SaxaVord Spaceport Assessment of Environmental Effects Public Consultation Responses

The SaxaVord Assessment of Environmental Effects (AEE) version 2.1 dated 30/09/2022 has been publicised and consulted upon in accordance with the Civil Aviation Authority's (CAA's) guidance on the public consultation of AEEs (CAP2352). This summarises the consultation responses received and how the CAA has taken them into account and ensured any relevant matters have been appropriately addressed in the AEE or the Licence.

The AEE was advertised and made available to view online on the CAA Citizen's Space website: https://consultations.caa.co.uk/corporate-communications/public-consultation-aee-saxavord/. The consultation opened on the 10/11/2022 and closed on the 08/12/2022.

The AEE was updated (V3) on 30/06/2023 in response to requests for further information (RFIs) during the detailed review. A minor update was made to the document, and this was re-submitted to the CAA on 01/08/2023. Note, as the update was minor, the date and version number did not change within the document. AEE (V3) was not published on the website and re-consulted upon as it was determined that updates to the AEE were minimal and did not materially change overall conclusions, and no further consultation was needed.

Summary of responses

We received a total of 13 consultation responses. Ten of those were individual respondents representing their own views. Three of the comments were from individuals responding on behalf of an organisation to give its views. None of these were public bodies, regulators, or environmental organisations.

In this consultation, we considered comments which were relevant to the environmental effects from the specific licence proposals which the AEE is based on. This included matters such as:

- the potential environmental effects identified on the environmental topics assessed and the assessment of those effects
- whether any proposed mitigation measures for significant effects are appropriate or, if missing, where mitigation may be required
- any potential gaps, improvements or corrections to the AEE

Safety, national security, national interest and other matters are dealt with separately by the CAA in the licensing process in accordance with the relevant requirements of the Space Industry Act 2018 and its Regulations.

As part of the consultation, we sought views to the following question:

- Has the applicant identified the potential environmental effects of their intended activities, assessed the significance of those effects and shown how any significant effects can be mitigated? If proposed mitigation methods are not considered appropriate, where may further mitigation be required?

A summary of the key matters raised by respondents to the consultation and how they have been addressed in the AEE or the licence (where relevant) is provided below. The information in the right-hand column is based on the AEE itself, and additional information obtained from the applicants in response to matters raised during the consultations or in RFI responses.

Summary of matters raised	Summary of how the matter has been addressed in the AEE and/or licence
Considered all possible environmental impacts A few of the respondents considered that the SaxaVord AEE is thorough, covers all the possible environmental effects and that the appropriate mitigation measures have been proposed to be put in place.	We have noted this consultation response, and no further action is required.
Harmful impact to wildlife which will impact tourism A respondent objects to the development on the grounds that SaxaVord Spaceport will harm wildlife, including in the sea and birdlife and this will have impacts on tourism. They added that the extent that this will impact tourism hasn't been accounted for.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to cover the operational phases of the proposed operations. The construction phases and development of the Spaceport are not required to be covered by the AEE. The environmental effects of these activities would be assessed during the planning permissions stage. SaxaVord received planning permission from Shetland Islands Council on 30/03/2022 and therefore the development is consented to continue, outside of the CAA's licensing process for the operation of the Spaceport. The effects of the proposed SaxaVord Spaceport operations on wildlife (ornithology, terrestrial ecology and marine animals) have been assessed and are reported in Chapters 5, 6 and 10 of the AEE respectively. For birds (see Table 16.2) there are no significant effects for all bird species assessed after mitigation has been implemented. Mitigation includes the implementation of a Breeding Bird Protection Plan (BBPP) and Habitat Management Plan (HMP) (see paragraph 5.12.4 of the AEE for further details). Appendix 1.3 of the AEE details planning condition 15, set out by Shetland Islands Council, which states that no launches or static tests are to be carried out between mid-May and the end of June. This is to avoid disturbing birds during the critical incubation and early brooding period. Additionally, planning condition 9 sets out the requirement to develop a detailed HMP.

	There are no significant effects on habitats during the operation of the Spaceport. Overall, for terrestrial ecology there are no likely significant effects identified during the operation of the Spaceport (see Table 16.2). Terrestrial ecology was assessed by Shetland Islands Council and the relevant statutory consultees (including NatureScot and Scottish Environment Protection Agency (SEPA)) during the planning application stage of the Proposed Project. The Proposed Project is found to be suitable with the development plans and mitigation measures (the development of an HMP) outlined within the planning application (planning condition 9) and referenced in the AEE. For marine ecology, the potential effect of spaceport operations on water quality, biodiversity, and human activities have been assessed as having no likely significant effects to marine life (see Table 16.1 and Section 10.10 of the AEE for further details). Chapter 4 of the AEE states there will be a beneficial effect on tourism from operation of the Spaceport (see Table 16.1 and Section 4.9), attracting tourists who will visit to watch launches and/or explore the Spaceport (including outside the current summer tourism season). Appendix 1.3 of the AEE details planning condition 22, set out by Shetland Islands Council, which requires the development of a Visitor and Spectator Management Plan (VSMP). This will manage visitors and spectators to minimise impacts on wildlife with particular consideration of environmentally sensitive areas.
<u>How will the Spaceport mitigate habitat loss and noise pollution</u> Concerns raised on how SaxaVord will mitigate habitat loss, noise pollution and its knock-on effects.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases

	are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. Habitat loss from the operational activities at the Spaceport is considered within Chapter 6 of the AEE. The AEE concludes that there will be no significant effects on the habitats identified within the study area as no impacts on habitats during the operation of the Spaceport were identified. Habitat loss was assessed by Shetland Islands Council and the relevant statutory consultees (including NatureScot and the SEPA) during the planning application stage of the Spaceport and the Spaceport was found to be suitable with the development plans and mitigation measures outlined within the planning permission and referenced in the AEE. As the AEE is concerned with the operational phase of the Proposed Project only, it is considered that the significant effects arising from the development and presence of the Spaceport have been appropriately dealt with through the planning process and subsequent planning conditions. The potential impacts of noise and vibration from the operation of the Spaceport (including launches) are considered in Chapter 8 of the AEE. The AEE concludes that there will be no significant noise effects during the daytime. In regard to night-time launches, of the proposed 30 launches per year, when taking into account the no-launch window agreed between mid-May to the end of June, in any one month there may be three or four launches. Given the proposed frequency of launches and the short duration of the noise events associated with launches adverse effects associated with sleep disturbance due to night-time launches are considered to be minimal, resulting in no likely significant effect (paragraph 4.3.9).
<u>Appropriate consideration of impacts on nesting birds</u> A respondent states that SaxaVord has consulted with various bodies on impacts to nesting birds and have made the necessary adjustments to satisfy all.	We have noted this consultation response, and no further action is required.

Supportive of the proposals A few of the respondents expressed their support in the proposals and how SaxaVord are leading the way in a responsible manner.	We have noted this consultation response, and no further action is required.
Impact on otters One respondent considers that whilst reference has been made to some of the bird life, limited consideration has been made to the impacts to other animals including otters. They raised concerns that otters use a waterway under a road in Haroldswick and that the Sustainability Officer would be informed to set up cameras to check their activity. However, it now looks as if the drain is blocked off.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed activities. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. The concerns regarding otters and use of a waterway under a road in Haroldswick relate to the construction phase of SaxaVord Spaceport and therefore out of scope of the AEE. The effects of operation of the Spaceport on the local otter population are considered in Chapter 6 of the AEE. Relevant otter surveys are reported in Appendix 6.3 and considered throughout Chapter 6. The AEE reports that no significant effects on otters are anticipated as a result of the operation of the Spaceport and no further mitigation was required (paragraph 6.8.39). As an enhancement measure, a Habitats Management Plan (HMP) has been developed and includes the creation of artificial otter holts (paragraph 6.8.37).
Increased noise from construction traffic Concerns raised that there will be increased noise not only from the proposed launches but also from construction traffic, which affects both humans and wildlife.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. The concerns regarding noise from construction traffic relate to the construction phase of SaxaVord Spaceport and therefore out of scope of the AEE.

	The potential impacts of noise and vibration from the operation of the Spaceport (including launches) are considered in Chapter 8 of the AEE. The AEE concludes that there will be no significant noise effects during the daytime. In regard to night-time launches, of the proposed 30 launches per year, when taking into account the no-launch window agreed between mid-May to the end of June, in any one month there may be three or four launches. Given the proposed frequency of launches and the short duration of the noise events associated with launches adverse effects associated with sleep disturbance due to night-time launches are considered to be minimal, resulting in no likely significant effect (paragraph 4.3.9).
Noise from dumping of debris Concerns that the dumping of launch debris into the ocean will create noise impacts which will cause danger to marine wildlife, particularly whales and dolphins. The resultant pollution from the debris will also have a detrimental impact on the marine environment.	Acoustic disturbance (including underwater noise) from the impact of jettisoned objects hitting the sea surface is considered in Chapter 10 of the AEE. No likely significant effects are anticipated in relation to acoustic disturbance from the impact of jettisoned objects hitting the sea surface (see paragraphs 10.10.50 to 10.10.59). Effects on water quality, sediment quality and ecological receptors are also considered in the same chapter, with associated risk assessments presented in Appendices 10.3 and 10.4. No likely significant effects on water quality, sediment quality and ecological receptors (including ingestion of plastic, breakdown of carbon composite, and toxic contamination from metals) are anticipated from operation of the Spaceport (see paragraphs 10.10.22 to 10.10.32).
Impacts to land environment Concerns raised of peat removal, increased risk of flooding to the site, suggested improvements to roads also leading to increased flooding.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. The concerns regarding peat removal, flood risk and improvements to roads relate to the construction phase of SaxaVord Spaceport and therefore out of scope of the AEE.

Destroying the peace and beauty of the area Concerns that the development will destroy the peace and beauty and when the animals are no longer there, the noise and environment will be like an urban area.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. The planning application for SaxaVord Spaceport was lodged with Shetlands Islands Council in January 2021 and planning permission granted on 30 March 2022 (planning reference number 2021/005/PPF). These issues have been assessed by Shetland Islands Council and relevant statutory consultees during the planning application stage. This will be managed through planning conditions agreed with Shetland Islands Council. The Spaceport will have a maximum of 30 launch events per year (a maximum of 4 times per month). Appendix 1.3 of the AEE details planning condition 15, set out by Shetland Islands Council, which states that no launches or static tests are to be carried out between mid-May and the end of June. This is to avoid disturbing birds during the critical incubation and early brooding period. These measures will limit the number and time of year noise from launches will be generated over the lifetime of the project. Chapter 8 of the AEE, paragraph 8.10.1, concludes that there will be no likely significant effects on noise sensitive receptors during operation of the Spaceport.
Fuel being used One respondent wanted to know what fuel is being used, whether it was hydrogen (H_2) and oxygen (O_2), or hydrocarbon fuelled?	Chapter 10 of the AEE, Table 10.9 sets out representative launch vehicle (RepLV) parameters for orbital launch vehicles. This assumes that the propellants used are liquid hydrocarbon (for example RP-1 which is a highly refined form of kerosene) and liquid oxygen (LOX).
Debris outcome	SaxaVord state in paragraph 3.9.20 that for the purposes of the AEE, it has been assumed that there is no recovery of orbital and sub-orbital launch vehicle components. However, SaxaVord notes that all launches affecting

One respondent raised concerns over the debris and whether recovery or recycling was an option, or will it be burned up on re-entry or is 'end of life' not being considered.	Icelandic waters will need to consider the requirements set out in the Memorandum of Understanding (MoU) between the Government of Iceland and the UK Government in relation to debris recovery. Individual launch vehicle operators will confirm whether launch vehicles will be recovered or not as part of those AEEs for launch operator licence applications.
<u>Prevention of wildfires</u> Concerns raised on how the applicant will prevent and mitigate wildfires, particularly as there is peat present in some areas.	Chapter 15 of the AEE considers the environmental effects of accidents and disasters scenarios associated with operation of the Spaceport. Paragraph 15.7.23 states that any "resulting deflagration following ignition of propellant during a launch failure would create a short-lived initial fireball potentially extending several tens of metres from the launch pad, with the residual propellant rapidly burning off over several minutes". It is expected that the risk of ignition of peat will be low following a rocket propellant deflagration. The launch pads all have concrete bases and peat substrate close to the launch pads has been removed for use in off-spaceport peatland improvement projects.

<u>Concerns raised in relation to fuel storage, nesting birds and ambulance access/emergency helicopter transport at Baltasound Airport</u> • Concerns that fuel stored at the Baltasound airstrip is close to occupied dwellings and that transport of fuel across the island to the launch site on narrow roads is concerning. • Concerns that nesting birds (Terns, Ringed Plovers, Curlew, Oystercatcher, Gulls etc) around the airstrip will be disrupted. Protected birds will also be disrupted by increased volume and noise of traffic, flashing, constant lights on the strip, proposed lengthening of the strip is likely to exacerbate these issues. • Concerns that there is the risk of potential delays to ambulance access / emergency helicopter transport, which is required to part of the strip near the council yard, due to padlocked gates. Furthermore, the presence of padlock and barbed wire is not community spirited.	The concerns raised in relation to fuel storage, nesting birds, ambulance access/emergency helicopter transport are in reference to Baltasound Airport, not SaxaVord Spaceport, and as such is not applicable to the AEE.
<u>Unsafe and impractical roads</u> Concerns raised that the improvements to the roads do not seem accurate. Two large vehicles have gone off the roads as they remain too narrow to accommodate large vehicles. Large aggregate which has been piled up on the sides of the 'improved' roads are seriously hazardous for drivers as it makes it impossible to safety drive over the edge of the designated highway if required.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. The concerns regarding road improvements relate to the construction phase of SaxaVord Spaceport and therefore out of scope of the AEE.
<u>Unsuitable weather conditions</u> Concerns that Shetland is one of the windiest locations in the UK so how can it be considered to be a viable location for the safe launching of rockets. Further concerns over the meteorological data used ('north-east (45) wind only occurs for approx. 9% of the year on Unst') and how can this analysis be used when future weather/climate is unpredictable and fluctuating.	The purpose of the AEE is to ensure that applicants for either a spaceport or launch operator licence have considered the potential environmental effects of their proposed activities and, if necessary, taken (or identified) proportionate steps to avoid, mitigate or offset the risks and their potential effects. The viability of the Spaceport location is not relevant to the AEE. The resilience of the Spaceport to the effects of climate change is discussed in Chapter 11 of the AEE. The assessment considers future climate change

	by using Met Office UK Climate Projections 2018 (UKCP18) data (paragraph 11.4.4).
<u>No benefits to the inhabitants of Unst</u> Concerns that the majority of the inhabitants will not benefit from the development. Future skilled and technical jobs are likely to be filled with individuals drafted in, the jobs for locals are more likely to be in cleaning or domestic roles.	The effects of operation of the Spaceport on population (including the inhabitants of Unst) are considered in Chapter 4 of the AEE under Section 4.9. Paragraph 4.9.1 states that during operation of the Spaceport, "beneficial economic impacts are expected to arise from three main sources: • employment associated with the operation of the Proposed Project; • accommodation for temporary workers during launches; and • space tourism activity." Three highly skilled jobs are anticipated which relate to operation of the proposed project, as well as supporting roles (see paragraph 4.9.3). It is anticipated 98 jobs are to be supported by full operation of the proposed project, 63 expected to be based in Unst and 35 elsewhere in Shetland Islands (see paragraph 4.9.4). Paragraph 4.9.11 states that local accommodation providers would be used within Unst. Paragraph 4.9.18 states that launches are anticipated to attract visitor to Unst and the Shetland Islands, leading to visitor spending which would have economic benefits supporting local businesses and increasing employment in the tourism sector. Paragraph 4.9.29 identifies a list of wider, less quantifiable benefits such as complementing existing space sector activities in Scotland, diversifying the economic base of Unst and the Shetland Islands, and offering new career paths for young people.

	Paragraph 8.7.2 states that the local community will be engaged to support local jobs, and increase employment and tourism in the area.
<u>Provision of calculations for reported gross value added (GVA) and employment figures</u> A respondent details the reported significant beneficial local effects from the SaxaVord Spaceport and the estimated employment that will be generated as: • £4.9 million GVA and 139 jobs in Unst • £7.5 million GVA and 209 jobs in the Shetland Islands • £9.3 million GVA and 255 jobs in Scotland A detailed breakdown of how these figures have been calculated should be provided, including the assumptions behind them.	A detailed breakdown of how figures quoted for GVA and job numbers have been calculated and the assumptions used in the calculation process is included in Chapter 4 of the AEE, Section 4.9.
<u>Consideration of socio-economic impacts to local community</u> Concerns raised that the impacts on the local community appear to have been assessed principally in economic terms, with little consideration of broader socio-economic impacts. Experience at other spaceports (notably in the United States) indicate that the predicted advantages to local communities frequently do not materialise, while socio-economic impacts can be significant.	The AEE considers effects on human health in Chapters 7 and 8 of the AEE in relation to air quality, and noise and vibration respectively. Additionally, Chapter 4 considers population and human health and focuses on socio-economic effects. We consider this to be a sufficient assessment of the socio-economic impacts, though note that in addition SaxaVord have engaged in social initiative activities such as being part of Shetland Islands Council led Education Employment and Skills Pipeline Working Group since early 2021.
<u>Local community impacts which require further consideration</u> Concerns raised that the following issues require further consideration in the AEE: • What type of jobs might be offered to local residents and will any training be provided to residents? If so, then where will that take place and to what accredited standards? • What wage range can locally recruited employees expect to be paid at? • What proportion and numbers of employees will be locally recruited and what proportion are expected to migrate to the locality?	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. The planning application for SaxaVord Spaceport was lodged with Shetlands Islands Council in January 2021 and planning permission granted on 30 March 2022 (planning reference number 2021/005/PPF). Any issues relating to jobs, recruitment, local housing and retail outlets have been appropriately addressed at this stage.

• What impact is the migration of employees from outside the Shetlands expected to have on local housing availability and local prices? • Are any new commercial retail outlets to be provided at or in association with the Spaceport to accommodate increased demand? • How many temporary workers are expected to work at the site during the construction phase; from where will these workers be drawn, and what measures will be taken to ensure that a large influx of workers from outside will not have an undue impact on the local community? • What steps will be taken to ensure that the anticipated economic benefits are distributed equitably among the local community and do not disrupt current livelihoods and economic activities? • What agreements do the developers expect to enter into with local authorities to provide an equitable contribution to local infrastructure and services to meet demand from the Spaceport and its employees?	The AEE considers the potential environmental effects of the operation of the Spaceport. The consideration of specific local community impacts such as those listed in this response is not applicable to AEE, and the issues are considered more relevant to the planning process. Chapter 4 of the AEE, considers potential effects in relation to employment associated with the operation of the Proposed Project under Section 4.9. Paragraph 4.9.1 states that during operation of the Proposed Project, "beneficial economic impacts are expected to arise from three main sources: • employment associated with the operation of the Proposed Project; • accommodation for temporary workers during launches; and • space tourism activity." Three highly skilled jobs are anticipated which relate to operation of the Spaceport, as well as supporting roles (see paragraph 4.9.3). It is anticipated 98 jobs are to be supported by full operation of the Spaceport, 63 expected to be based in Unst and 35 elsewhere in Shetland Islands (paragraph 4.9.4). Paragraph 4.9.11 states that local accommodation providers would be used within Unst. Paragraph 4.9.18 states that launches are anticipated to attract visitors to Unst and the Shetland Islands, leading to visitor spending which would have economic benefits supporting local businesses and increasing employment in the tourism sector. Paragraph 4.9.29 identifies a list of wider, less quantifiable benefits such as complementing existing space sector activities in Scotland, diversifying the

	economic base of Unst and the Shetland Islands, and offering new career paths for young people. Paragraph 8.7.2 states that the local community will be engaged to support local jobs and increase employment and tourism in the area. Furthermore, the 'EIA Report Schedule of Environmental Commitments' (Appendix 1.2) under 'Socio-economic – Stakeholder Framework Analysis (LaunchUK, Open University)' details that SaxaVord have committed to further study the socio-economic effects.
<u>Competition with other United Kingdom (UK) spaceports</u> Concerns raised that the AEE should clarify how space launch activities at SaxaVord Spaceport will relate to those at other planned UK spaceports. If they are acting in competition, it is possible that the anticipated economic benefits for SaxaVord Spaceport may not fully materialise as a result of business being attracted to an alternative location.	The purpose of the AEE is to ensure that applicants for either a spaceport or launch operator licence have considered the potential environmental effects of their proposed activities and, if necessary, taken (or identified) proportionate steps to avoid, mitigate or offset the risks and their potential effects. As such, the AEE considers environmental effects of the operation of the Spaceport. These concerns raised are not directly relevant to the AEE or the licence. SaxaVord is a private enterprise and would act independently of other spaceports; albeit working collectively and collaboratively where appropriate to drive forward innovation and UK space sector and thus bring maximum benefit to Shetland and the wider UK. SaxaVord are constructing a multi-pad spaceport to attract a diverse client base from engine testing, sub-orbital launches operators and orbital launch operators. Other spaceports are likely to have their own client base they will attract. Competition between spaceports may attract wider business aiding in providing benefits locally, regionally and across the UK.
<u>Implementation of a site stakeholder group</u> A respondent considers that a site stakeholder group should be put in place to adequately address emerging environmental and social issues as they arise. This should be required as a condition of its spaceport licence. Members of the stakeholder group should include local authorities,	The CAA will regulate SaxaVord Spaceport. Any emerging environmental and social issues can be regulated through the Spaceport licence terms, conditions, reporting and monitoring. Updates to the AEE could be required where there are any material changes (e.g. newly identified

relevant public authorities, local community, voluntary sector and environmental groups. The stakeholder group should meet regularly to discuss activities and impacts associated with the Spaceport and hold SaxaVord to account. All meetings should be open for member of the public to attend and ask questions.	significant effects) to what was reported in the AEE and any other information provided to the CAA, that the licensing decision was based on. Shetland Island Council have included a planning condition (planning condition 19) which requires SaxaVord to develop a detailed Operational Environmental Management Plan (OEMP). The matters raised will be managed through this planning condition agreed with Shetland Islands Council. Within the OEMP (an outline of which is in Appendix 3.1) SaxaVord have committed to ensuring the local community is kept informed in a pro-active and responsive manner and the establishment of a community consultation programme, key objectives of which include: • To understand any concerns of local community groups; • Community consultation activities including: a dedicated SSC webpage, offering general information; and • A community telephone line to provide a central point of contact for community enquiries.
<u>Tourism impact assessment</u> A respondent considers that a more detailed tourism impact assessment is required, which should address the following: • How many tourists are expected to visit the Spaceport, and at what times? • How will tourists travel to visit the Spaceport? • Car hire arrangements are limited and private motor transport has a relatively high carbon footprint. What additional public transport facilities will be established to allow tourists and employees to travel to the Spaceport? • How long will tourists visit the area for, and where are they expected to stay? • What additional local services and infrastructure will be needed to meet tourist demand, and what arrangements will the Spaceport be making with local authorities to contribute to the costs?	The planning application for SaxaVord was lodged with Shetlands Islands Council in January 2021 and planning permission granted on 30 March 2022 (planning reference number 2021/005/PPF). Appendix 1.3 of the AEE details planning condition 22, set out by Shetland Islands Council, which requires the development of a Visitor and Spectator Management Plan (VSMP). The VSMP, which must also include a Launch Day Traffic Management Plan, must be submitted and approved by Shetland Islands Council before any launch events take place. Further details in relation to the matters raised, will be managed through planning conditions agreed with Shetland Islands Council. Furthermore, the viability/practicalities of the location of the Spaceport, including additional infrastructure and amenities required would been considered as appropriate at the planning permission stage. The AEE, and CAA licensing, does not duplicate the requirements of this consenting regime.

	Chapter 4 of the AEE, paragraphs 4.9.18 to 4.9.27 provides an assessment on tourism activity in relation to socio-economic impacts. Estimates on tourist numbers, to establish the level of impact from tourism, is based on capacity of the ferry links and accommodation capacity. The AEE states there will be capacity to accommodate 160 visitors per launch and maximum number of day visitors (based on ferry capacity) is expected to be 329. In total, it is estimated that a maximum of 489 visitors will be able to view any given launch. It is expected that numbers of visitors will decline after the initial launches.
<u>Emissions from spectator traffic</u> Concerns raised that due to the lack of public transport on Unst and the significant distances involved this will result in significant additional road traffic. Any emissions from increased visitor traffic should be calculated and accounted for based on assumptions for projection of visitor numbers. The Traffic Assessment (Technical Annex 7.1) appears to model only visitors to the Spaceport and not broader tourism traffic. While a Spectator Traffic Management Plan is mentioned, neither it nor the emissions impact of that traffic seem to be presented in the AEE.	The planning application for the SaxaVord Spaceport was lodged with Shetlands Islands Council in January 2021 and planning permission granted on 30 March 2022 (planning reference number 2021/005/PPF). Appendix 1.3 of the AEE details planning condition 22, set out by Shetland Islands Council, which requires the development of a Visitor and Spectator Management Plan (VSMP). The VSMP, which must also include a Launch Day Traffic Management Plan, must be submitted and approved by Shetland Island Council before any launch events take place. Further details in relation to the matters raised, will be managed through planning conditions agreed with Shetland Islands Council. The AEE Guidance (CAP2215), states the regulator should take into consideration any conditions or obligations that the applicant already has to fulfil under other regulatory regimes, with a view to avoiding duplication (paragraph 6.11). The AEE, and CAA licensing, does therefore not duplicate the requirements of this consenting regime. Operational traffic movements are considered within Chapter 7 and Appendix 7.1 of the AEE. The assessment of traffic emissions concludes that there will be no likely significant effects. Broader tourism traffic, not relating to the Spaceport, is considered outside of the operational phase of the Spaceport and therefore are outside the scope of the AEE. Visitor estimates have been based on accommodation and ferry capacity. However, tourism traffic movements and vehicle emissions of visitors are

	difficult for the Spaceport to manage and could relate to visitors beyond the Spaceport alone (e.g. visiting other tourism sites on Shetland Islands). This will be managed as part of the planning permission granted and through planning condition 22 as part of the VSMP.
<u>Impacts to wildlife</u> Concerns raised over the AEE predicting that the construction and operation of SaxaVord Spaceport is likely to have a significant residual effect on the otter population but does not predict any other likely significant ecological residual effects associated with the proposed project. Their view is that this is not feasible and that the impacts likely to affect otters are likely to have an impact on other wildlife. Specific arrangements for mitigating and compensating the impact on otters and other wildlife should be set out in the AEE in adequate detail. The AEE did highlight that some of the local wildlife was "particularly sensitive to sudden noise events" and suggestions have been made that sound-proofed boltholes be built for the animals such as otters to take shelter in.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. The planning application for the SaxaVord Spaceport (which looks at the construction phases) was lodged with Shetlands Islands Council in January 2021 and planning permission granted on 30 March 2022 (planning reference number 2021/005/PPF). Appendix 1.3 of the AEE details planning condition 17, set out by Shetland Islands Council, which requires the development of an Otter Protection Plan and planning condition 9 requires the development of a detailed HMP. Both documents must be submitted and approved in writing by the Planning Authority in Consultation with NatureScot. The AEE Guidance (CAP2215), states the regulator should take into consideration any conditions or obligations that the applicant already has to fulfil under other regulator regimes, with a view to avoiding duplication (paragraph 6.11). The AEE, and CAA licensing, does not therefore duplicate the requirements of this consenting regime. The operational effects of the Spaceport on the local otter population are considered in Chapter 6 of the AEE. Relevant otter surveys are reported in Appendix 6.3a (Otter Species Protection Plan) and considered within Chapter 6. Table 4 of the Otter Species Protection Plan outlines otter protection plan actions. Paragraph 6.8.30 to 6.8.40 conclude no likely significant effects on the otter population in Shetland are anticipated as a result of operation of the Spaceport and no further mitigation was

	required. As an enhancement measure, a HMP has been developed and includes the creation of artificial otter holts (paragraph 6.8.37). The operational effects of the Spaceport on other wildlife (ornithology, terrestrial ecology and marine animals) have been assessed in in Chapters 5 (ornithology), 6 (ecology) and 10 (marine and transboundary) respectively. A HMP is required as part of discharging planning condition 9. This has been provided as an outline HMP (as it is a live document) that will be finalised as part of the planning condition. For birds (see Table 16.2) there are no significant effects for all bird species assessed pre-mitigation, with the exception to a confidential bird species in which after mitigation is applied, no significant effects remain. Mitigation includes the implementation of a Breeding Bird Protection Plan and HMP (see paragraph 5.12.4). For marine ecology (Section 10.12 of the AEE), the potential effect of the Spaceport operations on water quality, biodiversity (including direct strike, acoustic disturbance, toxic contaminants, thermal effects, visual disturbance and displacement of fish), and human activities have been assessed as having a negligible or minor risk on receptors; resulting in no likely significant effects to marine life.
<u>Impacts on ornithology</u> Concerns raised that Unst is home to protected bird species and it is noted that the Royal Society for the Protection of Birds (RSPB) still had concerns regarding the AEE. RSPB points out that SaxaVord will need to provide information on how they will avoid disturbing breeding birds, submit a breeding birds protection plan. They also state that there is potential for impacts on nearby Hermaness, Saxa Vord and Valla Field Special Protected Areas, which are about 3.79 kilometres from one of the proposed launch pads. This internationally designated site is protected for its populations of breeding seabirds; fulmar, gannet, great skua, guillemot, puffin, kittiwake, red-throated diver and shag. The SPA overlaps two nationally designated	Note, this comment relates to consultation responses made during the planning application process. The planning application for the SaxaVord was lodged with Shetlands Islands Council in January 2021 and planning permission granted on 30 March 2022 (planning reference number 2021/005/PPF). Appendix 1.3 of the AEE details planning condition 15, set out by Shetland Islands Council, which states that no launches or static tests are to be carried out between mid-May and the end of June. This is to avoid disturbing birds during the critical incubation and early brooding period.

Sites of Special Scientific Interest (SSSIs): Hermaness SSSI and Saxa Vord SSSI, which are also protected for their seabirds. The respondent shares RSPB's concerns and considers that a detailed bird protection plan should be submitted as part of the AEE, covering not just the site of the development but the impact further afield.	Additionally, planning conditions 9 and 16 set out the requirement to develop a detailed HMP and a Breeding Bird Protection Plan respectively. Appendix 5.3 of the AEE is an outline HMP and the breeding bird protection plan (not within the AEE) are both live documents that will be developed in detail and managed as part of the planning condition. The AEE Guidance (CAP2215), states the regulator should take into consideration any conditions or obligations that the applicant already has to fulfil under other regulator regimes, with a view to avoiding duplication (paragraph 6.11). The AEE, and CAA licensing, does not therefore duplicate the requirements of this consenting regime. In relation to the planning application, a consultation response was provided by the Royal Society for Protection of Birds (RSPB) on 12 March 2021 in which RSPB requested further information and stated an objection to the proposal. On 11 March 2021, no objection was stated by NatureScot, but they advised that no launches or static tests should be carried out during the critical incubation and early brooding period. Subsequently, an addendum to the EIA Report was submitted which included a no-launch period (as mentioned above) to cover the most sensitive period of the bird breeding season. Subsequently, no launches or static tests during the critical incubation and early brooding period was agreed by SaxaVord, and a second consultation response was provided by RSPB on 12 January 2022, in which the objection was withdrawn. In the most recent planning consultation responses from NatureScot and RSPB, there was no concern raised around the potential likely significant effects on important ornithological receptors in their formal response to the submitted planning application with planning condition 15 in place. For birds (see paragraph 5.12.4), the predicted operational effects were not considered significant for all bird species except one, a confidential

	Schedule 1 species. However, after mitigation (implementation of an HMP) all residual effects are predicted likely to not be significant.
<u>Impact on flora</u> Concerns that appropriate consideration hasn't been made to impacts on flora as the AEE does not mention flora. Edmonston's Chickweed is a rare flower which is endemic to Unst. The AEE should assess whether the SaxaVord Spaceport activities will impact this species and if so, such activities should be prohibited by the licence.	Whilst the distribution and habitat of Edmonston's Chickweed is well known on Unst, none were recorded in the study area (Appendix 6.2). NatureScot did not raise any concerns around the potential impacts on Edmonston's Chickweed in their formal response to the submitted planning application (see Table 6.1 of the AEE). SaxaVord have reviewed and updated the ecology assessment, used for planning, for inclusion in the AEE as Chapter 6 of the AEE. No significant effects to flora are predicted from the operation of the Spaceport.
<u>Environmental net gain and enhancement measures</u> SaxaVord have significant potential to allow for enhancements of the local environment with the objective of conserving and improving biodiversity. The AEE should identify opportunities for enhancements and commit to undertaking them.	The planning application for the SaxaVord Spaceport was lodged with Shetlands Islands Council in January 2021 and planning permission granted on 30 March 2022 (planning reference number 2021/005/PPF). During this processes enhancements were identified and agreed at this stage. Appendix 1.3 of the AEE details planning condition 9, set out by Shetland Islands Council, which states the requirement to develop a detailed Habitat Management Plan (HMP). The HMP has identified and committed to enhancement measures. Opportunities for enhancement and other biodiversity considerations are discussed in Chapter 6, Section 6.7, of the AEE. An outline of the HMP is included for information as Appendix 5.3 which includes enhancement. The HMP has two overarching aims: • To enhance habitats for species of importance present on, or linked to, the Study Area • To restore important habitats and associated species The HMP links these aims to four objectives to which SaxaVord have committed to:

	• Create a wildlife watching hide on Lamba Ness; • Peatland restoration; • Create native riparian broadleaf tree/scrub cover; and • Coastal grassland habitat management.
<u>Associated noise from non-launch activities</u> Concerns that noise during engine testing and launch will be at levels that will exceed the criterion for community annoyance associated with aircraft noise. A condition restricting noise limits to below a certain ceiling at sensitive receptors and a condition limiting the hours of the day and total number of hours per week which these activities can take place should be included in the Spaceport licence.	Potential noise and vibration effects associated with the proposed activities have been assessed within the AEE and reported in Chapter 8 of the AEE. Paragraphs 8.8.1 to 8.8.22 discuss noise from engine testing and launches. Regarding community annoyance related to launch activities, noise levels are predicted to be above the 45 dBL_{den} threshold of community annoyance for airports (this assumes that noise from the Spaceport will generate similar levels of annoyance to noise from airports) at the closest noise sensitive receptors (NSRs). The assessment concludes that the level of annoyance is likely to be less than for an equivalent airport, as launches will be less frequent than aircraft taking off/landing at an airport. Paragraph 8.8.6 states that launches will offer substantially greater periods of respite for nearby residents than an equivalent airport, and residents will be given warning in advance of each launch, such that they can plan accordingly to avoid the noise if they choose. Paragraphs 8.8.23 to 8.8.27 discuss noise from non-launch activities and plant. The worse-case predicted specific noise level at the closest receptor, NSR1, is 24dB from generators and 27dB from fixed and mobile plant. The typical background noise level in the vicinity of the proposed project is 22dB. In accordance with British Standard 4142, where a rating noise level of less than five dB above the background level is indicative of a low impact, the noise level for fixed and mobile plant at NSR1 is 27dB. The predicted worst-case rating level for fixed and mobile plant of 24 dB is three dB below the derived noise limit, meaning the resultant effect is slight. Overall, the assessment determines non-launch activities and plant do not cause significant effects at off-site NSRs, both because of the

	separation distances involved and the relatively low noise levels of non-launch plant.
Impacts of light Concerns raised that there will be significant night-time lighting and that there is no impact assessment on how this might affect local insect life. A light pollution impact assessment should be required before the licence is approved.	The effects of night-time lighting have been previously assessed during the planning phase. Potential ecological effects were reported in Chapter 6 of the EIA Report submitted to Shetland Islands Council in support of the planning application for the Spaceport, whilst Chapter 5 of the EIA Report considered lighting issues. Night-time lighting was not predicted to have likely significant adverse effects on any ecological receptors. Very few invertebrate species (and important invertebrate species on the Scottish Biodiversity List) were recorded as historically present. Of those species present, it was considered highly unlikely that generally common and widespread insect species would be significantly adversely impacted though the Proposed Project because of a range of factors e.g.: • the small number of records within the Proposed Development area compared to the wide distribution of their (mostly under-recorded) UK population. • the Proposed Project area was and is not specially designated for these species, nor were important habitats which support these species. Chapter 6 of the AEE considers insects such as Lepidoptera (moths) in Table 6.10, but were scoped out of the assessment for the following reasons: • the relatively small number of records • no designated sites or habitats which support these species no significant impacts are considered likely from the operation of the Proposed Project on these species The AEE is based on the EIA Report submitted to support the planning application, on which no issues were raised by NatureScot in relation to potential effects of lighting on insects.
Hazardous material storage and handling	Chapter 15 of the AEE, Section 15.7 provides a list of materials (liquids and gases) to be used on site, discusses the potential effects on the

Concerns that details of hazardous materials which may be stored at the site have not been included in the AEE. An inventory of hazardous materials and potential pollutants should be included within the AEE. Measure for preventing and dealing with spills of hazardous substances should also be detailed in the AEE. The measures should be developed in accordance with best practice and meet the requirements of the SEPA and the local fire and rescue service.	environment from loss of containment or ignition of them, and identifies mitigation measures. Spill response procedures have been developed as part of SaxaVord's Safety Case and Emergency Response Plans (ERP). The ERP sets out the arrangements for dealing efficiently with an emergency incident in connection with launch and hazardous operations in support of a launch. The ERP is a multi-agency response plan, including both SEPA and fire and rescue. It clarifies the roles of the participating agencies through defined responsibilities and ensures procedures are in place for dealing with reasonably foreseeable incidents of emergencies.
<u>Other licenses required for emissions to air and discharges to water</u> A respondent states that all discharges from the site to the atmosphere and the water environment must be consented by SEPA.	The Space Industry Act 2018 (SIA) regulates all spaceflight activities and associated activities carried out in the United Kingdom. It requires any person or organisation wishing to undertake spaceflight activities or associated activities to obtain the relevant licence. The CAA performs the functions of the regulator under the SIA. SaxaVord have applied for a spaceport licence under the SIA. The AEE is required as part of the licence application process, under the SIA. It is in addition to any other environmental assessments that may be required under different laws in relation to the proposed activities. It is SaxaVord's responsibility to identify the need for other licenses, permits or consents.
<u>Recovery of spent stages</u> Concerns that the AEE stating the spent stages of the launch vehicle are 'expected' to be recovered is vague. Full details of measures to recover spent stages should be provided and licence condition imposed.	For the purposes of the AEE it has been assumed that there is no recovery of orbital and sub-orbital launch vehicle components. However, it is noted that all launches affecting Icelandic waters will need to show consideration to the requirements set out in the Memorandum of Understanding (MoU) between the Government of Iceland and the UK Government in relation to debris recovery, and that this information will be included in the associated future launch operator AEEs. Whether or not individual future launch vehicles will be recovered will be considered and reported in the AEEs for launch operators.

	A marine licence will also be required, from the Marine Directorate (formally known as Marine Scotland) for any deposition of objects from the launch vehicles into the marine environment.
Impact on local fisheries and leisure industries Concerns that any exclusion zone which are implemented around the spent stage impact zones will disrupt local fishing and leisure industries. A full assessment of the impacts of launches on fishing and leisure industries should be provided in the AEE.	Paragraph 3.9.7 states that "In order to provide public safety, measures to control a launch exclusion zone (LEZ) will be implemented at specific periods of the launch, including the run-up to and during launch. The LEZ will include an area around the launch pad and a downrange sea and overflight exclusion zone. The LEZ is defined as the area within which access by the public will be restricted in the run-up to and during a launch…" Paragraph 3.9.36 states that "Safety Clear Zones and a LEZ will be implemented at appropriate times to ensure the safety of the operation. The length of time restrictions are in place will be kept to the practicable minimum." When launches reach fall cadence there will be up to a maximum of 30 launch events per year (a maximum of 4 times per month), (paragraph 3.10.1). Timings of launches will be advertised well in advance, in local media and online (paragraph 8.7.2). Potential effects on displacement of vessels (including commercial fisheries) and marine and coastal tourism activities (marine leisure industries) are considered in detail in Chapter 10 of the AEE. No likely significant effects on vessel navigation (including commercial fishing) are anticipated from operation of the SaxaVord Spaceport (paragraphs 10.10.100 to 10.10.107). A marine licence will also be required, from the Marine Directorate (formally known as Marine Scotland) for any deposition of objects from the launch vehicles into the marine environment. A Navigational Risk Assessment (NRA) must be submitted to support the marine licence

	application. NRAs address the impact of launch activities on shipping and navigation. As part of this routes and operational areas associated with fishing vessels are identified to minimise disruption and reduce risks from the hazards associated with the launch activity.
<u>Impacts from greenhouse gas emissions</u> Concerns that an assessment on the effects of greenhouse gas emissions from the proposed project has not been provided. A full life-cycle analysis of greenhouse gas emissions should be provided. SaxaVord should indicate how these emissions will be offset to ensure that the development remains carbon neutral over its lifetime. The CAA should ensure a licence condition is included to ensure the mitigation measures identified are mandatory. The disruption of large areas of peat has the potential to have significant climate change impacts as it sequesters greenhouse gases. The AEE should include an assessment on the climate impacts from peat disruption which includes measures for minimising and mitigating identified impacts.	The Space Industry Act 2018 sets the requirement for an assessment of environmental effects to be submitted with a spaceport and launch operator licence application. The AEE is only required to consider the operational phases of the proposed operations. The construction phases are not required to be considered by the AEE. The environmental effects of these activities would be assessed during the planning permission stage. As such, the AEE is concerned with the operational effects of the Spaceport, rather than effects over the whole project lifecycle. Disturbance of peat is considered to take place during construction. As such, this is outside of the scope of the AEE and is not considered further. Greenhouse gas (GHG) emissions in relation to the operation of the Spaceport are considered within Chapter 11, based on the RepLV described. The assessment considered emissions arising from the operation of the Spaceport, including transportation, electricity and fuel consumption. The assessment concluded that the potential climate change effects caused by GHG emissions associated with the Spaceport, when considering the context of the overall annual emissions by the Shetland Islands, are not considered to be significant. GHG emissions specific to launch operator launch vehicles and associated launch operations will be assessed within AEEs submitted by launch operators. Data on greenhouse gas emissions and future mitigation will be gathered through a reporting plan requirement requiring information on calculated greenhouse gas emissions based on licensed activities and progress to reduce greenhouse gas emissions, including implementation of the measures outlined in the Assessment of Environmental Effects. .
<u>Impacts to the upper atmosphere</u>	It is noted that launches which use hydrocarbon fuel are associated with temporary ozone depletion and climate change effects.

Concerns that the AEE does not address effects of launches on the upper atmosphere. Research indicates that rockets travelling through the upper atmosphere can damage the ozone layer and contribute to climate change. Releases of significant quantities of carbon dioxide, alumina particulates, black carbon and water vapour into the stratosphere can all contribute to climate change. The AEE should provide a detailed assessment of these impacts and measures to minimise, mitigate and offset these impacts to ensure that launches from SaxaVord Spaceport have no climate change and upper atmosphere impacts. Section 7.4.27 ignores the governmental spaceflight environmental objectives guidance on broader effects such as soot in the upper atmosphere from burning fossil fuels. Current best practices consider black carbon to be the largest source of emissions impact and therefore it is inappropriate to exclude this source from an impact study on the effects from fossil fuelled launches.	Paragraph 11.2.8 of the AEE states that calculated emissions are indicative and assume that RP-1 (highly refined kerosene) is used and using liquid or solid hydrocarbon fuels will be similar. Data on greenhouse gas emissions and future mitigation will be gathered through a reporting plan requirement requiring information on calculated greenhouse gas emissions based on licensed activities and progress to reduce greenhouse gas emissions, including implementation of the measures outlined in the Assessment of Environmental Effects. Paragraph 11.2.10 considers ozone depletion and recognises that stratospheric ozone depletion by the reaction with RP-1 fuel exhaust compounds is related to black carbon and incomplete combustion of hydrocarbons. It states that that most effective mitigation against black carbon will be through transition to carbon-free fuels. However, this is not within SaxaVord's control and would be through the launch operator's choice of propellants. Further details on the potential for launches to effect the upper atmosphere are expected from launch operators and the AEEs produced associated with a launch operator licence. The CAA has reviewed the AEE against the Secretary of State's (SoS) environmental objectives for spaceflight activities. The CAA is satisfied that the environmental objective for the Regulator to 'minimise emissions contributing to climate change resulting from spaceflight activities' has been met, including the specific guidance from the SoS with respect to this objective.
<u>Major accidents and disasters</u> Concerns raised over the potential for major accident and disasters, including ignition events, which can cause significant damage and loss of life to humans and wildlife. The AEE should include an assessment of feasible major accident and disaster scenarios and measures put in place to	Under section 2 of the Space Industry Act 2018, the regulator (in this case the CAA) must carry out its functions relating to spaceflight activities with a view to securing the health and safety of members of the public and the safety of their property. This duty has primacy over the other matters that the regulator must take into account in exercising its functions.

avoid, mitigate and respond to these scenarios. What are the measures that will be put in place for the evacuation of humans in the case of an emergency and will there be sufficient resources in place to deal with such a scenario? SaxaVord should not rely on local emergency services to respond to accidents. The Spaceport licence should include a condition requiring SaxaVord Spaceport to maintain a full suite of emergency equipment and adequate numbers of suitably qualified and experienced personnel to cope with credible accident scenarios.	The matters relating to significant damage and loss of life to humans falls outside the scope of the AEE but are considered by the CAA as part of the Safety Case in the licensing process. An Emergency Response Plan (ERP) has been developed as part of SaxaVord's Safety Case. The ERP sets out the arrangements for dealing efficiently with an emergency incident in connection with launch and hazardous operations in support of a launch. The purpose of the AEE is to ensure that applicants for either a spaceport or launch operator licence have considered the potential environmental effects of their proposed activities and, if necessary, taken (or identified) proportionate steps to avoid, mitigate or offset the risks and their potential effects. As such, the AEE considers environmental effects of the operation of the Spaceport. Chapter 15 of the AEE considers the environmental effects of accidents and disasters potentially associated with operation of the Spaceport. Accident and disaster events taken forward for assessment are summarised in Table 15.2. The events have been grouped into failure of containment (liquids), failure of containment (gases), ignition (liquids and gases) and off-nominal launch scenarios. The nature of the hazards is also discussed in paragraphs 15.7.4 to 15.7.28. Table 15.2 also sets out mitigation measures to manage the risk. Launch operators will be required to consider off-nominal launches beyond the Spaceport boundary and their potential environmental effects.
<u>Impacts of space junk and overcrowding</u> Concerns raised that space, in particular Low Earth Orbit, is becoming overcrowded and the launches SaxaVord will support will add to the problem. Space debris and non-active satellites pose hazards to future	The Space Industry Act 2018, Section 11 (3)(a)[1] sets the requirement in relation to a spaceport licence, including the requirement for an assessment of the effects that launches of spacecraft or carrier aircraft are

[1] The Space Industry Act 2028, Section 11. Accessed from: https://www.legislation.gov.uk/ukpga/2018/5/section/11/enacted

space launches and hinder scientific research into space. Astronomers are also impacted by the volume of satellites and their trails. The AEE should address these concerns. The CAA should work with the UK Space Agency to ensure that policy and licensing addresses this issue. They should also consider how SaxaVord Spaceport and other spaceports take space overcrowding into consideration when deciding on space launches and how will all satellites place into orbit be removed once their useful lifetime has been reached.	expected to have on the environment. Section 69 (2)[2] defines launch as causing a craft to take off (also paragraph 1.20 of the AEE guidance). There is no requirement for spaceports to consider the impacts of space debris in the orbital/space environment. The impacts of space debris are considered in orbital licence assessments. Paragraphs 5.10 and 5.11 of the Guidance for Orbital Operator licence applicants and Orbital Operator Licences (CAP2210)[3] which explains the intention of the sustainability principle and how orbital operator applicants must demonstrate how they will adhere to the sustainability objectives. Such concerns are addressed under separate Orbital Operator Licences and as such this matter is not applicable to the AEE.
Militarisation of space Concerns raised about the increasing militarisation of space. The following matters should be clarified when licensing SaxaVord: • Will the ethical and moral implications of launches be a consideration for spaceport licensing? • How will the purpose and use of the satellites to be launched from the site be publicized? • What actions will the Spaceport take to address ethical concerns about the use of space and adherence to the Outer Space Treaty? • Will there be any restrictions on the type of satellites to be launched from the site? • How many of the launches from Unst will be for military use?	The purpose of the AEE is to ensure that applicants for either a spaceport or launch operator licence have considered the potential environmental effects of their proposed activities and, if necessary, taken (or identified) proportionate steps to avoid, mitigate or offset the risks and their potential effects. As such, the AEE considers environmental effects of the operation of the Spaceport. The matter raised does not therefore fall within the scope of the AEE.
Continued monitoring of environmental effects A respondent considers that there should be ongoing assessment of environmental effects from SaxaVord Spaceport. The AEE should provide information on what ongoing monitoring and survey work will be	The Licence and Reporting Plan, including licence terms and conditions, reporting requirements relating to the environment, is published on the CAA website upon grant of a licence.

[2]The Space Industry Act 2028, Section 69. Accessed from: https://www.legislation.gov.uk/ukpga/2018/5/section/69/enacted

[3] Guidance for Orbital Operator licence applicants and Orbital Operator Licences (CAP2210). Accessed from: https://publicapps.caa.co.uk/docs/33/Guidance%20for%20Orbital%20Operator%20licence%20applicants%20and%20Orbital%20Operator%20Licensees%20(CAP2210).pdf

conducted by SaxaVord to assess the ongoing impacts. This should include environmental impact monitoring, annual reporting on the numbers and purposes of launches and annual carbon accounting reports. The Spaceport should also account for the status of all objects it has launched into space over the lifetime of these objects. These reports should be accessible to the public.	Although the AEE focuses on significant effects, there are areas of uncertainty and/or gaps in knowledge due to the new nature of the spaceports and space launches in the UK. To help provide more certainty to what has been reported in the AEE, the Reporting Plan includes a programme to capture and report actual data (upon request of the CAA) where this information was not available (or was uncertain/assumptions made) for the AEE. This will inform updates to the AEE where required. In addition, as part of the planning application, a number of planning conditions set by Shetland Islands Council require ongoing monitoring and surveys (see Appendix 1.2 of the AEE). These include: • Planning condition 16, development of a breeding bird protection plan • Planning condition 5, appointment of an ecological clerk of works to monitor compliance with all environmental and nature conservation works • Planning condition 9, development of a detailed HMP • Planning condition 12, development of a conservation management plan • Planning condition 8, development of a detailed peat management plan • Planning condition 19, development of a detailed operational environmental management plan (including a scheme of noise and vibration monitoring) The AEE Guidance (CAP2215), states the regulator should take into consideration any conditions or obligations that the applicant already has to fulfil under other regulatory regimes, with a view to avoiding duplication (paragraph 6.11). The AEE, and CAA licensing, does not therefore duplicate the requirements of this consenting regime. The status of objects launched into space over the operational lifetime is outside the scope of the AEE.

Data to inform the assessments Concerns over where the information in the AEE has been taken from/based on given that it is a new industry in the UK. It appears to have been taken from software model simulations and assumptions. There are other spaceports (around the world), and the findings should be based on/taken from these live working models and related to the geographical location of the proposed site at Lamba Ness.	The AEE has been carried out using competent experts in accordance with the AEE Guidance (CAP 2215). The information and data within the AEE has been sourced by a team of competent environmental impact assessment practitioners, as identified in Chapter 1 of the AEE (CVs provided in Appendix 1.1). Chapter 2 of the AEE states that the AEE is based on the best available information. However, the AEE notes that where there is uncertainty and limitations, these are set out, where relevant, in the technical topic chapters. Emissions data for the air quality assessment were provided by two candidate launch operators for a large and small launch vehicle. The assessment includes dispersion modelling based on a range of typical UK meteorological conditions with UK average wind speeds and local Unst wind speeds from Baltasound Airport (related to the geographical location of the Spaceport). The noise assessment also uses specialist modelling undertaken by Blue Ridge Research & Consulting LLC (BRRC). BRRC have used information from their measurements of rocket launches at active sites in the USA and other countries. They have developed models specifically relating to rocket noise. It is therefore considered that the predictions are robust and are appropriate for use. The BRRC modelling report is provided in Appendix 8.1 of the AEE and their demonstration of competency provided in Appendix 1.1.
Expediate existing subsidence Concerns raised that existing subsidence on the Floggie road, that runs behind the Norwick Banks/Booths settlements up to the proposed site, will be further impacted by noise and vibrations created by each launch. Has there been any testing of the ground in that area to establish whether the ground will be stable or whether it will start to deteriorate and create more subsidence? Concerns that this could encroach on safety of the habitable settlement below.	Chapter 8 of the AEE has determined that vibration associated with launches will be negligible, such that existing fragile structures on the SaxaVord Spaceport site itself will not be affected. Vibration from launches at more distant locations, including the Floggie Road, would be even less and will therefore not result in further deterioration and subsidence.

Safety of nearby settlements A respondent queries that as the waters around the North of Unst are to be restricted to vessels of all kinds, will residents in the Norwick Banks/Booths settlements be able to remain living in their home during a launch? The AEE should provide evidence of the following: • Will residents be able to continue living in Norwick Banks/Booths settlements? • Will they be able to remain in their home and continue to live a normal life with no interruptions or disturbances during a launch? • Will they be able to continue to live with no risk to immediate health or long-term health issues? • Will it be guaranteed by SaxaVord to be safe to do so? Concerns that the AEE makes reference to the Basner 2006 study as anticipating having no adverse effect on human health due to noise associated with aircraft, but not rocket launches. Concerns that the proposed site is too close to a habitable settlement on both noise, air quality and safety issues.	Under Section 2 of the Space Industry Act 2018[4], the CAA must carry out its functions relating to spaceflight activities with a view to securing the health and safety of members of the public and the safety of their property. This duty has primacy over the other matters that the regulator must take into account in exercising its functions. The purpose of the AEE is to ensure that applicants for either a spaceport or launch operator licence have considered the potential environmental effects of their proposed activities and, if necessary, taken (or identified) proportionate steps to avoid, mitigate or offset the risks and their potential effects. The matters relating to safety of people and property fall outside the scope of the AEE but are considered by the CAA as part of the Safety Case in the licensing process. Waters around the North of Unst will be restricted to vessels only during launch events. This will be for a short duration during each launch event. NAVTEX and Sécurité Notices to Airmen and Mariners will be used to warn third parties to remain clear of the impact zone(s) where jettisoned material is expected to fall. Chapter 8 states that noise effects associated with launches are not considered to be significant for identified noise sensitive receptors (NSRs) including residential properties at Norwick Banks/Booths. The assessment has determined that there is no risk of hearing damage arising from launch noise at the closest NSRs, and any effects would reduce further from the Spaceport. Launches will be relatively infrequent and launch times will be published in advance. Residents wishing to further minimise their noise exposure can do so by remaining inside their properties.

[4] The Space Industry Act 2028, Section 2. Accessed from: https://www.legislation.gov.uk/ukpga/2018/5/section/2/enacted

	On the point regarding Basner 2006, SaxaVord notes that noise from rocket launches is not markedly different in character than noise from aircraft (paragraph 4.3.10); however, the significant point of Basner's study is the number of noise-induced awakenings, such that the cause of the awakening (rocket or conventional aircraft) is non-material. There will only be a single launch in any given night-time period and as such noise-induced awakenings will be limited to at most one per night at the closest NSRs. Awakenings are less likely at more distant NSRs as noise levels will be lower. Chapter 7 of the AEE states air quality effects associated with operation of the Spaceport are not considered to be significant for identified receptors. Proposed project generated traffic and launch event emissions are predicted to have no perceptible impact at any identified receptors under all meteorological conditions. The maximum predicted impact of launch emissions at a sensitive receptor is predicted to occur with north-easterly winds which occur typically for less than 10% of the year. The maximum predicted 8-hour concentration of carbon dioxide (CO) is 28% of the Air Quality Standard. Emissions from launch events are therefore considered to have an effect of negligible significance on air quality, posing no risk to health.
<u>Derivation of the exclusion zone</u> Queries over where the 2.24 and 1.8 kilometre radii come from? If the exclusion zone radii are currently based on a certain rocket size, what happens if rockets increase in size at a later date?	The exclusion zone distances referred to in the response were detailed in the EIA Report submitted to Shetland Islands Council in support of the planning application for the Spaceport, rather than the AEE. Under section 2 of the Space Industry Act 2018, the regulator (in this case the CAA) must carry out its functions relating to spaceflight activities with a view to securing the health and safety of members of the public and the safety of their property. This duty has primacy over the other matters that the regulator must take into account in exercising its functions. The purpose of the AEE is to ensure that applicants for either a spaceport or launch operator licence have considered the potential environmental

	effects of their proposed activities and, if necessary, taken (or identified) proportionate steps to avoid, mitigate or offset the risks and their potential effects. Matters relating to the safety clear zones and exclusion zones fall outside of the scope of the AEE but are considered by the CAA as part of the Safety Case in the licensing process. In accordance with the Guidance for spaceport licence applicants and spaceport licensees (CAP 2212)[5], an appropriate safety clear zone must be defined as part of the Safety Case. A safety clear zone is an area to which access is restricted for safety reasons during hazardous pre-flight and post-flight operations. The purpose of setting up a safety clear zone is to ensure that the risk to any person from the hazards of the activities is reduced to as low as reasonably practicable (ALARP). The safety clear zone must reflect the nature of the activities and risks involved as set out on the Safety Case. The safety clear zone is based on expected maximum sized launch vehicle to launched from SaxaVord Spaceport. Where larger launch vehicles are proposed, SaxaVord will be required to review and revise where necessary their Safety Case and safety clear zone to take account of any increased risk to the public. Launch exclusion zones for specific launch vehicles will be calculated by launch operators as part of their Safety Case and ground safety analysis supporting their launch operator licence application.
Impacts from spectators on habitat sites Concerns raised on where the spectators are going to assemble to watch launches. Concerns that SaxaVord are suggesting Norwick, which is an area	Appendix 1.3 of the AEE, planning condition 22 set out by Shetland Islands Council, states the requirement to develop a Visitor and Spectator Management Plan (VSMP). The VSMP is required to detail the visitor

[5] Guidance for spaceport licence applicants and licensees (CAP 2212). Accessed from: https://publicapps.caa.co.uk/modalapplication.aspx?appid=11&mode=detail&id=10547

comprising of Norwick Meadows Sites of Special Scientific Interest (SSSI) and Norwick Dunes/Sands SSSI. How are these SSSI's going to be protected, maintained and managed if used? Evidence of what is going to be put in place should be provided.	management interventions proposed depending on launch parameters. This will be developed by SaxaVord and agreed with Shetland Islands Council. As such, impacts relating to spectators impacting on habitats will be managed by the VSMP. The CAA licensing, does not therefore duplicate the requirements of this consenting regime.
<u>Assessment of alternative fuels</u> Concerns raised that section 11.2.8 assumes all launch vehicles will use rocket propellent 1 (RP-1) and that all emissions used within the AEE are 'indicative'. It also states that emissions per launch will be similar for liquid or solid hydrocarbon fuels. However, solid-fuelled rockets have a very different emissions profile than liquid-fuelled rockets and often contain waste products such as alumina. The granting of the licence should depend on much more specific calculations of the impact of the planned use of the Spaceport.	In accordance with the Guidance for the AEE (CAP 2215) it is possible to apply for a spaceport licence without knowing the full details of launch vehicles. In this case, applicant must base their AEE on a reasonable worst-case scenario, based on a representative launch vehicles (RepLV). SaxaVord's AEE is based on a RepLV which uses liquid hydrocarbon (for example RP-1 which is a highly refined form of kerosene) and liquid oxygen (LOX) as engine fuel (paragraph 3.6.17). Sub-orbital sounding rockets will also be launched and these launch vehicles will be smaller. These will use solid fuel, liquid fuel or a hybrid (3.9.21). However, for the purposes of the AEE, the assessment assessed all 30 launches per year as RepLV, which presents the worst (limiting) case (3.9.22). SaxaVord have stated that this fuel and oxidant combination is likely to be quite common. However, propellants, fuels and oxidants for individual launch vehicles may differ depending on launch operator preference, and the actual propellants, fuels and oxidants proposed will be assessed and reported in the relevant launch operator AEEs.
<u>Use of cleaner fuels</u> Concerns raised that section 11.2 does not discuss the use of lower carbon fuels which are being used by at least two European launch vehicle operators. Is there a reason for why such fuels have been excluded? Part of the spaceflight environmental objectives guidance is that 'the regulator should encourage the UK spaceflight sector to adopt cleaner fuels	The AEE considers an operational envelope considered representative of expected launch vehicle activities from SaxaVord Spaceport. SaxaVord have undertaken a climate change assessment which looks at the proposal's greenhouse gas emission contributions, including from transportation, electricity and fuel burn. The assessment identified that pre-mitigation that the potential climate change effects caused by

and technologies which minimise the contribution of this sector to climate change and ozone depletion'. SaxaVord could set targets or constraints for users of the Spaceport and the CAA could make licence conditions to encourage the adoption of low impact fuels. For example, Sutherland Spaceport has made commitments on carbon footprint and banning use of highly toxic fuels such as hydrazine.	greenhouse gas emissions are not considered to be significant. Mitigation measures, such as switch to electrical power and continued decarbonisation of passenger and freight transport, will contribute to bringing the greenhouse gas emissions down. As cleaner fuels and technologies are developed, the sector would be encouraged to consider and compare the options and their potential effects. Fossil fuel-based launches is likely to have a greater net greenhouse gas impact than launches using non-fossil derived fuels, hence the choice of RP-1 for the AEE which both represents common practice and a robust case for assessment. The choice of fuel is a matter for launch vehicle operators and not a matter the Spaceport can control or enforce. The fuels used for launch vehicles may differ depending on launch operator preference and the actual propellants, fuels and oxidants proposed will be assessed and reported in the relevant launch operator AEEs.
<u>Offsetting</u> Concerns raised that section 11.2.12 does not consider offsetting as a mitigation measure, whilst other UK spaceport have actively engaged in offsetting emissions.	Chapter 11 of the AEE states that the effects of launch greenhouse gas emissions from SaxaVord Spaceport have been assessed as not significant. Mitigation measures, including offsetting, is only required where significant effects are likely. Nonetheless, SaxaVord will be engaging on local greenhouse gas mitigation projects, including peatland improvements.
<u>Impact of satellite transportation</u> One respondent queries the reported impacts of satellite transport in section 11.8.4. For example, at a minimum payloads will be transported from Glasgow and could travel as far as from California or Japan. Consideration should be made to estimate the carbon impact of payload transport.	Paragraph 11.1.3 states a reasonable worst-case scenario for carbon emissions associated with the proposed operations (including launch vehicle transport) is assessed within Chapter 11 of the AEE. However, the focus of this is launch vehicle transport rather than satellite transportation. Consideration of satellite transportation is beyond the scope of the AEE, which is to assess the environmental effects of launch.
<u>Launch vehicle emissions calculations</u> Concerns raised regarding the launch vehicle calculations. Section 11.8.18 states that the site will have a capacity to support 30 launches per year,	The AEE has been carried out using competent experts in accordance with the guidance for the assessment of environmental effects (CAP 2215).

each generating an average of 24.45 tCO_2e. This equates to 764 tCO_2e of emissions annually. By comparison the figures used for the Sutherland Spaceport planning application was a baseline of 25.3 tCO_2e per launch vehicle using a low carbon biofuel weighing 19 tonnes. The total annual emissions figure of 302.3 tCO_2e based on 12 launches. There are concerns that a site planning 30 launches per year with heavier vehicles, using fossil fuels could have a substantially similar emission footprint per launch.	For RepLV launches, details of the assessment methodology is set out in section 11.4 of the AEE. The emission factors used were primarily from UK Government greenhouse gas conversion factors for company reporting or Chartered Institution of Building Services Engineers (CIBSE) Energy Benchmarks (see paragraph 11.8.3). The SaxaVord AEE assumed all 30 launches are based on the RepLV to give the worst-case scenario. However, of those 30 launches SaxaVord will be accommodating smaller sub-orbital launches which are expected to generate lower greenhouse gas emissions. Therefore, the average fuel load figure used to calculate greenhouse gas emissions is considered reasonable.
<u>Inaccurate calculations used</u> One respondent references Table 1, which explains how the rocket emissions data per launch were derived. However, concerns that there are a number of issues with this analysis. Two sample issues are highlighted • a jet velocity of 2.1 m/s for a rocket engine is equivalent to a subtle breeze on a calm summer day and not a rocket engine exhaust • doing a very quick model for the Skyrora XL 70kN engine, assuming Pc=5MPa, c*eff=0.96, O/F=5.5 using 98% Peroxide and RP-1 while trimming for the stated exhaust temperature of 1450K and the sea level Isp of 250.4 stated in their Payload User Guide yields a total mass flow from the stage of 256kg/s. With an exhaust species split of approx. 8.8% CO, 34.5% CO2, 55.5%H20, 1% H2 we anticipate a higher CO figure Concerns that these are a very important set of metrics that should be accurately assessed by suitably qualified staff. This should be done across the full range of launch vehicles intended for use on the site, e.g. solid, hybrid, liquid, and by studying a range of scenarios that model mixes of varying classes of vehicle. The respondent anticipates that the impact on air quality and environmental receptors will be significantly higher than stated in the current AEE. Until such impacts are convincingly modelled it is hard to	The AEE has been carried out using competent experts in accordance with the AEE Guidance (CAP 2215). Using orbital launches as an example, the velocity used in the dispersion modelling of the launch emissions is not the rocket engine exhaust gas velocity from the nozzles, it is a reduced speed horizontal jet velocity at ground level calculated from the width of the flame deflector as described in Appendix 7.3 of the AEE. Emissions for the candidate rockets considered at the time of writing the AEE were provided by candidate launch service providers. A representative launch scenario using liquid hydrocarbon (for example RP1 which is a highly refined form of kerosene) and liquid oxygen (LOX) as launch vehicle first stage engine fuel has been assessed within the AEE (section 3.9.17). To calculate the emissions associated with a launch, emissions factors were taken from Appendix D of the Federal Aviation Administration's "Final Programmatic Environmental Impact Statement for Streamlining the Processing of Experimental Permit Applications". Criteria pollutant emissions were only calculated while below the mixing height (i.e., 3,000 feet or less).

justify that the effects are or will be 'negligible' or have 'no significant residual effect'.	Specific propellants, fuels and oxidants for individual launch vehicles may differ depending on launch operator preference and will be assessed and reported in the relevant launch operator AEEs.
<u>Dumping of debris on the seabed</u> Concerns raised that due to the high volume of launches and large launch vehicles the impacts the debris will have on the seabed/marine environment requires more detailed analysis than what is presented in the current AEE. Concerns raised that all of the requirements to 'protect the marine environment from the impacts of spaceflight' environmental objective (Guidance to the regulator on environmental objectives relating to the exercise of its functions under the Space Industry Act 2018) have not been met. It is highlighted that best practice internationally is moving toward tighter regulation of the impacts of dumping debris from launchers in the marine environment.	The AEE has been undertaken in accordance with guidance set out in the "Guidance to the Regulator on Environmental Objectives Relating to the Exercise of its Functions under the Space Industry Act 2018" and the Guidance for the assessment of environmental effects (CAP 2215). A marine environmental risk assessment (MERA) has been undertaken (Chapter 10 of the AEE), including the impacts of launch vehicle debris, in accordance with the AEE guidance. The AEE takes account of the sensitivity of the receptor, the exposure of the receptor to effects, and the magnitude of the effects over and above the baseline condition. This considers the frequency of launches, mass of debris deposited into the marine environment, and total area over which deposition is predicted to occur. The assessment considers the effects on marine environments from fuel spillage, metal corrosion and toxic contamination, debris and microplastics, smothering of marine organisms and habitats, direct strike, acoustic disturbance, thermal effects, and displacement of marine organisms, in addition to potential impacts on human activities. The findings show there to be no likely significant effects. Mitigation is only required where significant effects have been identified, in accordance with the AEE Guidance.