

Air Departure Tax - Consultations on an overall 50% reduction policy plan and an Environmental Report

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Scottish Government
Riaghaltas na h-Alba
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About this document

This document contains the following two Scottish Government consultations relating to Air Departure Tax (ADT):

- Consultation 1: The Scottish Government's policy for an overall 50% ADT reduction by the end of the current session of the Scottish Parliament;
- Consultation 2: An assessment of the likely significant environmental impacts from the overall 50% ADT reduction policy (Strategic Environmental Assessment Environmental Report).

Both consultations are being carried out in compliance with the requirements of the Environmental Assessment (Scotland) Act 2005, which requires that a Strategic Environmental Assessment be carried out where a policy plan or programme is likely to have a significant environmental impact.

How to respond

We are inviting responses to both consultations by **Friday 15 September 2017**. Please respond to this consultation using the Scottish Government's consultation platform, Citizen Space. If you are unable to respond online, you can also respond by email or by post.

- Responding online: You can respond online using the Scottish Government's consultation platform, Citizen Space, at:

<https://consult.scotland.gov.uk/fiscal-responsibility/air-departure-tax>.

Citizen Space allows you to save and return to your responses while the consultation is still open. A copy of your final response will be emailed to you.

- Responding by email or post: To ensure that your response is attributed correctly, please indicate clearly which consultation and questions each part of your response relates to.

You can email your response (and Respondent Information Form – see below) to ADT@gov.scot or post it to:

Fiscal Responsibility Division, Scottish Government, Area 3D-North, Victoria Quay, Edinburgh, EH6 6QQ.

In order for your response to be valid you must also provide a completed [Respondent Information Form](#) (RIF).

If you respond using Citizen Space, you will be directed to the RIF. Please indicate how you wish your response to be handled and, in particular, whether you are happy for your response to be published. If you ask for your response not to be published, we will regard it as confidential, and we will treat it accordingly.

If you are unable to respond by Citizen Space, and are responding by email or by post, please complete and return the [RIF](#) included in this document.

All respondents should be aware that the Scottish Government is subject to the provisions of the Freedom of Information (Scotland) Act 2002 and would therefore have to consider any request made to it under the Act for information relating to responses made to this consultation exercise.

Next steps in the process

- Where respondents have given permission for their response to be made public, and after we have checked that they contain no potentially defamatory material, responses will be made available to the public at: <http://consult.scotland.gov.uk>. If you use Citizen Space to respond, you will receive a copy of your response via email.
- Following the closing date, all responses will be analysed and considered along with any other available evidence to help us. Responses will be published where we have been given permission to do so, and will be used to help inform the Scottish Government's final proposals for ADT tax bands and rate amounts which will be delivered in secondary legislation in the autumn.
- A post-adoption SEA statement will be published, which will reflect on the findings of the assessment and consultation, and explain how the issues raised have been considered and addressed in the preparation of the finalised policy.

Scottish Government consultation process

Consultation is an essential part of the policy-making process. It gives us the opportunity to consider your opinion and expertise on a proposed area of work.

You can find all our consultations online: <http://consult.scotland.gov.uk>. Each consultation details the issues under consideration, as well as a way for you to give us your views, either online, by email or by post.

Consultations may involve seeking views in a number of different ways, such as public meetings, focus groups, or other online methods such as Dialogue (<https://www.ideas.gov.scot>).

Responses will be analysed and used as part of the decision-making process, along with a range of other available information and evidence. We will publish a report of this analysis for every consultation. Depending on the nature of the consultation exercise the responses received may:

- indicate the need for policy development or review;
- inform the development of a particular policy;
- help decisions to be made between alternative policy proposals; and
- be used to finalise legislation before it is implemented.

While details of particular circumstances described in a response to a consultation exercise may usefully inform the policy process, consultation exercises cannot address individual concerns and comments, which should be directed to the relevant public body.

Comments and complaints

If you have any comments about how this consultation exercise has been conducted, please send them to: Fiscal Responsibility Division, Scottish Government, Area 3D-North, Victoria Quay, Edinburgh, EH6 6QQ.

Consultation Questions

Consultation one (Policy for an overall 50% reduction in Air Departure Tax by the end of the current session of the Scottish Parliament)

1. Do you support the Scottish Government's policy plan to reduce the overall burden of ADT by 50% by the end of the current session of the Scottish Parliament? Please answer 'Yes' or 'No'.
2. Please explain your answer to question 1.
3. If you answered 'Yes' to question 1, please provide any suggestions you may have on the most effective way, in your view, in which a 50% reduction in the overall ADT burden should be applied across tax bands and tax rate amounts in order to achieve the Scottish Government's overall connectivity and sustainable growth objectives.

For example, should: (a) all of the ADT reduction only be applied to short-haul flights; (b) all of the ADT reduction only be applied to long-haul flights; (c) ADT be reduced equally by 50% across all flight types; (d) some other differential combination be applied?

4. Please provide any other comments you have on the policy plan.

Consultation two (Environmental report)

1. What are your views on the evidence set out in the Environmental Report that has been used to inform the assessment process? (Please give details of additional relevant sources).
2. What are your views on the predicted environmental effects as set out in the Environmental Report?
3. Are there any other environmental effects that have not been considered?
4. Do you agree with the conclusions and recommendations set out in the Environmental Report?
5. Please provide any other comments you have on the Environmental Report.



RESPONDENT INFORMATION FORM

Please Note this form **must** be completed and returned with your response.

Which Air Departure Tax (ADT) related consultation are you responding to?

- Policy: Overall 50% ADT reduction by the end of the current Scottish Parliament session
- Environmental Report
- Both

Are you responding as an individual or an organisation?

- Individual
- Organisation

Full name or organisation's name

Phone number

Address

Postcode

Email

The Scottish Government would like your permission to publish your consultation response. Please indicate your publishing preference:

- Publish response with name
- Publish response only (without name)
- Do not publish response

Information for organisations:

The option 'Publish response only (without name)' is available for individual respondents only. If this option is selected, the organisation name will still be published.

If you choose the option 'Do not publish response', your organisation name may still be listed as having responded to the consultation in, for example, the analysis report.

We will share your response internally with other Scottish Government policy teams who may be addressing the issues you discuss. They may wish to contact you again in the future, but we require your permission to do so. Are you content for Scottish Government to contact you again in relation to this consultation exercise?

- Yes
- No

Consultation One: Policy for an overall 50% reduction in Air Departure Tax by the end of the current session of the Scottish Parliament

Background

1. Air Passenger Duty (“APD”) is a duty of excise first introduced in 1994 which is levied on the carriage, from a UK airport, of chargeable passengers on chargeable aircraft. It becomes due when a flight with chargeable passengers occurs and is payable by the operator of the aircraft. The amount due is dependent on the final destination and class of travel of the chargeable passenger.
2. The Smith Commission convened following the 2014 Scottish independence referendum and published the Smith report¹ on 27 November 2014 recommending, amongst other things, further devolution over elements of taxation and public spending to the Scottish Parliament. Paragraph 86 of the report recommended that “the power to charge tax on air passengers leaving Scottish airports will be devolved to the Scottish Parliament. The Scottish Government will be free to make its own arrangements with regard to the design and collection of any replacement tax, including consideration of the environmental impact.”
3. This proposal, and others contained in that report, were taken forward in the Scotland Act 2016² which received Royal Assent on 23 March 2016. Following the commencement of section 17 of this Act on 23 May 2016, the Scottish Parliament now has the power to legislate for a tax which will replace APD in Scotland.
4. As a consequence of these measures, the Scottish Government introduced the Air Departure Tax (Scotland) Bill³ (“the Bill”) before the Scottish Parliament on 19 December 2016. The Bill makes provision for Air Departure Tax (“ADT”), a tax to be charged on the carriage of chargeable passengers on chargeable aircraft by air from airports in Scotland. The tax is to be payable by aircraft operators.
5. Under paragraph 26 of the fiscal framework agreement⁴ reached between the Scottish Government and UK Government, APD will cease to apply in Scotland

¹ http://webarchive.nationalarchives.gov.uk/20151202171017/http://www.smith-commission.scot/wp-content/uploads/2014/11/The_Smith_Commission_Report-1.pdf

² <http://www.legislation.gov.uk/ukpga/2016/11/part/2/crossheading/devolved-taxes>

³ <http://www.parliament.scot/parliamentarybusiness/Bills/102778.aspx>

⁴ <http://www.gov.scot/Publications/2016/02/3623>

from 1 April 2018 and, if the ADT Bill is enacted, ADT will replace it from that date.

Overview of the policy and its development to date

6. The Scottish Government aims to reduce the overall burden of ADT by 50% by the end of the current session of the Scottish Parliament. Important decisions have yet to be taken on how the 50% reduction could be delivered, including how the reduction will be distributed across tax bands (e.g. short-haul and long-haul flights) and tax rates and the profile of the reduction to ADT. Tax bands and tax rate amounts are not set out in the Bill, and will instead be set out in secondary legislation in the autumn and will be shaped by, amongst other things, the policy and by responses to this consultation.
7. Public discussion and debate on this policy and the provisions underpinning the Bill began with the Scottish Government's publication of a consultation document, "A consultation on a Scottish replacement to Air Passenger Duty"⁵, on 14 March 2016.
8. In addition to that consultation, the Scottish Government established a stakeholder forum on 6 August 2015 to provide expert input into the development of policy and legislative proposals for ADT. Chaired by the Cabinet Secretary for Finance and the Constitution, membership of the stakeholder forum was formed from a broad range of sectors including airlines, airports, travel organisations, business representatives, tax accountancy and legal professional bodies and environmental organisations.

Strategic objectives of the policy

9. The strategic context for the Scottish Government's aims can be found in Scotland's Economic Strategy⁶, which sets out the ambition to create a more cohesive and resilient economy that improves the opportunities, life chances and wellbeing of every citizen in Scotland. Internationalisation is one of the four priorities for sustainable growth which underpins this strategy.
10. The Scottish Government believes that a 50% reduction in the overall burden of ADT by the end of the current session of Parliament will boost Scotland's air connectivity and economic competitiveness, encouraging the establishment of new routes which would enhance business connectivity and inbound tourism and help generate sustainable growth.
11. The Scottish Government also wants to create an environment which encourages airlines to base more aircraft in Scotland. If successful this could create

⁵ <http://www.gov.scot/Publications/2016/03/3238/downloads>

⁶ <https://beta.gov.scot/publications/scotlands-economic-strategy/>

employment opportunities (such as flight crew, cabin crew, engineering and ancillary support roles) in Scotland, through direct, indirect and wider business impacts and net additional Gross Value Added.

12. APD is currently one of the highest taxes of its kind in the world. Scotland's airports are competing on a world stage to secure new routes and capacity. Reducing the tax burden will help ensure a more level playing field with many other European airports competing to secure the same airlines and similar routes.
13. It is estimated that approximately 48% of APD revenues currently generated in Scotland is accrued from short-haul flights and approximately 52% from long-haul flights. There are therefore a number of ways in which the policy of a 50% reduction in the overall tax burden could be applied in order to meet the overall objective of incentivising route development and improving connectivity. This could include adopting a differential approach in how the tax reduction is applied across tax bands and tax rate amounts in order to deliver a 50% reduction in the overall tax burden.

Summary and next steps

14. The Scottish Government plans to reduce the overall burden of ADT by 50% by the end of the current session of the Scottish Parliament. It is recognised that there are a number of different ways in which a 50% reduction in the overall tax burden could be applied across all tax bands and tax rate amounts.
15. The objectives of the policy are to boost Scotland's air connectivity and economic competitiveness, encouraging the establishment of new routes which would enhance business connectivity and inbound tourism and help generate sustainable growth.
16. Detail on tax bands and tax rate amounts will be delivered in secondary legislation in the autumn. In preparing these final plans the Scottish Government will take into account the responses received to both this consultation and the consultation on the [Environmental Report](#) produced as part of the Strategic Environmental Assessment process that has been undertaken on the policy plan.

How can I provide comment on this consultation?

17. Public views and comments are invited on both this consultation for the policy plan for an overall 50% reduction in ADT by the end of the current session of the Scottish Parliament and the consultation on the [Environmental Report](#) which is set out later on in this document.
18. Responses to the following questions on the policy plan should be submitted by **Friday 15 September 2017** and these can be submitted online, by email or by post. Details on how to submit responses has been set out in the introductory ['How to respond'](#) section of this document.

Consultation questions:

1. Do you support the Scottish Government's policy plan to reduce the overall burden of ADT by 50% by the end of the current session of the Scottish Parliament? Please answer 'Yes' or 'No'.
2. Please explain your answer to question 1.
3. If you answered 'Yes' to question 1, please provide any suggestions you may have on the most effective way, in your view, in which a 50% reduction in the overall ADT burden should be applied across tax bands and tax rate amounts in order to achieve the Scottish Government's overall connectivity and sustainable growth objectives.

For example, should: (a) all of the ADT reduction only be applied to short-haul flights; (b) all of the ADT reduction only be applied to long-haul flights; (c) ADT be reduced equally by 50% across all flight types; (d) some other differential combination be applied?

4. Please provide any other comments you have on the policy plan.

Consultation Two: An assessment of the likely significant environmental effects (SEA Environmental Report)

Part One

Introduction

The following paragraphs set out a summary of the Strategic Environmental Assessment undertaken on the Scottish Government's policy for an overall 50% reduction in Air Departure Tax by the end of the current session of the Scottish Parliament. This includes information on how the assessment process was undertaken and the main findings and recommendations.

This summary is intended as an easy to read overview of the full assessment which can be found in Part Two of this report. Part Two sets out detailed information on the assessment process, including how the assessment was undertaken and the evidence used to inform the assessment process.

Brief description of the policy

The Scottish Government aims to reduce the overall burden of Air Departure Tax by 50% by the end of the current session of the Scottish Parliament. Important decisions have yet to be taken on how the overall 50% reduction could be delivered, including how the reduction will be distributed, across tax bands (e.g. short-haul and long-haul flights) and tax rates. It is intended that responses to this consultation will help shape the tax bands and tax rate amounts which will be set out in secondary legislation in the autumn.

How will the preferred policy option sit within the wider context of Scottish Government policies and ambitions?

Scotland's Economic Strategy sets out ambitions to create a more cohesive and resilient economy that improves opportunities for business and the people of Scotland alike, based upon increasing competitiveness and tackling inequality. The importance of transport infrastructure is also set out in a number of publications such as Scotland's Infrastructure Investment Plan, National Planning Framework 3 and Scotland's National Transport Strategy.

Once developed, the legislative proposals for Air Departure Tax will also sit within the context of Scottish Government policies for meeting ambitious statutory targets for the reduction of greenhouse gas emissions, as set by the Climate Change

(Scotland) Act 2009. In January 2017, the draft Climate Change Plan: the draft Third Report on Policies and Proposals 2017-2032 was published for parliamentary scrutiny. This builds on previous reports and explores options for sectors across the economy to reduce Scotland's greenhouse gas emissions. Additionally, the Scottish Government has confirmed its intention to bring forward a new Climate Change Bill to establish a new and more testing 2020 emissions target.

What is Strategic Environmental Assessment?

In Scotland, public bodies are required to assess, consult and monitor the likely impacts of their plans, programmes and strategies on the environment. This process is known as Strategic Environmental Assessment. Further guidance on Strategic Environmental Assessment, the assessment process, including statutory requirements, is available on the Scottish Government website.

Strategic Environmental Assessment is a means to judge the likely impact of a public plan on the environment and to seek ways to minimise that effect, if it is likely to be significant, by:

- systematically assessing and monitoring the significant environmental effects of plans, programmes and strategies;
- ensuring that expertise and views are sought throughout the process from Scottish Natural Heritage, the Scottish Environment Protection Agency and Historic Environment Scotland; and,
- providing an opportunity for public participation in the decision making process, including a requirement to provide a statement as to how these opinions have been taken into account (a "Post Adoption Statement").

At the screening and scoping stage views were sought from the three Statutory Consultation Authorities. As a matter of good practice and in the interest of transparency, public consultation was also undertaken at this stage. The Screening and Scoping Report was published for consultation on 14 March 2016 and set out a range of information, including proposals on how the assessment would be taken forward.

How was the assessment undertaken?

As noted above, the Strategic Environmental Assessment process started with the production of a Screening and Scoping Report that was issued for public consultation in March 2016. Views were sought at this early stage to help inform the assessment process and ensure the assessment proceeded with an effective evidence base, informed by key stakeholders, organisations and individuals.

Following this initial period of consultation, the assessment builds on the work set out in the Screening and Scoping Report and has been informed by the comments

received. Further information on the assessment process is set out below under relevant headings.

The identification of likely effects and development of key assumptions

Early in the assessment process it was considered that there was the potential for the proposed policy - to reduce the overall tax burden of Air Departure Tax by 50% - to have a range of environmental effects. Furthermore, it was noted that some of the environmental effects considered likely to arise would occur at altitude and were therefore likely to be experienced over a larger geographical envelope; others would be felt more at a local level. As such, it was proposed that the assessment would consider the potential effects at differing geographical scales.

To better establish the environmental effects of a 50% reduction in the overall tax burden, three key assumptions were used in the assessment. These are set out below. The assumptions were developed by drawing on research undertaken by Transport Scotland and informed through discussions with the Scottish Government's Air Departure Tax stakeholder forum, the Consultation Authorities, and were subject to wide stakeholder engagement through public consultation at screening and scoping stage.

It is envisaged that a range of different pathways could be applied to meet the 50% reduction in the overall tax burden. Illustrative scenarios have therefore been included in the assessment process to help frame the discussion on the likely environmental impacts of the preferred policy option, and to inform consideration of how the different pathways to achieve an overall 50% reduction could influence these impacts. This has included the consideration of applying the proposed 50% reduction in the overall Air Departure Tax burden equally to all flight types or applying the tax reduction through a sliding scale approach. For example, applying a zero tax charge to all short-haul flights and maintaining the tax charged on long-haul flights at current UK Air Passenger Duty levels, or vice versa.

Key assumptions

- 1: The proposal to reduce Air Departure Tax in Scotland will lead to an increase in the overall number of flights and could potentially create opportunities for new routes to be created.
- 2: An increase in flight numbers will lead to an increase in overall greenhouse gas emissions (CO₂ and non-CO₂ emissions) in the short-term, even with advances in technology.
- 3: An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Consideration of Reasonable Alternatives

It is a requirement when undertaking a Strategic Environmental Assessment that consideration is given to the potential for significant environmental effects of reasonable alternatives to the plan, programme or strategy being assessed. The assessment considered “*no reduction in the overall tax burden of Air Departure Tax compared to the overall tax burden of UK Air Passenger Duty*” as a reasonable alternative. It is considered that this represents a “like for like” approach as the tax rate amounts would remain the same as that currently set under UK Air Passenger Duty. Under this approach, it is considered that activity in the sector would likely continue on the current predicted path.

It is also a requirement that the assessment sets out information on how the environment will change in the absence of the plan, programme or strategy. Many of the environmental trends identified as likely to be affected by the policy proposals are also considered likely to continue in the absence of the preferred policy option. For example, it is considered that greenhouse gas emissions and pressure placed on infrastructure would likely remain consistent with current levels of growth in the industry in the absence of the preferred policy option. As discussed above, it is considered that the reasonable alternative represents a like for like approach as the tax rate amounts would remain the same and, as such, activity in the sector would likely continue on the current path as predicted. For the purposes of this assessment, it is considered that the assessment findings concerning the impacts likely to arise from the reasonable alternative can also be considered to apply to the evolution of the baseline in the absence of the policy.

Consideration of current and future work to reduce emissions

Across the aviation industry there are a number of goals and commitments that have been made to improve efficiency and reduce emissions. Future global measures have also been developed and agreed. Additionally, developments in aircraft technology and engine efficiency, alongside airspace management, can improve performance and reduce the impacts from aviation.

Furthermore, the impact of some of the above measures will extend beyond helping to reduce emissions and can have wider benefits, for example, reducing air pollutants or noise. Some efficiency measures may also lead to airports being able to carry more passengers within their existing infrastructure, reducing pressure to expand.

The above factors have been taken into account during the assessment process.

Limitations experienced in the assessment process

Research work has been undertaken by Transport Scotland in 2017 to estimate the greenhouse gas emissions of a 50% reduction in Air Departure Tax, and updates similar research undertaken in 2014. This research has been used to inform this Strategic Environmental Assessment, including the development of key assumptions (further information on this research can be found in Part Two of this Report).

A number of assumptions were used in these research projects, for example a direct relationship between the number of passengers and the estimated amount of emissions was assumed. It is however noted that there a number of unknown factors were discovered in taking forward the research, such as the response to the reduced tax in the distribution of passengers between domestic and international flights.

Other limitations experienced during the Strategic Environmental Assessment process concern the impacts on overall emissions that may arise as a result of potential changes in the way people travel. It is not within the scope of this assessment to undertake the modelling work that would be required to examine the impact on overall emissions to an acceptable level, should a modal shift arise.

Finally, there are uncertainties surrounding the outcome of the Brexit negotiations which will have implications for the future of the UK's and Scotland's continued participation in the EU Emissions Trading Scheme. This is currently the main mechanism for delivering emissions reduction from international aviation.

What are the environmental impacts of aviation?

In 2014, transport, including international aviation and shipping, was the second highest source of Scottish greenhouse gas emissions after the energy supply sector. Passenger numbers have also increased, with over 25 million air terminal passengers using Scottish airports in 2015. Four of Scotland's main airports, Edinburgh, Glasgow, Aberdeen and Inverness accounted for the majority of passenger numbers in 2015. There are also many regional airports spread across the country, many servicing remote areas.

Aircraft emit a range of greenhouse gases throughout different stages of flight and are fairly unique in that some of these gases are emitted into the higher levels of the atmosphere. There are many factors that affect the amount of emissions during flight. Some of these are within the ability of the airline to manage, such as operational measures; others are not, for example the weather.

Certain emissions from aviation, though not direct greenhouse gas emissions, can also contribute towards climate change. The warming and cooling effects of these emissions arise as a direct result of the height at which they are emitted. The scale of the impact these emissions can have on climate change can also be greater as a result of the high altitudes in which they are emitted. This is known as the multiplier effect.

Closer to the ground, airport related operations also contribute to climate change, for example passengers and workers travelling to and from the airport, ground support vehicles and airport buildings.

Aviation can also lead to pressure on local air quality and to concerns regarding noise exposure. Aircraft noise is generated by both the engine and the airframe. Noise during activities such as take-off and landing is the most clear, however other activities such as from taxiing aircrafts and airport vehicular traffic also generate noise. Additionally, noise impacts can also arise through increased traffic to and from airports, and from construction activities. Noise can lead to a number of impacts on human health; for example sleep disturbance, fatigue and annoyance. Noise disturbance and the impact of this is a complex area, and whilst studies have demonstrated the links between noise disturbance and stress, the relationship between noise exposure and their potential adverse effects on people is of variable quality.

Air pollution can also impact on human health, both in the short and long-term, and those with pre-existing health issues may be more vulnerable to poor air quality over long time periods. Air pollution can also have wider harmful effects on the environment. Whilst air quality has improved over the last few decades, there are some towns and cities where air quality has been identified as a concern. Aircraft engines, support vehicles and equipment, and vehicles accessing the airport are the main aviation sources of emissions that affect air quality.

Many airport masterplans consider that existing infrastructure would continue to accommodate current levels of passenger numbers; however, new development may be required in the future. Additionally, an increase in travel to and from these transport hubs may also arise due to increased passenger and flight numbers. The development of new infrastructure can lead to a number of environmental impacts, for example loss of habitat and noise disturbance from construction activities.

Airports are also significant users of resources such as water and energy, and can generate significant amounts of waste.

What are the likely environmental effects of the preferred policy option?

The following sections summarise the assessment findings of the preferred policy option of a 50% reduction in the overall tax burden of Air Departure Tax by the end of the current session of the Scottish Parliament, which is estimated to be 2021. Additionally, consideration was given to a number of illustrative scenarios that could be adopted to meet the 50% reduction in the overall tax burden set out in the preferred policy option. The findings have been set out under the headings of national and local implications, reflecting the assessment approach that was undertaken to consider the potential for environmental impacts to occur at differing geographical scales.

The assessment also considered a reasonable alternative to the preferred policy option. A summary of the findings of this assessment has been included below.

Summary of findings: National Impacts

Based on the latest research undertaken by Transport Scotland in 2017, the introduction of a 50% reduction in Air Departure Tax (applied proportionally equally across all flight types) could lead to increased emissions from aviation in the first year (which is assumed to be 2018), relative to where they would be in the absence of the policy. Furthermore, the predicted increase in emissions would be greater than that initially estimated in the 2014 research undertaken by Transport Scotland.

Aviation currently accounts for less than 4% of total Scottish emissions. The increase in aviation emissions forecast as a result of the 50% reduction in Air Departure Tax is estimated to represent less than 0.3% of the Scottish total.

It is recognised in the assessment that there are a number of different ways that the proposed tax reduction could be applied in order to achieve a 50% reduction in the overall tax burden. This could include applying a zero tax charge to all short-haul flights and maintaining the tax charged on long-haul flights at current UK Air Passenger Duty rates, or vice versa. The impacts of the different approaches to applying the tax reduction in terms of passenger numbers will likely differ. For example, applying a zero tax rate amount to only short-haul flights has the potential to lead to a greater increase in passenger numbers over current levels, compared to either reducing the tax equally across all flight types or only on long-haul flights. This view has been based on current understanding of ticket pricing and demand and there being fewer long-haul flights operating from Scottish airports, and therefore fewer passengers.

There are a number of factors that can influence the greenhouse gas emissions likely to arise from increased aviation activity and it has not been possible to consider all of these in undertaking this assessment. These include the potential start-up of new flight routes and/or destinations, the extent to which a shift in modes

of transport could arise and the effect that certain aviation emissions have at atmosphere (known as the multiplier effect). It has also not been possible to assess the impact on overall emissions that technological and operational improvements, alongside the development of global measures, will have in a meaningful way.

Significant progress has been made by the industry in establishing goals for reducing aircraft greenhouse gas emissions on a per-flight basis and efficiency is expected to improve continuously through to 2050 and beyond. However, it is also projected that greenhouse gas emissions will continue to grow in line with demand if greater improvements are not made.

There are also a wide range of relevant plans, programmes and strategies within which the preferred policy option will sit if implemented, and these include those that set out long-term visions and ambitions for development and investment in Scotland. Further relevant considerations include the current ambitions and objectives of the Scottish Government with regard climate change which are set through a range of policies and proposals. The Scottish Government has committed to keeping Scotland at the forefront of global climate action by responding to the Paris Agreement with a Climate Change Bill setting new, evidence-based, statutory emission reduction targets.

In light of the ambitious climate change targets, managing the environmental implications that are considered likely to arise from the introduction of the preferred policy option is likely to present some challenges. It is considered that a 50% reduction in the overall tax burden of Air Departure Tax will lead to short-term increases in greenhouse gas emissions, relative to where they would otherwise be, even with efficiency measures in place. If the preferred policy option were to be reached through a scenario of applying a zero tax rate amount only to short-haul flights, there is the potential that this could lead to higher passenger numbers than if a tax reduction was applied only to long-haul flights or proportionally equally to all flight types. In turn, this could have an influencing effect on overall greenhouse gas emissions.

Medium to long-term it is more challenging to predict the amount of future increases in greenhouse gas emissions. Projecting the estimated emissions beyond the short-term is complex and based on a number of key drivers. Technical developments and industry aspirational goals, in addition to future global measures, will play key roles in reducing emissions. However, the future of global measures, and the exact form these will take, is uncertain in light of wider political changes. A number of uncertainties also exist that could influence significance, such as the creation of new routes and the multiplier effect.

It was also noted that there would likely be negative effects for the environment, for example biodiversity, flora and fauna, linked to the effects of climate change, which could be made worse by increased air traffic movements.

Climatic Factors

Related SEA topics:

Climate change impacts are likely to have a direct or indirect impact on the other SEA topics

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- The predicted increase in greenhouse gas emissions from the policy is likely to be experienced over a wide geographical area.
- Climate change has been identified as a primary pressure on many of the SEA topic areas.

Wider Context and Mitigation

- Technological and operational improvements, industry aspirational goals and the development of global measures have a key role to play in reducing aviation fuel use and associated carbon emissions.
- Aircraft emissions can have a greater impact on climate change due to the height at which they are emitted. This is known as the multiplier effect.
- The Climate Change (Scotland) Act 2009 sets out binding targets with regard to greenhouse gas emissions. The Paris Climate Agreement further emphasises the need for global climate action.

Summary of Overall Effects

- A 50% reduction in the overall tax burden of Air Departure Tax will lead to short-term increases in greenhouse gas emissions, relative to where they would otherwise be, even with efficiency measures in place.
- Medium to long-term, it is more challenging to predict the magnitude of future increases in greenhouse gas emissions.
- Climate change has the potential to have a range of direct and indirect effects on the natural environment.

Summary of findings: Local Impacts

It has been assumed that the introduction of the preferred policy option will lead to increased passenger and flight numbers, both of which will place increased pressure on existing airport and interconnecting infrastructure. The degree of pressure experienced will also be influenced by the extent to which the expected increase in passenger numbers are realised.

Currently, some airport masterplans set out an objective of the best use of existing infrastructure before developing new facilities. However, they also note that in the medium to long-term, it is likely that increased pressure from passenger growth could lead to development at some airports. The development of any new infrastructure can have a number of impacts on the environment including; biodiversity, soil and cultural heritage. There is also the potential for benefits to arise through the provision of new airport and interconnecting infrastructure.

Further pressure in air quality may arise at local level as a result of increased flights, in addition to surface traffic to and from airports, with the potential for negative effects on air quality. A number of areas are currently designated as having air quality issues and increased pressure from any activity that contributes to air pollution could exacerbate existing problems.

Whilst it is a relevant consideration, it has not been possible for this assessment to consider the implications of potential changes in the way people travel and the impact on emissions. Road traffic movement is a complex issue and a number of factors outwith the aviation sector influence modal shift. Surface action strategies are also produced by some airports, promoting alternative travel options to and from the airport. It is considered likely, however, that the projected growth in the aviation sector could contribute to a number of pressures experienced at local level that influence air quality.

Aircraft noise, and exposure to this, is likely to remain a key concern. A number of airports produce noise maps and operational and technological improvements continue to be sought to reduce the noise generated from aircraft. Any increase in flight numbers or changes to flight patterns will continue to present a challenge in terms of how the industry can maintain growth whilst addressing concerns regarding noise implications.

The impacts identified as likely to arise at a local level are considered secondary impacts. Factors such as the ability of individual airport capacity to facilitate the predicted growth are relevant considerations and it is noted that these secondary impacts would be outwith the preferred policy option to influence.

There is the potential for the impacts to be long-term in nature, for example from development and operational activity, in addition to short-term impacts from construction activities. Their significance will be dependent on factors such as

current operational activities and mitigation applied at individual airports and the extent of the increase in passenger numbers.

Population and Human Health

Related SEA topics:

Many of the issues that affect population and human health have direct or indirect impacts on other SEA topics such as air quality

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- Changes in noise exposure and air quality may arise through increased passenger and flight numbers, in addition to increased surface travel to and from airports.
- Changes in noise exposure and air quality can have negative impacts on human health, particularly amongst those with pre-existing conditions.
- Construction of new infrastructure could lead to temporary disturbance impacts such as noise, vibration, and dust generation, all of which can impact human health.

Wider Context and Mitigation

- Technological developments and improvements to airport operational procedures can reduce noise exposure and many airports are obligated under law to produce a noise action plan and strategic noise maps.
- Many airports produce surface access strategies, promoting alternative modes of transport to and from airports.
- Road traffic movement is a complex area and a number of factors outwith the aviation sector influence modal shift.

Summary of Overall Effects

- It is likely that, even in light of technological and operational improvements, continued growth in the aviation sector will place further pressure on local air quality and noise exposure.
- Any increase in pressure will likely occur over the long-term as a result of operational activity, in addition to short-term impacts from construction work.
- The extent and significance of any impacts will be most realised at a local level and will be dependent on factors, including the extent to which the growth in passenger numbers are realised.

Air Quality

Related SEA topics:
Air quality can directly or indirectly impact on other SEA topics such as biodiversity and population and human health

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- Changes in air quality may arise through an increase in flight activity in addition to increased travel to and from airports.
- Air quality can have a range of adverse environmental effects, including impacts on water quality and soils.
- Poor air quality can also impact on population and human health and this is discussed above.

Wider Context and Mitigation

- Technological developments and efficiencies in operational activities can help to reduce the impact of aircraft emissions on local air quality.
- A number of airports produce surface access strategies which set out alternative travel options to and from the airport.
- There are a number of plans and strategies that set out objectives for greater connectivity, such as linking development with public transport networks.

Summary of Overall Effects

- It is likely that, even in light of technological and operational improvements, continued growth in the aviation sector will place further pressure on local air quality.
- Any increase in pressure will be over the long-term through operational activity, in addition to short-term implications from construction work.
- The extent and significance of any impacts will be most realised at a local level and will be dependent on factors, including where any changes are likely to occur. This will be most relevant in areas where existing problems have been identified.

Biodiversity, Flora, and Fauna

Related SEA topics:

Biodiversity, flora, and fauna impacts have direct or indirect effects on other SEA topics such as air, water, and soil quality

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- The development of new infrastructure could lead to the loss of habitats.
- Increased flight activity and ground operations could lead to further noise and vibration disturbance.
- Greater flight activity could increase the risk of bird strikes from aircraft.
- The effects of climate change are likely to have an impact on biodiversity, flora, and fauna (this has been considered under the heading of Climatic Factors).

Wider Context and Mitigation

- Airport masterplans set out an objective of being able to accommodate the predicted growth in the sector within current infrastructure.
- Codes of Practice have been developed to help reduce the environmental impacts of ground operations and departing aircraft.
- Any significant infrastructure would be required to undertake project level assessment through existing mechanisms such as an Environmental Impact Assessment.

Summary of Overall Effects

- The primary impacts on biodiversity are likely to occur as a result of habitat alterations and noise disturbances arising from flight activity and ground operations.
- The impacts may be long-term through operational activity, in addition to short-term implications from construction work.
- The extent and significance of any impacts will be most realised at a local level and will be dependent on factors including the scale and location of where any changes are likely to occur.
- Climate change continues to be a primary pressure on biodiversity.

Soil

Related SEA topics:

Loss of soil or poor quality soils can have direct or indirect impacts on other SEA topics such as biodiversity and water quality.

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- Infrastructure development can have a negative impact on soils in a number of ways, for example, through soil sealing and compaction. Also, soils can store carbon and loss of this key function can also occur.
- Soil is closely interrelated with other environmental topic areas. Any negative impacts on soil function can also lead to negative impacts on other resources, such as water quality.
- Climate change can lead to a number of negative impacts on soil resources (this has been considered under the the heading of Climatic Factors).

Wider Context and Mitigation

- Airport masterplans aim to make best use of existing infrastructure to accommodate increased passenger and flight numbers. However, new infrastructure may be required in the medium to long-term.
- Any significant infrastructure requirements would likely be required to undertake project-level assessment.
- Soil is a non-renewable resource and is fundamentally one of Scotland's most important assets.

Summary of Overall Effects

- The development of new infrastructure can lead to negative impacts on soil health.
- The impacts may be long-term through operational activity, in addition to short-term implications from construction work.
- The extent and significance of any impacts will be most realised at a local level and will be dependent on factors including the scale and location of where any changes are likely to occur.
- There may be impacts for soil resources as a result of climate change, and poor soil health can lead to further negative effects on other resources, such as water quality.

Water

Related SEA topics:

Water quality and quantity can have a direct or indirect impact on other SEA topics such as biodiversity and population and human health

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- Growth in the sector could increase the requirement for the storage and handling of potential pollutants such as fuels and chemicals and the potential for greater runoff from hard surfaces.
- Increased passenger and flight numbers could increase demand for, and consumption of, water.
- The effects of climate change are predicted to be an increasing pressure on water quality (the contribution of the aviation sector to climate change is considered under the heading of Climatic Factors).

Wider Context and Mitigation

- The handling and storage of fuels and other chemicals used in aviation is subject to strict rules to prevent.
- Water consumption is monitored as part of an airport's sustainability performance or corporate responsibility.
- Impacts from construction activities are likely to be managed at the project level through existing mechanisms such as the planning process and on-site measures such as Environmental Management Plans.

Summary of Overall Effects

- Increased passenger and flight numbers may put pressure on water resources through greater demand for water as well as through the risk of pollution posed by fuel and chemical runoff.
- The impacts are likely to be both long-term, through operational activity, and short-term, such as those that could arise from construction activity.
- There is also likely to be additional impacts on water resources as a result of climate change.

Landscape, Cultural Heritage, and Historic Environment

Related SEA topics:
Climate change can have direct or indirect impacts on landscape, cultural heritage, and the historic environment

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- Construction and development of new infrastructure could potentially damage or affect the setting of local cultural/historic sites and assets.
- Scotland's landscapes and historic environment are likely to be negatively affected by the effects of climate change.

Wider Context and Mitigation

- Airport masterplans set out an objective of being able to accommodate future growth in the short-term within existing infrastructure, however it is noted that, in the medium to long-term, new development may be required.
- Any impact on landscape and on historical or cultural heritage assets may be subject to project level assessment processes, such as an Environmental Impact Assessment.
- There is likely to be a need, at project level, to consider provisions to protect previously unknown archaeological assets from damage.

Summary of Overall Effects

- There may be a need to enhance and expand aviation and transport infrastructure to accommodate an increased number of passengers and flights. Such development may alter the character of both historic and cultural assets as well as the wider setting and landscape in which they are found.
- The significance of the identified impacts will be dependant on a number of factors, including the location and design of any future works.
- Climate change is likely to continue to have a negative impact on landscape, cultural heritage and the historic environment.

Material Assets

Related SEA topics:

Changes made to material assets can directly or indirectly impact on other topic areas, such as air quality and population and human health

Assumptions

- Increased flight numbers and opportunities for the creation of new routes.
- Increase in flight numbers will lead to an increase in overall greenhouse gas emissions in the short-term, even with advances in technology.
- An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Potential Environmental Impacts

- It is expected that the policy will place increased pressure on existing airport and interconnecting transport infrastructure.
- Benefits for material assets could, however, be realised through the enhancement of airport and transport infrastructure.
- Increased passenger and flight numbers may increase the amount of waste generated at airports.

Wider Context and Mitigation

- Airport masterplans acknowledge that, in the longer term, development may be required to accommodate continued growth in the sector.
- A number of airports produce surface access strategies which set out ways to improve access to the airport.
- Additionally, improvements in technology and operational procedures can lead to airports being able to undertake increased growth within existing infrastructure.
- Most airports and airlines publish data regarding waste management approach and performance.

Summary of Overall Effects

- There is the potential for increased pressure being placed on existing airport and interconnecting transport infrastructure to lead to development requirements.
- The identified impacts are likely to be long-term through operational activity, in addition to short-term impacts from construction activities.
- The extent and significance of these impacts are influenced by a range of factors, such as the scale and location of any development and operational activities at individual airports.

Summary of findings: Reasonable Alternative

As part of the assessment process, a reasonable alternative was considered and compared to the preferred policy option. The assessment considered the following reasonable alternative: *no reduction in the overall tax burden of Air Departure Tax compared to the overall tax burden of UK Air Departure Tax*. As discussed previously, this is viewed as a “like for like” approach as the tax rate amounts would remain the same as that currently set under UK Air Passenger Duty. Under this approach, it is considered that there would be no reduction in tax rate amounts and, as such, there would be no additional impact on passenger and flight numbers. Activity in the sector would likely continue in the current trend.

Research undertaken by Transport Scotland in 2017 concluded that the preferred policy option of a 50% reduction in the overall tax burden of Air Departure Tax would lead to an increase in greenhouse gas emissions, relative to where they would otherwise be. As the reasonable alternative is viewed as not likely to have an impact on passenger and flight numbers, it would therefore seem reasonable to assume that no additional impact on greenhouse gas emissions would arise beyond that currently projected.

A number of indirect impacts have been identified throughout the assessment as likely to arise from increased activity in the aviation sector. These include impacts on noise exposure, biodiversity, and air quality. It is considered that these pressures would likely remain consistent with current levels of industry activity under the reasonable alternative.

It is a requirement when undertaking a Strategic Environmental Assessment that consideration is also given to how the environment would change in the absence of the policy. Many of the trends and pressures identified throughout this assessment are considered likely to continue on the current path if the preferred policy option was not implemented. As such, it is considered that the assessment findings of the impacts likely to arise from the reasonable alternative can also be considered to apply to how the environment would change if the preferred policy were not put in place.

What monitoring was proposed?

There are a number of measures in place that set out a requirement to report on greenhouse gas emissions, for example requirements set out in the Climate Change (Scotland) Act 2009. Reporting includes the annual Official Statistics publication of the “Scottish Greenhouse Gas Emissions”. This publication sets out details of emissions levels for a range of gases and also provides information on whether or not the statutory annual targets have been met.

Scotland’s emissions are adjusted to take into account trading in the EU Emissions Trading System for the purpose of reporting progress towards statutory targets as

outlined within the Climate Change (Scotland) Act 2009. Global efforts to address emissions from aviation are being led by industry through the International Civil Aviation Organization. Most significant has been the development and agreement on the Carbon Offsetting and Reduction Scheme for International Aviation, a global market-based measure aimed at delivering a goal of carbon neutral growth in aviation from 2020. Once implemented, the measures will require all airlines to monitor emissions on all international routes. All European Union countries will join the scheme from the beginning.

In March 2017, the Committee on Climate Change provided advice to the Scottish Government on the new Scottish Climate Change Bill. Advice was provided on a range of issues and included a recommendation that the overall accounting framework shift to one based on actual emissions, rather than adjusting for activity as currently undertaken for purposes of the EU Emissions Trading System.

Given the known spatial nature of Scotland's airports, monitoring at the local and project levels will be an important consideration. A wide range of environmental monitoring programmes are currently in place and are relevant to the potential issues identified. This includes the monitoring of designated sites that have been identified as being located in near proximity to airports and transport routes, such as those designated for their biodiversity and habitat interests. Additionally, noise maps are produced and updated every five years and air quality is currently monitored across a range of local sites in Scotland.

What were the conclusions and recommendations of the assessment?

In light of the ambitious climate change targets, managing the environmental effects that are considered likely to arise from the preferred policy option may present some challenges. The policy to introduce a 50% reduction in the overall tax burden of Air Departure Tax is likely to lead to short-term increases in greenhouse gas emissions, relative to where they would be without the policy, even with efficiency measures in place. It is more challenging to predict the implications of any increase in greenhouse gas emissions and the significance of these in the medium to long-term.

A number of secondary impacts were identified as likely to arise. These included increased pressure on local air quality and potential changes to noise exposure, both of which have the potential to have negative impacts on population and human health. Aircraft noise, through changes in flight numbers and patterns, is likely to remain a key challenge in how the industry can grow whilst addressing concerns on this.

There is the potential that new infrastructure will be required as a result of increased pressure from growth in the aviation sector, and this could lead to a number of environmental effects. It was also noted that there may be national level impacts

across the environment as a result of climate change, the effects of which could be made worse through increased aviation activity.

The significance of the impacts identified in the assessment will be dependent on a number of factors. This includes operational activities and technological developments, with many of these applied at individual airports. The scale and location of any proposed airport development will also influence the impacts that may arise. The extent to which the preferred policy leads to increases in passenger numbers will also influence the significance of the impacts and this is likely to differ depending on how the 50% reduction in the overall tax burden is delivered.

Recommendations

A key part of the Strategic Environmental Assessment process is to identify ways in which the impacts that have been identified can be reduced. As noted earlier, it is considered that the impacts of the preferred policy will be felt at differing geographical scales. Some will be experienced over a larger geographical area, others are likely to be realised at a more local level.

There are limitations to the measures that can be proposed in this assessment to reduce the identified impacts as many of these will be outwith the preferred policy to influence. Measures to reduce the impacts will be best placed and most beneficial when they are undertaken in a way that reflects the differing geographical scales. For example, international and global measures to address the impacts of global emissions, or within lower level plans and strategies that set out action to meet any new climate change target. Additionally, local level consideration is likely to be given at project level to any new infrastructure requirements. Whilst the future of many of the global measures to reduce emissions is uncertain, they are likely to play a key part in addressing global emissions.

Continued and future action with regards climate change, set through a range of Scottish Government policies, proposals and strategies, is also supported. This includes the potential to include new and testing targets through the development of the new Scottish Climate Change Bill, alongside a change in the overall accounting framework to one based on actual emissions.

Significant improvements have been made to date through technical and operational improvements within the industry to reduce emissions. These, alongside collaborative goals agreed within industry on climate change action, are also supported. Continued progress will be necessary to improve efficiencies within the industry.

The assessment notes and supports the commitment made by the Scottish Government to undertake further assessment work on the potential impacts for noise levels that may arise through changes in air traffic movements.

Airport masterplans will continue to play a key role in stakeholder engagement, providing a means for airport operators to set out how they propose to take forward strategic airport decisions for specific projects. Action taken within the industry to establish and maintain effective community engagement are also supported and encouraged at all times where possible.

Next steps

Responses received during this consultation will be analysed and used as part of the decision-making process, along with a range of other available information and evidence. We will publish a report of this analysis for each consultation.

Thereafter, the next stage in the SEA process is the production of a post-adoption SEA Statement. The post-adoption Statement will reflect on the findings of the assessment and consultation, and will explain how the issues raised have been considered and addressed in the preparation of the secondary legislation setting out tax bands and tax rate amounts for Air Departure Tax that will be laid before the Scottish Parliament in the autumn.

How can I provide comment on this Environmental Report?

Public views and comments are invited on both the consultation on this Environmental Report and on the Scottish Government's [policy for an overall 50% reduction in Air Departure Tax](#) by the end of the current session of the Scottish Parliament.

Responses should be submitted by **Friday 15 September 2017** and these can be submitted online, by email or by post. Details on how to submit responses has been set out in the introductory '[How to respond](#)' section of this document.

Respondents may find the following first four questions helpful to provide a focus for their responses on this Environmental Report. Please note that responses do not need to be confined to these questions, and more general comments on this Environmental Report are welcomed in question 5.

Questions:

1. What are your views on the evidence set out in the Environmental Report that has been used to inform the assessment process? (Please give details of additional relevant sources).
2. What are your views on the predicted environmental effects as set out in the Environmental Report?
3. Are there any other environmental effects that have not been considered?
4. Do you agree with the conclusions and recommendations set out in the Environmental Report?
5. Please provide any other comments you have on the Environmental Report.

Consultation Two: An assessment of the likely significant environmental effects (SEA Environmental Report)

Part Two

Part two of this report is structured as follows:

- Section 1 sets out a summary of the policy proposals for an overall 50% reduction in Air Departure Tax, including a review of the wider context between it and other plans, programmes and strategies and relevant environmental objectives.
- Section 2 sets out the assessment approach, including the methodology used and the consideration of a reasonable alternative.
- Section 3-10 sets out the findings of the assessment.
- Section 11 provides a summary of the assessment findings at a national and local level, in addition to the reasonable alternative.
- Section 12 sets out an overview of the proposals for monitoring.
- Section 13 sets out the conclusions and recommendations of the assessment and includes discussion on potential mitigation.
- Section 14 provides information on the next steps, including an overview of the consultation process.

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1 Introduction

1.1 Policy plan for Air Departure Tax

- 1.1.1 The Scottish Government aims to reduce the overall burden of Air Departure Tax (“ADT”) by 50% by the end of the current session of the Scottish Parliament. The Scottish Government considers that this will boost Scotland’s air connectivity and economic competitiveness, encouraging the establishment of new routes which would enhance business connectivity and inbound tourism and help generate sustainable growth.
- 1.1.2 Important decisions have yet to be taken on how the overall 50% reduction could be delivered, including how the reduction will be distributed across tax bands (e.g. short-haul and long-haul flights) and tax rates. Tax bands and tax rate amounts are not set out in the Bill, and will instead be set out in secondary legislation in the autumn and will be shaped by, amongst other things, the policy and by responses to this consultation.
- 1.1.3 Further background information on this policy can be found [earlier](#) in this document.

1.2 What is Strategic Environmental Assessment

- 1.2.1 The Environmental Assessment (Scotland) Act 2005 (“the 2005 Act”) requires the assessment of certain plans, programmes and strategies that may have significant effects on the environment. This process is known as Strategic Environmental Assessment (“SEA”). Further guidance on SEA including requirements and stages, is available on the Scottish Government website⁷. SEA is a key component of sustainable development, achieving this through:
- systematically assessing and monitoring the significant environmental effects of plans, programmes and strategies;
 - ensuring that expertise and views are sought throughout the process from Scottish Natural Heritage, Scottish Environment Protection Agency and Historic Environment Scotland; and
 - providing an opportunity for public participation in the decision making process, including a requirement to provide a statement as to how these opinions have been taken into account (a “Post Adoption Statement”).
- 1.2.2 This SEA has been undertaken in parallel with the policy on ADT to both inform its development and assess how the adoption of the proposals may impact on the environment, both positively and negatively.

⁷ Scottish Government (undated) SEA Guidance [\[online\] Available at: http://www.gov.scot/Topics/Environment/environmental-assessment/sea/guidance/SEAGuidance](http://www.gov.scot/Topics/Environment/environmental-assessment/sea/guidance/SEAGuidance) (accessed 01/02/2017)

1.3 Context of ADT

- 1.3.1 The 2005 Act requires that the Environmental Report includes an outline of the relationships between the proposals for ADT and other relevant plans, programmes and strategies. It is also a requirement of the 2005 Act that relevant environmental protection objectives at the international, European or national level be identified.
- 1.3.2 A number of policy and legislative drivers at a national and UK level relate to Scotland's economic ambitions and seek to ensure future sustainable growth to match these ambitions. Scotland's Economic Strategy⁸ sets out ambitions to create a more cohesive and resilient economy that improves opportunities for business and the people of Scotland alike, based upon increasing competitiveness and tackling inequality. The Economic Strategy also discussed the findings of the Smith Commission and that devolution of powers over Air Passenger Duty ("APD") to the Scottish Parliament would "enable [Scotland] to set a policy that helps support our internationalisation ambitions, and in particular improve connectivity with major airport hubs". It also stated the importance of work to "expand the rail network and improve accessibility of ferries and airports" to "rural parts of Scotland".
- 1.3.3 These ambitions reflect those set out in the 2016-17 Programme for Government⁹, including the importance of transport investment in enabling this growth. This is also reflected in Scotland's Infrastructure Investment Plan and the related projected project pipeline published in early 2015¹⁰, in addition to being a key component of Scotland's National Transport Strategy which was updated in 2016¹¹. The role that transport plays in producing greenhouse gas ("GHG") emissions is recognised and it was announced in 2016 that the National Transport Strategy will be subject to a full review. The review will include setting out an updated vision and exploring ways to address the strategic challenges facing the transport network.
- 1.3.4 These ambitions are also mirrored in the vision of 'A Connected Place' set out in National Planning Framework



⁸ Scottish Government (2015) Scotland's Economic Strategy [online] Available at: <https://beta.gov.scot/publications/scotlands-economic-strategy/> (accessed 16/04/2017)

⁹ The Scottish Government (2016) A Plan for Scotland, The Government's Programme for Scotland 2016-17 [online] Available at: <https://beta.gov.scot/publications/plan-scotland-scottish-governments-programme-scotland-2016-17> (accessed 16/04/2017)

¹⁰ The Scottish Government (2015) Infrastructure Investment Plan [online] Available at: <https://beta.gov.scot/publications/infrastructure-investment-plan-2015/> (accessed 16/04/2017)

¹¹ Transport Scotland (2016) National Transport Strategy [online] Available at: <http://www.transportscotland.gov.uk/strategy/national-transport-strategy> (accessed 02/02/2017)

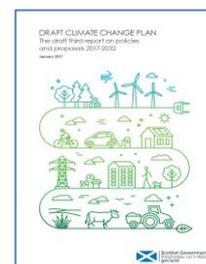
3 (“NPF3”)¹², which discussed improving connectivity in transport links between Scottish towns and cities, and proposals for airport enhancements at Aberdeen, Prestwick, Edinburgh, Glasgow and Inverness. Scottish Planning Policy (“SPP”)¹³ was published alongside NPF3 and set out how these visions will be delivered.

1.3.5 Once developed, the legislative proposals for ADT will also sit within the context of a number of Scottish Government policies, including many focused on meeting ambitious statutory targets for the reduction of GHG emissions, as set by the Climate Change (Scotland) Act 2009 (“the 2009 Act”).

1.3.6 The Climate Change Delivery Plan¹⁴, published in 2009, set out the high level measures required in each sector to meet Scotland's statutory climate change targets, looking both up to 2020 and beyond. This was taken forward following the introduction of the 2009 Act. The 2009 Act requires that annual GHG emissions targets are set, by Order, for each year in the period 2010 – 2050. Section 35 of the 2009 Act also requires that Scottish Ministers lay a report in Parliament setting out proposals and policies for meeting these emission reduction targets. These are the Reports of Proposals and Policies (“RPP”). RPP¹⁵ and RPP2¹⁶ contain policies and proposals for sectors across the economy for the period 2010 to 2027 to reduce GHG emissions per the statutory targets.



1.3.7 In January 2017, the draft Climate Change Plan: the draft Third Report on Policies and Proposals 2017-2032¹⁷ was published for parliamentary scrutiny. The draft Climate Change Plan builds on the work of the previous RPP reports, taking forward these ambitions and exploring opportunities across the economy to reduce Scotland's GHG emissions by 66% in 2032 (against the 1990 baseline). Four Parliamentary committees scrutinised the Plan, and the Scottish Government is now considering the Committee reports.



¹² Scottish Government (2014) National Planning Framework 3 [online] Available at: <https://beta.gov.scot/policies/planning-architecture/> (accessed 10/04/2017)

¹³ Scottish Government (2014) Scottish Planning Policy [online] Available at: <https://beta.gov.scot/publications/scottish-planning-policy/> (accessed 10/04/2017)

¹⁴ The Scottish Government (2009) Climate Change Delivery Plan: Meeting Scotland's Statutory Climate Change Targets [online] Available at: <http://www.gov.scot/Resource/Doc/276273/0082934.pdf> (accessed 02/02/2017)

¹⁵ The Scottish Government (2013) Low Carbon Scotland - Meeting the Emissions Reduction Targets 2010-2022 [online] Available at: <http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/lowcarbon/rpp> (accessed 02/02/2017)

¹⁶ The Scottish Government (2013) Low Carbon Scotland – Meeting our Emissions Reduction Targets 2013-2027 [online] Available at: <http://www.scotland.gov.uk/Topics/Environment/climatechange/scotlands-action/lowcarbon/meetingthetargets> (accessed 02/02/2017)

¹⁷ Scottish Government (2017) Draft Climate Change Plan: the Third Report on Policies and Proposals 2017-2032 [online] Available at: <http://www.gov.scot/Publications/2017/01/2768/downloads> (accessed 22/03/2017)

- 1.3.8 Scotland has made strong progress towards the emissions reduction targets set by the 2009 Act¹⁸ and the Scottish Government has confirmed its intention to bring forward a new Climate Change Bill to establish a “new and more testing 2020 target”¹⁹. In March 2017, the Committee on Climate Change, which has a statutory advisory role under the 2009 Act, provided advice to the Scottish Government on a range of issues, including the potential level of ambition for new Scottish climate change targets²⁰.

Collaborative Climate Change Action

- 1.3.9 The International Civil Aviation Organization (“ICAO”), a United Nations specialised agency, and the aviation industry, represented through the cross-industry Air Transport Action Group (“ATAG”)²¹ are jointly endorsing collaborative efforts to reduce climate impacts. Common goals include: improving fuel efficiency by an average of 1.5%²² per year until 2020; stabilising net emissions from 2020 through carbon-neutral growth and reducing net aviation carbon emissions by 50% by 2050 relative to 2005 levels²³. To achieve these measures, a comprehensive set of mitigation actions have been rolled out which include new, more efficient aircraft technology, sustainable alternative fuels and better use of infrastructure and operational improvements, particularly air traffic management²⁴. The development of an effective, global market-based measure to fill any remaining emissions gaps is another measure in the four pillar strategy set to meet these targets²⁵.
- 1.3.10 Other aviation mechanisms include the European Union (“EU”) Single European Sky Initiative^{26 27}. In addition to tackling issues such as air traffic safety, the initiative has the potential to deliver benefits such as fuel efficiency. The objectives of the Single European Sky are met through the Civil Aviation Authority’s Future Airspace Strategy which sets out a plan to

¹⁸ Reduce greenhouse gas emissions by at least 80% by 2050 with an interim target of a 42 reduction by 2020

¹⁹ Scottish Government (2016) A Plan for Scotland: The Scottish Government’s Programme for Scotland 2016-17 [online] Available at: <http://www.gov.scot/Publications/2016/09/2860> (accessed 04/04/2017)

²⁰ Committee on Climate Change (2017) Advice on the new Scottish Climate Change Bill [online] Available at: <https://www.theccc.org.uk/publication/advice-on-the-new-scottish-climate-change-bill/> (accessed 22/03/2017)

²¹ Air Transport Action Group is an independent coalition of member organisations and companies throughout the global air transport industry

²² ICAO has set a more ambitious target of 2% with regard improved fuel efficiency

²³ United Nations Climate Summit 2014 (2014) Transport Aviation Action Plan [online] Available at: http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/UN_ICAO-ATAG-Agreement_2_action-plan.pdf (accessed 02/02/2017)

²⁴ United Nations Climate Summit 2014 (2014) Transport Aviation Action Statement [online] Available at: http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/UN_ICAO-ATAG-Agreement_1_action-statement.pdf (accessed 02/02/2017)

²⁵ Ibid

²⁶ European Commission (2017) Single European Sky I [online] Available at: http://ec.europa.eu/transport/modes/air/single_european_sky/ses_1_en (accessed 02/02/2017)

²⁷ European Commission (2017) Single European Sky II [online] Available at: http://ec.europa.eu/transport/modes/air/single_european_sky/ses_2_en (accessed 02/02/2017)

modernise airspace by 2020²⁸. These initiatives are complementary and both have a common aim of reducing the environmental impact of aviation through the improved airspace design and new on-board and ground-based systems. These new technologies and procedures should allow flight routes to be more direct and reduce fuel burn²⁹.

- 1.3.11 Sustainable Aviation is a long-term strategy which sets out the collective approach of the UK aviation industry to tackling the challenge of ensuring a sustainable future of the industry³⁰. It is an alliance of UK airlines, airports, aerospace manufacturers and air navigation service providers and its goals and commitments cover climate change, local air quality and noise. The Sustainable Aviation CO₂ Road Map³¹ sets out a number of activities being undertaken in the sector to reduce CO₂ emissions. These include optimised aircraft operations and air traffic management, improvements in aircraft and energy efficiency and sustainable biojet fuels. The Road Map states that “UK aviation is able to accommodate significant growth to 2050 without a substantial increase in absolute CO₂”³².
- 1.3.12 The Committee on Climate Change has stated that policy approaches to aviation emissions should be set at a global or EU level given the international nature of the industry. The Committee have further indicated that, until these are agreed, an appropriate long-term planning assumption for UK aviation is for emissions to be around 2005 levels in 2050³³.
- 1.3.13 Further information regarding other plans, programmes and strategies of relevance to the context of ADT are considered throughout this document.



²⁸ Civil Aviation Authority (undated) Future Airspace Strategy, the development of future airspace management [online] Available at: <http://www.caa.co.uk/default.aspx?catid=2408&pagetype=90> (accessed 02/02/2017)

²⁹ SESAR (2010) The future of flying[online] Available at: http://ec.europa.eu/transport/modes/air/sesar/doc/2010_the_future_of_flying_en.pdf (accessed 06/02/2017)

³⁰ Sustainable Aviation (2015) A strategy towards sustainable development of UK Aviation [online] Available at: <http://www.sustainableaviation.co.uk/our-story/> (accessed 02/02/2017)

³¹ Sustainable Aviation (2016) Sustainable Aviation CO₂ Road-Map 2016 [online] Available at: http://www.sustainableaviation.co.uk/wp-content/uploads/2016/12/FINAL_SA_Roadmap_2016.pdf (accessed 02/02/2017)

³² Sustainable Aviation (2012) Sustainable Aviation CO₂ Road Map 2012 [online] Available at: <http://www.sustainableaviation.co.uk/wp-content/uploads/2015/09/SA-Carbon-Roadmap-full-report.pdf> (accessed 06/02/2017)

³³ Committee on Climate Change (undated) Aviation [online] Available at: <https://www.theccc.org.uk/charts-data/ukemissions-by-sector/aviation/> (accessed 02/02/2017)

2 Approach to the assessment

2.1 SEA process to date

- 2.1.1 SEA has a number of distinct stages: screening, scoping, the environmental assessment and the production of an Environmental Report and Post Adoption Statement. At each stage, there is a requirement to consult with three statutory Consultation Authorities. These are Historic Environment Scotland (“HES”), Scottish Natural Heritage (“SNH”) and the Scottish Environment Protection Agency (“SEPA”). In addition, there is a requirement for early and effective engagement with the wider public once the Environmental Report has been published.
- 2.1.2 The SEA process began with the production of a joint Screening and Scoping Report³⁴ published for consultation in March 2016. This set out information including the proposed assessment methodology and environmental baseline that would form the basis of the assessment process. The report also set out information on the consideration of reasonable alternatives and the initial findings of some early assessment work. As noted above, it is a statutory requirement to seek views at screening and scoping stage from the three statutory Consultation Authorities. As a matter of good practice and in the interests of transparency, public consultation was also undertaken at this stage. Further information on this process can be found below in Section 2.2.
- 2.1.3 Following this stage of consultation, the Scottish Government determined that a SEA would be required. This determination was formally advertised as required by the 2005 Act.

2.2 Views received at Screening and Scoping Stage

- 2.2.1 The Scottish Government published “A consultation on a Scottish replacement to Air Passenger Duty”³⁵ on 14 March 2016. The policy consultation sought early views on how a tax to replace UK APD in Scotland should be structured and operated in order to boost Scotland’s international connectivity and help deliver the Scottish Government’s strategic objective of sustainable growth.
- 2.2.2 In addition, the SEA Screening and Scoping Report³⁶ was also published for consultation. Views were sought at this early stage in the process to help

³⁴ Scottish Government (2016) A Scottish replacement to Air Passenger Duty - Strategic Environmental Assessment Screening and Scoping Report [online] Available at: <http://www.gov.scot/Publications/2016/03/6647/downloads> (accessed 01/02/2017)

³⁵ Scottish Government (2016) A consultation on a Scottish replacement to Air Passenger Duty [online] Available at: <http://www.gov.scot/Publications/2016/03/3238/downloads> (accessed 01/02/2017)

³⁶ Scottish Government (2016) A Scottish replacement to Air Passenger Duty - Strategic Environmental Assessment Screening and Scoping Report [online] Available at: <http://www.gov.scot/Publications/2016/03/6647/downloads> (accessed 01/02/2017)

inform the assessment process and ensure that the assessment proceeded with an effective evidence base, informed by key stakeholders, organisations and individuals. Following the close of the consultation period “SEA Screening and Scoping Report Consultation – Analysis of Responses”³⁷ was produced and published in July 2016.

- 2.2.3 Where applicable, a summary of the views expressed at this consultation stage has been included within this report in coloured text boxes under relevant sections. Details have also been included on how these views have been considered within the assessment process as this progressed.
- 2.2.4 The paragraphs below set out a summary of the key issues and comments received in response to the Screening and Scoping Report and, where relevant, the 2016 policy consultation.

Overview of comments

- 2.2.5 One of the main concerns raised from respondents at this stage was the increase in GHG emissions considered likely to arise through greater activity in the aviation sector and the impact of this on Scottish Government’s climate change commitments and ambitions. Other common issues included the potential for further impacts on climate change that may arise through the proposed reduction in tax encouraging a shift from train to air travel. The potential for associated localised environmental impacts from aviation activity, such as increased noise and traffic around airports, was also raised as a concern.
- 2.2.6 A few respondents felt that the policy proposals were inconsistent with wider Scottish Government policies, such as those that support active travel and policies related to transitioning to a low carbon economy. This was mirrored by views that the assessment of air connectivity should not be taken in isolation, but should be considered and assessed against wider objectives, such as those related to climate change, improving public health and quality of life. Other respondents also requested that the assessment consider the context of aviation within the broader picture of activity outwith the sector’s influence, for example, increased traffic that may arise as a result of factors that were not within the ability of the aviation sector to influence. The potential for a modal shift to occur and the environmental implications of this was also a common issue raised. It was requested that this be given greater consideration, both during the policy development and in the assessment process.
- 2.2.7 Many respondents felt that a Scottish APD replacement tax should reflect the environmental and social impacts of aviation or be increased to reduce growth in the sector. A few respondents, however, expressed a view that the introduction of a replacement tax was not an environmental tax, nor an

³⁷ Scottish Government (2016) SEA Screening and Scoping Report Consultation – Analysis of Responses [online] Available at: <https://consult.scotland.gov.uk/fiscal-responsibility/air-passenger-duty/> (accessed 01/02/2017)

appropriate or cost effective measure when considered in a purely environmental way.

- 2.2.8 The role of existing mitigation measures, such as the EU Emissions Trading System, alongside work undertaken to improve efficiencies in the sector, was also noted by some respondents. However, views on the effectiveness of these differed, with some respondents of the view that these were not sufficient when considered in isolation in addressing climate change emissions from the industry.

2.3 Assumptions and limitations relevant to the assessment process

Early development of assumptions

- 2.3.1 To better establish the changes that a Scottish APD replacement tax may bring about, three assumptions were made early in the assessment process to reflect changes in the aviation industry considered likely to arise as a consequence of implementation of the proposals. These assumptions were developed and applied in order to focus the assessment process and draw out the likely significant environmental effects that may arise as a result of the reduction of the replacement tax.
- 2.3.2 The key assumptions (Box 2.1) were developed by drawing on previous research carried out by Transport Scotland in September 2014 (this is discussed further under section 2.3.3). They were informed through stakeholder engagement, including discussion with members of the stakeholder forum, the Consultation Authorities and subject to a wide range of stakeholder engagement through public consultation at SEA screening and scoping stage. The views expressed on the key assumptions at the screening and scoping consultation stage are provided in Box 2.2.

Box 2.1 Key assumptions

1: The proposal to reduce Air Departure Tax in Scotland will lead to an increase in the overall number of flights and could potentially create opportunities for new routes to be created.

2: An increase in flight numbers will lead to an increase in overall greenhouse gas emissions (CO₂ and non-CO₂ emissions) in the short-term, even with advances in technology.

3: An increase in passenger and flight numbers will place increased pressure on existing airport and interconnecting infrastructure.

Box 2.2 Key assumptions: Views received at screening and scoping stage

The majority of respondents who provided views on the key assumptions and the proposed focus of the assessment agreed or broadly agreed with them. A few respondents, whilst supportive, felt that it was important that the assessment give greater consideration to the wider context of growth in the aviation industry. For example, the assumption that there will be an increase in GHG emissions and increased pressure on infrastructure should be considered in conjunction with potential mitigation, such as new technologies, fuels and operational improvements and the greater optimisation of current capacity.

The work of Sustainable Aviation, such as the industry noise and carbon road maps, was highlighted as demonstrating that additional connectivity can be delivered within current obligations and environmental targets. The role of the International Civil Aviation Organization in delivering environmental improvements at a global level, such as the development of global market-based measure, and the EU Emissions Trading System was also highlighted. Whilst agreeing with the assumptions in principle, it was suggested that the assessment should include consideration of the effects on environmental objectives. For example, the consideration of increased GHG emissions should be assessed against Scotland's climate change obligations. It was also proposed that the assessment should include consideration of the impact of aviation emissions at differing atmospheric levels (known as the multiplier effect).

Scottish Government Response: These points are relevant and have been built into the assessment process, for example when considering the significance of the likely environmental effects. The key assumptions and focus of the assessment remain largely the same as that proposed at the screening and scoping stage.

Research work considered during this assessment

- 2.3.3 In 2017, Transport Scotland undertook research to estimate the impact on GHG emissions of a 50% reduction in ADT³⁸. This updates similar research undertaken in 2014 to consider the implications that may arise from a 50% reduction in a Scottish APD replacement tax³⁹. This body of research has been used to inform this SEA.
- 2.3.4 A number of assumptions were utilised in undertaking these research projects. For example, the relationship between passenger numbers and estimated emissions was assumed to be a linear average. The research projects also noted a number of factors which would introduce greater uncertainty into the analysis and results. This included data requirements and the complexity of ticket types and prices. It is also noted that a number of unknown factors were discovered in taking forward the research, such as the response to the reduced tax in the distribution of passengers between domestic and international flights.

Limitations experienced during this assessment

- 2.3.5 SEA is a high level assessment; therefore it is important to be clear regarding the scope and focus of the assessment work that can be undertaken through this process. The potential impact on overall GHG emissions that may arise as a result of any modal shift brought about by the implementation of the preferred policy option for ADT, beyond that considered as part of the research projects noted above, has been outwith the scope of this assessment. Whilst it remains a relevant consideration, the assessment cannot predict the impact on overall emissions to an acceptable level, should a modal shift arise.

Implications of Brexit

- 2.3.6 Following the outcome of the referendum in June 2016, the UK is to leave the EU. The Prime Minister triggered Article 50 on 29 March, meaning the date of the UK's withdrawal from the EU will be 29 March 2019, unless all EU Member States agree to extend the negotiating period. In the intervening period, the UK remains a full Member State of the EU. Much of Scotland and the UK's environmental legislation is derived from EU Law and Regulations. The Scottish Government will not accept any diminution of the current standards of environmental protection as a result of Brexit and is pursuing all options to ensure that Scotland's interests are protected through Brexit, including through continued membership of the European Single Market.

³⁸ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

³⁹ Transport Scotland (2014) Estimate of the Impact on Emissions of a Reduction in Air Passenger Duty in Scotland [online] Available at: <https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/> (accessed 04/04/2017)

2.3.7 The outcome of the Brexit negotiations has implications for the future of the UK's and Scotland's continued participation in the EU Emissions Trading Scheme, which is currently the main mechanism for delivering emissions reduction from international aviation. Furthermore, the EU will implement the new global scheme (CORSIA – see section 3.3.32), therefore the UK might have to consider how to implement this outside of the EU.

2.4 The scope and scale of likely significant impacts considered in the assessment

2.4.1 At screening and scoping stage the assumptions developed to focus the assessment (Box 2.1) were applied to help identify the likely environmental effects that might arise from the proposal to reduce the overall burden of a Scottish APD replacement tax. This process was undertaken to identify the SEA topic areas that may be affected and therefore “scoped in” to the assessment. It was considered at this stage that there was potential for the Scottish Government's policy plans for a Scottish APD replacement tax to have a range of environmental effects. All SEA topics have therefore been scoped into this assessment.

2.4.2 It was also noted at screening and scoping stage that many of the potential environmental effects likely to arise will impact at differing geographical scales as a result of a combination of factors. For example, the type of effect, the nature of the environmental receptor and whether the impacts are likely to occur only in certain locations. As a result of these factors, some of the environmental effects that arise from the aviation sector occur at altitude and are therefore trans-boundary in nature and experienced over a larger geographical envelope. Other environmental effects may be associated with airport infrastructure and, whilst potentially still significant in nature, are likely to be experienced at a more local level.

2.4.3 It was proposed that the SEA would explore and consider the potential effects at differing geographical scales, using the key assumptions to build on the initial assessment work undertaken at screening and scoping stage.

Box 2.3 Proposal to consider differing geographical scales: Views expressed at screening and scoping stage

This was viewed as essential and sensible given the global nature of the industry. Respondents emphasised, however, that different weight or significance should not be given to national priorities or impacts over local effects. Noise and air pollution were provided as examples of where effects will be experienced more acutely at a localised scale. A few other respondents considered that, as a global industry with global effects, recognition should be given to measures and mitigation implemented globally by the industry.

Scottish Government Response: The assessment process considers the environmental impacts likely to arise from the preferred policy option at differing geographical scales. Scale has been one of a number of factors taken into account when considering the significance of likely environmental effects.

2.5 Reasonable Alternatives

2.5.1 The 2005 Act requires that the potential for significant environmental effects of reasonable alternatives to a plan, programme, or strategy are assessed as part of the SEA process. This section discusses the consideration of reasonable alternatives that have been assessed alongside the preferred policy option of a 50% reduction in the overall burden of ADT by the end of the current session of the Scottish Parliament, which is expected to be in 2021.

2.5.2 The SEA has considered and compared the following policy approach as a reasonable alternative:

- ***No reduction in the overall tax burden of ADT compared to the overall tax burden of UK APD (i.e. tax rate amounts maintained at current levels).***

Box 2.4 Proposed alternatives: Views expressed at screening and scoping stage

The majority of respondents provided a view at screening and scoping stage that a Scottish APD replacement tax should reflect the environmental or social impacts of aviation or be increased to reduce growth in the aviation sector and associated environmental impacts.

Scottish Government Response: The Scottish Government does not consider a Scottish APD replacement tax with a higher overall tax burden compared to UK APD to be a “reasonable alternative” to delivering the main objectives of the policy.

2.6 Building on other previous relevant assessment work

- 2.6.1 A considerable amount of research has been undertaken to explore the environmental effects that arise from activity in the aviation sector. For example, in addition to the research projects undertaken by Transport Scotland noted earlier, in 2011 the UK Government undertook a consultation on “A sustainable framework for UK aviation”⁴⁰. Other relevant research includes the work undertaken by the Airports Commission in 2015⁴¹. This considered the impacts of increasing the UK’s long-term aviation capacity and included an assessment of the potential implications on a number of factors such as surface access, noise and air quality.
- 2.6.2 The SEA undertaken on NPF3 and SPP explored transport issues. In particular, this SEA involved the assessment of the vision of ‘A Connected Place’ including proposals for Scottish airport enhancements at Aberdeen, Glasgow Prestwick, Edinburgh, Glasgow and Inverness, and improving transport links between cities (e.g. rail links). Transport connectivity for Scotland’s airports is also widely addressed through the Local Development Planning process, which are subject to SEA.
- 2.6.3 Where appropriate, this SEA has built on this and other relevant work to inform the evidence gathering and assessment process.

2.7 Evidence used in the assessment process

- 2.7.1 Schedule 3 of the 2005 Act requires that the following be identified:
- Relevant aspects of the current state of the environment and its likely evolution without the plan or programme.
 - Environmental characteristics of areas likely to be affected.
 - Relevant existing environmental problems.
 - Relevant environmental protection objectives at the international, European or national level.
- 2.7.2 There are many objectives for environmental protection and improvement within existing legislation, policies and strategies that form the context for this SEA. A summary of these have been set out in the following sections of the report under the respective topic.
- 2.7.3 Additionally, a wide range of evidence has been drawn together in order to inform the assessment process and much of this information was included in

⁴⁰ Department of Transport (2011) Sustainable framework for UK aviation consultation [online] Available at: <https://www.gov.uk/government/consultations/sustainable-framework-for-uk-aviation-consultation> (accessed 01/02/2017)

⁴¹ Airports Commission (2015) Airports Commission: Final Report July 2015 [online] Available at: <https://www.gov.uk/government/publications/airports-commission-final-report> (accessed 01/02/2017)

the Screening and Scoping Report, alongside the finding of some early assessment work. The views expressed at the screening and scoping consultation stage on the proposed evidence base to be used in the assessment and initial identification of potential environmental effects have been summarised in Box 2.5.

- 2.7.4 Evidence continued to be collated as the assessment progressed, with specific focus on the characteristics which have the potential to be affected by activity in the aviation sector. The information presented within each topic area has been drawn from a number of sources, such as SNH, SEPA, HES, the Committee on Climate Change and the aviation industry. In order to provide transparency, an overview of the sources of information used to inform the assessment has been included in Appendix B.

Box 2.5 Initial findings and proposed evidence base: Views expressed at screening and scoping stage

There were mixed views on the proposed evidence base for the assessment process. Views ranged from it being reasonably comprehensive to overly complex.

A few respondents emphasised that it was important that the impacts of Scottish air transport are not assessed in isolation and that the assessment should consider the environmental implications the changes may have on other transport sources or at other locations. For example, an increase in emissions in some airports may be offset by decreases in others. A few respondents also felt that the assessment needed to better consider current and future mitigation measures, for example, the EU Emissions Trading System. In addition, the work of Sustainable Aviation, such as the development of road maps on carbon, noise and sustainable fuels, was discussed. It was requested that this body of work be more thoroughly assessed and incorporated into the evidence base.

Views on the effectiveness of mechanisms such as the EU Emissions Trading System and the work of Sustainable Aviation and the International Civil Aviation Organization differed. Some felt references to the collaborative approach and targets set through the work of Sustainable Aviation were misleading. This was based on the belief that these were aspirational targets of the aviation industry and not based on actual emissions trends and evidence of the implementation of emissions reductions mechanisms. Furthermore, whilst it was acknowledged that some progress has been made with a global market-based measure via the International Civil Aviation Organization, no standard had yet been adopted. The effectiveness of the standard (once adopted) in meeting the target deadlines, such as stabilisation of emissions by 2020, was also questioned due to timing implications of its adoption.

Additional sources of information and amendments were provided on a range of issues. Suggestions of further evidence included information on climate change such as the Paris Agreement and the Committee on Climate Change's reports "The high ambition towards a low carbon economy" and "Meeting the UK Aviation target – options for reducing emissions to 2050". It was suggested that the assessment should also give greater consideration to the airline fleet replacement programme and investment in modern, quieter and fuel efficient aircraft.

A number of respondents broadly agreed with the initial findings but provided further comments. Some felt the findings were reasonable and thorough, but that wider considerations had not been sufficiently reflected. It was also felt that the assessment did not consider the extent to which forecast growth may be accommodated through existing infrastructure and aircraft movement, for example through higher load factors. It was suggested that factors such as these should be given greater consideration in order to provide a more nuanced and complete picture of the likely environmental effects.

It was also requested that specific consideration be given to how the proposed policy could incentivise modal transport shift on routes where air and rail compete, and that the subsequent impact on CO₂ emissions should be modelled.

Mitigation was also raised as an issue from a number of respondents. It was noted that the assessment presumed that the legislation that currently exists is applied effectively and considered that too much responsibility for regulating impacts was left to the aviation industry. Another respondent considered the findings reasonable but expressed concern that mitigation such as climate neutral growth or sustainable fuels may be used to minimise the likely impacts.

Scottish Government response: We have taken into account the best available environmental information and have been clear regarding where this information has been sourced to ensure a robust evidence base underpinned the assessment. The early assessment work presented in the Screening and Scoping Report was provided as an indication of initial issues under consideration across a range of receptors, for example, climatic factors, soil and biodiversity, flora and fauna. As part of this process, examples of potential mitigation measures were included. It was made clear that the significance of the initial findings would be explored as the assessment and preferred policy option developed. The following sections setting out the findings of the assessment process have built on this initial work to consider issues such as existing mitigation, the likely significance of the identified likely environmental impacts and broader considerations such as existing growth pressures on infrastructure, local airport policies and initiatives and existing airport capacity.

2.8 How the findings of the assessment have been presented

- 2.8.1 As discussed earlier (Section 2.3), three key assumptions have been used to consider the likely environmental impacts that may arise from a 50% reduction in the overall tax burden of ADT by the end of the current session of the Scottish Parliament, which is expected to be in 2021.
- 2.8.2 Additionally, the SEA has considered illustrative scenarios that could be applied to meet the 50% reduction in the overall tax burden set out in the preferred policy option. These have been included in the assessment process to help frame the discussion on the likely impacts of the preferred policy option and how different ways to achieve the overall objective of a 50% reduction in the overall tax burden could influence these impacts.
- 2.8.3 This has included the consideration of applying a 50% reduction in the overall tax burden proportionally equally across all tax bands and tax rate categories. Applying a zero tax rate amount to short-haul flights only, with the tax rate amounts for long-haul flights maintained at current UK APD levels, and vice versa, was also considered. Both these scenarios would still broadly deliver a 50% reduction in the overall tax burden (it is estimated that approximately 48% of all APD revenue currently generated in Scotland is from short-haul flights, and 52% is from long-haul flights).
- 2.8.4 A reasonable alternative to the preferred policy option and the potential impacts it may have has also been considered in undertaking this SEA. The SEA has considered and compared the following policy approach as a reasonable alternative: no reduction in the overall tax burden of ADT compared to the overall tax burden of UK APD. This would replace the existing UK APD with a like for like tax in Scotland.
- 2.8.5 The following sections set out the findings of the assessment process under each SEA topic alongside the objectives for environmental protection and enhancement detailed within existing legislation, policies, strategies and plans relating to that topic area. Information including relevant aspects of the environment likely to be affected and existing environmental problems has also been included.
- 2.8.6 At the end of each SEA Topic, a summary box has been included, which sets out the key points and issues relating to that topic. Furthermore, the assessment findings and evidence within these discussions have been used to inform Section 11 of the report. This sets out a summary of the assessment findings at the national and local level, in addition to the reasonable alternative.

3 Climatic Factors

3.1 Environmental Objectives

- 3.1.1 The 2009 Act⁴² created the statutory framework for GHG emissions reductions in Scotland and set targets for reductions in emissions of the basket of seven Kyoto Protocol greenhouse gases⁴³ of 80% by 2050, with an interim 2020 target of 42%, compared to the 1990/1995 baseline level. The 2009 Act sets out Scotland's ambition on tackling climate change and, through this legislation, Scotland's contribution to international (EU and UN) efforts on climate change mitigation and adaptation. Under the 2009 Act, both domestic aviation emissions and Scotland's share of international aviation emissions are included when measuring progress towards meeting statutory emission reduction targets.
- 3.1.2 The 2009 Act also requires that annual GHG emissions targets are set, by Order, for each year in the period 2010-2050. When setting each batch of targets, Scottish Ministers are required to have regard to advice received from the Committee on Climate Change. Following the initial phase of target-setting, the annual targets are set in five year batches, at least twelve years in advance. The third and most recent batch of annual targets, covering the years 2028-2032, was agreed by the Scottish Parliament in October 2016.
- 3.1.3 Official statistics published in June 2016 show that Scottish emissions, for the purpose of reporting against statutory targets, were 45.8% below the 1990 baseline level in 2014⁴⁴. This means that the level of the statutory interim 2020 target has been exceeded six years early⁴⁵. Having made strong progress towards the targets set out in the 2009 Act, the Scottish Government has committed to keeping Scotland at the forefront of global climate action by responding to the United Nations Framework Convention on Climate Change ("UNFCCC") Paris Agreement with a Climate Change Bill that sets new, evidence-based, statutory emission reduction targets⁴⁶.
- 3.1.4 Section 35 of the Act requires that Scottish Ministers lay a report in Parliament setting out proposals and policies for meeting emission reduction targets, as soon as reasonably practicable after each batch of annual targets

⁴² Scottish Government (2012) Climate Change (Scotland) Act 2009 [online] Available at: <http://www.gov.scot/Topics/Environment/climatechange/scotlands-action/climatechangeact> (accessed 04/04/2017)

⁴³ The basket of Kyoto Protocol greenhouse gases comprises carbon dioxide (CO₂), methane, and nitrous oxide, for which the baseline is 1990; and hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride, for which the baseline is 1995. Nitrogen trifluoride has subsequently been added.

⁴⁴ The Scottish Government (2016) Scottish Greenhouse Gas Emissions 2014, An official Statistics Publication for Scotland [online] Available at: <http://www.gov.scot/Resource/0050/00501550.pdf> (accessed 30/01/2017)

⁴⁵ The Scottish Government (2016) Purpose Target: Sustainability [online] Available at: <http://www.gov.scot/About/Performance/scotPerforms/purposetargets/sustainability> (accessed 31/01/2017)

⁴⁶ Inspired PQ S5W-05402

has been set. These have become the series of Reports of Proposals and Policies. In January 2017, the draft Climate Change Plan: the draft Third Report on Policies and Proposals 2017-2032⁴⁷ was published for parliamentary scrutiny. The draft Climate Change Plan builds on the work of the previous RPP reports, taking forward these ambitions and exploring opportunities to further reduce Scotland's GHG emission between now and 2032. The draft Climate Change Plan sets out Scotland's ambitious approach to mitigating the effects of climate change across a range of sectors including transport.

- 3.1.5 The Scottish Climate Change Adaptation Programme ("the Programme")⁴⁸ was developed in 2014 to address the impacts identified for Scotland in the 2012 UK Climate Change Risk Assessment⁴⁹. The Programme set out Scottish Ministers' objectives in relation to adapting to climate change, their proposals and policies for meeting these objectives, the period within which these proposals and policies would be introduced, and arrangements for wider engagement in meeting these objectives. The impacts identified for Scotland by the 2017 UK Climate Change Risk Assessment⁵⁰ are expected to be addressed by the second iteration of the Programme which is due in 2019⁵¹.

Paris Climate Agreement

- 3.1.6 In November 2016 the UNFCCC Paris Agreement came into force⁵² after being adopted by 195 countries. The Agreement is the first ever universal, legally binding global climate deal and sets out goals to limit global warming to well below 2°C, and to pursue further efforts to limit it to 1.5°C⁵³. The Agreement also covers a range of other issues such as mitigation through reducing emissions, adaptation, and loss and damage⁵⁴.

⁴⁷ Scottish Government (2017) Draft Climate Change Plan: the Third Report on Policies and Proposals 2017-2032 [online] Available at: <https://beta.gov.scot/publications/draft-climate-change-plan-draft-third-report-policies-proposals-2017/> (02/05/2017)

⁴⁸ Scottish Government (2014) Climate Ready Scotland Scottish Climate Change Adaptation Programme [online] Available at: <http://www.gov.scot/Publications/2014/05/4669> (accessed 05/04/2017)

⁴⁹ UK Government (2012) UK Climate Change Risk Assessment [online] Available at: <https://www.gov.uk/government/publications/uk-climate-change-risk-assessment-government-report> (accessed 05/04/2017)

⁵⁰ Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017 [online] Available at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/> (accessed 05/04/2017)

⁵¹ Committee on Climate Change (2016) Scottish Climate Change Adaptation Programme: An independent assessment for the Scottish Parliament [online] Available at: <https://www.theccc.org.uk/wp-content/uploads/2016/09/Scottish-Climate-Change-Adaptation-Programme-An-independent-assessment-CCC-September-2016.pdf> (accessed 05/04/2017)

⁵² UNFCCC (2016) The Paris Agreement [online] Available at: http://unfccc.int/paris_agreement/items/9485.php (accessed 05/04/2017)

⁵³ European Commission (2016) Climate Action – Paris Agreement [online] Available at: https://ec.europa.eu/clima/policies/international/negotiations/paris_en (accessed 05/04/2017)

⁵⁴ *ibid*

EU Emissions Trading System

- 3.1.7 The EU Emissions Trading System (“EU ETS”) is a key component of the EU’s policy to combat climate change, with a 20% emission reduction target for 2020 on 2005 levels. In operation since 2005, it introduced a cap for GHG emissions from energy intensive industries. Companies are required to obtain allowances, the availability of which decreases over time, to cover their emissions. The EU ETS operates in 31 countries (all 28 EU countries plus Iceland, Liechtenstein and Norway)⁵⁵ and covers 45% of the EU’s emissions.
- 3.1.8 The EU ETS was amended to include emissions from international aviation in 2012, with the target of reducing emissions 5% below the 2004-6 average. Under the EU ETS CO₂ emissions from both domestic and international aviation, are capped at 95% of historic levels from 2013 to 2020⁵⁶. A subsequent decision was taken to exclude flights outwith the European Economic Area (“EEA”) between 2013 and 2016 (known as the “Stop the Clock” decision)⁵⁷. This decision was taken to avoid jeopardising talks by ICAO on the development of a global market-based measure.
- 3.1.9 In February 2017 the European Commission proposed to permanently fix the scope of the aviation EU ETS to flights within the EEA from the 2017 compliance year onwards (effectively meaning a continuation of the Stop the Clock decision beyond 2016 with no break)⁵⁸. The proposal recognises that an agreement was reached to develop a global market based measure for international aviation emissions at the ICAO assembly in October 2016 (discussed further in Section 3.3). It therefore includes the future review of the aviation EU ETS once the detail of the global market based measure is known.

3.2 Environmental Context

- 3.2.1 Over the last 50 years, it has become increasingly apparent that the world’s climate is changing at an unprecedented rate. Evidence of an increase in average global temperatures, along with an increase in GHG in the atmosphere, has led to the conclusion that human activities such as the use of carbon based fuels is the main reason for this increase⁵⁹. In addition,

⁵⁵ European Commission (2016) EU Emissions Trading System (EU ETS) [online] Available at: http://ec.europa.eu/clima/policies/ets/index_en.htm (accessed 31/01/2017)

⁵⁶ Scottish Government (2013) RPP2 [online] Available at: <http://www.gov.scot/Publications/2013/06/6387/9> (accessed 31/01/2017)

⁵⁷ European Commission (2013) The EU Emissions Trading System (EU ETS) [online] Available at: https://ec.europa.eu/clima/sites/clima/files/factsheet_ets_en.pdf (accessed 31/01/2017)

⁵⁸ Parliament UK (2017) Aviation Emissions [online] Available at: <https://www.publications.parliament.uk/pa/cm201617/cmselect/cmeuleg/71-xxxii/7106.htm> (accessed 08/05/2017)

⁵⁹ Scotland’s Environment (undated) Climate change [online] Available at: http://www.environment.scotland.gov.uk/our_environment/air_and_climate/climate_change.aspx (accessed 31/01/2017)

many of the activities that contribute to climate change (e.g. transport and energy generation) are often also responsible for generating air pollution.

- 3.2.2 Climate change is considered to be one of the most serious environmental threats to sustainable development, with adverse impacts expected on human health, food security, economic activity, natural resources and physical infrastructure^{60 61}. Adaptation to the effects of climate change is now acknowledged as necessary for responding effectively and equitably to the impacts of climate change.
- 3.2.3 Within Scotland, higher temperatures and changes in rainfall patterns have been exhibited since 1961. For example, some parts of northwest Scotland have become up to 45% drier over the summer months, while increases in winter rainfall of as much as 60% have been observed in northern and western regions⁶². As discussed above, climate change has the potential to have a wide range of direct, secondary or indirect effects on the natural environment, and has been identified as a primary pressure on many of the SEA topic areas (i.e. soil, water, biodiversity, cultural heritage and the historic environment). The predicted impacts from a changing climate have been discussed further under the relevant SEA topics in this Report.
- 3.2.4 In 2014, **Scotland's emissions** of the basket of seven Kyoto GHGs were estimated to be 46.7 million tonnes of carbon dioxide equivalent (MtCO₂e). This is 8.6% lower than the 2013 figure of 51.1 MtCO₂e, a 4.4 MtCO₂e decrease in absolute terms⁶³. In 2014, Scotland's emissions from transport (including international aviation and shipping) were 12.9 MtCO₂e. This is the second largest source of GHG emissions in 2014, after the energy supply sector (13.8 MtCO₂e)⁶⁴. Between 1990 and 2014, there was an overall 0.4 MtCO₂e (2.8 per cent) fall in emissions from the transport sector (including international aviation and shipping). Emissions in this sector rose from 1990 to a peak in 2007, before falling slightly since then⁶⁵.
- 3.2.5 GHG emissions from transport tend to correlate with Gross Domestic Product. Hence the 2008 recession is widely thought to be a contributing factor for the fall in transport emissions in Scotland after 2007. For example, when the economy grows, the demand for goods rises. The demand for these increases the volume of goods in transit, and the volume of

⁶⁰ ICAO (undated) Climate change adaptation [online] Available at: <http://www.icao.int/environmental-protection/Pages/adaptation.aspx> (accessed 31/01/2017)

⁶¹ Committee on Climate Change (2016) UK Climate Change Risk Assessment 2017 [online] Available at: <https://www.theccc.org.uk/uk-climate-change-risk-assessment-2017/> (accessed 31/01/2017)

⁶² Scotland's Environment (2016) Scotland's Climate Trends Handbook. Available at: http://www.environment.scotland.gov.uk/climate_trends_handbook/index.html (accessed 31/01/2017)

⁶³ Scottish Government (2014) Scottish Greenhouse Gas Emissions 2014, An official Statistics Publication for Scotland [online] Available at: <https://beta.gov.scot/publications/scottish-greenhouse-gas-emissions-2014/> (accessed 31/01/2017)

⁶⁴ *ibid*

⁶⁵ *ibid*

passengers traveling to purchase them, and the reverse is true when the economy contracts.

- 3.2.6 At a **Scotland level**, the latest GHG inventory shows that aviation accounted for around 4% of total Scottish GHG emissions in 2014⁶⁶. The share of aviation emissions which arise from domestic flights is much higher for Scotland than for the UK as a whole, at approximately 30% of aviation emissions. The table below sets out the proportion of emissions between domestic and international aviation in 2014⁶⁷.

Proportion of Total Aviation Emissions, 2014	Scotland	UK
Domestic	34.07%	8.37%
International	65.93%	91.63%
Total	100.00%	100.00%

- 3.2.7 The nature of flights undertaken can be varied and complex. Some can be point to point flights; others, whilst considered domestic, can be connecting flights to onward journeys. For example, a domestic flight starting in Scotland can often be part of a long-haul route via airports such as London Heathrow, as this serves as a major airport hub for Scotland's main airports.
- 3.2.8 Approximately 25.5 million air terminal passengers utilised **Scottish** airports in 2015, an increase of 5.9%, or 1.4 million passengers from the previous year⁶⁸. Of this number, three quarters travelled to or from Edinburgh or Glasgow⁶⁹. In 2015, four airports, Edinburgh, Glasgow, Aberdeen and Inverness, accounted for 94% of total passenger numbers at Scottish airports. Passenger numbers increased by 39% between 2001 and 2007, reaching a peak of 25,132 before falling 17% to 20,907 in 2010⁷⁰. Since then they have risen 22%⁷¹.
- 3.2.9 At the **UK level**, the Civil Aviation Authority ("CAA") reports that direct emissions from flights equalled approximately 34 million tonnes (Mt) in 2012⁷². It is also stated that the average house produces 4.5t of CO₂ per annum so aviation's contribution to GHG emissions is approximately

⁶⁶ Scottish Government (2014) Scottish Greenhouse Gas Emissions 2014, An official Statistics Publication for Scotland [online] Available at: <https://beta.gov.scot/publications/scottish-greenhouse-gas-emissions-2014/> (accessed 31/01/2017) and data obtained from published Pivot tables

⁶⁷ National Atmospheric Emissions Inventory (2016) Report: Greenhouse Gas Inventories for England, Scotland, Wales and Northern Ireland: 1990-2014 [online] Available at: http://naei.defra.gov.uk/reports/reports?report_id=894 (accessed 6/6/2017)

⁶⁸ Transport Scotland (2016) Scottish Transport Statistics No 35 2016 Edition [online] Available at: <https://www.transport.gov.scot/publication/scottish-transport-statistics-no-35-2016-edition/> (accessed 16/04/2017)

⁶⁹ ibid

⁷⁰ ibid

⁷¹ ibid

⁷² Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

equivalent to the CO₂ generated from 7.7 million homes⁷³. In 2011, it was reported that in the UK aviation accounted for approximately 6% of total UK CO₂ emissions in 2011⁷⁴. Of these emissions, around 90% arise from international flights, and 10% from domestic flights⁷⁵.

- 3.2.10 Aircraft emit a range of GHG throughout the different stages of flight and are fairly unique in that they emit gases directly into the higher levels of the atmosphere. The GHG created by aviation are: CO₂; oxides of nitrogen; ozone (created by the reaction of sunlight and nitrogen oxides); soot; aerosols; and water vapour (causing contrail or man-made cirrus clouds)⁷⁶. CO₂ is generally viewed as the most problematic GHG and in aviation it is primarily generated by burning carbon-rich fossil fuels in engines. Aircraft emit CO₂ in direct proportion to the quantity of the fuel burned⁷⁷. In approximate terms, every tonne of aviation fuel burned produces between 3.15 and 3.18 tonnes of CO₂⁷⁸.
- 3.2.11 There are many factors that affect the amount of CO₂ emissions emitted from a flight. Some of these are within the capacity of airlines to manage, such as operational features; some can be controlled or influenced by airports and regulators; and some are to do with weather. The main factors are aircraft type, flight profile and distance, weight of the aircraft, operational procedures, use of next-generation biofuels, weather, and efficiency improvements⁷⁹.
- 3.2.12 One approach to reducing aviation emissions growth in the future is the development and use of sustainable alternative fuels. These have a reduced carbon footprint compared to conventional jet fuel and could therefore reduce GHG emissions. It is predicted that sustainable fuels could contribute to an 18% reduction in the UK's aviation CO₂ emissions by 2050⁸⁰. Some alternative fuels are clean burning and can provide air quality benefits as the fuels emit low levels of particulates⁸¹.

⁷³ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentallInformation29032017.pdf> (accessed 16/04/2017/2017)

⁷⁴ Committee on Climate Change (undated) Factsheet: Aviation [online] Available at: <https://www.theccc.org.uk/wp-content/uploads/2013/04/Aviation-factsheet.pdf> (accessed 16/04/2017)

⁷⁵ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentallInformation29032017.pdf> (accessed 16/04/2017/2017)

⁷⁶ *ibid*

⁷⁷ *ibid*

⁷⁸ *ibid*

⁷⁹ *ibid*

⁸⁰ Sustainable Aviation (2016) Sustainable Aviation CO₂ Road-Map [online] Available at: http://www.sustainableaviation.co.uk/wp-content/uploads/2016/12/FINAL_SA_Roadmap_2016.pdf (accessed 31/01/2017)

⁸¹ Sustainable Aviation (2015) Sustainable Fuels UK Road-Map [online] Available at: <http://www.sustainableaviation.co.uk/wp-content/uploads/2015/09/SA-SAF-Roadmap-FINAL-24-Nov-2.pdf> (accessed 02/02/2017)

3.2.13 Closer to the ground, airport related operations also contribute to climate change. For example aircraft taxiing, passengers and workers travelling to and from the airport, airfield ground transport, airport buildings and airfield systems all produce GHG emissions⁸². It should also be noted that below 1,000 feet, aviation related emissions also affect air quality⁸³. This has been assessed under the topics of population and human health and air quality.

Other non-CO₂ GHG

3.2.14 Aviation contributes to climate change through a range of “non-CO₂” impacts which occur at altitude. Certain emissions, though not direct GHG themselves, can act to modify, produce or destroy GHGs. The interaction between nitrogen oxides and methane and ozone concentrations are of primary concern⁸⁴. Furthermore, the magnitude of the impact these emissions can have on climate change is a function of the height at which the emissions are realised. For example, compounds such as nitrogen oxides and water vapour have a greater effect at higher altitudes.

3.2.15 The scenario that arises as a result of this greater effect is expressed by scientists as a multiplier⁸⁵. Less is known about the effect of non-CO₂ GHG emissions and scientific uncertainty remains⁸⁶.

3.3 Assessment Findings

3.3.1 In order to assess the impacts likely to arise from the proposal to reduce the overall burden of ADT by 50% by the end of the current session of the Scottish Parliament, consideration needs to be given to the potential impact this could have on current passenger and flight numbers. It has been estimated⁸⁷ that passenger numbers (without the introduction of the preferred policy option) could reach 28.0 million by 2021 (an increase of 10% from 2015) and 33.3 million by 2032 (a rise of 30% over the period from 2015)⁸⁸.

3.3.2 Research by Transport Scotland in 2017 (“the 2017 research”) reported that reducing the overall burden of ADT by 50% was likely to lead to increased

⁸² EUROCONTROL (2017) Environmental issues for aviation: Climate Change [online] Available at: <http://www.eurocontrol.int/articles/environmental-issues-aviation> (accessed 02/02/2017)

⁸³ ibid

⁸⁴ Stockholm Environment Institute (2011) Indirect Impacts from Aviation: Nitrogen Oxides, Ozone and Methane [online] Available at: <http://www.co2offsetresearch.org/aviation/IndirectEmissions.html> (accessed 13/02/2017)

⁸⁵ ATAG (undated) Aviation Benefits Beyond Borders Aviation and climate change [online] Available at: <http://aviationbenefits.org/environmental-efficiency/aviation-and-climate-change/> (accessed 13/02/2017)

⁸⁶ Department for Transport (2011) Developing a sustainable framework for UK aviation [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/2579/consultationdocument.pdf (accessed 13/02/2017)

⁸⁷ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

⁸⁸ These figures have been estimated using actual passenger numbers from 2015 and demand based upon DfTs growth forecasts

aviation activity over current levels⁸⁹. This activity is likely to comprise both international and domestic flights. Consideration was also given to the implications that might arise from passengers “switching” airports as a result of changes in the tax rate amounts. For example, passengers choosing to fly from Scottish airports instead of northern English airports, such as Manchester and Newcastle, in response to lower tax rates.

- 3.3.3 It is recognised that there are a number of different ways in which a 50% reduction in the overall ADT burden could be delivered. For example, the tax charged across all flights types could be reduced equally by 50%. Alternatively, the policy could also be delivered by applying a zero tax charge to all short-haul flights and maintaining the tax charged on long-haul flights at current UK APD levels, or vice versa. It is considered that these **illustrative scenarios** would meet the preferred policy option of a 50% reduction in the overall tax burden as it is estimated that approximately 48% of APD revenues currently generated in Scotland is accrued from short-haul flights, and approximately 52% of revenue is from long-haul flights.
- 3.3.4 In terms of passenger numbers, applying a zero tax rate amount only to short-haul flights has the potential to lead to a greater number of passengers than cutting both short and long-haul flights by an equal proportion. Conversely, if a zero tax rate amount were to be applied only to long-haul flights, it is likely that the increase in passenger numbers could be lower than cutting both equally or applying a tax reduction only to short-haul flights.
- 3.3.5 The above view has been based on the Transport Scotland research which included the current understanding of price elasticity on passenger demand for air travel. For example, short-haul leisure travel - both domestic and international - tends to be the most elastic (i.e. most price sensitive), with long-haul business and leisure trips considered as the most inelastic (i.e. least price sensitive)⁹⁰. Additionally, there are fewer long-haul flights operating from Scottish airports and, therefore, fewer passengers. Currently less than 5% of passengers fall within these types of long-haul flights.
- 3.3.6 A **reasonable alternative** to the preferred policy option is that there is no reduction in the overall burden of ADT. It is considered that this represents a “like for like” approach as the tax rate amount would remain the same as that currently set under UK APD. Under this approach there would be no reduction under ADT (compared to UK APD) in the tax charged on flights from Scottish airports and, as such, it is considered that there would be no additional impact on passenger and flight numbers. Activity in the sector would likely continue on the current predicted trajectory.

⁸⁹ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

⁹⁰ Transport Scotland (2014) Estimate of the Impact on Emissions of a Reduction in Air Passenger Duty in Scotland [online] Available at: <https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/> (accessed 11/05/2017)

What are the likely implications of increased passenger and flight numbers on climatic factors?

- 3.3.7 The 2017 research has estimated that the introduction of a 50% reduction in the overall burden of ADT (applied proportionally equally across all flight types) could lead to increased emissions of between 0.087 MtCO₂e and 0.101 MtCO₂e in the year of introduction (assumed to be 2018), relative to where they would be in the absence of the policy⁹¹. This is an increase greater than the estimated figures of between 0.05 MtCO₂e and 0.06 MtCO₂e set out in the 2014 research⁹². Furthermore, the 2017 research estimates (assuming the growth in baseline passenger numbers used in the research continues) that by 2021, the carbon emissions will increase by between 0.090 MtCO₂e and 0.105 MtCO₂e. Aviation currently accounts for less than 4% of total Scottish emissions and the increase in aviation emissions forecast as a result of the 50% reduction in ADT is estimated to represent less than 0.3% of the Scottish total⁹³.
- 3.3.8 Applying a zero tax rate amount only to short-haul flights has the potential to lead to a greater increase in passenger numbers over current levels, compared to either reducing the tax equally across all flight types or only on long-haul flights. Conversely, the impact on passenger numbers of applying a zero tax rate amount only to long-haul flights is likely to be lower than either applying a proportionally equal tax reduction to all flight types or only applying a tax reduction to short-haul flights. This will have the potential to influence GHG emissions.
- 3.3.9 As the reasonable alternative is not considered likely to have an impact on passenger and flight numbers due to there being no change in the tax rate amount, it would therefore be reasonable to assume that no additional impact on GHG emissions, over that which is expected, would occur.
- 3.3.10 There are a number of challenges in predicting with any certainty the likely increase in GHG emissions arising from the preferred policy option and the illustrative pathways that could be considered in order to meet a 50% reduction in the overall ADT burden. Whilst growth in the sector has steadily increased, there have also been substantial improvements in efficiency measures, such as engine and air frame technologies and air traffic management, leading to reductions in GHG emissions. The potential impact of aviation emissions at altitude is also a key variable. These and other relevant considerations are discussed below in greater detail.

⁹¹ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

⁹² *ibid*

⁹³ *ibid*

Passenger switching

- 3.3.11 As part of the 2014 and 2017 research undertaken by Transport Scotland, consideration was given to passengers “switching” from northern English airports to Scottish airports in response to lower tax rates. This consideration was based on separately published research by HMRC⁹⁴ that concluded that a 50% cut in tax in Scotland could lead to an estimated increase in passengers/trips being undertaken from passengers switching to Scottish airports from airports in northern England, principally Manchester and Newcastle^{95,96}.
- 3.3.12 The consideration of passenger “switching” and the implications of this on GHG emissions is complex as it has the potential to lead to a number of outcomes. For example, longer surface journeys being undertaken to capitalise on lower flight rates could lead to further emissions. Conversely, emissions may also be impacted though increased opportunities for more direct flights, thus eliminating the need to undertake multiple journeys to reach a given destination. The potential creation of new routes and destinations brought about by a reduced tax rate amount could also incentivise Scottish passengers who may have previously travelled to airports in northern England, such as Manchester, to use Scottish airports.
- 3.3.13 Passenger switching could also be further influenced if a zero tax rate were to be applied only to short-haul flights. For example, it would be reasonable to assume that flying would provide a feasible alternative mode of transport for journeys of this distance within the UK mainland, whilst alternative modes of transport are more restricted when considering longer journeys.
- 3.3.14 Another factor that will influence the extent of passenger “switching”, and the estimated additional impact on Scottish emissions as considered in the Transport Scotland research, is price differentials. It is noted that any passenger switching occurring as a result of a 50% reduction of tax would be dependent on the price differential between the airports. Were the price difference to be eroded (either through the cutting of ticket prices or a similar reduction in UK APD being applied for flights from northern English airports), then the additional emissions impact from passenger switching as estimated would not materialise⁹⁷. The extent to which passenger switching will arise, and the time period in which this effect will be realised, is unknown.

⁹⁴ HM Revenue & Customs (2012) Modelling the Effects of Price Differentials at UK Airports, HM and Customs Research Report 118 [online] Accessed 6/6/2017)

⁹⁵ Transport Scotland (2014) Estimate of the Impact on Emissions of a Reduction in Air Passenger Duty in Scotland [online] Available at: <https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/> (accessed 04/04/2017)

⁹⁶ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

⁹⁷ Transport Scotland (2014) Estimate of the Impact on Emissions of a Reduction in Air Passenger Duty in Scotland [online] Available at: <https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/> (accessed 04/04/2017)

Additional destinations

- 3.3.15 A key assumption of this assessment has been that the preferred policy option will boost Scotland's air connectivity and economic competitiveness, encouraging the establishment of new routes which would enhance business connectivity and inbound tourism and help generate sustainable growth. The impact of additional destinations from Scotland as a result of a reduction in APD/ADT in Scotland has not been considered as part of the 2014 and 2017 research. It was however noted in the 2014 research that, should there be an extension of the route network which included long-haul destinations, this would add to the total impact on emissions⁹⁸. It would be reasonable to assume that applying a zero tax rate amount only to long-haul flights has the potential to increase the start-up opportunities for new long-haul routes to a greater extent than if a tax reduction was applied either only to short-haul flights or proportionally equally to all flight types.
- 3.3.16 As new routes are business decisions which are market-led, it would not be possible to predict with any degree of certainty how many and what type of new routes would be established as a result of a 50% reduction in the overall ADT burden.

Non-CO₂ climate impacts of aviation

- 3.3.17 Another important factor to consider is the effect of aviation emissions at altitude. In order to estimate the full effect of aviation on climate change it is necessary to account for CO₂ as well as for all other non-CO₂ warming effects⁹⁹. As discussed previously, the scenario that arises as a result of the greater effect these non-CO₂ gases have at altitude is expressed by scientists as a multiplier¹⁰⁰.
- 3.3.18 Whilst there is no straightforward answer to what the overall impact of aviation on climate change is, there is high scientific confidence that the total climate warming effect of aviation is more than that from CO₂ emissions alone¹⁰¹.

⁹⁸ Transport Scotland (2014) Estimate of the Impact on Emissions of a Reduction in Air Passenger Duty in Scotland [online] Available at: <https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/> (accessed 04/04/2017)

⁹⁸ *ibid*

⁹⁹ Stockholm Environment Institute (2011) The Climate Footprint of Air Travel [online] Available at: <http://co2offsetresearch.org/aviation/index.html> (accessed 06/02/2017)

¹⁰⁰ ATAG (undated) Aviation Benefits Beyond Borders Aviation and climate change [online] Available at: <http://aviationbenefits.org/environmental-efficiency/aviation-and-climate-change/> (accessed 13/02/2017)

¹⁰¹ Committee on Climate Change (2009) Meeting the UK Aviation targets – options for reducing emissions to 2050 [online] Available at: <https://www.theccc.org.uk/publication/meeting-the-uk-aviation-target-options-for-reducing-emissions-to-2050/> (accessed 06/02/2017)

What wider context and potential mitigation measures (both current and future) should be taken into account?

- 3.3.19 Current and future mitigation, including efficiency measures such as technological improvements, can provide relevant context when assessing the potential implications arising from the preferred policy option.
- 3.3.20 The following paragraphs set out further discussion on some of these under relevant headings.

Mitigation measures within the aviation industry

- 3.3.21 As discussed earlier (Section 1.3), collaborative efforts are being made within the aviation industry to reduce climate impacts. Common aspirational goals have been agreed that include stabilising net emissions from 2020 through carbon-neutral growth (subject to a concerted effort from industry and government initiatives), and reducing net aviation carbon emissions 50% by 2050, relative to 2005 levels¹⁰².
- 3.3.22 To achieve these aspirational goals, a comprehensive set of mitigation action has been rolled out, based on a basket of measures which includes technological and operational improvements and better use of infrastructure, particularly air traffic management. The development of an effective, global market-based measure for international aviation is also part of this work (discussed further under the development of future international mitigation measures in paragraphs 3.3.31 to 3.3.36).

Technical and operational improvements

- 3.3.23 The most direct way for an airline to improve its fuel efficiency is to modernise its fleet with new aircraft incorporating the latest available technology¹⁰³. For example, fleet replacement programmes can help achieve fuel efficiencies with newer, more modern planes. Boeing states that the 737 MAX aircrafts utilise a new type of engine that results in 9–14% reduction in carbon emissions and fuel consumption per seat¹⁰⁴. Carrying capacity can also be improved through technological improvements alongside increased fuel efficiency. For example, some of the newer more modern planes can carry 48% more passengers 119% further with a 67% increase in payload, while burning 23% less fuel – or 48% less fuel on a per-seat basis¹⁰⁵. However, there can be a long lead in time between the

¹⁰² Climate Summit 2014 (2014) Transport Aviation Action Plan [online] Available at: http://www.un.org/climatechange/summit/wp-content/uploads/sites/2/2014/07/UN_ICAO-ATAG-Agreement_2_action-plan.pdf (accessed 06/02/2017)

¹⁰³ ATAG (2010) Beginners Guide to Aviation Efficiency [online] Available at: <http://www.atag.org/our-publications/latest.html> (accessed 19/04/2017)

¹⁰⁴ Boeing (undated) Boeing Next-Generation 737 [online] Available at: <http://www.boeing.com/commercial/737ng/#/design-highlights/environmentally-progressive/cleaner-for-the-community/more-efficient-operations/> (accessed 06/02/2017)

¹⁰⁵ ATAG (2010) Beginners Guide to Aviation Efficiency [online] Available at: <http://www.atag.org/our-publications/latest.html> (accessed 19/04/2017)

acquisition and roll out of new fleets, meaning that the investments made in new fuel efficient aircraft can take some time to make a difference to emissions performance¹⁰⁶.

- 3.3.24 More recently, airlines have undertaken a range of operational, maintenance and planning procedures to ensure that their current technology aircraft are flying to their optimal levels of efficiency¹⁰⁷. Air traffic management affects when, how far, how high, how fast and how efficiently aircraft fly. These parameters in turn influence how much fuel an aircraft burns, the release of GHG and other gases from the engine and how much noise an aircraft makes. Fuel savings of up to 40% during the approach phase through continuous descent operations have been demonstrated, with potential secondary benefits arising through reduced noise footprints¹⁰⁸.
- 3.3.25 A number of publications are available promoting procedures such as the above to improve fuel efficiency, including Sustainable Aviation's Continuous Descent Campaign¹⁰⁹. Additionally, the Single European Sky Air Traffic Management Research is the technical pillar of the Single European Sky and it aims to improve air traffic management. Specific objectives include a target of a 10% reduction of CO₂ emissions per flight through introducing new technologies and procedures to decrease fuel burn¹¹⁰.
- 3.3.26 Whilst aircraft have become substantially more energy efficient through improvements in engine and airframe technology, projections show that aviation will increase its relative share of UK emissions if greater improvements are not made¹¹¹. This is supported by the findings of a trends assessment performed by the ICAO Committee on Aviation Environmental Protection, which forecasts that even with the anticipated gain in efficiency from technological and operational measures, aviation CO₂ emissions will increase in the next decade due to the continuous growth in air traffic¹¹².
- 3.3.27 The assessment also notes the role of sustainable alternative fuels in reducing GHG emissions, with some potential additional benefits with regard air quality. However, there are long-term challenges associated with the

¹⁰⁶ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

¹⁰⁷ ATAG (2010) Beginners Guide to Aviation Efficiency [online] Available at: <http://www.atag.org/our-publications/latest.html> (accessed 19/04/2017)

¹⁰⁸ *ibid*

¹⁰⁹ Sustainable Aviation (undated) Continuous Descent Operation Campaign [online] Available at: <http://www.sustainableaviation.co.uk/sustainable-aviations-continuous-descent-operation-campaign/> (accessed 19/04/2017)

¹¹⁰ SESAR (2014) SESAR and the environment document [online] Available at: http://ec.europa.eu/transport/modes/air/sesar/index_en.htm (accessed 31/01/2017)

¹¹¹ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

¹¹² ICAO (undated) Environmental Protection Alternative Fuels [online] Available at: <http://www.icao.int/environmental-protection/Pages/AlternativeFuels-QuestionsAnswers.aspx> (accessed 06/02/2017)

development and deployment of alternative fuels, including feedstock availability and sustainability¹¹³. These challenges are also noted in the Committee on Climate Change 2009 report “Meeting the UK Aviation target – options for reducing emissions to 2050”¹¹⁴. The report states that the use of biofuels in aviation is likely to be technically and economically viable but that concerns around land availability and sustainability mean that it is not prudent to assume that biofuels in 2050 could account for more than 10% of global aviation fuel¹¹⁵.

Efficiency and distance

- 3.3.28 As discussed in previous sections of this report, aviation emissions are directly related to fuel burn and there are many factors that can affect the amount of CO₂ emissions emitted from a flight. Flight distance is an essential factor in determining fuel consumption¹¹⁶ and is therefore a key consideration when assessing the potential GHG implications that may arise from applying a zero tax rate amount to either only short-haul flights or only long-haul flights in order to meet the 50% reduction in the overall tax burden set out in the preferred policy option.
- 3.3.29 Generally speaking, the farther the route, the more fuel burned¹¹⁷. However, since take-off and landing demand higher fuel burn rates than level flights, shorter routes tend to be the least efficient as they spend a greater proportion of their total journey in the high emissions phase of take-off and landing¹¹⁸. Long-haul flights are, broadly speaking, the next most inefficient type of flight¹¹⁹. Although the aircraft spend a long time at its most efficient cruise altitude, over very long distances the fuel use per mile increases because of the greater amount of fuel that has to be carried during the early stages of the flight¹²⁰. Medium range routes are considered to be generally more efficient, as smaller proportions of the flight are spent in the take-off or landing phase¹²¹.

¹¹³ ICAO (undated) Environmental Protection Alternative Fuels [online] Available at: <http://www.icao.int/environmental-protection/Pages/AlternativeFuels-QuestionsAnswers.aspx> (accessed 06/02/2017)

¹¹⁴ Committee on Climate Change (2009) Meeting the UK Aviation targets – options for reducing emissions to 2050 [online] Available at: <https://www.theccc.org.uk/publication/meeting-the-uk-aviation-target-options-for-reducing-emissions-to-2050/> (accessed 10/02/2017)

¹¹⁵ *ibid*

¹¹⁶ Stockholm Environmental Institute (2011) Flight Profile and Distance [online] Available at: <http://co2offsetresearch.org/aviation/Distance.html> (accessed 10/05/2017)

¹¹⁷ *ibid*

¹¹⁸ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

¹¹⁹ *ibid*

¹²⁰ Stockholm Environmental Institute (2011) Flight Profile and Distance [online] Available at: <http://co2offsetresearch.org/aviation/Distance.html> (accessed 10/05/2017)

¹²¹ *ibid*

3.3.30 For any given aircraft flying the same route, emissions will vary because of factors such as climatic conditions, aircraft may be kept in holding patterns and the mass load may vary between flights¹²². Improving efficiency also means reducing the level of emissions per passenger or tonne of freight carried¹²³. Whilst passengers make up a relatively small proportion of the total weight of an aircraft, an aircraft is more ‘efficient’ when more passengers are carried as the total emissions are shared between larger numbers of people¹²⁴. Passenger load factors are the percentage of actual passengers carried relative to the number of seats available and this is considered a good indicator of efficiency¹²⁵. Operational and technical developments also need to be taken into account, for example, some of the newer, more modern planes can carry more passengers whilst burning less fuel¹²⁶.

International mitigation measures

3.3.31 Currently, the main international mitigation measure for Scottish aviation emissions is through participation in the EU ETS (see Section 3.1.7). The EU ETS is currently limited to flights within the EEA, which the European Commission proposes to maintain indefinitely, but with a future review when a truly global mitigation measure emerges¹²⁷.

3.3.32 Global efforts to address emissions from aviation are being led by industry through ICAO. In 2013 ICAO agreed to develop a “basket of measures” to address international aviation emissions including technological improvements, biofuels and operational improvements to air traffic management. Most significant was the proposal for a global market-based measure (“GMBM”) to deliver ICAO’s goal of carbon neutral growth in aviation from 2020. Agreement on a GMBM, the Carbon Offsetting and Reduction Scheme for International Aviation (“CORSIA”) was reached at the ICAO Assembly in October 2016¹²⁸. Unlike the EU ETS, which reduces emissions against 2005 levels, CORSIA aims to achieve carbon neutral growth in aviation above 2020 levels but will not seek to reduce emissions below 2020 levels.

¹²² Jardine, C. (2009) Calculating the Carbon Dioxide Emissions of Flights [online] Available: <http://www.eci.ox.ac.uk/research/energy/downloads/jardine09-carboninflights.pdf> (accessed 10/05/2017)

¹²³ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

¹²⁴ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

¹²⁵ *ibid*

¹²⁶ ATAG (2010) Beginners Guide to Aviation Efficiency [online] Available at: <http://www.atag.org/our-publications/latest.html> (accessed 19/04/2017)

¹²⁷ European Commission (2017) Proposal to amend the EU ETS for aviation https://ec.europa.eu/clima/sites/clima/files/com_2017_54_en.pdf

¹²⁸ ICAO (2016) Historic Agreement reached to mitigate international aviation emissions [online] Available at: <http://www.icao.int/Newsroom/Pages/Historic-agreement-reached-to-mitigate-international-aviation-emissions.aspx> (accessed 25/04/2017)

- 3.3.33 To date 50 countries have opted-in to the first two voluntary phases of CORSIA (2021-2023 and 2024-2026)¹²⁹. Airline operators flying between these countries will have to purchase certified offsets to cover their emissions above 2020 levels. From 2027 participation will be mandatory for all countries in ICAO¹³⁰.
- 3.3.34 Work is on-going to develop the detail of CORSIA including the necessary operational rules for monitoring, reporting and verification and the Standards and Recommended Practices. The effective implementation of CORSIA will depend on national measures to be developed and enforced at a domestic level¹³¹. Once the legal instruments to implement CORSIA are adopted by ICAO, the EU will consider how to implement them. There will be a review of the operation of the EU ETS for aviation post-2020 once CORSIA comes into effect¹³². It is not yet known therefore whether the EU ETS will continue to be the means by which emissions from aviation within the EEA continues to be accounted for¹³³.
- 3.3.35 The future of international mitigation measures is not yet clear - neither how CORSIA will be implemented nor the future of the EU ETS for aviation. Furthermore, following the UK's vote to leave the EU, its continued participation in the EU ETS is uncertain. The future of international mitigation measures will be influenced by future changes in the wider political landscape.
- 3.3.36 It is anticipated that a new global emissions standard proposed by ICAO will be applicable to new aircraft from 2020 and new aircraft in production from 2023¹³⁴. A cut-off date of 2028 for aircraft that do not comply with the Standard was also recommended¹³⁵. The new Standard is reported to be especially stringent where it will have the greatest impact, such as specific rules for larger aircraft that weigh over 60 tonnes¹³⁶. However, care has been taken to ensure that the proposed Standard covers a full range of sizes and types of aircraft used in international aviation, encompassing all

¹²⁹ ICAO (2016) Historic Agreement reached to mitigate international aviation emissions [online] Available at: <http://www.icao.int/Newsroom/Pages/Historic-agreement-reached-to-mitigate-international-aviation-emissions.aspx> (accessed 25/04/2017)

¹³⁰ ibid

¹³¹ European Commission (2017) Reducing emissions from aviation [online] Available at: https://ec.europa.eu/clima/policies/transport/aviation_en (accessed 08/05/2017)

¹³² European Commission (2017) Proposals for amending the EU ETS for aviation <http://ec.europa.eu/transparency/regdoc/rep/1/2017/EN/COM-2017-54-F1-EN-MAIN-PART-1.PDF> (accessed 22/05/2017)

¹³³ Carbon Brief (2016) Carbon Brief Clear on Carbon, International Policy [online] Available at: <https://www.carbonbrief.org/aviation-consume-quarter-carbon-budget> (accessed 10/08/2016)

¹³⁴ ICAO (08/02/2016) New ICAO Aircraft CO2 Standard one step closer to final adoption [online] Available at: <http://www.icao.int/Newsroom/Pages/New-ICAO-Aircraft-CO2-Standard-One-Step-Closer-To-Final-Adoption.aspx> (accessed 20/07/2016)

¹³⁵ ibid

¹³⁶ ibid

technological feasibility, emissions reduction potentials, and cost considerations¹³⁷.

National mitigation measures

- 3.3.37 Scotland's emissions are adjusted to take into account trading in the EU ETS for the purpose of reporting progress towards statutory targets under the 2009 Act. In March 2017, the Committee on Climate Change provided advice to the Scottish Government on the new Scottish Climate Change Bill¹³⁸. Advice was provided on a range of issues and included a recommendation that the overall accounting framework shift to one based on actual emissions, which would involve removing the accounting adjustment to reflect the operation of the EU ETS. It was further recommended that Scotland's shares of international aviation emissions should continue to be included in Scottish targets
- 3.3.38 The Committee on Climate Change's UK-level report "Meeting the UK Aviation target – options for reducing emissions to 2050" states a current expectation that improvement in fleet fuel efficiency of 0.8% per annum in the period to 2050 is achievable, through evolutionary airframe and engine technology innovation, and improved efficiency of air traffic management and operations¹³⁹. The Report also highlights that, whilst faster technological improvements are possible, unless and until they are achieved aviation policy should be based on the assumption that demand growth between now and 2050 cannot exceed 60% if aviation emissions in 2050 are to be no higher than 2005 levels (37.5 MtCO_{2e})¹⁴⁰.
- 3.3.39 The predicted increase in passenger and flight numbers that is considered likely to arise through the introduction of the preferred policy option, as well as the likely environmental implications of this on climate change, also need to be considered within the context of the range of relevant policies and strategies in which it sits. For example, NPF3 sets out a long-term vision for development and investment across Scotland over the next 20 to 30 years. Strategic Airport Enhancements were discussed within the "A Connected Place" section which considered maintaining and developing good internal and global connections.
- 3.3.40 It is a requirement of the 2009 Act that Scottish Ministers lay a report in Parliament setting out proposals and policies for meeting annual GHG emissions reduction targets. The Climate Change Plan: the draft Third

¹³⁷ ICAO (08/02/2016) New ICAO Aircraft CO₂ Standard one step closer to final adoption [online] Available at: <http://www.icao.int/Newsroom/Pages/New-ICAO-Aircraft-CO2-Standard-One-Step-Closer-To-Final-Adoption.aspx> (accessed 20/07/2016)

¹³⁸ Committee on Climate Change (2017) Advice on the new Scottish Climate Change Bill [online] Available at: <https://www.theccc.org.uk/publication/advice-on-the-new-scottish-climate-change-bill/> (accessed 22/03/2017)

¹³⁹ Committee on Climate Change (2009) Meeting the UK Aviation targets – options for reducing emissions to 2050 [online] Available at: <https://www.theccc.org.uk/publication/meeting-the-uk-aviation-target-options-for-reducing-emissions-to-2050/> (accessed 10/02/2017)

¹⁴⁰ *ibid*

Report on Policies and Proposals was submitted for parliamentary scrutiny in January 2017. The report sets out how the Scottish Government intends to meet its statutory climate change targets for the period of 2017-2032.

- 3.3.41 Having made strong progress towards the statutory emission reduction targets set out in the 2009 Act, the Scottish Government has committed to keeping Scotland at the forefront of global climate action by responding to the UNFCCC Paris Agreement with a Climate Change Bill that sets new, evidence-based, statutory emission reduction targets¹⁴¹.

What is the likely significance of the predicted impacts?

- 3.3.42 The 2017 research has estimated that the introduction of a 50% reduction in ADT (applied proportionally equally across all flight types) could lead to increased emissions from aviation in the first year (assumed to be 2018), relative to where they would be in the absence of the policy¹⁴². The latest analysis estimates an increase in carbon emissions by between 0.087 MtCO₂e and 0.101 MtCO₂e¹⁴³, an increase over the previous analysis of between 0.05 MtCO₂e and 0.06 MtCO₂e set out in the 2014 research¹⁴⁴. Furthermore, it is estimated in the 2017 research, that assuming the growth in baseline passengers numbers continues, by 2021 carbon emissions will increase by between 0.090 MtCO₂e and 0.105 MtCO₂e.
- 3.3.43 Aviation currently accounts for less than 4% of total Scottish emissions and the increase in aviation emissions forecast as a result of the 50% reduction in ADT is estimated to represent less than 0.3% of the Scottish total¹⁴⁵.
- 3.3.44 The 2014 and 2017 Transport Scotland research estimated that a 50% reduction in APD/ADT in Scotland could lead to additional flight and passenger numbers over current levels, and included the consideration of passenger switching. The estimated impact of CO₂ emissions as a result of this has been included within the overall impact assessment.
- 3.3.45 The degree to which passenger switching takes place, alongside changing prices, will be key drivers behind any emissions profile. There is the

¹⁴¹ Inspired PQ S5W-05402

¹⁴² Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

¹⁴³ *ibid*

¹⁴⁴ Transport Scotland (2014) Estimate of the Impact on Emissions of a Reduction in Air Passenger Duty in Scotland [online] Available at: <https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/> (accessed 04/04/2017)

¹⁴⁵ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

potential that if a zero tax rate amount was applied only to short-haul flights, this could have a greater influence on passenger switching than if a tax reduction were applied either only to long-haul flights or to all flight types.

- 3.3.46 Technological developments and operational improvements will play a key role in seeking to reduce emissions arising from activity in the sector. Collaborative agreements and objectives agreed across industry will also continue to play an important part in effort undertaken in the sector to improve sustainability. Future mitigation measures, such as the development of a GMBM, are considered as key to achieving ICAO's goal of carbon neutral growth of international aviation from 2020¹⁴⁶. Agreement on the form this should take has since been reached and a pilot phase of implementation will begin from 2021 through to 2023.
- 3.3.47 The introduction of the preferred policy option of a 50% reduction in the overall ADT burden by the end of the current session of the Scottish Parliament represents one of many challenges that will need to be considered to Scotland's ambitious climate change targets. The implications of climate change are far reaching and can have adverse effects across a range of environmental receptors. The implications of this have been discussed in this assessment under relevant topic headings.
- 3.3.48 It is considered that the preferred policy option, in the short-term, will lead to increases in GHG emissions even with efficiency measures in place, relative to where they would be in the absence of the preferred policy option. If the preferred policy option were to be reached through a pathway of applying a zero tax rate amount only to short-haul flights, there is the potential that this could lead to higher passenger numbers than if tax reduction was applied only to long-haul flights or proportionally equally to all flight types. In turn, this could have an influencing effect on overall GHG emissions.
- 3.3.49 Medium to long-term, it is more challenging to predict the magnitude of future increases in GHG emissions. There are a number of key drivers, such as changing ticket prices and the degree of passenger switching that require consideration when projecting emissions beyond the short-term. Technological developments and the aspirational goals agreed by the aviation industry, alongside international measures such as the development and introduction of a GMBM, will also play a key role in the wider mitigation of emissions once implemented.
- 3.3.50 A number of uncertainties also exist that could influence significance, such as the creation of new routes, the multiplier effect and price differentials, and it has not been possible to consider these in this SEA.

¹⁴⁶ Carbon Brief (2016) Carbon Brief Clear on Carbon, International Policy [online] Available at: <https://www.carbonbrief.org/aviation-consume-quarter-carbon-budget> (accessed 10/08/2016)

3.3.51 The assessment considers that as the reasonable alternative represents a “like for like” approach, no additional impact on GHG emissions over that which is currently projected would occur.

Box 3.1 Climatic Factors: Summary of impacts and key points

IMPACTS	<ul style="list-style-type: none"> • An increase in GHG emissions (CO₂ and non CO₂ emissions) has been identified. • Climate change impacts will have implications across all SEA topic areas.
KEY POINTS	<ul style="list-style-type: none"> • The scientific consensus is that warming of the Earth’s climate system is unequivocal and that it is very likely that anthropogenic greenhouse gas emissions have been the dominant cause of this warming since the mid-20th century. • Transport (including domestic and international aviation) was the second largest contributor of Scottish GHG emissions in 2014 • Aircraft emit a range of GHG emissions at different stages of a flight and when emitted at altitude the same gas can have a different effect than at ground level. • CO₂ is generally viewed as the most problematic GHG and in aviation it is primarily generated by fossil fuel use. • Aviation produces other non-CO₂ GHG emissions which can contribute to climate change. The scenario that arises as a result of the greater effect these gases have at altitude is expressed by scientists as a multiplier. • Early estimates show that a 50% reduction in ADT will lead to an uptake in passenger numbers and flights. These extra flights are forecast to generate an increase in GHG emissions. • Engineering improvements, technological enhancements, and advanced operations (including efficiency improvements in air traffic management) all have a role to play to reduce aviation fuel use and associated carbon emissions • However, it is forecast that even with the anticipated gain in efficiency from technological and operational measures, aviation CO₂ emissions will increase in the next decade due to the continuous growth in air traffic. Further reduction measures will be needed. • Sustainable alternative fuels can reduce GHG emissions and are seen as one reduction measure; however, long-term challenges regarding its development and deployment remain. • Emissions at or below a certain altitude also have implications for air quality and, consequently, population and human health.

4 Population and Human Health

4.1 Environmental Objectives

- 4.1.1 Many existing environmental protection objectives are relevant to population and human health, either directly or indirectly. For example, the Air Quality Standards (Scotland) Regulations 2010¹⁴⁷, the Air Quality (Scotland) Regulations 2000, the Air Quality (Scotland) Amendment Regulations 2002 and the Air Quality (Scotland) Amendment Regulations 2016¹⁴⁸ help set out current objectives and requirements for air quality with clear relevance for human health.
- 4.1.2 Protection is also afforded through existing legislation against noise and vibration nuisance at both the European level through the Environmental Noise Directive (2002/49/EC)¹⁴⁹ and the national level through regulations such as the Environmental Noise (Scotland) Regulations 2006¹⁵⁰.

4.2 Environmental Context

- 4.2.1 Air quality is important for both short and long-term human health, and poor air quality can have impacts on people with existing health issues. In general, healthy people may not suffer from any serious health effects from exposure to the levels of pollution commonly experienced in urban environments. However, continual exposure can cause harm over the long-term, and those with pre-existing health conditions such as heart disease, lung conditions and asthma can be adversely impacted by daily exposure to air pollutants¹⁵¹. Activities that generate air pollutants have been considered under the topic of Air Quality.
- 4.2.2 Noise has historically been the principal environmental issue for aviation and remains high on the agenda of public concern¹⁵². The European Environmental Noise Directive (2002/49/EC) defines environmental noise as harmful or unwanted outdoor sound created by humans, including noise

¹⁴⁷ The Air Quality Standards (Scotland) Regulations 2010 [online] Available at: http://www.legislation.gov.uk/ssi/2010/204/pdfs/ssi_20100204_en.pdf (accessed 06/02/2017)

¹⁴⁸ The Air Quality (Scotland) Amendment Regulations 2016 [online] Available at: <http://www.legislation.gov.uk/sdsi/2016/9780111030837/contents> (accessed 06/02/2017)

¹⁴⁹ Environmental Noise Directive 2002/49/EC [online] Available at: http://ec.europa.eu/environment/noise/directive_en.htm (accessed 06/02/2017)

¹⁵⁰ Environmental Noise (Scotland) Regulations 2006 [online] Available at: <http://www.legislation.gov.uk/ssi/2006/465/made> (accessed 06/02/2017)

¹⁵¹ Scotland's Environment (2014) Air Quality [online] Available at: http://www.environment.scotland.gov.uk/our_environment/air_and_climate/air_quality.aspx (accessed 06/02/2017)

¹⁵² EUROCONTROL (2015) Environmental Issues for aviation, aircraft noise [online] Available at: <http://www.eurocontrol.int/articles/environmental-issues-aviation> (accessed 06/02/2017)

emitted by transport and air traffic¹⁵³. Aviation noise generates considerable interest as it tends to cover larger geographical areas and is more difficult to mitigate when compared to road and rail noise¹⁵⁴.

- 4.2.3 Aircraft noise is generated by both the engine and the airframe and is most evident during landing and take-off, with further noise generated from taxiing aircrafts, the application of reverse-thrust during landing, engine tests and airport vehicular traffic. However, noise impacts can also extend to vehicular and rail traffic to and from the airport, alongside noise disturbance associated with construction activities associated with infrastructure development.
- 4.2.4 The effects of disturbance, particularly increases in noise and nocturnal noise is a complex area of study and the potential impacts on human health can be varied and wide ranging. It has been reported that noise can cause sleep disturbance, fatigue and annoyance. Annoyance can also be accompanied by stress-related symptoms leading to changes in heart rate and blood pressure¹⁵⁵. This linkage between noise disturbance and stress has been demonstrated by a range of noise impact studies, alongside additional effects such as losses of concentration and anxiety¹⁵⁶. However, information on the relationship between noise exposures and their potential adverse effects upon people is also of variable quality¹⁵⁷.
- 4.2.5 It is considered that airports in more densely populated areas will have a greater noise impact as more people are likely to be affected¹⁵⁸. The phrase community annoyance has been suggested as the most useful catch-all term to describe overall, long-term aircraft noise impact, which can also be correlated with long-term average noise exposure¹⁵⁹.
- 4.2.6 Whilst there could be some correlation between increased volume of traffic in and around airports and risk of collision and traffic accidents, it is difficult to identify with any certainty the likelihood and scale of risk. There are

¹⁵³ Environmental Noise Directive 2002/49/EC [online] Available at: http://ec.europa.eu/environment/noise/directive_en.htm (accessed 07/02/2017)

¹⁵⁴ Civil Aviation Authority (2014) Managing Aviation Noise [online] Available at: <http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=6251&filter=2> (accessed 19/04/2017)

¹⁵⁵ Queen Mary University of London (2015) Aircraft noise effect on health, report prepared for the Airport Commission [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/446311/noise-aircraft-noise-effects-on-health.pdf (accessed 07/02/2017)

¹⁵⁶ Stansfield A.A. and Matheson M.P. (2003) Noise pollution: non-auditory effects on health [online] Available at: <http://bmb.oxfordjournals.org/content/68/1/243.full> (accessed 06/02/2017)

¹⁵⁷ Civil Aviation Authority (2014) Managing Aviation Noise [online] Available at: <http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=6251&filter=2> (accessed 19/04/2017)

¹⁵⁸ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

¹⁵⁹ Civil Aviation Authority (2014) Managing Aviation Noise [online] Available at: <http://publicapps.caa.co.uk/modalapplication.aspx?catid=1&pagetype=65&appid=11&mode=detail&id=6251&filter=2> (accessed 19/04/2017)

several factors that would influence this risk, such as modal competition, road design, speed restrictions and driver skill. This SEA cannot assess this potential secondary effect with appropriate certainty but it is considered unlikely that effects would be nationally significant.

- 4.2.7 The Scottish Index of Multiple Deprivation (“SIMD”) ranks small areas (called datazones)¹⁶⁰ from the most deprived to the least deprived. It analyses data from a number of indicators across the domains of income, employment, health, education, skills and training, housing, geographic access and crime. Key findings from the 2016 Index show that 14 areas have been consistently among the 5% most deprived in Scotland since the 2004 Index¹⁶¹. The quality of the environment in which we live can greatly affect quality of life. Vulnerable populations can also be more susceptible and less resilient to health issues.

4.3 Assessment Findings

What are the likely implications of increased passenger and flight numbers on local air quality and noise exposure?

- 4.3.1 Air pollutants are emitted throughout flight activity. Depending on the stage of the flight or atmospheric level at which they are emitted, these can have implications for local level air quality. Furthermore, changes in local air quality levels may arise from increased passenger and flight numbers, potentially leading to increased road traffic to and from the airports. These are considered to be secondary impacts and have been based on the assumptions that the implementation of the policy will lead to increased passenger and flight numbers. However, it is considered that any secondary impacts that arise are outwith the ability of the policy option to influence.
- 4.3.2 Air quality issues currently exist in and around Scotland’s airports. For example, there have been several Air Quality Management Areas declared along popular traffic routes to and from several airports¹⁶². The SEA of NPF3 noted that there could be mixed effects on air quality in relation to the proposed Strategic Airport Enhancements¹⁶³. The assessment reported the potential for negative effects on air quality to arise as a result of increased levels of traffic to and from airports, in addition to increased flight numbers.

¹⁶⁰ Datazones have roughly the same population; however the boundaries of datazones are kept constant although the populations may change over time. <http://www.gov.scot/Topics/Statistics/SIMD/FAQs>

¹⁶¹ SIMD 2016 Results (2016) Introducing the Scottish Index of Multiple Deprivation 2016 [online] Available at: <http://www.gov.scot/Resource/0050/00504809.pdf> (accessed 06/02/2017)

¹⁶² Air Quality in Scotland (2017) Air quality management areas [online] Available at: <http://www.scottishairquality.co.uk/laqm/aqma> (accessed 07/02/2017)

¹⁶³ The Scottish Government (2013) NPF3 and SPP – SEA Environmental Report [online] Available at: <http://www.gov.scot/Publications/2013/04/3435> (accessed 08/02/2017)

However, potential benefits on air quality due to increased public transport connectivity were also reported.

- 4.3.3 Noise arising from operational activities can be a concern for people who live near airports, and aviation noise negatively affects more people in the UK than in other country in Europe¹⁶⁴.
- 4.3.4 It has been assumed that an increase in passenger and flight numbers will occur as a result of the preferred policy option and consideration has been given to the following **illustrative scenarios** (as set out in paragraph 2.8.3). These are the likely impact on passenger numbers of applying a zero tax charge to only short-haul flights, with the tax charged on long haul flights maintained at current UK APD levels, and vice versa. It is considered that applying a zero tax rate amount to only short-haul flights could lead to higher passenger numbers than reducing both short-haul and long-haul flights by an equal proportion or applying a zero tax rate amount to only long-haul flights.
- 4.3.5 This has the potential to impact on population and human health in two ways. Firstly, any increase in passengers, and in turn flights, could lead to implications for current noise levels with the potential for negative impacts to arise in some areas. There may also be a need for airports to undertake operational changes to accommodate increased growth, such as changes in flight patterns or the start-up of additional routes and their destinations from Scottish airports. Such changes in operational activities could also influence current noise exposure.
- 4.3.6 When considering passenger and flight numbers, it is considered that the **reasonable alternative** of applying tax rates that would remain the same as that currently set under UK APD, represents a “like for like” approach. As such, activity in the sector would likely continue on the current predicted trajectory.

What wider context and potential mitigation measures should be taken into account?

- 4.3.7 Technological developments and improvements to airport operational procedures can help reduce the impact of noise by creating quieter aircraft and designing airspace and air traffic routes that aim to reduce the number of people affected by noise¹⁶⁵. It is reported that, through improved

¹⁶⁴ Civil Aviation Authority (2014) Managing Aviation Noise [online] Available at: <https://publicapps.caa.co.uk/docs/33/CAP%201165%20Managing%20Aviation%20Noise%202.pdf> (accessed 19/04/2017)

¹⁶⁵ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

technology, aircraft operations today are 75% quieter than they were 50 years ago¹⁶⁶. Furthermore, design improvements offer the potential to reduce perceived noise from aircraft by an additional 65% by 2050¹⁶⁷.

- 4.3.8 The main overarching policy on aircraft noise adopted by the ICAO is the “Balanced Approach to Aircraft Noise Management”¹⁶⁸. It defines four pillars to managing noise: noise reduction through technology, noise reduction through better operation, improved noise perception through better land use planning and, if the other three pillars are exhausted, operating restrictions on aircraft such as movement restrictions and curfews.
- 4.3.9 The Sustainable Aviation Noise Road Map focusses on applying the ICAO Balanced Approach within the UK. The Road Map sets out four areas of work which can be prioritised to reduce noise before operational restrictions should be considered. These comprise aircraft and engine technology, operational improvements, land use planning, communication and community engagement¹⁶⁹. However, the Road Map also notes that there are many variables, such as volume, duration, pitch and tone, that can cause someone to be annoyed by aircraft noise. While the aviation industry can control some issues, others will require a multi-stakeholder approach to resolve.
- 4.3.10 Airport masterplans play an important role in stakeholder engagement, in addition to their value in informing the planning process. Guidance on the preparation of airport masterplans also sets out the importance of considering noise impacts within these plans, as well as proposals for mitigation measures where major impacts have been identified¹⁷⁰.
- 4.3.11 There are also a number of Codes of Practice, such as those developed by Sustainable Aviation, that set out measures that can be applied at airports to reduce the environmental implications of operational activities. The Codes consider a number of issues including the implications of noise and local air quality impacts that arise as a result of aviation activity. In some instances, measures to reduce emissions can have additional benefits, for example continual descent operations can lead to substantially smaller noise footprints than that of conventional approach procedures¹⁷¹.

¹⁶⁶ Sustainable Aviation (2015) Noise Road Map [online] Available at: <http://www.sustainableaviation.co.uk/road-maps/> (accessed 07/02/2017)

¹⁶⁷ *ibid*

¹⁶⁸ ICAO (undated) Aircraft noise: Balanced Approach to Aircraft Noise [online] Available at: <http://www.icao.int/environmental-protection/Pages/noise.aspx> (accessed 19/04/2017)

¹⁶⁹ Sustainable Aviation (2015) Noise Road Map [online] Available at: <http://www.sustainableaviation.co.uk/road-maps/> (accessed 07/02/2017)

¹⁷⁰ Department of Transport (2004) Guidance on the Preparation of Airport Master Plans [online] Available at: <http://webarchive.nationalarchives.gov.uk/+http://www.dft.gov.uk/about/strategy/whitepapers/air/pwpa/guidanceonthe-preparation-of-air-5683> (accessed 07/02/2017)

¹⁷¹ ATAG (2010) Beginners Guide to Aviation Efficiency [online] Available at: <http://www.atag.org/our-publications/latest.html> (accessed 19/04/2017)

- 4.3.12 Under the EU Environment Noise Directive, any airport with more than 50,000 aircraft movements a year, or that has a significant noise impact on a densely populated urban area, must produce a strategic noise map and noise action plan which must be updated every five years¹⁷². These maps are published by the Scottish Government.¹⁷³ Additionally, noise action plans have been produced at a number of airports setting out measures taken to reduce the impact of noise. Although the Directive seeks to minimise environmental noise arising from aviation activities, it does not set clear noise targets or limit values¹⁷⁴. The World Health Organisation is due to publish Environmental Noise Guidelines for the European region¹⁷⁵. It is anticipated that this guidance will reflect latest evidence on how noise from specific sources affects health.
- 4.3.13 At a national level, the preferred policy option will sit within the context of a wide range of policies and proposals that set out objectives for improved connectivity. These will have implications on transport options to and from airports, with further implications on air quality. In addition, a number of airports produce surface access strategies which set out alternative travel options to and from the airport for passengers, workers and suppliers¹⁷⁶.

What is the likely significance of the predicted impacts?

- 4.3.14 There are many factors that influence air quality at a local level. For example, any additional road traffic that may arise as a result of the preferred policy option would need to be considered in the context of relevant factors such as growth and changes within other sectors. Changes to air quality, and the significance of this, would also depend on factors such as the current state of the air quality in areas surrounding individual airports.
- 4.3.15 Additionally, the significance of any impacts on human health that arise through changes in air quality will depend on a number of factors. For example, those with existing health conditions have the potential to be more

¹⁷² Civil Aviation Authority (2015) Aviation noise information [online] Available at: <https://www.caa.co.uk/Environment/Environmental-information/Information-by-environmental-impact/Noise/Aviation-noise-information/> (accessed 07/02/2017)

¹⁷³ Scottish Government (2007) Scottish Noise Mapping [online] Available at: <https://noise.environment.gov.scot> (accessed 07/02/2017)

¹⁷⁴ Civil Aviation Authority (2015) Aviation noise and why it matters – What level of aviation noise is allowed in the UK? [online] Available at: <https://www.caa.co.uk/Environment/Environmental-information/Information-by-environmental-impact/Noise/What-noise-is-and-why-it-matters/FAQs/> (accessed 07/02/2017)

¹⁷⁵ WHO (undated) Development of WHO Environmental noise guidelines for the European Region [online] Available at: <http://www.euro.who.int/en/health-topics/environment-and-health/noise/activities/development-of-who-environmental-noise-guidelines-for-the-european-region> (accessed 07/02/2017)

¹⁷⁶ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

adversely affected. Furthermore, those living in areas where there are existing issues of poor air quality may already be subject to prolonged exposure from pollutants.

- 4.3.16 Aircraft noise is the most significant cause of adverse community reaction related to the operation and expansion of airports and this is expected to remain the case in most regions of the world for the foreseeable future¹⁷⁷. Although noise performance has improved dramatically over the past fifty years, community perception of noise has, if anything, worsened¹⁷⁸. Noise may affect greater numbers of people than other local issues such as air quality¹⁷⁹ and many local communities believe that the current noise metrics, including the use of average noise contours, do not fully reflect their experience of local aircraft noise¹⁸⁰.
- 4.3.17 The extent and significance of any impacts will be most realised at a local level and be dependent on a number of factors, including the extent to which the predicted increase in passenger numbers are realised. In general, impacts on noise and air quality are likely to be long-term in nature; however, short-term impacts, for example noise and dust from construction activities, could also arise.

¹⁷⁷ ICAO (2016) ICAO Environmental Report 2016 - On Board A Sustainable Future [online] Available: <http://www.icao.int/environmental-protection/Pages/env2016.aspx> (accessed 07/02/2017)

¹⁷⁸ Civil Aviation Authority (2014) Managing Aviation Noise [online] Available at: <https://publicapps.caa.co.uk/docs/33/CAP%201165%20Managing%20Aviation%20Noise%202.pdf> (accessed 19/04/2017)

¹⁷⁹ *ibid*

¹⁸⁰ Sustainable Aviation (2015) Noise Road Map [online] Available at: <http://www.sustainableaviation.co.uk/road-maps/> (accessed 07/02/2017)

Box 4.1 Population and Human Health: Summary of impacts and key points

IMPACTS	<ul style="list-style-type: none"> • Changes in noise exposure and air quality may arise through increased passenger and flight numbers and increased traffic to and from airports. • Accessibility may be improved through increased connectivity of associated infrastructure and more frequent and diverse flight routes.
KEY POINTS	<ul style="list-style-type: none"> • Air quality is important for both short and long-term human health • In particular, continual exposure to poor air quality can impact on people with pre-existing health issues, such as heart disease, asthma and lung conditions. • Noise is generated at all airports from a number of sources such as aircraft noise, airport vehicle operations and associated transport rounds to and from airports. • Noise disturbance is a difficult issue to evaluate as it is open to subjective reaction; however the impacts can be significant. • Noise can have a number of negative health impacts, such as fatigue, stress, anxiety and can increase blood pressure and heart rate. • Noise is regulated to some extent at all UK airports, with some additional obligations applied through planning frameworks at local authority level. • Technological and operational improvements, land use planning and community engagement, are mechanisms that can be applied to manage noise impacts. • Many airports are obligated under law to produce a noise action plan and strategic noise maps which must be updated every five years.

5 Air Quality

5.1 Environmental Objectives

5.1.1 Scotland's air quality environmental protection objectives are largely derived from the EC Air Quality Directive (2008/50/EC) and the 4th Air Quality Daughter Directive (2004/107/EC)¹⁸¹, via the Air Quality Standards (Scotland) Regulations 2010¹⁸² which transposes these Directives into a Scottish context. There are also domestic objectives as part of the Local Air Quality Management system set under the Environment Act 1995 and associated regulations¹⁸³. These objectives are largely aimed at reducing air emissions that are potentially harmful to human health and the environment, and together they set out the requirement for monitoring with a particular focus on areas where air pollution is concentrated.

5.2 Environmental Context

5.2.1 As discussed above under 'Population and Human Health', air quality is important for both short and long-term human health. It is also clear that those with pre-existing health issues may be more vulnerable to poor air quality over the long-term¹⁸⁴. Air pollution can also cause adverse effects in the wider environment. For example, it can add nutrients to water bodies and soils and contribute to acidification and eutrophication, both of which can impact on plant and animal life. It can also damage the fabric of buildings and monuments, threatening cultural heritage and the historic environment¹⁸⁵.

5.2.2 Air quality in Scotland has improved considerably over the last few decades. Between 1990 and 2014 there were decreases of 75% for carbon monoxide, 69% for nitrogen oxides, 65% for non-methane volatile organic compounds, 46% for fine particulate matter (PM₁₀) and 90% for sulphur dioxide¹⁸⁶¹⁸⁷. However, there are some towns and cities where air quality has been

¹⁸¹ EC (2015) Air Quality – Existing Legislation [online] Available at: http://ec.europa.eu/environment/air/quality/legislation/existing_leg.htm (accessed 07/02/2017)

¹⁸² The Air Quality Standards (Scotland) Regulations 2010 [online] Available at: http://www.legislation.gov.uk/ssi/2010/204/pdfs/ssi_20100204_en.pdf (accessed 07/02/2017)

¹⁸³ Scottish Government (2016) Local Air Quality Management policy guidance [online] Available at: <http://www.gov.scot/Publications/2016/03/9717> (accessed 07/02/2017)

¹⁸⁴ Scotland's Environment (undated) Air Quality [online] Available at: http://www.environment.scotland.gov.uk/our_environment/air_and_climate/air_quality.aspx (accessed 07/02/2017)

¹⁸⁵ *ibid*

¹⁸⁶ Scottish Government (2016) Air Quality - Air Pollutant Emissions, High Level summary of Statistics Trend [online] Available at: <http://www.gov.scot/Topics/Statistics/Browse/Environment/trendairpollutants> (accessed 20/04/2017)

¹⁸⁷ National Atmospheric Emissions Inventory (2016) https://uk-air.defra.gov.uk/assets/documents/reports/cat07/1609130909_Devolved_Administrations_Air_Quality_Pollutant_Inventory_1990-2014_Issue1.1.pdf (accessed 20/04/2017)

identified as a concern¹⁸⁸, and in Scotland air pollution is estimated to reduce life expectancy by 3-4 months¹⁸⁹.

- 5.2.3 As per section 83(1)¹⁹⁰ of the Environment Act 1995, where air quality objectives are not being met or are unlikely to be met within the relevant period, Local Authorities are required to designate an Air Quality Management Area (“AQMA”). Within Scotland, 14 of the 32 Local Authorities have currently declared a total of 39 AQMAs. The majority of these are declared in urban areas as a result of nitrogen oxides alone or in combination with PM₁₀ levels, primarily as a result of traffic emissions. While none of these areas have been declared as a consequence of aviation activities, several AQMAs have been declared along popular traffic routes to and from several airports¹⁹¹.
- 5.2.4 As set out in the Air Quality Standards (Scotland) Regulations 2010¹⁹², Scottish Ministers must ensure that levels of airborne pollutants are maintained below the limit values, and must endeavour to maintain the best ambient air quality compatible with sustainable development.
- 5.2.5 Emissions attributed to aircraft operations that have local air quality effects are nitrogen oxides, carbon monoxide, unburned hydrocarbons, sulphur dioxide, fine particulate matter (PM₁₀ and PM_{2.5}) and odour¹⁹³. These arise from a number of sources including the combustion of aviation fuel, vehicles travelling to and from airports, operation of ground service equipment and construction activities associated with infrastructure development¹⁹⁴.

5.3 Assessment Findings

- 5.3.1 The consideration of air quality implications on human health and climate change has been assessed under the respective topics of Population and Human Health and Climatic Factors.

¹⁸⁸ Scotland’s Environment (undated) Air [online] Available at: <http://www.environment.scotland.gov.uk/get-informed/air/> (accessed 20/04/2017)

¹⁸⁹ Scottish Government (2016) Air Quality - Air Pollutant Emissions, High Level summary of Statistics Trend [online] Available at: <http://www.gov.scot/Topics/Statistics/Browse/Environment/trendairpollutants> (accessed 20/04/2017)

¹⁹⁰ Environmental Act 1995 – Section 83(1) [online] Available at: <http://www.legislation.gov.uk/ukpga/1995/25/section/83> (accessed 07/02/2017)

¹⁹¹ Air Quality in Scotland (undated) Air quality management areas [online] Available at: <http://www.scottishairquality.co.uk/laqm/aqma> (accessed 07/02/2017)

¹⁹² The Air Quality Standards (Scotland) Regulations 2010 [online] Available at: http://www.legislation.gov.uk/ssi/2010/204/pdfs/ssi_20100204_en.pdf (accessed 07/02/2017)

¹⁹³ EUROCONTROL (2015) Environmental Issues for Aviation, Local Air Quality [online] Available at: <http://www.eurocontrol.int/articles/environmental-issues-aviation> (accessed 07/02/2017)

¹⁹⁴ ibid

What are the likely implications of increased passenger and flight numbers on local air quality?

- 5.3.2 The following paragraphs set out the impacts that arise from aviation activity and how these can impact on air quality. These are considered to be secondary impacts and are based on the assumptions that the implementation of the preferred policy option will lead to increased passenger and flight numbers. However, it is considered that any secondary impacts that arise are outwith the ability of the policy option to influence.
- 5.3.3 Aircraft engines, support vehicles and equipment, and vehicles accessing the airport are key aviation sources of emissions that affect air quality¹⁹⁵. Aircraft engines produce emissions that are similar to those resulting from any oil based fuel consumption and these, like any exhaust emissions, can affect local air quality at ground level. It is the emissions from aircraft below 1,000 feet above the ground (typically 3 kilometres from departure or, for arrivals, around 6 kilometres from touchdown) that are predominantly involved in influencing local air quality¹⁹⁶. These emissions disperse with the wind and blend with emissions from other sources such as road transport pollution. Aircraft operations are the most significant source of emissions¹⁹⁷.
- 5.3.4 Ground operations that support flight activity will also be influenced by the estimated growth in the industry, and there is the potential for the increased use of service equipment such as power units and vehicle movements to further contribute to emissions.
- 5.3.5 The preferred policy option could also influence road traffic levels as a result of an increase in passengers, workers and supplier journeys. As discussed previously, there is also the potential for a modal shift to arise which could have implications for air quality. For example, through longer road surface journeys being undertaken, thereby contributing to increased GHG emissions. Whilst this remains a relevant consideration, this SEA cannot predict to an acceptable level the impact on overall emissions should a modal shift arise.
- 5.3.6 The SEA of the NPF3 considered the proposed Strategic Airport Enhancements and noted that mixed effects on air quality could be expected¹⁹⁸. The assessment reported that there was potential for negative effects to arise as a result of increased levels of traffic to and from airports,

¹⁹⁵ Sustainable Aviation (undated) UK Aviation and Air Quality [online] Available at: <http://www.sustainableaviation.co.uk/uk-aviation-and-air-quality/> (accessed 20/04/2017)

¹⁹⁶ EUROCONTROL (2015) Environmental Issues for Aviation, Local Air Quality [online] Available at: <http://www.eurocontrol.int/articles/environmental-issues-aviation> (accessed 07/02/2017)

¹⁹⁷ Sustainable Aviation (undated) UK Aviation and Air Quality [online] Available at: <http://www.sustainableaviation.co.uk/uk-aviation-and-air-quality/> (accessed 20/04/2017)

¹⁹⁸ The Scottish Government (2013) NPF3 and SPP – SEA Environmental Report [online] Available at: <http://www.gov.scot/Publications/2013/04/3435> (accessed 08/02/2017)

in addition to increased flights. However, it was also considered that there could be benefits to air quality through increased public transport connectivity.

- 5.3.7 These secondary impacts will also be further influenced by the extent to which passenger numbers increase. For example, when considering the **illustrative scenarios** of adopting a differential approach to how the tax reduction is applied. There is the potential that applying a zero tax rate amount to only short-haul flights as a means of delivering the preferred policy option could lead to a higher number of additional passengers, compared to reducing the tax charged on both short and long-haul flights by an equal proportion. Conversely, applying a zero tax rate amount to only long-haul flights could lead to a lower number of additional passengers compared with reducing both short and long-haul flights proportionally equally. As discussed previously, this is due to factors such as passenger demand on long-haul flights being the most price inelastic (i.e. least price sensitive) and there being fewer long-haul flights.
- 5.3.8 Under the **reasonable alternative**, it is considered that there would be no direct impact on passenger and flight numbers as this would approach would lead to no reduction in the overall tax burden of ADT. As such, there would be no additional pressure on local air quality beyond that currently experienced.

What wider context and potential mitigation measures should be taken into account?

- 5.3.9 Internationally, work is being undertaken by ICAO on initiatives to improve air quality, as well as developing measures to reduce the impact of aircraft emissions on local air quality¹⁹⁹. These measures focus on the effect of aircraft engine emissions below 3,000 feet and emissions from airport sources such as airport traffic, ground service equipment and de-icing operations. ICAO also state that technological innovations in aviation will continue to lead the way towards effective and efficient measures to support their environmental goals of limiting or reducing the impact of air craft emissions on local air quality²⁰⁰.
- 5.3.10 At a local level, many airports and airlines have made changes to their operations to help improve air quality through improvements to aircraft and engine design, operational procedures and fuels²⁰¹. The “UK Aviation and

¹⁹⁹ ICAO (2016) ICAO Environmental Report 2016 On Board A Sustainable Future [online] Available: <http://www.icao.int/environmental-protection/Pages/env2016.aspx> (accessed 07/02/2017)

²⁰⁰ *ibid*

²⁰¹ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

Air Quality Report²⁰² also sets out a range of initiatives to reduce emission in and around UK airports such as the introduction of cleaner or zero emission aircraft handling equipment and airport vehicles to replace diesel versions.

- 5.3.11 NPF3 is one of a number of plans and strategies that set out objectives for greater connectivity. This vision is set out in “a successful, sustainable place” which considered a range of topics, including the role of green networks and linking development with public transport networks, aimed at promoting active and sustainable travel options.
- 5.3.12 A number of airports also produce surface access strategies which set out alternative travel options to and from the airport for passengers, workers and suppliers²⁰³. Measures promoted include the investment in new or improved infrastructure to enhance traffic flow and ease congestion, encouraging staff car sharing schemes and actively discouraging the number of car journeys to and from the airport.

What is the likely significance of the predicted impacts?

- 5.3.13 There are a number of factors that make assessing the impacts on air quality difficult. Firstly, when assessing the atmospheric emissions that arise from aviation activity there are variables that affect individual airports differently. For example, operational procedures and mitigation measures applied at a local level will be specific to individual airports.
- 5.3.14 Additionally, any potential effect that may arise with regard to road traffic movement is a complex issue. There are a number of factors that outwith the aviation sector that can influence modal shift. The estimated increase of passenger numbers predicted in the 2017 research²⁰⁴ sits within the wider context of growth within a range of sectors which all have the potential to individually influence local air quality.
- 5.3.15 Although there are many factors that influence air quality, it is considered likely that the predicted increase in passenger and flight numbers could contribute to pressures experienced at a local level. Any pressure placed on local air quality through aviation activity is likely to be influenced by the degree of the predicted increase in passenger numbers.

²⁰² Sustainable Aviation (undated) UK Aviation and Air Quality Report [online] Available at: <http://www.sustainableaviation.co.uk/uk-aviation-and-air-quality/> (accessed 20/04/2017)

²⁰³ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

²⁰⁴ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

5.3.16 The significance of the secondary impacts to air quality identified as likely to occur from the policy will be dependent on factors such as the location. For example, there is the potential that problems experienced in areas designated as AQMAs may be further exacerbated through increased pressure from any activity that contributes to air pollution. The secondary impacts identified may be long-term in nature as a result of operational activity, in addition to short-term impacts that may arise from any construction works undertaken.

Box 5.1 Air Quality: Summary of impacts and key points

IMPACTS	<ul style="list-style-type: none"> • Changes in air quality may arise through increased passenger and flight numbers and increased traffic to and from airports.
KEY POINTS	<ul style="list-style-type: none"> • Scotland’s air quality has improved considerably over the last few decades, however, there are still some towns and cities where air quality is of concern. • Air quality can have a range of adverse environmental effects including impacts on water quality and soils. • Aviation air quality concerns are principally related to the areas on and around airports. • Air pollution from airports and aviation can arise from a number of activities, such as the combustion of aviation fuels and vehicles travelling to and from airports. • The aviation industry is working to reduce the levels of pollutants emitted through measures such as surface access plans, technological improvements and operational procedures. • Guidance and Codes of Practice are available on this topic.

6 Biodiversity, Flora and Fauna

6.1 Environmental Objectives

- 6.1.1 Existing environmental protection objectives stem from a number of pieces of legislation and policy relating to the protection of biodiversity, flora and fauna. These objectives are largely aimed at protecting habitats and species from disturbance and damage, principally through the identification and conservation of areas of particular value. The policies define a hierarchy of protection from international and European levels down through to local level. International convention includes the development of the Aichi Biodiversity Targets²⁰⁵ set by the United Nations Convention on Biological Diversity²⁰⁶.
- 6.1.2 At the European level, the Natura 2000 network of sites aims to protect key natural assets under the EC Habitats²⁰⁷ and Birds Directives²⁰⁸, both of which have been transposed into UK and Scottish regulations. The Natura 2000 network is made up of Special Areas of Conservation (“SAC”) and Special Protection Areas (SPA). The majority of SPAs and SACs are also underpinned by Site of Special Scientific Interest (“SSSI”) legislation as part of the Nature Conservation (Scotland) Act²⁰⁹.
- 6.1.3 The designation of European protected species, and the identification of species and habitats requiring conservation action in the UK, demonstrates the prioritisation of conservation ambitions at European and national levels. The 2020 Challenge for Scotland’s Biodiversity²¹⁰ is Scotland’s response to the 20 Aichi Targets set by the United Nations Convention on Biological Diversity and the European Union’s Biodiversity Strategy for 2020. The 2020 Challenge supplements the 2004 Scottish Biodiversity Strategy²¹¹ and focuses on the importance of healthy ecosystems and an outcome that “Scotland’s ecosystems are restored to good ecological health so that they provide robust ecosystem services and build on our natural capital”.

²⁰⁵ Convention on Biological Diversity (undated) Aichi Biodiversity Targets [online] Available at: <https://www.cbd.int/sp/targets/default.shtml> (accessed 08/02/2017)

²⁰⁶ Convention on Biological Diversity (1992) Text of the Convention of Biological Diversity [online] Available at: <https://www.cbd.int/convention/text/> (accessed 08/02/2017)

²⁰⁷ European Commission, The Habitats Directive [online] Available at: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm (accessed 08/02/2017)

²⁰⁸ European Commission, The Birds Directive [online] Available at: http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm (accessed 08/02/2017)

²⁰⁹ Scottish Government (2016) Natura 2000 [online] Available at: <http://www.gov.scot/Topics/Environment/Wildlife-Habitats/protectedareas/NATURA> (accessed 08/02/2017)

²¹⁰ Scottish Government (2013) 2020 Challenge for Scotland’s Biodiversity – A Strategy for the conservation and enhancement of biodiversity in Scotland [online] Available at: <http://www.gov.scot/Publications/2013/06/5538> (accessed 08/02/2017)

²¹¹ Scottish Government (2004) Scottish Biodiversity Strategy – It’s in your hands [online] Available at: <http://www.gov.scot/Publications/2004/05/19366/37239> (accessed 08/02/2017)

- 6.1.4 Beyond site and species designations there are also longer term aspirations for enhancing biodiversity, improving landscape-scale ecological networks and addressing the impacts of climate change on the natural environment.

6.2 Environmental Context

- 6.2.1 Scotland is rich in biodiversity, evident in the wide array of species and habitats found within its many unique terrestrial, coastal and marine ecosystems. Biodiversity plays a key role in supporting our lives through the provision of crucial resources like fresh air, clean water and food²¹². It is commonly used as a measure of the health of ecosystems, and provides many of the ecosystem services that are the basis of life, such as soil formation, nutrient recycling, flood regulation, and pollination, amongst others²¹³. As such, biodiversity is closely linked with other environmental topics such as water and soil.
- 6.2.2 Many of Scotland's species and habitats are recognised for their vulnerability and/or importance at the European, UK and national levels. This is demonstrated through the establishment of a range of environmental designations aimed at safeguarding biodiversity. Such designations include 239 SACs, 153 SPAs, 51 Ramsar sites and 2 Biosphere reserves, amongst other internationally designated sites²¹⁴. Further national level designations include 1,425 SSSIs, 30 Marine Protected Areas and 2 National Parks²¹⁵.
- 6.2.3 Some of these protected sites are located in the vicinity of Scotland's airports, with many more located along air traffic flight paths and near to important transport hubs connecting these airports with urban centres. For example, Glasgow Airport is located adjacent to Black Cart SPA and Glasgow-Prestwick Airport is located approximately 200 miles south east of Troon Golf Links and Foreshore SSSI. In addition, Edinburgh Airport is located adjacent to the River Almond which flows into the Firth of Forth, which is itself an SPA.
- 6.2.4 Biodiversity loss has been well documented over the last 50 years, and today there are a range of pressures on Scotland's wildlife and biodiversity. Key issues such as climate change, changing land use and management

²¹² SNH (2015) An Ecosystems Approach [online] Available at: <http://www.snh.gov.uk/about-scotlands-nature/scotlands-biodiversity/an-ecosystems-approach/> (accessed 08/02/2017)

²¹³ Mackey E.C. and Mudge G.P. (2010) Scotland's Wildlife: An assessment of biodiversity in 2010, Scottish Natural Heritage, Inverness [online] Available at: <http://www.snh.gov.uk/docs/B811968.pdf> (accessed 08/02/2017)

²¹⁴ SNH (2016) International Designations [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/international-designations/> (accessed 04/10/2016)

²¹⁵ SNH (2016) National Designations [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/> (accessed 08/02/2017)

leading to loss or damage of natural habitats, and the pollution of air and water, have been noted²¹⁶.

- 6.2.5 Birds can be a significant hazard to aircraft, particularly during take-off and landing. The CAA states that roughly 85% of bird strikes involve aircraft below 800 feet in altitude²¹⁷. As a consequence, control measures such as landscaping and noise and flare gun deterrents are used at many UK airports to reduce bird strike. There is also an online system for reporting incidents.

6.3 Findings

What are the likely implications of increased passenger and flight numbers on biodiversity, flora, and fauna?

- 6.3.1 Growth in the aviation sector has risen steadily over the last decade and a number of airport masterplans have set out a vision to facilitate this growth within current airport capacity. However, these plans acknowledge that, from 2020 to 2040, it is likely that increased pressure on infrastructure though passenger growth will potentially lead to some airports undertaking development. The figures used in the masterplans to predict growth do not reflect any additional increase that has been estimated to arise as a result of the preferred policy option. As such, it would be reasonable to assume this has the potential to lead to further pressure on the ability of some airports to accommodate growth within existing infrastructure.
- 6.3.2 Aviation activity can have a negative impact on biodiversity through habitat loss and fragmentation, wildlife can be disturbed by increased noise and vibration levels, and measures taken to reduce the risk of planes colliding with birds can have their own disruptive effects²¹⁸. Construction and development activities can also have a negative impact, for example, through noise and disturbance. The SEA of the NPF3 noted that there would be the potential for loss of habitats arising from the proposed Strategic Airport Enhancements and disturbance during construction activities²¹⁹. It further stated that, in some instances, consideration would be required to be

²¹⁶ Biodiversity Scotland (2014) Climate change [online] Available at: <http://www.biodiversityscotland.gov.uk/biodiversity/pressures/> (accessed 08/02/2017)

²¹⁷ Civil Aviation Authority (2015) CAA Environmental Programme 2014-2016 [online] Available at: <http://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=6338> (accessed 08/02/2017)

²¹⁸ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

²¹⁹ The Scottish Government (2013) NPF3 and SPP – SEA Environmental Report [online] Available at: <http://www.gov.scot/Publications/2013/04/3435> (accessed 08/02/2017)

given to situations where the proposed development may impact on designated sites nearby.

- 6.3.3 The above are considered as potential secondary impacts that may arise as a result of the preferred policy option. Another secondary impact likely to arise is the contribution to GHG emissions arising from the aviation sector. The predicted effects of climate change and the potential for associated impacts on biodiversity, flora, and fauna are well documented, with evidence showing the wide range of effects that a changing climate can have on flora and fauna, species and their habitats²²⁰.
- 6.3.4 There is the potential that the above impacts will be influenced by the degree of increase in passenger and flight numbers. For example, the greater the increase over current levels experienced, the greater the potential pressure placed on existing infrastructure. When considering the **illustrative scenarios** of adopting a differential approach to delivering the preferred policy option, applying a zero tax rate amount to only short-haul flights could exert more pressure on infrastructure through higher passenger numbers than compared to reducing the tax charged on both short and long-haul flights by an equal proportion. Conversely, the additional pressure on infrastructure may be lower by applying a zero tax rate amount to only long-haul flights and maintaining the tax charged on short-haul flights at current UK APD levels.
- 6.3.5 It is considered that there would be no direct impact on passenger and flight numbers as a result of the **reasonable alternative** of applying tax rates that would remain the same as that currently set under UK APD as this represents a “like for like” approach. As such, activity in the sector would continue on the current trajectory predicted.

What wider context and potential mitigation measures should be taken into account?

- 6.3.6 Airport masterplans consider potential development up to 2040, with acknowledgement that predicting requirements up to this stage is complex due to the many variables surrounding passenger demand, such as economic and global events.
- 6.3.7 Any future airport and supporting infrastructure development would be outwith the remit of the preferred policy option to influence. It is likely that any proposals for future significant infrastructure works will be required to undertake an Environmental Impact Assessment (“EIA”). Further project level assessment, including EIA screening, will therefore be required to

²²⁰ Biodiversity Scotland (2014) Climate change [online] Available at: <http://www.biodiversityscotland.gov.uk/biodiversity/pressures/climate-change/> (accessed 08/02/2017)

establish significance. Travel connectivity for Scotland's airports is also widely addressed through Local Development plans, which are currently subject to SEA.

- 6.3.8 Airports manage large sites which are not accessible to the general public and therefore can also provide an opportunity to support biodiversity in some instances.

What is the likely significance of the predicted impacts?

- 6.3.9 At this stage of the SEA process it is difficult to predict with any degree of certainty the extent and significance of the identified impacts. It has been assumed that the preferred policy option will lead to increased growth in the aviation sector and place further pressure on existing airport infrastructure. The extent to which this increase is realised is likely to be further influenced through the different pathways that could be taken to in order to meet the 50% reduction in the overall ADT burden set out in the preferred policy option.
- 6.3.10 The scale and location of any proposed works may also be influenced by a number of factors: for example, the creation of more accessible and sustainable transport infrastructure links, as set out in NPF3. Additionally, technological and operational developments at individual airports may accommodate the estimated growth without the need for further development in the short-term.
- 6.3.11 Due to the nature of the identified changes, impacts that could arise from infrastructure requirements are likely to be realised at a local level and could be long-term in nature. Short-term impacts may also arise from construction activities. Further to this, there may be impacts on biodiversity as a result of climate change.

Box 6.1 Biodiversity, Flora and Fauna: Summary of impacts and key points

IMPACTS	<ul style="list-style-type: none">• Infrastructure requirements (including construction activities) can lead to negative impacts on habitats and species.• Noise disturbance from aviation activity can impact on biodiversity.• Bird populations can both harm and be harmed by aircraft.
KEY POINTS	<ul style="list-style-type: none">• Scotland is rich in biodiversity and many species are of international or European importance.• Mitigation against these impacts is best identified and undertaken at the project level.• Climate change continues to be a primary stressor on biodiversity and may exacerbate the effects of other pressures, such as those arising from the preferred policy option.

7 Soil

7.1 Environmental Objectives

- 7.1.1 The importance of soil as a resource is recognised internationally through the European Commission's Thematic Strategy for Soil Protection²²¹. Nationally, the protection of prime quality agricultural land and peatlands is set out in the Scottish Soil Framework²²², Scotland's National Peatland Plan²²³, and the Scottish Government's Draft Peatland and Energy Policy Statement²²⁴.
- 7.1.2 Geological sites receive protection through the designation of geological SSSIs at the national level as well as international recognition through the establishment of a network of Geoparks²²⁵.

7.2 Environmental Context

- 7.2.1 Soil is essentially a non-renewable resource and is fundamentally one of Scotland's most important assets²²⁶. It supports a wide range of natural processes and underpins much of our natural environment, and through this important role helps to provide a wide range of environmental, economic and societal benefits. For example, soil provides the basis for food, it controls and regulates environmental interactions such as regulating water flow and quality, stores carbon, and serves as a platform for buildings and roads²²⁷. There is an intrinsic relationship between soil health and other environmental topics; biodiversity, water and air quality in particular.
- 7.2.2 Soils play a significant role in terms of storing carbon and therefore help to regulate GHG emissions. It is estimated that Scotland's soils contain 3,200 million tonnes of carbon, making up over 50% of the UK's total soil carbon²²⁸. Soils also can carry out more than one function at a time; therefore any impact on their ability to carry out these functions can have

²²¹ European Commission (2016) Soil, The Soil Thematic Strategy [online] Available at: http://ec.europa.eu/environment/soil/three_en.htm (accessed 08/02/2017)

²²² The Scottish Government (2009) The Scottish Soil Framework [online] Available at: <http://www.gov.scot/Publications/2009/05/20145602/0> (accessed 12/02/2016)

²²³ SNH (2015) Scotland's National Peatland Plan, Working for our Future [online] Available at: <http://www.snh.gov.uk/docs/A1697542.pdf> (accessed 16/09/2015)

²²⁴ The Scottish Government (2017) Draft Peatland and Energy Policy Statement [online] Available at: <http://www.gov.scot/Resource/0050/00502389.pdf> (accessed 17/01/2017)

²²⁵ SNH (2015) Geoparks [online] Available at: <http://www.snh.gov.uk/enjoying-the-outdoors/what-can-i-see/geology-rocks/geoparks/> (accessed 29/06/2016)

²²⁶ Scottish Government (2006) Scotland's Soil Resource Current State and Threats [online] Available at: <http://www.gov.scot/publications/2006/09/21115639/7> (accessed 08/02/2017)

²²⁷ Scottish Government (2009) Scottish Soil Framework [online] Available at: <http://www.gov.scot/Publications/2009/05/20145602/0> (accessed 08/02/2017)

²²⁸ Scottish Government (2016) Scotland's Soil – Soil Organic Matter [online] Available at: <http://www.soils-scotland.gov.uk/context/organic> (accessed 08/02/2017)

multiple effects on the wider environment. For example, the erosion of soil can also contribute to diffuse water pollution²²⁹.

- 7.2.3 While Scotland's soils are considered to generally be in good health, there are a range of pressures on them. Climate change, loss of organic matter, soil sealing through development and construction activities, compaction, loss of biodiversity and deposition of acidifying and eutrophying air pollutants are considered to be the primary threats facing Scotland's soils. Changes in land use are another key pressure on soil²³⁰. Many of these pressures have the potential to affect soil functions, such as ability to store carbon, and are difficult to reverse. In the case of climate change, this has the potential for not only national impacts, but impacts on a global scale²³¹. These pressures are likely to increase in the future with greater demand for resources and development associated with population growth.
- 7.2.4 At present there is a lack of information on threats to soil functions, particularly relating to the extent of soil sealing, changes in soil biodiversity and compaction of soils²³².

7.3 Assessment Findings

What are the likely implication of increased passenger and flight numbers on soil resources?

- 7.3.1 The following paragraphs set out the potential impacts that are considered likely to arise from increased aviation activity on soil resources. These are considered secondary impacts and have been based on the assumptions that the implementation of the preferred policy option will lead to increased passenger and flight numbers and pressure on existing airport and interconnecting infrastructure. However, it is considered that any secondary impacts that arise are outwith the ability of the policy option to influence.
- 7.3.2 Soil resources are likely to be impacted in two ways: firstly, through any new construction / development that may be required to facilitate the estimated growth in passenger numbers, and which could lead to soil sealing or compaction.

²²⁹ SEPA (undated) Soil [online] Available at: <http://www.sepa.org.uk/environment/land/soil/> (accessed 08/02/2017)

²³⁰ Dobbie, K.E., Bruneau, P.M.C., Towers, W. (2011) The State of Scotland's Soil [online] Available at: <http://www.sepa.org.uk/media/138741/state-of-soil-report-final.pdf> (accessed 08/02/2017)

²³¹ Scotland's Environment (2016) Soil [online] Available at: <http://www.environment.scotland.gov.uk/get-informed/land/soils/> (accessed 08/02/2017)

²³² European Commission (2015) JRC Technical Reports, Soil Threats in Europe, Status, methods, drivers and effects on ecosystem services [online] Available at: http://esdac.jrc.ec.europa.eu/public_path/shared_folder/doc_pub/EUR27607.pdf (accessed 08/02/2017)

- 7.3.3 The potential for impacts arising from the requirement for new infrastructure development was given consideration in the assessment of the proposals for airport expansion in the NPF3²³³. It was reported that new development, such as the expansion of facilities and improvements to transport access, would be likely to lead to soil sealing, loss of soil resource, and, in some instances, loss of agricultural land.
- 7.3.4 Secondly, as noted above, soils play a significant role in terms of storing carbon, thus helping to regulate the impacts of climate change. It has been identified that the preferred policy option is likely to lead to an overall increase in GHG emissions, relative to where they would be in the absence of the policy. This in turn has the potential to have a negative impact on climate change (further detail on this has been reported under the topic of Climatic Factors).
- 7.3.5 The extent to which passenger numbers increase will also influence the pressure that is placed on current infrastructure to accommodate growth, and therefore the effects on soils, as outlined above. For example, when considering the **illustrative scenarios** of adopting a differential approach to how the overall 50% tax reduction is applied. There is the potential that applying a zero tax rate amount to only short-haul flights, as a means of delivering the preferred policy option, could lead to higher passenger numbers than compared to reducing the tax charged on both short and long-haul flights proportionally equally.
- 7.3.6 Under the **reasonable alternative** approach, it is considered that there would be no direct impact on passenger numbers due to the “like for like” approach this represents. As such, there would be no additional pressure on soil resources beyond that currently experienced.

What wider context and potential mitigation measures should be taken into account?

- 7.3.7 Many airport masterplans consider that existing infrastructure would continue to facilitate current levels of passengers and flight numbers. However, new development may be required in the future to facilitate the continual growth that has been experienced over the last decade.
- 7.3.8 Any development of airports and supporting infrastructure would be outwith the remit of the preferred policy option to influence. Travel connectivity for Scotland’s airports is widely addressed through Local Development Plans, which are subject to SEA. In addition, it is likely that any proposals for any significant infrastructure works will require an EIA. Further project level

²³³ The Scottish Government (2013) NPF3 and SPP – SEA Environmental Report [online] Available at: <http://www.gov.scot/Publications/2013/04/3435> (accessed 08/02/2017)

assessment, including EIA screening where use and significant effects on natural resources including soils are assessed, will therefore be required.

- 7.3.9 Issues that may require further mitigation include where a proposal for development could affect soils of a high value, such as prime agricultural land. This SEA recommends that all soil types be considered as a valuable, non-renewable resource.

What is the likely significance of the predicted impacts?

- 7.3.10 It has been assumed that the preferred policy option will lead to increased growth in the aviation sector and has the potential to place further pressure on existing airport infrastructure. In turn, the amount of pressure exerted is also likely to be influenced by the extent to which the increase in passenger numbers is realised.
- 7.3.11 At this stage of the SEA process it is difficult to predict with any degree of certainty the extent and significance of the identified impacts. This will be dependent on factors such as the scale and location of any proposed development, which in turn will also be influenced by factors such as the creation of more accessible and sustainable transport infrastructure links.
- 7.3.12 The extent of any development would also relate to factors relevant to a specific airport, such as current capacity to accommodate the predicted growth in passenger numbers. Soil status will also influence significance; for example, current pressures may be exacerbated through development impacts. Due to the nature of the identified changes, however, it is likely that impacts identified in relation to infrastructure and development will be realised at a local level. It is also considered that these could be long-term in nature, although short-term impacts may also arise from construction activities.
- 7.3.13 Further to the impacts arising from infrastructure and development, there may be national level implications for soil resources as a result of climate change.

Box 7.1 Soil: Summary of impacts and key points

IMPACTS	<ul style="list-style-type: none">• Infrastructure requirements (including construction activities) pose a threat to soil.
KEY POINTS	<ul style="list-style-type: none">• Soil is essentially a non-renewable resource and is fundamentally one of Scotland's most important assets.• Climate change, land use change and management, loss of organic matter, and soil sealing through development and construction activities are considered to be key threats to Scotland's soils.

8 Water

8.1 Environmental Objectives

- 8.1.1 Objectives relating to the condition of all water bodies are set through the Water Framework Directive²³⁴, which governs objectives for rivers, lochs, transitional waters, coastal waters, and groundwater resources. The Water Framework Directive sets out the requirement for an assessment of both chemical and ecological status, alongside the requirement to consider the status of biodiversity as an indicator in determining water quality.
- 8.1.2 These objectives are set in the Scottish context in a range of water, coastal and marine policies. Scotland's two River Basin Management Plans²³⁵ aim to improve the overall condition of water bodies. The protection of Scotland's water resources has also been translated through the establishment of legislation and regulations such as the Water Environment and Water Services (Scotland) Act 2003²³⁶ and the Water Environment (Controlled Activities) (Scotland) Regulations 2011 as amended²³⁷. These complement the role of others such as the Pollution Prevention and Control (Scotland) Regulations 2012²³⁸, developed to specifically control pollution relating to industry discharges.
- 8.1.3 The Flood Risk Management (Scotland) Act 2009 and subsequent regulations and orders²³⁹ provide for the management of flood risk and translate the EU Floods Directive²⁴⁰ to the national context.

8.2 Environmental Context

- 8.2.1 Scotland's water resources provide a wide range of benefits across a number of environmental topic areas. Together with other environmental topics, including soil and air, water resources play a key role in supporting the health of our ecosystems and, in doing so, also make a significant contribution towards sustaining our health and prosperity. They also support

²³⁴ European Commission (2000) The Water Framework Directive [online] Available at: http://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF (accessed 08/02/2017)

²³⁵ SEPA (undated) River Basin Management Planning [online] Available at: <https://www.sepa.org.uk/environment/water/river-basin-management-planning/> (accessed 08/02/2017)

²³⁶ Water Environment and Water Services (Scotland) Act (2003) [online] Available at: <http://www.legislation.gov.uk/asp/2003/3/contents> (accessed 08/02/2017)

²³⁷ Water Environment (Controlled Activities) (Scotland) Regulations (2011) [online] Available at: <http://www.legislation.gov.uk/ssi/2011/209/contents/made> (accessed 08/02/2017)

²³⁸ The Pollution Prevention and Control (Scotland) Regulations (2012) [online] Available at: <http://www.legislation.gov.uk/ssi/2012/360/contents/made> (accessed 08/02/2017)

²³⁹ Scottish Government (2015) Flood Risk Management Act 2009 [online] Available at: <http://www.gov.scot/Topics/Environment/Water/Flooding/FRMAct> (accessed 08/02/2017)

²⁴⁰ Directive 2007/60/EC The EU Floods Directive [online] Available at: http://ec.europa.eu/environment/water/flood_risk/ (accessed 08/02/2017)

a diverse array of habitats and nationally and internationally important species such as Atlantic salmon and freshwater pearl mussels.

- 8.2.2 In recent decades, significant improvements in water quality in many rivers, canals and estuaries have been observed, and there have been significant reductions in pollution. However, rivers across Scotland's central belt and east coast require additional work to achieve Scotland's overarching target of all water bodies achieving 'good or better' for overall status²⁴¹.
- 8.2.3 Key pressures on the surface water environment originate from human activities and include urbanisation, intensive agriculture/aquaculture and climate change. Rural and urban diffuse pollution also remains a concern for water quality²⁴². For example, runoff from hard surfaces in urban areas may be contaminated with oil, petrol and toxic metals which can then be washed into drains, polluting nearby watercourses.

8.3 Assessment Findings

What are the likely implications of increased passenger and flight numbers on water resources?

- 8.3.1 The following paragraphs set out the potential impacts to water resources which are considered likely to arise from increased activity in the aviation sector, based on the assumptions that the implementation of the policy will lead to increased flight and passenger numbers. These secondary impacts are considered outwith the ability of the policy option to influence.
- 8.3.2 Airport related development and aviation activity can affect water quality in several ways, including run-off from buildings and hard surfaces and through the use and accidental spillage of potential pollutants such as fuel and de-icing fluids. It has been considered that growth in the sector has the potential to lead to the requirement for expansion of supporting infrastructure if current capacity is exceeded, which could increase the proportion of hard surfaces and the potential for run-off. Additionally, ground activities may increase in line with growth in the sector, such as an increase in the use of fuel and chemicals for maintaining operations. Construction and development activities can also negatively impact on water quality.
- 8.3.3 The potential for impacts on water quality arising from airport development was considered during the assessment of the proposed Strategic Airport Enhancements in the NPF3. The assessment noted that short-term impacts

²⁴¹ Scotland's Environment (undated) Water [online] Available at: <http://www.environment.scotland.gov.uk/get-informed/water/> (accessed 08/02/2017)

²⁴² SEPA (2015) The river basin management plan for the Scotland river basin district: 2015–2027 [online] Available at: <https://www.sepa.org.uk/media/163445/the-river-basin-management-plan-for-the-scotland-river-basin-district-2015-2027.pdf> (accessed 09/02/2017)

on water quality from construction activities could arise, with additional potential for long-term impacts stemming from operational activities. In addition, specific water courses, such as the Firth of Forth and its tributaries and the Black and White Cart Waters, were identified as potentially requiring further consideration with regards runoff and flood risk implications²⁴³.

- 8.3.4 Additionally, the effects of climate change are predicted to be an increasing pressure and likely to present a significant challenge to ambitions for improving water quality²⁴⁴. The contribution of the aviation sector to climate change is considered further under the topic of Climatic Factors.
- 8.3.5 The degree to which the identified increase in passenger numbers will be realised will influence these secondary effects. This has been considered though the **illustrative scenarios**. For example, if a greater number of passengers over current levels were to be experienced, this would place further pressure on water resources as airports are large consumers of water²⁴⁵.
- 8.3.6 A **reasonable alternative** to the preferred policy option is that there is no reduction in the overall tax burden of ADT. It is considered that this represents a “like for like” approach as the tax rate amounts would remain the same as those currently set under UK APD. Under this approach there would be no reduction in the tax burden and, as such, it is considered that there would be no additional direct impact on passenger and flight numbers and therefore no potential affect water on resources.

**What wider context and mitigation measures should
be taken into account?**

- 8.3.7 There are strict rules in place around the storage and handling of fuels, and advice is provided on the environmental impacts of de-icing chemicals used in aviation²⁴⁶. Airports are also investing in improved handling facilities and processes to reduce the risk of groundwater or surface water pollution from de-icing and fuel handling equipment²⁴⁷. In addition, through the Water

²⁴³ The Scottish Government (2013) NPF3 and SPP – SEA Environmental Report [online] Available at: <http://www.gov.scot/Publications/2013/04/3435> (accessed 08/02/2017)

²⁴⁴ Scotland’s Environment (2015) Water [online] Available at: <http://www.environment.scotland.gov.uk/get-informed/water/> (accessed 09/02/2017)

²⁴⁵ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentallInformation29032017.pdf> (accessed 16/04/2017/2017)

²⁴⁶ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentallInformation29032017.pdf> (accessed 16/04/2017/2017)

²⁴⁷ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentallInformation29032017.pdf> (accessed 16/04/2017/2017)

Environment (Controlled Activities) (Scotland) Regulations 2011 as amended²⁴⁸, any new water discharges by airport operators would require the permission of SEPA.

- 8.3.8 Any future airport and supporting infrastructure development would be outwith the remit of the preferred policy option to influence. In addition, it is likely that any significant proposals for any infrastructure works will be required to undertake an EIA. Further project level assessment, including EIA screening, will therefore be required.
- 8.3.9 Water consumption is considered as part of an airport's sustainability performance or corporate responsibility. These reports set out information such as monitoring and conservation measures for that airport.

What is the likely significance of the predicted impacts?

- 8.3.10 At this stage of the SEA process it is difficult to predict with any degree of certainty the extent and significance of the identified impacts that may arise from infrastructure requirements.
- 8.3.11 It is assumed that the preferred policy option will lead to increased growth in the aviation sector, placing further pressure on existing airport infrastructure. This will further be influenced by the extent to which the anticipated increase in passenger numbers is realised. Any proposed works that may be required to facilitate this growth will also be influenced by a number of factors, such as other strategies that seek to create sustainable transport links.
- 8.3.12 Due to the nature of the identified changes, it is considered that the likely impacts will be realised at a local level, with the significance of these dependent on factors such as the scale and location of any proposed development and specific operational activities at individual airports. Long-term impacts from operational activities are considered likely, in addition to short-term impacts arising from construction activities. Further to this, there may be national level implications for water resources as a result of climate change.

²⁴⁸ Water Environment (Controlled Activities) (Scotland) Regulations (2011) [online] Available at: <http://www.legislation.gov.uk/ssi/2011/209/contents/made> (accessed 08/02/2017)

Box 8.1 Water: Summary of impacts and key points

IMPACTS	<ul style="list-style-type: none">• Increased potential for contamination of water bodies from the handling of fuels and chemicals used in operational activities.• New infrastructure requirements (which will involve construction activities) may arise from increased passenger and flight numbers, and this could increase the risk of run-off from areas of hard standing.• As passenger number rise, the consumption of water resources is also likely to increase.
KEY POINTS	<ul style="list-style-type: none">• Water resources play a key role in supporting the health of our ecosystems and support many nationally and internationally important species.• Impacts from urban development and pollution are among the key pressures on water quality.• Airports are large consumers of water.

9 Landscape, Cultural Heritage and the Historic Environment

9.1 Environmental Objectives

- 9.1.1 Relevant environmental protection objectives reflect the importance of all landscapes and also the need to help to improve those that have become degraded. The European Landscape Convention²⁴⁹ lays the foundation for these objectives.
- 9.1.2 Key national objectives such as the establishment of the National Scenic Areas Programme and the development of Wild Land Areas by SNH²⁵⁰ demonstrate a continuing commitment to recognise the special qualities of nationally important landscapes. Alongside this, the planning system also recognises and protects landscapes and seascapes at the local level. This includes the establishment of regional and local designations and recognition of their importance such as Local Landscape Areas and Special Landscape Areas.
- 9.1.3 Relevant cultural heritage objectives are set out in a number of legislative documents focused on the protection of valued sites, townscapes (i.e. places, buildings and open spaces), buildings, archaeological sites, battlefields, wrecks and landscapes that have been recognised at the international, national and local levels through a hierarchy of designations. These broadly include the Historic Environment (Amendment) Scotland Act 2011²⁵¹, the Ancient Monuments and Archaeological Areas Act 1979 (as amended)²⁵² and the Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997²⁵³.
- 9.1.4 Policies such as NPF3 and SPP aim to improve the quality of our settlements and built environment with a national level focus. These are complemented by the Historic Environment Strategy for Scotland (2014)²⁵⁴ and the Historic Environment Scotland Policy Statement²⁵⁵, which provide an

²⁴⁹ European Landscape Convention (2009) [online] Available at: <http://www.coe.int/en/web/landscape/home> (accessed 09/02/2017)

²⁵⁰ SNH (2017) Wild Land [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/looking-after-landscapes/landscape-policy-and-guidance/wild-land/> (accessed 09/02/2017)

²⁵¹ Historic Environment (Amendment) (Scotland) Act 2011 [online] Available at: <http://www.legislation.gov.uk/asp/2011/3/contents/enacted> (accessed 09/02/2017)

²⁵² Ancient Monuments and Archaeological Areas Act 1979 (as amended) [online] Available at: http://www.legislation.gov.uk/ukpga/1979/46/pdfs/ukpga_19790046_en.pdf (accessed 09/02/2017)

²⁵³ Planning (Listed Buildings and Conservation Areas) (Scotland) Act 1997 [online] Available at: <http://www.legislation.gov.uk/ukpga/1997/9/contents> (accessed 09/02/2017)

²⁵⁴ Historic Environment Scotland (2014) Our Place in Time: The Historic Environment Strategy for Scotland [online] Available at: <http://www.gov.scot/Resource/0044/00445046.pdf> (accessed 09/02/2017)

²⁵⁵ Historic Scotland (2016) Historic Environment Scotland Policy Statement [online] Available at: <https://www.historicenvironment.scot/advice-and-support/planning-and-guidance/legislation-and-guidance/historic-environment-scotland-policy-statement/> (accessed 21/10/2016)

overarching framework for historic environment policy in Scotland. Together, they emphasise the importance of preserving recognised sites, avoiding negative impacts on them and their wider settings, and contributing to their enhancement, where appropriate, in a sustainable way. These key objectives also extend to taking into account of, and avoiding damage to or loss of, currently unknown archaeology.

9.2 Environmental Context

- 9.2.1 Scotland's diverse and distinctive landscapes are a significant part of the country's natural and cultural heritage, making an important and positive contribution to the economic, cultural and social wellbeing of the nation. There are 40 National Scenic Areas in Scotland, and over 13% of its land area has been classified as such²⁵⁶. Designations such as Local Landscape Areas, Special Landscape Areas, Regional Scenic Areas and Areas of Great Landscape Value have also been established at a regional and local level by many local authorities. These areas of important nature or landscape value have been designated locally for conservation purposes and protection from inappropriate development²⁵⁷. However, no National Scenic Areas²⁵⁸ or Local Landscape Areas²⁵⁹ have been designated near to Scotland's main airports.
- 9.2.2 While cultural heritage and historic assets are distributed widely throughout Scotland, there are clusters of sites in and around settlements and also around the coastlines. Many listed buildings and recorded historic features (e.g. recorded in the Canmore Database) have been identified not just in the vicinity of Scotland's airports, but in many cases within airport boundaries²⁶⁰. For example, Edinburgh Airport is in proximity to a number of listed buildings and scheduled monuments, such as Gogar Mains Fort and Huly Hill cairn and stone circle. Within its boundary lies the Catstane scheduled monument. Similarly, a wide range of features with historic and heritage records have been identified near to and/or within the boundaries of Scotland's other main airports including Glasgow, Glasgow Prestwick and Aberdeen, and many of its smaller airports²⁶¹.

²⁵⁶ SNH (2016) National Scenic Areas, [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/national-designations/nsa/> (accessed 09/02/2017)

²⁵⁷ SNH (2016) Local Designations, [online] Available at: <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/local-designations/> (accessed 09/02/2017)

²⁵⁸ SNHi [online] Available at: <http://www.snh.gov.uk/publications-data-and-research/snhi-information-service/map/> (09/02/2017)

²⁵⁹ SNH (2016) Local Designations [online] Available at <http://www.snh.gov.uk/protecting-scotlands-nature/protected-areas/local-designations/> (09/02/2017)

²⁶⁰ RCAHMS and Historic Scotland (2017) PastMap [online] Available at: <http://pastmap.org.uk/> (accessed 09/02/2017)

²⁶¹ RCAHMS and Historic Scotland (2017) PastMap [online] Available at: <http://pastmap.org.uk/> (accessed 09/02/2017)

- 9.2.3 Inappropriate development is a key pressure on the historic environment, landscape and cultural heritage, both directly in terms of damage to known and unknown features, and in relation to potential site and setting impacts. There are also potential impacts on coastal landscapes and the historic environment as a result of climate change.

9.3 Findings

What are the likely implication of increased passenger and flight numbers on landscape, cultural heritage, and the historic environment?

- 9.3.1 The following paragraphs set out the potential impacts that are considered likely to arise from increased activity in the aviation sector. These are considered secondary impacts and are based on the assumptions that increased passenger and flight numbers will place increased pressure on existing infrastructure. However, it is considered that any secondary impacts that arise are outwith the ability of the policy option to influence.
- 9.3.2 The preferred policy option will give rise to potential implications in two main ways; firstly, as a result of any development or infrastructure works that may be required to facilitate the assumed growth in the sector. Incremental and on-going development, such as the upgrading of roads and infrastructure projects, is a key pressure on landscape²⁶² and can lead to the loss or damage of historical assets and impact the setting of some assets²⁶³.
- 9.3.3 The SEA of the NPF3 noted that there would be the potential for negative impacts to arise from the proposed Strategic Airport Enhancements²⁶⁴. Predicted impacts included loss of and damage to cultural heritage resources, and negative effects in landscape character.
- 9.3.4 Climate change is also a key pressure and Scotland's landscapes and historic environment could be affected by changing temperatures, rainfall, weather events such as flooding and droughts, and sea-level change²⁶⁵. The impacts of the preferred policy option with regard climate change have been reported under the Climatic Factors topic.

²⁶² Scotland's Environment (2016) Landscape [online] Available at: <http://www.environment.scotland.gov.uk/get-informed/land/landscape/> (accessed 09/02/2017)

²⁶³ Scotland's Environment (2015) Historic Environment [online] available at: <http://www.environment.scotland.gov.uk/media/202524/people-and-the-environment-historic-environment.pdf> (accessed 09/02/2017)

²⁶⁴ The Scottish Government (2013) NPF3 and SPP – SEA Environmental Report [online] Available at: <http://www.gov.scot/Publications/2013/04/3435> (accessed 08/02/2017)

²⁶⁵ Scotland's Environment (2016) Landscape [online] Available at: <http://www.environment.scotland.gov.uk/get-informed/land/landscape/> (accessed 09/02/2017)

- 9.3.5 The degree to which the identified increase in passenger numbers is realised will further influence these secondary effects. For example, undertaking a differential approach to how the tax reduction is applied such as discussed in the **illustrative scenarios** could influence this.
- 9.3.6 It is considered that there would be no direct impact on passenger and flight numbers as a result of the **reasonable alternative** as this approach would lead to no reduction in the overall burden of ADT.
- 9.3.7 Another pressure that may arise is through increased visitor numbers²⁶⁶. Scotland's heritage attracts millions of visitors each year, and whilst raising awareness of Scotland's assets brings advantages both locally and nationally, increased visitors can also lead to pressures both in and around sensitive areas in which assets can be located²⁶⁷. However, it is not considered within the scope of the preferred policy option to have influence over onward journeys undertaken by passengers.

**What wider context and potential mitigation measures
should be taken into account?**

- 9.3.8 Airport masterplans consider potential development up to 2040, with acknowledgement that predicting requirements up to this stage is complex, and that there are many variables which influence passenger demand, for example economic and global events.
- 9.3.9 Masterplans continue to play an important role in stakeholder engagement in addition to their value in informing the planning process. Guidance on the preparation of airport masterplans also sets out the importance of considering heritage and landscape impacts within these plans, stating that proposals for mitigation measures across the areas where major impacts have been identified should be set out²⁶⁸.
- 9.3.10 Any future airport development, including supporting infrastructure, would be outwith the preferred policy option to influence. Additionally, any future development proposals may be required to undertake an EIA. Further project level assessment will be required establish significance.

²⁶⁶ Historic Environment Scotland (2014) Scotland's Historic Environment Audit [online] Available at: <https://www.historicenvironment.scot/media/2392/she-a-2014-main-report.pdf> (accessed 09/02/2017)

²⁶⁷ Historic Environment Scotland (2014) Scotland's Historic Environment Audit [online] Available at: <https://www.historicenvironment.scot/media/2392/she-a-2014-main-report.pdf> (accessed 09/02/2017)

²⁶⁸ Department of Transport (2004) Guidance on the Preparation of Airport Master Plans [online] Available at: <http://webarchive.nationalarchives.gov.uk/http://www.dft.gov.uk/about/strategy/whitepapers/air/pwpa/guidanceonthe-preparation-of-air-5683> (accessed 10/08/2016)

What is the likely significance of the predicted impacts?

- 9.3.11 It is considered likely that the potential impacts that could arise from infrastructure requirements will be realised at airports and their surrounding environs. The location and design of development will be important in terms of the overall setting of the airport in its landscape.
- 9.3.12 Any impact on landscape and on historical or cultural heritage assets is likely to be considered as part of the EIA/planning process. A careful approach to any works being undertaken may be required to ensure that any previously unknown archaeological assets are not damaged. This will require consideration at a local level. Any current pressures may also influence significance as these may be exacerbated through further development.
- 9.3.13 The potential impacts that have been identified as likely to arise from development requirements could be long-term, with their significance dependent on factors such as the scale and location of the proposed development. Significance will also be influenced by the degree of the predicted increase in passenger numbers likely to arise. Short-term impacts may also arise from construction activities.
- 9.3.14 Further to this, there may be implications on important landscape, cultural heritage and historic environment assets as a result of climate change. In addition to local importance, Scotland also has a number of national and international designated sites.

Box 9.1 Landscape, Cultural Heritage and the Historic Environment: Summary of key impacts and key points

IMPACTS	<ul style="list-style-type: none"> • New infrastructure requirements (which will involve construction activities) may arise as a result of increased flights and passenger numbers and this could place pressure on local cultural/historic sites and assets.
KEY POINTS	<ul style="list-style-type: none"> • Scotland's diverse and distinctive landscapes are a significant part of the country's natural and cultural heritage. • Key pressures on our landscapes, cultural heritage and historic environment include climate change and inappropriate development.

10 Material Assets

10.1 Environmental Protection Objectives

- 10.1.1 Under the topic heading of material assets, this assessment has focused primarily on the potential for effects on infrastructure associated with the preferred policy option to reduce the overall tax burden of ADT by 50% by the end of the current session of the Scottish Parliament.
- 10.1.2 While existing policies relating to infrastructure and facilities are wide-ranging, they largely share the common aim of contributing to the core planning objectives of supporting sustainable development, reducing GHG emissions, and making the best use of Scotland's resources and existing infrastructure.
- 10.1.3 There are a wealth of existing protection objectives and policy at the national and international levels relating to these broad topic areas. These include existing and forthcoming energy policy and climate change commitments, in addition to current objectives and commitments set out in relevant policies, for example the NPF3, SPP, Scotland's National Transport Strategy and Making Things Last: A Circular Economy Strategy for Scotland²⁶⁹.

10.2 Environmental Context

- 10.2.1 Scotland's main airports include Edinburgh, Glasgow, Glasgow Prestwick, Aberdeen, Inverness and Dundee, and cater to both domestic and international flights. There are also many regional airports spread across the country in locations such as Dundee, Wick/John O'Groats, Campbeltown, Islay, Tiree, Outer Hebrides, Orkney and Shetland that provide connectivity between parts of Scotland and provide lifeline air services for many routes²⁷⁰.
- 10.2.2 Scotland's main airports are generally well connected to nearby urban centres by public transport services. For example, Edinburgh Airport is connected by public transport services to/from the cities of Glasgow and Edinburgh. Glasgow Airport and Glasgow Prestwick Airport are served by public transport services to/from Glasgow city.
- 10.2.3 A UK-wide survey reported in 2014 that 81% of adults who had flown from a UK airport said that they had travelled to the airport by private transport (i.e. car, van, taxi, minicab), this proportion having fallen from 87% in 2010 and

²⁶⁹ Scottish Government (2016) Making Things Last: A Circular Economy Strategy for Scotland [online] Available at: <http://www.gov.scot/Resource/0049/00494471.pdf> (accessed 09/02/2017)

²⁷⁰ Transport Scotland (2017) Lifeline Air Services [online] Available at: <https://www.transport.gov.scot/transport-network/> (accessed 09/02/2017)

90% in 2006. The remaining 19% of trips to the airport were made using public transport²⁷¹.

- 10.2.4 Aviation activity generates considerable waste that requires disposal. This comprises waste generated on aircraft, at the terminal and from the construction of new airport infrastructure²⁷². Many airports publish key waste performance data, for example published figures show the total waste generated from Edinburgh Airport was 1,392 tonnes in 2014 and Glasgow Airport reported total waste figures of 1,925 tonnes in 2012²⁷³.

10.3 Findings

What are the likely implications of increased passenger and flight numbers on material assets?

- 10.3.1 The need for some airports to undertake development work in the medium to long-term to accommodate the growth in the sector has been identified in a number of airport masterplans. It has been assumed that the preferred policy option of a 50% reduction in the overall ADT burden has the potential to place increased pressure on existing airport and interconnecting infrastructure.
- 10.3.2 It was noted in the SEA of the proposed Strategic Airport Enhancements within NPF3 that there would be benefits for material assets through the enhancement of transport infrastructure²⁷⁴.
- 10.3.3 Construction can lead to the production of waste material, however, and any increase in passenger and flight numbers is also likely to have an influencing effect on the amount of waste produced.
- 10.3.4 The above impacts are considered as secondary effects and have been based on the assumption that increased passenger and flight numbers may lead to new or upgraded development at airports to facilitate this growth. The level of pressure exerted will be further influenced by the degree of the predicted increase in passenger numbers. For example, undertaking a

²⁷¹ Department for Transport (2014) Statistical release, Public experiences of and attitudes towards air travel: 2014 [online] Available at: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/336702/experiences-of-attitudes-towards-air-travel.pdf (accessed 10/02/2017)

²⁷² Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

²⁷³ Civil Aviation Authority (2017) Information on aviation's environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentalInformation29032017.pdf> (accessed 16/04/2017/2017)

²⁷⁴ The Scottish Government (2013) NPF3 and SPP – SEA Environmental Report [online] Available at: <http://www.gov.scot/Publications/2013/04/3435> (accessed 08/02/2017)

differential approach to how the tax reduction is applied, as discussed in the **illustrative scenarios**, could influence this.

- 10.3.5 When considering passenger and flight numbers, it is considered that the **reasonable alternative** of applying tax rate amounts that would remain the same as those currently set under UK APD represents a “like for like” approach. As such, activity in the sector would likely continue on the current predicted trajectory.

What wider context and potential mitigation measures should be taken into account?

- 10.3.6 A number of airport masterplans set out objectives that current capacity will be optimised before developing new facilities. They also note that many variables to passenger demand, for example economic and global events, make it difficult to identify specific development requirements.
- 10.3.7 Interconnecting infrastructure used by passengers and workers traveling to and from airports is a complex topic. The preferred policy option sits within the broader context of other policies and strategies that have an influencing effect on these. For example, there are a number of policies that seek to optimise use and development of sustainable modes of transport, including enhancing interconnection between major transport hubs.
- 10.3.8 A number of airports produce surface access strategies that set out alternative travel options to and from the airport²⁷⁵. Examples of measures that airports have already undertaken include investment in new or improved infrastructure to enhance traffic flow and ease congestion, encouraging the use of public transport and actively discouraging the numbers of car journeys to and from the airport²⁷⁶.
- 10.3.9 Waste is managed locally by airports, and some airlines have policies in place to help reduce the amount that is generated by encouraging the re-use and recycling of waste. Sustainable Aviation also works collaboratively to share best practice and seek ways to increase the recycling of aircraft cabin waste.
- 10.3.10 It is considered that it would be outwith the scope of the preferred policy option to influence waste management at individual airports, in addition to the development of any supporting infrastructure within and beyond airport boundaries.

²⁷⁵ Civil Aviation Authority (2017) Information on aviation’s environmental impact [online] Available at: <http://publicapps.caa.co.uk/docs/33/CAP1524EnvironmentallInformation29032017.pdf> (accessed 16/04/2017/2017)

²⁷⁶ *ibid*

What is the likely significance of the predicted impacts?

10.3.11 At this stage of the SEA process it is difficult to predict with any degree of certainty the extent and significance of the identified impacts on infrastructure that may arise as a result of a 50% reduction in the overall ADT burden. However, it is considered likely that the impacts that could potentially arise from infrastructure requirements will be realised at airports and their surrounding environments.

10.3.12 The significance of these identified impacts will be dependent on factors such as the scale and location of any proposed development and operational activities at individual airports. Additionally, significance will also be influenced by the extent to which the anticipated increase in passenger numbers is realised. Potential impacts are likely to range from long-term in nature, through operational requirements leading to development, to short-term, for example from construction activities.

Box 10.1 Material Assets: Summary of key impacts and key points

IMPACTS	<ul style="list-style-type: none"> Increased pressure on existing infrastructure from changes in flight numbers, patterns and passenger numbers has been identified. Airport accessibility may be improved through increased connectivity of associated infrastructure and more frequent and diverse flight routes. Increased passenger and flight numbers may have an impact on the amount of waste generated.
KEY POINTS	<ul style="list-style-type: none"> In 2014, 81% of passengers departing or arriving in a UK airport travelled to or from the airport by private transport. This proportion has fallen over the last nine years. Surface access strategies are produced and published by a number of airports. These set out ways to improve access to the airport. Examples of proposed measures include the encouragement of the use of public transport. Aviation generates considerable waste, comprising that generated in the aircraft cabin, at the terminal and from construction activities, such as new airport infrastructure. Most airports and airlines publish data regarding waste management approach and performance.

11 Summary of findings

11.1 Introduction

- 11.1.1 The following sections summarise the assessment findings of the preferred policy option of a 50% reduction in the overall tax burden of ADT by the end of the current session of the Scottish Parliament. Additionally, consideration was given to a number of **illustrative scenarios** that could be adopted to potentially deliver the 50% reduction in the overall tax burden set out in the preferred policy option. The findings have been set out under the headings of national and local implications, reflecting the assessment approach that was undertaken to consider the potential for environmental impacts to occur at differing geographical scales.
- 11.1.2 The assessment also considered a **reasonable alternative** to the preferred policy option. A summary of the findings of this assessment work has also been included below.
- 11.1.3 The detailed assessment, and the evidence used to inform the following paragraphs, are located in Sections 3 to 10 of Part Two of this Environmental Report.

11.2 Summary of findings: National Impacts

- 11.2.1 The 2017 research has estimated that the introduction of a 50% reduction in ADT (proportionally equally across all flight types) could lead to increased emissions of between 0.087 MtCO₂e and 0.101 MtCO₂e in the year of introduction (assumed to be 2018), relative to where they would be in the absence of the policy²⁷⁷. This is an increase greater than the estimated figures of between 0.05 MtCO₂e and 0.06 MtCO₂e set out in the 2014 research²⁷⁸. Furthermore, the 2017 research estimates that, assuming the growth in baseline passenger numbers used in the research continues, by 2021 the carbon emissions will increase by between 0.090 MtCO₂e and 0.105 MtCO₂e²⁷⁹. Aviation currently accounts for less than 4% of total Scottish emissions. The increase in aviation emissions forecast as a result of the 50% reduction in Air Departure Tax is estimated to represent less than 0.3% of the Scottish total²⁸⁰.

²⁷⁷ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

²⁷⁸ Transport Scotland (2014) Estimate of the Impact on Emissions of a Reduction in Air Passenger Duty in Scotland [online] Available at: <https://www.transport.gov.scot/publication/estimate-of-the-impact-on-emissions-of-a-reduction-in-air-passenger-duty-in-scotland/> (accessed 04/04/2017)

²⁷⁹ Transport Scotland (2017) Estimate of the Impact on Emissions of a Reduction in air Departure Tax in Scotland (2017 update) [online] Available at: <https://www.transport.gov.scot/air-dep-tax/emissions> (accessed 06/06/2017)

²⁸⁰ *ibid*

- 11.2.2 Carbon envelopes (or budgets) were developed for each sector as part of the Climate Change Plan to help set out an optimal pathway to meeting Scotland's statutory climate change targets. In 2021, an envelope of 12.2 MtCO₂e for the transport sector was set out. The emissions predicted to arise from the aviation sector in 2021 from the implementation of the preferred policy option of a 50% reduction in the overall ADT burden by the end of the current session of the Scottish Parliament represents approximately 16% of the envelope target.
- 11.2.3 It is acknowledged in this SEA that there are a number of ways in which a 50% reduction in the overall ADT burden could be delivered. The tax charged across all flight types could be reduced proportionally by 50%. Alternatively, a zero tax charge could be applied to all short-haul flights whilst maintaining the tax charged on long-haul flights at current UK APD levels, or vice versa. The impacts of this in terms of passenger numbers will likely differ. For example, applying a zero tax rate amount to only short-haul flights has the potential to lead to higher passenger numbers than compared to either reducing both short and long-haul flights by an equal proportion or by applying a zero tax rate amount to only long-haul flights. This view has been based on the current understanding of price elasticity on passenger demand and there being fewer long-haul flights operating from Scottish airports, and therefore fewer passengers.
- 11.2.4 It is also noted that there are a number of variables that are likely to influence the GHG emissions arising from increased aviation activity which are outwith the scope of this SEA to consider. These include:
- the potential start-up of new flight routes and/or destinations;
 - the extent to which any shift in modes of transport arises;
 - the effect that certain aviation emissions have at atmosphere, known as the multiplier effect, as the impact of this effect is uncertain; and,
 - the impact on Scottish emissions from technological developments and the development of a global measures to reduce emissions from the sector.
- 11.2.5 Significant progress has been made by the industry in establishing technology goals for reducing aircraft GHG emissions on a per-flight basis, and efficiency is expected to improve continuously through to 2050 and beyond²⁸¹. However, it is also projected that GHG emissions will continue to grow in line with demand if greater improvements are not made.
- 11.2.6 There are also a wide range of relevant plans, programmes and strategies within which the preferred policy option will sit if implemented. These include those that set out long-term visions and ambitions for development and

²⁸¹ ICAO (undated) Environmental Protection Alternative Fuels [online] Available at: <http://www.icao.int/environmental-protection/Pages/AlternativeFuels-QuestionsAnswers.aspx> (accessed 06/02/2017)

investment in Scotland to create a more cohesive and resilient economy that improves opportunities for business and the people of Scotland. Further key context is the current ambitions and objectives of the Scottish Government with regard to climate change which are set through a range of policies and proposals.

- 11.2.7 The UNFCCC Paris Climate Agreement also adds new momentum to global action to meet the challenges of climate change. The Scottish Government has committed to keeping Scotland at the forefront of global climate action by responding to the UNFCCC Paris Agreement with a Climate Change Bill setting new, evidence-based, statutory emission reduction targets.
- 11.2.8 In light of the ambitious climate change targets, managing the environmental implications that are considered likely to arise from the introduction of the preferred policy option is likely to present some challenges. It is considered that a 50% reduction in the overall tax burden of ADT by the end of the current session of the Scottish Parliament will lead to short-term increases in GHG emissions relative to where they would otherwise be, even with efficiency measures in place. If the preferred policy option were to be reached through a pathway of applying a zero tax rate amount only to short-haul flights, there is the potential that this could lead to higher passenger numbers than reducing both short and long-haul flights by an equal proportion. In turn, this could have an influencing effect on overall GHG emissions.
- 11.2.9 In the medium to long-term it is more challenging to predict the magnitude of future increases in GHG emissions. Projecting an emissions profile beyond the short-term is complex and based on a number of key drivers. Technological developments and the aspirational goals as agreed by the aviation industry, alongside the development of global mitigation measures, will play a key role in the wider mitigation of emissions. However, the future implementation of global mitigation measures, and the exact form these will take, is uncertain in light of wider political changes.
- 11.2.10 A number of uncertainties also exist that could influence significance, such as the creation of new routes, the multiplier effect and price differentials, and it has not been possible to consider these in this SEA.
- 11.2.11 National level implications were also noted for a range of environmental receptors, such as biodiversity, flora and fauna, soil and water, linked to the effects of climate change exacerbated through increased air traffic movements in Scotland.

11.3 Summary of findings: Local Impacts

- 11.3.1 In undertaking this SEA, it has been assumed the introduction of the preferred policy option will lead to increased passenger and flight numbers, both of which will place increased pressure on existing airport and interconnecting infrastructure. The degree of pressure experienced will also

be influenced by the extent to which the expected increase in passenger numbers are realised.

- 11.3.2 Currently some airport masterplans set out a primary objective of the optimal use of existing infrastructure before developing more facilities. However, they also note that in the medium to long-term it is likely that increased pressure on infrastructure through passenger growth will potentially lead to some airports undertaking development. The development of any new infrastructure can have a range of environmental impacts, for example potential impacts on soil, water, cultural heritage and biodiversity. Some of the identified impacts could be long-term in nature, for example soil sealing and loss of habitat, whilst others may be short-term, such as those likely to arise from construction activities. There is also the potential for benefits to arise for material assets through the provision of new airport and interconnecting infrastructure.
- 11.3.3 The preferred policy option sits within the broader context of growth in a range of sectors which all have the potential to influence local air quality. It is considered likely, however, that even in light of operational improvements, the predicted growth in the aviation sector could contribute to pressures experienced at a local level through increased flights and surface traffic to and from airports. A number of areas are currently designated as having air quality issues and increased pressure from any activity that contributes to air pollution could exacerbate existing problems.
- 11.3.4 Whilst the potential for a modal shift to arise remains a relevant consideration, the assessment cannot predict to an acceptable level the impact on emissions should this take place. Road traffic movement is a complex issue and there are a number of factors outwith the aviation sector that also influence modal shift.
- 11.3.5 Aircraft noise, and exposure to this, is likely to remain a key concern to those affected. Any increase in flight numbers or changes to flight patterns will continue to present a challenge in terms of how the industry can maintain growth whilst addressing concerns regarding noise implications. A number of airports produce noise maps and technological advances, and operational improvements continue to be developed that seek to reduce noise generated by aircraft.
- 11.3.6 The impacts identified as likely to arise at a local level are considered secondary impacts. Factors such as the ability of individual airport capacity to facilitate the predicted growth are relevant considerations and it is noted that these secondary impacts would be outwith the preferred policy option to influence.
- 11.3.7 The identified impacts have the potential to be long-term in nature, for example from development and operational activity, in addition to short-term such as those likely to arise from construction activities. Their significance will be dependent on factors such as current operational activities and

mitigation applied at individual airports, the scale and location of proposed development, the extent of the increase in passenger numbers and the current state of the environment identified as likely to be affected.

11.4 Summary of findings: Reasonable alternative

- 11.4.1 A reasonable alternative to the preferred policy option is that no reduction in the overall tax burden of ADT is applied. It is considered that this represents a “like for like” approach, as the tax rate amounts would remain the same as those currently set under UK APD. Under this approach there would be no reduction in the tax burden and, as such, it is considered that there would be no additional impact on passenger and flight numbers. Activity in the sector would likely continue on the current trajectory predicted.
- 11.4.2 Research has concluded that the preferred policy option could result in an increase in GHG emissions, relative to where they would otherwise be. As it is considered that the reasonable alternative will not have an impact on passenger and flight numbers it would therefore be reasonable to assume that no additional impact on GHG emissions beyond that currently projected would occur.
- 11.4.3 A number of secondary effects that arise from activity in the aviation sector have been identified throughout this assessment, for example noise exposure and impacts on air quality and biodiversity, flora and fauna. It is considered that, under the reasonable alternative policy approach, these pressures would likely remain consistent with current levels of industry activity.
- 11.4.4 It is a requirement of the 2005 Act that consideration is also given to the evolution of the baseline in the absence of the plan, programme or strategy. Many of the trends identified in the environmental baseline are considered likely to continue on the current trajectory in the absence of the preferred policy option. As such, and for the purposes of this assessment, it is viewed that the assessment findings of the impacts likely to arise from the reasonable alternative can also be considered to apply to the evolution of the baseline in the absence of the policy.

12 Proposals for Monitoring

- 12.1.1 The requirement for reporting of GHG emissions and Scotland's performance against established emissions reduction targets is set out in the 2009 Act. The publication of the annual Official Statistics release "Scottish Greenhouse Gas Emissions"²⁸² fulfils this requirement by detailing emissions levels for a range of gases, including CO₂ and methane. The publication also provides information on whether or not the statutory annual targets have been met.
- 12.1.2 Scotland's emissions are adjusted to take into account trading in the EU ETS for the purpose of reporting progress towards statutory targets as outlined within the 2009 Act. The EU ETS is an EU policy aimed at mitigating climate change by limiting GHG emissions from large point source emitters (primarily electricity generation and energy-intensive industries) and in aviation. Under accounting rules of the 2009 Act, the contribution of those sectors to the annual targets is determined by the Scottish share of emissions allowances in the EU ETS, rather than the actual level of emissions.
- 12.1.3 Since 2012, CO₂ emissions from domestic and international aviation have been included within the scope of the EU ETS. As the emissions are attributed to the country where the airline operator is registered, the aviation emissions attributable to Scotland is estimated directly from the Scottish greenhouse gas inventory and compared to the EU ETS cap for aviation²⁸³.
- 12.1.4 Once implemented, the CORSIA will require all airlines to monitor emissions on all international routes²⁸⁴. All EU countries will join the scheme from the start.
- 12.1.5 In March 2017, the Committee on Climate Change provided advice to the Scottish Government on the new Scottish Climate Change Bill²⁸⁵. Advice was provided on a range of issues and included a recommendation that the overall accounting framework shift to one based on actual emissions, rather than adjusting for activity as currently undertaken for purposes of the EU ETS. It was further recommended that Scotland's shares of international aviation emissions should continue to be included within Scottish targets. This recommendation will be considered alongside others provided as work in developing the draft Climate Change Bill progresses.

²⁸² Scottish Government (2016) Scottish Greenhouse Gas Emissions 2014 [online] Available at: <https://beta.gov.scot/publications/scottish-greenhouse-gas-emissions-2014/> (accessed 08/05/2017)

²⁸³ *ibid*

²⁸⁴ European Commission (2017) Reducing emissions from aviation [online] Available at: https://ec.europa.eu/clima/policies/transport/aviation_en (accessed 08/05/2017)

²⁸⁵ Committee on Climate Change (2017) Advice on the new Scottish Climate Change Bill [online] Available at: <https://www.theccc.org.uk/publication/advice-on-the-new-scottish-climate-change-bill/> (accessed 22/03/2017)

- 12.1.6 The draft Climate Change Plan: the draft Third Report on Policies and Proposals 2017-2032²⁸⁶ sets out proposals for a monitoring framework. The framework builds on the approaches to assess the previous reports on policy and proposals and on the method applied by the Committee on Climate Change to monitor progress against the UK carbon budgets. Work is expected to continue to progress on this and it is intended that an update will be published alongside the final version of the Climate Change Plan.
- 12.1.7 Beyond the monitoring of GHG emissions, and given the known spatial location of Scotland's airports, monitoring at the local and project levels will be an important consideration. A wide range of environmental monitoring programmes are currently in place and are relevant to the potential local level impacts identified. This includes the monitoring of designated sites that have been identified as being located in near proximity to airports and transport routes. For example, Black Cart SPA and SSSI and Inner Moray Firth SPA and SAC.
- 12.1.8 Glasgow, Edinburgh and Aberdeen airports have noise maps produced by the CAA²⁸⁷. Noise maps are updated every five years as required by the EU Directive.
- 12.1.9 Air quality monitoring is currently undertaken locally at 95 sites across Scotland²⁸⁸. The monitoring of air quality largely targets emissions emitted from road transport, and monitoring sites include those that are located along important transport links to and from some airports.
- 12.1.10 Consideration is also likely to be given to the monitoring of noise and air quality when undertaking future airport expansion and infrastructure works. For example, the development of civil and building works (e.g. roads, rail lines and other associated infrastructure) typically involve the development of site-specific monitoring programmes - either through project-level assessment process (e.g. EIA) and/or set out as a condition of planning permission. This can include an appropriate programme of background monitoring prior to activities commencing on site, and monitoring during the construction, operation and decommissioning periods.

²⁸⁶ Scottish Government (2017) Draft Climate Change Plan: the Third Report on Policies and Proposals 2017-2032 [online] Available at: <http://www.gov.scot/Publications/2017/01/2768/downloads> (accessed 22/03/2017)

²⁸⁷ Scotland's Environment (2016) Noise mapping [online] Available at: <https://noise.environment.gov.scot/frequently-asked-questions.html> (accessed 08/05/2017)

²⁸⁸ Air Quality in Scotland (undated) Monitoring site summary [online] Available at: <http://www.scottishairquality.co.uk/latest/summary> (accessed 08/05/2017)

13 Conclusions

- 13.1.1 In light of the ambitious climate change targets, managing the environmental effects that are considered likely to arise from the preferred policy option are likely to present some challenges. The proposal to introduce an overall 50% reduction in ADT is likely to lead to short-term increases in GHG emissions, relative to where they would be in the absence of the policy, even with efficiency measures in place. Medium to long-term, it is more challenging to predict the implications of any increase in emissions and the magnitude of these.
- 13.1.2 A number of secondary impacts were noted, and included increased pressure on local air quality and potential changes to noise exposure. This has the potential to lead to negative impacts on population and human health. Aircraft noise, through changes in flight numbers and patterns, is likely to remain a key challenge in terms of how the industry can maintain growth whilst addressing concerns on this. Increased pressure on existing infrastructure, and the potential development of new infrastructure to facilitate growth in the industry, is also considered likely to arise and this could lead to a number of environmental impacts. National level implications for a range of environmental receptors, from the effects of climate change being exacerbated through increased aviation activity, were also noted.
- 13.1.3 The magnitude of the identified impacts will be dependent on a number of factors, such as operational activities, technological developments, current and future mitigation, including that applied at individual airports, and the scale and location of any proposed development. The extent of any increase in passenger numbers will also influence significance, and this is likely to differ depending on how the 50% reduction in the overall tax burden is delivered.

13.2 Mitigation and Recommendations

- 13.2.1 A key part of the SEA process is the identification of mitigation for adverse effects and opportunities to enhance benefits. As noted early in the assessment process, the potential environmental effects likely to arise from the preferred policy option will impact at differing geographical scales. Some will be trans-boundary and experienced over a larger geographical envelope, whilst other environmental impacts are likely to be realised at a more local level.
- 13.2.2 There are limitations to the mitigation that can be proposed, because much of this is outwith the scope of the preferred policy option to influence. Mitigation is likely to be best placed and most effective when implemented in a way that reflects these differing geographical scales. For example, international and global mitigation measures to address the impacts of emissions, or within lower tier of plans, programmes and strategies that set

out action to meet any challenging new climate change target. Furthermore, local level consideration is likely to be given at project level to any future infrastructure requirements, for example through an EIA.

- 13.2.3 Throughout this assessment, current and future mitigation measures have been discussed when considering the impacts identified as likely to arise within each SEA topic area. These include the agreement reached on the CORSIA at the ICAO Assembly in October 2016. Whilst the future of mitigation measures such as these and the EU ETS is uncertain, they are likely to remain key considerations to addressing global emissions.
- 13.2.4 Continued and future action with regards to climate change, set through a range of Scottish Government policies, proposals and strategies is also supported. This has the potential to include new and more testing targets through the current development of a new Scottish Climate Change Bill, alongside a possible shift in the overall accounting framework to one based on actual emissions.
- 13.2.5 Technical and operational improvements within the aviation industry to reduce GHG emissions, alongside the collaborative effects and aspirational goals agreed within industry on climate change action, are also supported. Significant improvements have been made to date and continued progress will be necessary to continue to improve efficiencies within the industry.
- 13.2.6 The SEA notes and supports the commitment given by the Scottish Government²⁸⁹ to undertake further assessment work on the potential implications for noise levels that may arise through changes in air traffic movements across Scotland.
- 13.2.7 Airport masterplans will continue to play a key role in stakeholder engagement, providing a mechanism for airport operators to explain how they propose to take forward this strategic framework in the form of airport-specific proposals. Action taken within the industry to establish and maintain effective community engagement as airports continue to expand is supported and encouraged at all times where possible.

²⁸⁹ Scottish Government response to the Scottish Parliament Finance and Constitution Committee's Stage 1 report on the Air Departure Tax (Scotland) Bill [Online] Available at: http://www.parliament.scot/S5_Finance/General%20Documents/Letter_to_Convener_-_ADT_-_21_April_2017.pdf (accessed 08/06/2017)

14 Programme of works and next steps

14.1.1 Public views and comments are invited on both the consultation on this Environmental Report, and the consultation on the Scottish Government's [policy plan for a 50% reduction in the overall burden of ADT](#) by the end of the current session of the Scottish Parliament.

14.2 How to respond

14.2.1 Responses to both consultations must be made by **Friday 15 September 2017**. You can respond online, by email or by post. Details on how to submit responses has been set out in the introductory '[How to respond](#)' section of this document.

14.3 Suggested questions to help frame responses

14.3.1 Respondents may find the following first four questions helpful to provide a focus for their responses on this Environmental Report. Please note that responses do not need to be confined to these questions, and more general comments on this Environmental Report are welcomed in question 5.

Questions:

1. What are your views on the evidence set out in the Environmental Report that has been used to inform the assessment process? (Please give details of additional relevant sources).
2. What are your views on the predicted environmental effects as set out in the Environmental Report?
3. Are there any other effects that have not been considered?
4. Do you agree with the conclusions and recommendations set out in the Environmental Report?
5. Please provide any other comments you have on the Environmental Report.

14.4 Next Steps

14.4.1 Responses received during this consultation will be analysed and used as part of the decision-making process, along with a range of other available information and evidence. We will publish a report of this analysis.

14.4.2 Thereafter, the next stage in the SEA process is the production of a post-adoption SEA Statement. The post-adoption Statement will reflect on the findings of the assessment and consultation, and will explain how the issues raised have been considered and addressed in the preparation of the secondary legislation setting out tax bands and tax rate amounts for ADT that will be laid before the Scottish Parliament in the autumn.

Appendix A: Glossary

ADT	Air Departure Tax
APD	Air Passenger Duty
AQMA	Air Quality Management Area
ATAG	Air Transport Action Group
CAA	Civil Aviation Authority
UK CCRA	UK Climate Change Risk Assessment
CO ₂	Carbon dioxide
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
EC	European Commission
EEA	European Economic Area
EIA	Environmental Impact Assessment
ETS	Emissions Trading System
EU	European Union
GHG	Greenhouse Gas(es)
GMBM	Global market-based measure
HES	Historic Environment Scotland
ICAO	International Civil Aviation Organization
Mt	Million tonnes
MtCO _{2e}	Million tonnes carbon dioxide equivalent
NPF3	National Planning Framework 3
PM	Particulate Matter
RPP	Low Carbon Scotland: Meeting our Emissions Reduction Targets 2010 – 2022 : The Report of Policies and Proposals
RPP2	Low Carbon Scotland: Meeting our Emissions Reduction Targets 2013 – 2027: The Second Report of Policies and Proposals
SAC	Special Area of Conservation
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SIMD	Scottish Index of Multiple Deprivation
SNH	Scottish Natural Heritage
SPA	Special Protection Area
SPP	Scottish Planning Policy

SSSI	Site of Special Scientific Interest
The 2005 Act	Environmental Assessment (Scotland) Act 2005
The 2009 Act	Climate Change (Scotland) Act 2009
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change

Appendix B: Sources of information used

Aberdeen International Airport	International Civil Aviation Organisation
Airports Commission	Intergovernmental Panel on Climate Change
Aviation Environment Federation	Scottish Index of Multiple Deprivation
Air Transport Action Group	Scottish Environment Protection Agency
Biodiversity Scotland	Scottish Government
Carbon Brief	Scottish Natural Heritage
Civil Aviation Authority	Single European Sky ATM Research
Committee on Climate Change	Soil Association
Department for Transport	Stockholm Environment Institute
Energy and Climate Intelligence Unit	Sustainable Aviation
Edinburgh International Airport	Transport Scotland
European Commission	United Nations
Eurocontrol	UK Government
Glasgow International Airport	Visit Scotland
Historic Environment Scotland	



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