currently approaches the airport on the west side of the Shoeburyness Danger Area, descending over Kent. Under this proposal the Southend arrivals would instead descend over the sea to the east of the Shoeburyness danger area.

In general the final designs and routes that are outlined in the proposal (and summarised above) will allow arriving aircraft to remain higher for longer, allow departures to climb sooner and reposition traffic over the sea where possible rather than over the land. All of these elements should reduce any noise impact experienced on the ground. However, it should also be noted that:

- The use of PBN technology may lead to an increase in concentration of traffic along departure and arrival routes. In this Module this is particularly relevant for the London City departures between 4,000-7,000ft. The new departure routes have sought to avoid communities as far as possible, but if traffic concentration occurs, some residents may still experience an increase in over-flights (even though these flights will typically be higher than they are currently).
- There will be an increase in flights above the region that includes Dedham Vale and Stour & Orwell. These are arrivals for London City and are expected to average two flights per hour at typical heights of 12,000ft. The noise impact of such flights is very unlikely to be significant, but may still be audible and as such could have a minor impact upon the tranquillity of that area.
- The repositioning of Gatwick arrivals and arrivals from the south into Point Merge mean that aircraft will be above different locations within the Kent Downs and High Weald AONBs. These aircraft currently already cross these AONBs and so the proposed change will move them laterally and also increase their height. All such flights will be above 7,000ft.

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

The consultation and proposal for each of the Modules contains details of their CO_2 impacts, and a combined CO_2 assessment is included in a "Bridging ACP" that was submitted in support of the LAMP Phase 1A proposals.

A summary of the impacts on CO_2 emissions from the LAMP Phase 1A Modules and the methodology is attached at Appendix 1.

The assessment of CO_2 emissions in the Bridging ACP does not include any reference to the affect on Biggin Hill arrivals. However this impact is likely to be both positive (a CO_2 reduction) and relatively small compared with the other CO_2 impacts.

For this Module, a reduction in CO_2 emission (compared with a "Do Nothing" scenario) is predicted – see the estimated annual totals in 6.2 below (and in Appendix 1).

The Bridging ACP contains the detailed analysis for the CO_2 emissions impact across all of the LAMP Phase 1A Modules, and it states (in Section 7 – Summary) that "Most of the savings come from changes to London City departures and arrivals". In fact, this is only the case for the 2020 estimate. For the 2016 estimate, Stansted departures account for a larger proportion of the combined CO_2 benefit than London City traffic. LCY accounts for 30% of the estimated benefit for 2016 and 34% for 2020. The largest contributor to the benefit for 2016 is that derived from Stansted departures (33%).

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

In the consultation (Part G) the sponsor explained that because final route alignments would not be established until after consultation they assessed the fuel benefit of a number of draft designs which provided an indication of the order of magnitude of the expected benefit. This was presented as a range of possible results rather than one figure, together with their stated hope of achieving benefits towards the high end of the range. However it was stressed that this would depend on design decisions after consultation, which would need to balance environmental and operational impacts. The estimate in the consultation was an annual total reduction of 2,500-5,000 tonnes of fuel (for London City traffic) plus 5% for Biggin Hill (125-250) for 2016. This equates to **8,350-16,700 tonnes of CO_2**. These figures do not include any impacts arising from the Gatwick elements of the consultation.

The proposal submitted to the CAA was based upon final designs, and cross-refers to the assessment within the Bridging ACP. Appendix 1 summarises this assessment, and the adjusted figure for 2016 for this Module is a reduction of 8,041 tonnes of enabled fuel, which converts to a reduction of 25,570 tonnes of CO_2. This reflects the impact of the London City Network changes, plus the associated changes for Gatwick arrivals and Southend that are covered by this Module. This figure is then adjusted to reflect the impact of tactical vectoring (a reduction of 21% for these Modules) to arrive at 6,352 tonnes of fuel and **20,201 tonnes of CO_2** for this Module.

Whilst the final estimate for this Module exceeds the estimate provided for the London City Network consultation, it is primarily because the final set of proposed changes incorporates CO_2 savings from the high-level changes for Gatwick arrivals (the TIMBA STARs). If the CO_2 impact solely attributable to London City traffic is considered, then the estimated enabled fuel saving for 2016 is 4,082 tonnes, which results in 12,981 tonnes of CO_2 which is within the range presented in the consultation. Once the adjustment for tactical vectoring is applied (the 21% reduction), these figures become 3,225 tonnes of fuel and 10,255 tonnes of CO_2.

The sponsor has then applied a further adjustment, as detailed in Appendix 1, to take account of the fact that the modelling of CO_2 impacts depends upon assumptions based upon operational expertise. To account for this, they have expressed a range of CO_2 savings by having a lower limit that is 50% of the estimate. Therefore, for this Module, that adjustment produces a range of CO_2 savings of **10,100 to 20,200 tonnes of CO_2** in 2016.

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

As all of the changes contained within this Module will be at 4,000ft or above and there is no anticipated growth in traffic as a direct result of the proposed changes, therefore will be no impact upon Local Air Quality (LAQ). No assessment of LAQ was required on that basis.

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

The relevant consultation documents (Parts E, F & G) make no reference to the issue of Local Air Quality however the proposal explains that as all aspects of this Module will only affect traffic at 4,000ft and higher, there will be no impact upon Local Air Quality (LAQ) and therefore no assessment was required or undertaken. This is a fair conclusion.

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

The potential for impact has been considered in both the consultation, the development of the design and the proposal submitted to the CAA.

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

The maps used in the Parts E & F of the consultation identified the AONBs relevant to the London City Network changes, plus the broad swathes where the final routes were likely to be and the expected heights of aircraft using those routes. In addition, both documents had specific sections that highlighted the issue of tranquillity and asked consultees to consider it.

In particular, Part F of the consultation shows the traffic swathes over the Dedham Vale area and a maximum daytime hourly average of 10 aircraft at typically 12,000ft.

The proposal notes that several AONBs are beneath the routes that have been submitted – making specific reference to the Kent Downs AONB and the High Weald AONB, but no direct reference is made to either the Dedham Vale AONB or the Suffolk Coast & Heaths AONB. Noise levels for any aircraft above an AONB as a result of this proposal are estimated by the sponsor to be below 59dBA L_{max}, based upon the typical altitudes of such aircraft. The accompanying "Design Report Following Consultation Feedback on the Network (above 4,000ft) over Sussex, Essex and Kent" does set out the consideration given to impacts upon tranquillity and visual intrusion when finalising the route design – both for traffic above the Kent Downs and High Weald AONBs, and the Dedham Vale and Suffolk Coast & Heaths AONBs. These impacts are already summarised in Section 5.2 above, and the anticipated impacts on the area around Dedham Vale are expanded in Appendix 2. For Dedham Vale, the final design expects there to be two additional aircraft on average per hour at typical heights of 12,000ft.

In light of the expected numbers of additional flights and the typical heights, it is useful to highlight two relevant paragraphs in the DfT's Air Navigation Guidance:

"8.2 Flights over National Parks and AONB are not prohibited by legislation as a general prohibition against over-flights would be impractical. Government policy will continue to focus on minimising the over-flight of more densely populated areas below 7,000 feet (amsl), but balanced with emissions between 4,000 and 7,000 feet (amsl), as set out in the altitude-based priorities in Chapter 4.1 of this Guidance. However, where it is practical to avoid over-flight of National Parks and AONB below 7,000 feet (amsl), the CAA should encourage this.

8.3 In line with the altitude-based priorities, the noise impact of flights above 7,000 feet (amsl) is unlikely to be significant and so no consultation is required on their noise impact at above this level."

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

The sense of visual intrusion is subjective – there is no accepted means to measure this impact or portray it. The potential for visual impact is remarked upon by the sponsors in both the consultation documents and the proposal (see 9.2 below).

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

The visual impact of aircraft and how the proposed changes are generally expected to improve that impact were outlined repeatedly through the consultation documents. In broad terms, with new routes enabling aircraft to stay higher for longer, to climb higher sooner or placing aircraft over the sea, the sponsor felt that the visual impact would be improved.

The proposal addresses visual intrusion as follows:

"Visual sighting of an aircraft will depend on a number of factors such as slant range of the aircraft, visibility and cloud cover, contrast against background and individual visual acuity. It will also depend on the type of activity in which the observer is engaged and whether the sighting is cued, either by detection of previous aircraft flying the same route, or by aircraft noise. The probability of visual sighting will be increased if an aircraft forms a contrail but it should be noted that meteorological conditions necessary for contrail formation (cold and humid air) rarely occur below 25,000 feet, so would not occur at the altitudes under consideration here.

Analysis completed using meteorological data indicates that approximately 25% of the time it would not be possible to achieve a visual sighting of aircraft at 4,000ft or above in this region due to cloud, mist, fog or haze."

This is a fair consideration of the potential for visual intrusion. It is a subjective perception and can be triggered by a number of factors. As such, any sense of visual intrusion will vary for each person and there is no accepted method for measuring or portraying any such impact. Whilst the proposal and consultation outline the extent of any flights directly over AONBs, a sense of visual intrusion could be created by aircraft that are actually some distance laterally from the AONB itself.

10.	Biodiversity	Status
10.1	**Has the impact upon biodiversity been adequately considered?**	Yes

The changes outlined in this Module will all be at 4,000ft or above. At these heights, it is extremely unlikely there will be any impacts upon biodiversity as a direct result of the changes.

10.2	**Has the impact upon biodiversity been adequately presented in the consultation and the submitted proposal?**	Yes

Whilst there is no reference to biodiversity in the consultation documents, the proposal notes that there will be no impact upon biodiversity. This is a fair conclusion considering the heights of any aircraft affected by this proposal (i.e. above 4,000ft).

11.	Continuous Descent Approaches	Status
11.1	**Has the implementation of, or greater use of, CDAs been considered?**	Yes

The implementation of Point merge for London City arrivals will enable more efficient (i.e. less stepped) approaches for aircraft.

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

The statutory purposes of National Parks are to conserve and enhance their natural beauty, wildlife, and cultural heritage and to promote opportunities for the understanding and enjoyment of their special qualities by the public. The statutory purpose of AONBs is to conserve and enhance the natural beauty of their area. In exercising or performing any functions in relation to, or so as to affect, land in National Parks and AONBs, the CAA is required to have regard to these statutory purposes under s.19 and Schedule 2 of the Civil Aviation Act 1982. This duty was re-stated in the revised Air Navigation Guidance issued in 2014.

This duty was also reiterated in the Aviation Policy Framework (March 2013) which stated "the CAA has legal duties to have regard to the purposes of National Parks and Areas of Outstanding Natural Beauty and must therefore take these into account when assessing airspace changes."

Whilst recognising this duty it is also true that flights over National Parks and AONBs are not prohibited by this legislation as a general prohibition against over-flights would be impractical.

Figure 8 in the proposal document shows the simulated traffic patterns for traffic arriving to the new JACKO hold. In particular, there is a flow of traffic arriving from the north west that crosses the Dedham Vale AONB, with most being at FL130 at that point (though a few as low as FL100).

Figure 9 in the proposal document shows the simulated traffic patterns for traffic arriving from the south to the new GODLU hold. In particular there is a flow of traffic at the hold (which sits above the eastern edge of the Kent Downs AONB, with traffic at FL100 in that location.

There are no National Parks beneath the proposed routes.

The potential for impact upon AONBs is commented upon in this report in Sections 5.2 & 8, and also in Appendix 2. Whilst the impact upon the Kent Downs and High Weald AONBs is expected to be positive, the sponsor does highlight that there may be a negative impact upon the Dedham Vale and Suffolk Coast & Heaths AONBs as a result of an addition of an average of two flights per hour. However, as already noted in this report, any such impact is likely to be minor as these aircraft will typically be at 12,000ft, plus current Government policy (the Air Navigation Guidance) makes it clear that a change to aircraft above 7,000ft over an AONB is not a significant impact.

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

The sponsor states that this proposal is not expected to have any influence on the rate of growth of traffic operating within the relevant airspace. For the purposes of the system-wide (LAMP Phase 1A) CO_2 analysis a level of growth has been assumed for the purposes of calculating CO_2 emissions for 2016 and 2020.

NATS traffic forecasts are specifically not based upon airport master plans. However this means that the forecasts used by NATS for their consultations within LAMP Phase 1A are typically more conservative than the forecasts used by any airport sponsors for their consultations.

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

The consultation for this proposal ran from 15 October 2013 until 21 January 2014, a period of 14 weeks.

Appendix D of the consultation documents lists a range of consultees, including many non-aviation organisations. In addition, consultation responses were received from members of the general public.

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 sponsor has considered the environmental factors raised by consultees, as evidenced by the "London Airspace Management Programme (LAMP) Stakeholder Organisations and General Public Consultation - Final Report (April 2014)" and the "Design Report Following Consultation Feedback on Route Network (above 4,000ft) over Sussex, Essex and Kent". Where these factors were relevant to the changes being proposed, they were considered and taken account of where possible.

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

All requirements have been met where applicable.

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?**	Yes

The introduction of RNAV SIDs and arrival transitions will change some CAS boundaries as noted previously in this report but the sponsor believes that these will not have an impact upon General Aviation (GA) activity other than a general reduction in the Class G available. Representatives of GA organisations were consulted via the NATMAC and have either supported or made no objection to the proposal. It is therefore reasonable to conclude that there are no anticipated impacts upon GA activity that are likely to then have an indirect environmental impact.

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

The sponsor to:

- Re-assess the impact on both L_{eq} noise contours and SEL noise footprints to determine if there has been any change with the pre-implementation impact as a result of the Airspace Change Proposal.
- Compare the routes and traffic patterns after implementation with the noise impact portrayed in both the consultation and proposal documents. This includes a comparison with the swathes, latitude bands, anticipated noise levels and frequency of flights that were used to portray the expected noise impact.
- Re-assess the annual CO_2 emissions impact based on actual traffic behaviour following implementation, including an appraisal of those assumptions that were based upon controller expertise, and the proportion of tactical vectoring in comparison to flight-planned ("enabled") fuel burn and emissions.

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

No – there is unlikely to be a significant detrimental environmental impact as a direct result of the changes proposed in this Module.

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

Whilst no overall environmental benefit can be demonstrated absolutely, it is reasonable to conclude that the positive impacts of this Module (e.g. substantial CO_2 reduction, general improvement in aircraft height and location which should have some positive noise impact) outweigh the potential negative impacts (e.g. any increase in overflights above 4,000ft for some locations as a result of concentration arising from RNAV, small increase in flights over the Dedham Vale area).

Noise:

- None of the changes in this Module will have an impact upon either L_{eq} noise contours (57dBA and above) or 90 SEL noise footprints.

- General improvement due to improved climb and descent profiles, and positioning routes over the sea where possible should reduce noise impacts. However, there may be possible negative impacts if traffic becomes concentrated due to RNAV (fewer people overflown in total but an increase in flights overhead for those beneath any such concentrations).

CO_2 Emissions:
The changes within this Module will enable a CO_2 reduction both on their own (estimated as ranging from 10,100 - 20,200 tonnes for 2016) and as part of the wider set of changes that form LAMP Phase 1A (estimated as ranging from 17,450 - 34,900 tonnes in 2016).

Local Air Quality:
All of the changes within this Module are at a height that would have no impact upon local air quality.

Tranquillity and Visual Intrusion:
For the Dedham Vale and Suffolk Coast & Heath AONBs the proposal recognises that there are expected to be additional aircraft above this area. However, this impact is expected to be minor – an average of two extra aircraft per hour at heights of typically 12,000ft and no less than 8,000ft. The impact on other AONBs south of the Thames Estuary (Kent Downs, High Weald) are likely to be beneficial such that whilst they will still be overflown, it will be at greater heights and with no increase in the number of such flights.

Biodiversity:
No impacts likely for the changes proposed in this Module which are all above 4,000ft.

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)			21 Aug 2015
Environmental Assessment approved by (Head of ERCD)			

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**.

Appendix 2 – Flights over Dedham Vale Area of Outstanding Natural Beauty (AONB)

General

This appendix considers the impact of the proposed changes in this Module on the Dedham Vale AONB and Suffolk Coast & Heaths AONB. The Stansted/Luton arrival route that was the issue for the Clacton Judicial Review is not a feature under consideration in LAMP Phase 1A.

Proposal document

Module C of LAMP Phase 1A includes arrivals to London City Airport from the north-west. In order to join Point Merge in the Thames Estuary, these arrivals ostensibly cross an area of Suffolk that includes Dedham Vale AONB and the Stour and Orwell estuaries.

The proposal document submitted to the CAA makes specific reference to the Kent Downs AONB and the High Weald AONB, but not specific reference to any other AONBs. However, Figure 3 (on page 7 of that document) clearly shows an area (Area C) that encompasses Dedham Vale AONB and the portion of the Suffolk Coast & Heaths AONB that contains the Stour and Orwell estuaries.

Consultation documents

Part F of the consultation document outlines the element of the proposal that included routes above 7,000ft, which includes the routes that are above Dedham Vale, Stour and Orwell. Figure 9 in this document illustrates a swathe of arrivals over the Dedham Vale area which is described as "minimum 8,000ft, typical 12,000ft".

The relevant extracts from the consultation document are:

> 4.19 Delivering this traffic into the Point Merge system would mean keeping it higher and rerouting it around the Shoeburyness Danger Area. This means positioning a route somewhere in the vicinity of Colchester and/or the Dedham Vale and Suffolk Coasts & Heaths AONBs. These aircraft would typically be medium sized jets such as the Embraer 170 at around 12,000ft, although occasionally as low as 9,000ft. Most London City and London Biggin Hill arrivals come from European destinations and approach from the south and east. On average, there would be only two flights per hour arriving from the north and west over Suffolk on this route, during daytime only (see Appendix H for further details on traffic numbers).
>
> 4.20 Today, Dedham Vale and the Suffolk Coasts & Heaths AONBs are overflown by London Stansted and London Luton arrivals which generally take one of two paths across Suffolk:
>
> - following the published route system up to a point near Ipswich before turning southwest towards a hold for Luton and Stansted arrivals in the vicinity of Sudbury, or

- flying from the east directly towards the hold in the vicinity of Sudbury, this flow is managed 'tactically' by air traffic control, which means they are following specific instructions given by air traffic control rather than the route system itself

4.21 These flows can be seen in Figures F2 and F3. The relatively few London City arrivals will not have a significant effect on the Stansted and Luton arrival flows. The Luton and Stansted flows will be considered further in Phase 2 of LAMP – see Part A for information on the phases of proposed changes in coming years.

Feedback documents

As part of the consultation feedback, NATS published a document entitled "Design Report Following Consultation Feedback on the Network (above 4,000ft) over Sussex, Essex and Kent".

Whilst this report includes repeated incorrect references to Sussex when in fact it means Suffolk, it is clear from the context when the text should read "Suffolk".

Relevant extracts from that document are:

London City and Biggin Hill High Altitude Arrival route over Sussex

5.22 London City arrivals from the north/northwest generally descend towards the airport over Hertfordshire and Essex. Flights on this route are descending towards 3,000-4,000ft where they are often required to fly extended tracks over parts of East London, Essex and Kent in order to wait for a landing slot. This is inefficient from both an operational and environmental perspective.

5.23 In order to join the point merge structure the route for arrivals from the north/northwest has to fly around the Shoeburyness Danger area. This means crossing North Essex/South Sussex in the vicinity of Dedham Vale and the Stour and Orwell Estuary AONBs. Minimising additional overflight of the AONB has been highlighted as a local priority. Specifically, local councils indicated that their choice would be to direct the route south of Dedham Vale, flying closer to Colchester in preference to overflying the AONB.

5.24 **Since the consultation** NATS has undertaken detailed design work considering both the operational and environmental factors that influence the route positioning.

The subsequent paragraphs, 5.25 to 5.38:

- Outline the consideration given to the positioning of the route;

- The difference between procedural and tactical operation;
- The two procedural routes they considered for the London City arrivals to avoid Dedham Vale (one to the north of Dedham Vale, one to the south of Dedham Vale);
- The rejection of the southerly option for safety reasons;
- The acceptance of the northerly one (the "blue route") despite the fact that whilst it avoids Dedham Vale it crosses the Stour and Orwell estuaries, which means that traffic on that procedural route is directly above an AONB for the least amount of time;
- The reality is that the need for tactical operation will mean that traffic is unlikely to be on that procedural route but will be spread across that area (namely Dedham Vale).

5.39 As a result of the new route there would be **an average of two additional flights per hour** in the region (either on the blue route or tactically positioned in the airspace around it). These aircraft would typically be at 12,000ft and would be of the types in operation at London City. These are generally smaller (and therefore generally quieter) compared to the Stansted and Luton arrivals that cross the area from east to west.

5.40 The real time simulation also indicated that these additional flights are likely to be offset by fewer Stansted and Luton arrivals flying directly over Dedham Vale. This is because Stansted and Luton arrivals are less likely to be given the tactical instruction that sends them along the length of Dedham Vale *if* there is a London City arrival crossing at the same time in the other direction. [CAA note - However it should be noted that this suggested benefit does not match with what was stated in the consultation document (para 4.21 shown above) which said that there would be no significant effect on Stansted and Luton arrivals.]