



Sky lanterns and helium balloons: an assessment of impacts on livestock and the environment



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1. Executive Summary

There is increasing concern, from a wide range of stakeholders about the possible impacts of sky lanterns and helium balloons on livestock and the environment. Particular concerns include the perceived risks to animal welfare through ingestion of debris, litter in the countryside, the sea and on the coastline, risks to aviation and impacts on coastal rescue services. Since sky lanterns contain a naked flame, there are additional concerns about the fire risk to buildings, property and crops from uncontrolled landing.

To date, much of the evidence presented has been largely anecdotal in nature. This study, jointly commissioned by English and Welsh Governments aimed to establish a robust and dependable evidence base to help inform any future decisions that may be made on sky lanterns and helium balloons, for example restrictions on sale and / or use. Risks were identified and assessed in relation to livestock health and welfare, the environment (with particular reference to litter), fire risk, damage to marine life and consumer safety.

The following working definitions are used in this report:-

- Sky lanterns (also known as 'Chinese' lanterns): small hot air balloons typically around 100cm high and with a diameter of approximately 60cm; they are made of paper with an opening at the bottom where a small fire is suspended;
- Helium balloons: made of latex or foil, inflated with helium gas and typically 25cm to 30cm in height. Larger balloons, often used for commercial or advertising purposes are not within the scope of this report.

To gather evidence, the project team carried out a desk-based literature review and telephone interviews with key stakeholder groups.

The aim of the literature review was to identify and critically appraise evidence on the impacts of sky lanterns and helium balloons on livestock health and welfare and the environment. An online scientific research database was used to identify peer-reviewed journals. In addition, non-scientific literature was reviewed from the popular farming press and from national, regional and local news websites. Material from key lobby organisations and special interest groups was also appraised. The focus of the review was primarily on England and Wales, but additional evidence was collected from other EU Member States, particularly where a ban or restriction on the use of sky lanterns and mass release of helium balloons has already been instigated.

In preparation for the telephone interviews, an official letter from Defra and the Welsh Government was sent to interested parties (a total of 92 recipients), encouraging them to contact the project team if they wished to provide evidence. A structured telephone interview form was designed and finalised in agreement with Defra and the Welsh Government. A second form was developed specifically for use with representatives of the sky lantern and helium balloon sectors, to enable additional information to be collected on market size, trends and the value of these products in England and Wales. Overall, 10 stakeholders gave evidence via a telephone interview and 23 provided written information following an initial telephone contact.

The results of the desk review and the telephone interviews were summarised in a matrix format. A number-based scoring system was used, so that data were assessed for independence, reliability and robustness. In total, over 150 references were considered but only 74 of these were eventually selected as evidence relevant to this study. Seven potential impacts were reviewed and for each, the evidence collected was considered separately for

sky lanterns and helium balloons. The main conclusions in relation to the present situation in England and Wales are as follows:-

1 Risks to livestock and animal health (including marine animals)

Anecdotal reports and media coverage suggest widespread concern from farming groups and others over the impacts of sky lanterns on the health and welfare of livestock and horses. However, the evidence reviewed indicates that the number of cases reported each year of animals affected through panic and fright and of ingestion of sky lantern debris is very small. It is recognised that there may be a significant level of under-reporting and that some businesses may be more vulnerable if they are close to and downwind of an event location. On the basis of the evidence presented, it is difficult to conclude that the overall impact is anything other than of minor significance.

The main concern regarding helium balloons is in relation to ingestion by animals. Whilst there may again be a significant level of under-reporting, the current evidence indicates that the impact is very small and confined to only isolated incidents.

Any harm to marine life often goes unseen, given the inaccessibility of habitats. More detailed diagnosis and improved recording of land-based incidents in future would enable the extent of the risks to be more accurately quantified.

2 Fire risk (sky lanterns only)

Incidents in which sky lanterns were said to be directly implicated in starting fires have been reported from a variety of sources, including the Chief Fire Officers Association (CFOA). Given that any of these individual incidents has the potential to cause significant disruption, loss of property and risk to human and animal life, the project team has concluded that fire risk associated with the use of sky lanterns is significant. Further consideration is required regarding potential mitigation options, which should consider both the *use* and the *design* of sky lanterns. Whilst some manufacturers have sought to improve sky lantern design and thus reduce the associated fire risk, others have been less proactive.

3 Impacts on the environment, littering on land and at sea

The project team concluded that the contribution of sky lantern debris to overall environmental littering is small and less significant than potential fire risks and risks to aviation and coastal rescue services. However, the localised effects of littering can be large in certain areas. Recent surveys have enabled evidence to be collected in relation to litter from helium balloons and from these the project team has again concluded that this is only of minor significance. Speed of degradation of balloon debris is an important factor and the currently-available evidence on the rate of latex degradation is considered inconclusive. Clarification would provide useful evidence of the extent to which balloon litter is likely to contribute to the overall environmental impact.

4 Risks to aviation

The Civil Aviation Authority (CAA) has provided quantifiable evidence of 48 incidents reported to be due to sky lanterns and helium balloons between 2001 and 2012, with sky lanterns accounting for 40 of these and only four of the remaining eight being due to small helium balloons (the focus of this report). When airborne, sky lanterns pose a safety risk to aviation due to possible ingestion into engines. When aircraft are on the ground, sky lantern debris can pose a risk to taxiing aircraft and cause delays to take-off and landing. CAA guidelines state that sky lanterns should not be released within 10 nautical miles of an airfield, but it is unlikely that the casual user is aware of this. Furthermore, there is an inconsistency between these guidelines and typical product guidance provided with sky lanterns. We conclude that there is a clear need for better consumer information from suppliers that is consistent with CAA guidelines.

The risk to aviation from helium balloons is due to aircraft manoeuvring to avoid them. Mass release of balloons is seen as a potential problem but industry codes of conduct stipulate the need for compliance with CAA guidelines. No information was presented to the project team to suggest that additional control measures are needed.

5 Risks to coastal rescue services

The project team has concluded, on the basis of well-documented evidence received that sky lanterns pose a significant risk to the proper and effective operation of coastal rescue services. The risk is due to sky lanterns, particularly when **red** sky lanterns are deployed, being mistaken for distress flares. It is concluded that the most practical mitigation to reduce the risk of false call-outs would be the introduction of a voluntary ban on the sale of **red** lanterns. Data from the UK Maritime and Coastguard Agency (MCA) indicates that the number of false call-outs likely to have been caused by sky lanterns increased to a peak in 2010. Incidents in subsequent years have been lower. No evidence has been found of any adverse impacts of helium balloons on coastal rescue services.

6 Risks to consumer safety

There is very little evidence to link either sky lanterns or helium balloons with risks to consumer safety at present. This is in marked contrast to the well-documented risks associated with fireworks.

7 Helium resources (helium balloons only)

Public concerns over the possible depletion of helium reserves to inflate balloons are countered by industry insistence that the helium is sourced from recycled gas previously used in the medical industry, subsequently mixed with air. It has not been possible to make an informed assessment of the impact on helium reserves, but widely-reported increases in the market price of helium may have a self-limiting effect on non-essential uses, including balloon filling, in the future.

The Sky Lantern and Helium Balloon Sectors

The sky lantern sector does not have a dedicated trade body to represent and co-ordinate the activities of suppliers and facilitate sector-wide initiatives. Improved designs which could reduce risks are already widely-available but have not been universally adopted by all manufacturers. In contrast, the helium balloon sector is well-represented by trade organisations and is able to demonstrate considered and tangible evidence of the sector's commitment to minimising risks.

The current annual turnover of the UK sky lantern market is variously valued at between £6m and £16m, based on an estimated average retail price of £2 per unit. There is evidence that the size of the market has recently contracted. The companies supplying sky lanterns tend to be small in terms of the number of employees and it is concluded that there are probably fewer than 100 individuals directly employed within the sector in the UK. The retail value of the UK market for helium balloons was estimated to be around £150m in 2012. Data has been provided on the number of businesses involved and people employed but there may be a degree of duplication and it is not clear that the numbers quoted relate to businesses that are solely engaged with the balloon sector. Nevertheless, this sector is associated with a significant level of economic activity.

2. Introduction and Methodology

2.1 Background

There is increasing concern about the possible impacts of sky lanterns and helium balloons on livestock and the environment. Particular concerns include the perceived risks to animal welfare through ingestion of debris, litter in the countryside, the sea and on the coastline, risks to aviation and impacts on coastal rescue services. Since sky lanterns contain a naked flame, there are additional concerns about the fire risk to buildings, property and crops from uncontrolled landing.

These concerns have been expressed by a wide range of stakeholders, including the farming and aviation sectors, the UK fire and rescue services and charity organisations such as Keep Wales Tidy, the Marine Conservation Society and the RSPCA. Issues relating to sky lanterns and helium balloons have been given media coverage in recent years, particularly in the agricultural press and on television.

To date, much of the evidence presented to Governments in both England and Wales about the impacts of sky lanterns and helium balloons on livestock and the environment has been largely anecdotal in nature and it has been difficult to quantify the risks because of the lack of reliable and robust information.

2.1.1 Working definitions

Sky lanterns: also known as ‘Chinese’ lanterns are small hot air balloons typically used at celebratory or commemorative events. They are made of paper with an opening at the bottom where a small fire is suspended. They are typically 100cm high with a diameter of approximately 60cm.

Helium balloons: a coloured latex or foil balloon inflated with helium gas and sealed at the neck typically used as a children’s toy, party accessory or decoration. They are typically 25cm – 30cm in height. The scope of this report does not include larger balloons used in commercial applications, for example weather balloons and large tethered balloons (often in excess of 5m long) used for advertising purposes.

2.2 Objectives of study

This study was jointly commissioned on 9 January 2013 by English and Welsh Governments in order to establish a robust and dependable evidence base to help inform any future decisions that may be made on sky lanterns and helium balloons, for example restrictions on sale and / or use.

Overall, the study aimed to identify and assess the risks associated with sky lanterns and helium balloons to livestock health and welfare, the environment (with particular reference to litter), fire risk, damage to marine life and consumer safety.

In particular, the key objectives of the project were as follows:

Objective 1

To gather evidence, through a desk-based literature review and telephone interviews with key stakeholder groups (as listed in 2.3.2).

Objective 2

To evaluate the evidence gathered in Objective 1, develop a robust and in-depth evidence base on the impacts of sky lanterns and helium balloons and draw conclusions as appropriate. This will help inform the Government's response to any call for action in England and/or Wales.

Objective 3

To prepare and deliver a final report in English with an Executive Summary translated into Welsh.

2.3 Methodology

The study was carried out during January to April 2013 and the approach is set out below. Table 1 summarises the timing of key inputs:

Table 1 Overview of key project inputs

Input	Key Dates 2013
Project start date	9 January
Project inception meeting with Defra, WG	11 January
Introductory letter sent out to stakeholders	15 January
Follow-up letter to stakeholders	4 February
Completion of structured telephone interview form	30 January
Undertake literature review	4 February to 21 March
Carry out stakeholder interviews	11 February to 5 March
Analysis and report drafting	26 February to 12 April
Meeting with Defra, WG to discuss preliminary findings	8 March
Preparation of first draft report	15 March
Preparation of final report	16 April

Objective 1- Evidence Gathering

2.3.1 Desk-based literature review

The aim was to identify, review and critically appraise evidence on the impacts of sky lanterns and helium balloons on livestock health and welfare and the environment, with particular reference to littering and damage to marine life. The scope of the review included peer-reviewed journals and grey literature, i.e. non-scientific literature websites such as those of the popular farming press, and national, regional and local news websites. Material from the key lobby organisations and special interest groups was also reviewed.

The focus for the literature review was primarily on evidence relating to England and Wales, but reference is also made to evidence from other EU Member States where a ban or restriction on the use of sky lanterns and mass release of helium balloons has already been instigated.

Key references that have been assessed include:

- Scientific literature from research databases;
- General position statements released by local authorities;
- Farming industry related sources such as: National Farmers Union (NFU), Women's Food and Farming Union (WFU), Farmers Union of Wales, Farmers Guardian, Farmers Weekly;
- Government agency sources, such as Environment Agency, Food Standards Agency, Animal Health and Veterinary Laboratories Agency (AHVLA);
- Key association publications e.g. Local Government Association, Country Land and Business Association (CLA), Chief Fire Officers Association (CFOA), Civil Aviation Authority (CAA); and
- Local/regional news articles.

To carry out the scientific section of the literature review, the online scientific research database 'Scopus' was initially used. Other research databases were used at the discretion of the project team to give a wider overview of available literature. The review included a list of search terms including (but not restricted to), 'sky lanterns OR Chinese lanterns OR helium balloons AND mass release, litter, environment, fire, crop damage, aviation, human health and livestock health and welfare'. The review also included a search on the effects of other litter-based hazards to livestock and the environment using search terms including (but not restricted to), 'fireworks and plastic bags'.

2.3.2 Telephone interviews with key stakeholders

The aim was to seek information and evidence of impacts in relation to helium balloons and sky lanterns from a range of different stakeholders, including suppliers, relevant authorities and other sectors which may be affected.

Planning and delivering the telephone interviews involved a number of steps:

a) Preparation of an official letter by Defra and the Welsh Government, dated 15th January 2013 (Appendix 1). The objective was to inform interested parties that the project was underway and that they might be contacted by ADAS to get their views on the subject. The letter was sent by Defra and the Welsh Government, to a total of 92 recipients using existing key stakeholder lists held by them under the following categories:

- Local authorities in England and Wales;
- Veterinary and farming groups, e.g. the British Veterinary Association (BVA) and National Farmers' Union (NFU);
- Fire Services and HM Coastguard;
- Charities, for example Marine Conservation Society (MCS), Keep Wales Tidy (KWT), RSPCA, RSPB;
- Sky lantern and helium balloon suppliers and distributors;
- Other government departments with a related interest e.g. Business Innovation and Skills (BIS), Department for Communities and Local Government (DCLG); and
- Other EU Member States.

b) This initial letter was followed-up by a further reminder letter (Appendix 2) on the 4th February 2013 to actively encourage interested parties to contact ADAS if they wanted to provide evidence to the project team. A list of interested parties for subsequent interviews by ADAS was compiled.

c) A structured telephone interview form (Appendix 3a) was designed and finalised by ADAS in agreement with Defra and the Welsh Government. A key objective was to ensure that the form captured as much empirical evidence as possible from stakeholders. A second stakeholder interview form (Appendix 3b) was designed specifically for the sky lantern and helium balloon industry. This was sent principally to the recognised associations for the leisure, hospitality and party industries including NABAS (The National Association of Balloon Artists and Suppliers, commonly referred to as the Balloon Association) and BAPIA (The Balloon and Party Industry Alliance).

d) Telephone interviews were carried out between 11th February and 5th March 2013. Stakeholders either provided verbal information by telephone interview or, following a telephone discussion, they completed the interview framework in the form of a written response or provided written evidence as a personal response. Overall 10 stakeholders gave evidence via a telephone interview and 23 provided written information, following an initial telephone contact. The organisations consulted are listed in Appendix 4 and included:

- Farming groups including the National Farmers' Union (NFU), Farming Union of Wales (FUW), Country Landowners and Business Association (CLA), Women's Food and Farming Union (WFU) and the Rural Farming Networks (RFN) across the country;
- Veterinary groups including British Veterinary Association (BVA), British Cattle Veterinary Association (BVCA), British Veterinary Zoological Society (BVZA) and the Goat Veterinary Society (GVS);
- Nominated local authority contacts;
- Nominated fire service contacts such as the Chief Fire Officers Association (CFOA);
- Marine and Coastguard Agency (MCA);
- Aviation authorities including the Civil Aviation Authority (CAA) and selected airports;
- Sky lantern retailers and distributors;
- Helium balloon manufactures and distributors;
- Charities and vested interest groups such as Marine Conservation Society and Keep Wales Tidy;
- Other government departments, including the Department for Business Innovation and Skills (BIS) and the Department for Communities and Local Government (DCLG);
- Selected EU Member States with an interest in the subject, confirmed from the desk review; and
- Insurance companies.

The telephone interviews with stakeholders (excluding those from the supply industry), provided an indication of the number of incidents associated with sky lanterns and helium balloons, their impact on livestock and the environment and whether or not the number of incidents has increased in recent years. They also provided information on possible seasonal, regional and geographic links or trends.

The telephone interviews with the sky lantern and helium balloon industry helped to build a picture of the estimated market size and value of these products in England and Wales, and

to provide background information on trends, trade implications, sales outlets and any regional differences in use.

Objective 2 - Evaluation of evidence

2.3.3. Evidence evaluation tool

The search results from both the desk review and the telephone interviews were summarised in a matrix format (see Appendix 5). To assist the evaluation of data, a number-based scoring system was used so that data were assessed for:

- **Independence** - the quality of the evidence based on the independence of the author;
- **Reliability** - the quality of the evidence based upon the information behind it, i.e. anecdotal or study based; and
- **Robustness** - the quality of the evidence based on whether there are clear causal links with sky lanterns or helium balloons.

Key factors considered included the date published, references cited, accuracy of information and potential bias. In total, over 150 references were considered but only 74 of these were eventually selected as evidence relevant to this study. These are summarised in Appendix 5.1 – 5.7.

Information gathered from the literature review and telephone interviews was used by the project team as the basis for assessing the impacts of sky lanterns and helium balloons. These are set out in Section 3. Where possible, this includes a quantitative assessment, otherwise a qualitative narrative is provided.

3. Review of Impacts

The following impacts were reviewed:

- 3.1 Livestock and animal health (including marine animals);
- 3.2 Fire risk and damage to crops and property;
- 3.3 Impact on the environment, including littering on land and at sea;
- 3.4 Risks to aviation;
- 3.5 Risk to coastal rescue services;
- 3.6 Risk to consumer safety; and
- 3.7 Threat to helium resources.

For each impact, the evidence collected was reviewed separately for sky lanterns and helium balloons and the main findings are set out below. Where appropriate, these impacts were compared to those relating to other devices such as fireworks, as requested in the ITT for this project.

Tables summarising all the information collated are shown in Appendix 5. Where the relevant information was available, numbers and types of incidents reported and recorded have been included.

3.1 Livestock and animal health (including marine animals)

3.1.1 Livestock and horses

Whilst airborne, both sky lanterns and helium balloons have potential to cause welfare issues to animals – most notably by causing panic and fright. On falling to earth, there is the possibility that debris from lanterns and balloons will be consumed by livestock and other animals.

Evidence gathered from articles, reports and personal interviews is collated in Tables 5.1.1 and 5.1.2. When reviewing the evidence collected, it became clear to the project team that there appeared to be a degree of overlap between some individual reports – i.e. the same incident being reported in separate articles and/or being referred to in personal interviews. Simply totalling the number of specific incidents cited may therefore give a false impression as to the true extent of the issue and so for this reason the project team paid particular attention to cross-referencing reports in an attempt to determine the most representative overview.

Sky lanterns

Impacts on animal behaviour

It has been suggested that airborne sky lanterns can create fear and panic in animals as they pass overhead. From the evidence available, this issue was more generally associated with the impact on horses. For example, there were nine anecdotal accounts¹ posted by British Horse Society (BHS) members over the period 2010 – 2013 of horses that were reported to have been ‘spooked’ (although not injured) as a result of sky lanterns flying nearby. ADAS understands that the BHS has a membership of around 75,000 from approximately 550,000 horse owners / careers and an estimated population of almost one million horses and ponies in Great Britain. This evidence from the BHS was the only source that specifically referred to the impact of sky lanterns on animal behaviour although a number other reports alluded to this as a possible outcome of lanterns landing in fields containing livestock.

It is important to note however that this potential impact may not be solely related to sky lanterns. Other flying objects – most notably full-size hot air balloons (although not within the scope of this report) – have been reported anecdotally to cause alarm to horses.

Ingestion of lantern debris

In recent years there have been reports of livestock or other animal loss, including cattle, horses, sheep and goats as a result of ingestion of parts from sky lanterns. This could occur either as a result of ingestion of lantern debris left on the field or through ingestion of wire or bamboo fragments in forage, due to lantern debris being picked up in forage harvesting equipment. The possible consequences of sky lantern ingestion (as highlighted by the sources in each case), include: penetration of the reticular/rumen wall, penetration of the heart, initiation of infection within the chest cavity, rupture of an abdominal blood vessel and development of chronic localised peritonitis, causing further chronic digestive problems.

The most reliable evidence of wire ingestion being the cause of animal death is that provided by post mortem examination by a veterinary surgeon and a number of such cases are cited in Table 5.1.1 and 5.1.2. Establishing a clear link between the wire recovered on post mortem and the source (in this case sky lanterns) is problematic and has been largely done

¹ www.horseaccidents.org.uk

on the basis of wire gauge. That is, lantern wire is much higher gauge (thinner) than other potential sources such as fencing wire. Although the technique is not infallible, the evidence suggests that cases reported via post mortem can be used as an accurate reflection of animal losses due to ingestion of sky lantern wire debris.

The evidence presented to the project team of specific cases of injury or death to livestock and horses came from 11 separate sources (two press articles and nine personal interviews) and spanned the period 2010 to 2013. Of these reports, a total of 16 cases were cited of injury or death to cattle, sheep or horses which were attributed to wire from sky lanterns. Twelve of these cases (75%) were reported to have been confirmed by post mortem examination. Whilst the latter is helpful in establishing the veracity of the majority of the reports in question, it is important to note that the total number of cases actually reported to the project team was very small. It is possible however that there may be a significant level of under reporting by veterinary surgeons and others.

In recent years there have been attempts by some manufacturers to produce lanterns that are less likely to lead to ingestion problems for livestock. For example, lanterns are now available where the wire used to hold the fuel cell in place has been replaced with string or similar material. Similarly, some designs now use bamboo instead of wire to provide structure to the lanterns. However these design enhancements have not been universally introduced and in the case of bamboo, it has been suggested that sharp splinters may be produced if the bamboo is chopped-up in forage harvesting equipment. These may pose risks to livestock health and welfare, although there were no reported incidents in the evidence reviewed by the project team.

Another approach to addressing the problem of ingestion, as reported by the BBC (February 2013), is to insert a magnet into the stomach of cattle. The rationale was that the magnets would attract wire fragments as well as other metal debris such as nails and fencing materials, thereby preventing damage to the stomach wall. It is not however clear whether this approach has been effective or not.

In summary, despite what appears to be widespread concern over behavioural impacts and possible ingestion, the evidence provided to the project team indicates that the number of cases reported each year (whether anecdotal or supported by post mortem) is very small in the context of the wider livestock population. It is however recognised that there may be a significant level of under-reporting at present and that the true impacts may be much higher. Notwithstanding the possibility of under-reporting of incidents, on the basis of the evidence presented here it is difficult to conclude that the overall impact on the livestock sector of sky lantern use is anything other than of minor significance. However, local effects may be important for some individual businesses, e.g. if downwind from an event location.

Helium balloons

The main health and welfare concern associated with helium balloons is the risk of animals choking (and potentially dying), following ingestion of balloon debris.

Only four reports were provided to the project team (two press/TV reports and two personal communications) and of these, only two reports actually cited cases which resulted in choking and/or death of the animal. One report (verified by post mortem) involved choking and death of a pedigree cow and the second (anecdotal) related to choking in a goat, although it is unclear whether this resulted in the death of the animal concerned.

Whilst there may be a significant level of under-reporting (as was also noted above for sky lanterns), the project team has concluded from the evidence provided that the impact of helium balloons on livestock and horse health and welfare is very small.

3.1.2 Marine animals

Concerns relate to direct ingestion of sky lanterns or helium balloons by marine animals and also their potential contribution to marine debris – both in water and along the shoreline. The main sources of information were peer-reviewed journals, news articles and information provided by environmental organisations. A total of 18 reports were reviewed and these are shown in Appendix 5.1. There was some specific mention of sky lanterns and balloons in these, although the information was more concerned with plastic debris in general.

It is clear that, given the inaccessibility of habitats, any harm to marine life, from whatever source often goes unseen and cases can usually only be recorded when marine life is washed ashore and the impacts can be seen.

Sky lanterns

There were no reported incidences of sky lanterns affecting the health and welfare of marine life. It is unclear whether species of marine life would ingest parts of a sky lantern if it landed nearby.

Helium balloons

There has been one recorded death in the UK, this related to a juvenile green turtle near Blackpool in 2001. Post mortem examination revealed a balloon in the stomach of the animal but this was in addition to other pieces of plastic litter, which makes determining the exact cause of death difficult. No other cases in the UK were reported which resulted in injury or death.

3.2 Fire risk and damage to crops and property

Sky lanterns contain a fuel source that keeps an exposed flame alight, allowing hot air to build up inside the lantern and causing it to float. This flame could pose a fire risk. The project team evaluated 19 separate pieces of evidence – 13 from press articles and TV reports and the remaining six from stakeholder contributions. This evidence spanned the period from 2006 to 2013 and is documented in Appendix 5.2.

Sky lanterns

Sky lanterns float up into the air and remain airborne for as long as they are filled with hot air. Therefore, they should only fall back to the ground when the fuel cell flame is extinguished. In practice, the evidence suggests that this is not always the case, and lanterns sometimes drift back to land whilst still alight. This can be due to inherent design and construction weaknesses and/or to ineffective launching procedures or release in high winds. The result is that the lantern could fall to the ground whilst still alight and could set fire to the canopy – particularly if the lantern is not made of flame retardant material. This could then become a significant fire hazard.

Much of the reported evidence of fire impacts from sky lanterns is anecdotal or reported in news articles, validated in some cases by evidence from the Chief Fire Officers Association (CFOA). The risks are mainly with respect to:

- Fires in agricultural crops;
- Fires in buildings; and
- Wildfires on moorland or similar land.

The most definitive source of evidence from the 19 of those provided to the project team was from the CFOA. They conducted a survey between 2009 and mid 2011 to evaluate the impact of sky lanterns on fire risk incidents, in response to a feature on a BBC television programme. This UK-based study was conducted among 60 fire and rescue services (FRS) and 42 responded (70% participation). Among the findings from this survey were:

- 186 call outs (121 incidents; 65 false alarms) to sky lantern-related incidents, reported by 26 FRSs, representing 62% of those responding to the survey; and
- 26 out of the 42 FRSs that responded had issued warnings on sky lantern use (62%).

The frequency of FRS call-outs thought to be related to sky lanterns was reported to have increased over the period of the survey, with 17 call-outs reported in 2009 and 82 cases in 2011. Whether this was due to an increase in the use of sky lanterns over the period in question or to increased awareness from the public of the potential risks is not certain. In addition, the project team were not able to establish whether there were any seasonal trends in reported cases. It could be that sky lantern releases peak at certain times, such as Halloween, New Year. The issue of sky lanterns is not believed to be a key focus for CFOA at present, and it is understood that they have no plans to conduct any follow up research on the subject.

Fourteen of the remaining 18 reports (from the 19 in total) cited cases where sky lanterns were said to be directly implicated in starting fires in a variety of agricultural and non-agricultural settings. Crop-related damage has been reported to both standing and stored crops and to fields after harvesting. Examples include 10 hectares of standing cereals reported to have been set alight in Oxfordshire in August 2009 (interview) and seven hectares of barley in Oxfordshire set alight in 2010 (literature).

A number of 'wildfire' incidents (un-controlled fire in an area of vegetation) have been reported to be caused by sky lanterns. These include eight fires in Dorset over the period 2008-2011 and an incident in Northumberland, caused by a lantern which took 20 fire fighters four hours to extinguish (according to local press). Wildfires represent a danger to human life and biodiversity (e.g. risks to rare nesting birds in heath and moorland). Concern about wildfires is growing, due to the increasing frequency of extreme weather events such as drought, which leads to drier vegetation that is more prone to ignition.

Because of the risk of double-counting of individual incidents, it is difficult to quantify the exact number of fires or 'near-misses' that may have been attributed to sky lanterns. However, on the basis of the available evidence, an estimated (minimum) of 81 separate events have been identified over the period 2009 to 2013. Given that any one of these individual incidents has the potential to cause significant loss of property and risk to human and animal life, the project team have concluded that fire risk associated with the use of sky lanterns is significant and one that warrants further consideration regarding potential mitigation options.

Discussions with sky lantern suppliers confirmed that they have been working with manufacturers to develop products that are considered to be safer and present a reduced fire risk. This has largely focussed on the increased use of flame retardant materials in the construction of the canopy and the inclusion of non-drip fuel cells. These are now widely (but not universally) available through internet suppliers and other sources and are generally advertised as being 'eco-friendly'. Whilst this development can be viewed as being very positive; further mitigations – mostly associated with *use* rather than *design* still need to be identified and implemented. During discussions with two lantern suppliers a number of possible mitigation measures were suggested. These were:

- Improved user launch instructions indicating wind speeds over which lanterns should not be released (one product guidance note suggests 5mph max).
- Not launching lanterns with damaged canopies, as this will lead to premature landing whilst still alight.

A good example of consumer advice on the use of sky lanterns is included as Appendix 7a. At the present time, there is no single trade body representing and co-ordinating the activities of sky lantern suppliers which means that developing and implementing improved lantern design and/or better consumer guidance is left to the discretion of the individual supplier.

Helium balloons

No incidents of damage to crops or property from helium balloons were reported to the project team.

3.3 Impacts on environment, littering on land and at sea

When sky lanterns and helium balloons fall back to land or on to the sea, they are usually some distance away from their point of release, and they are then generally described as 'litter'. There is a range of evidence on the possible impacts of sky lantern and helium balloon litter on the environment including scientific journals, information released by independent bodies and qualitative information gathered through interview. These have all contributed to the evidence base gathered and are summarised in Appendix 5.3.

The project team reviewed evidence from 11 separate sources (7 literature sources and 4 from personal interviews). The majority of the evidence focused exclusively on the impact of helium balloons (7 out of the 11 reports) which probably reflects the greater concerns over balloon littering, compared to that associated with sky lanterns.

Sky lanterns

The evidence provided in both the literature and from personal interviews was largely anecdotal and in the case of the personal interviews, respondents described sky lantern debris being picked up on a (more) regular basis from horticultural land and from hedges and roadsides. However in both cases, it was not described as being a problem of major significance or concern.

Although specific evidence was not available, it is likely that sky lantern debris will be intermittent and localised and more likely to affect agricultural holdings and wildlife habitats on the fringes of urban areas where release of lanterns is more likely. In addition, littering in a given area would probably be greater following mass release of sky lanterns that subsequently follow the same flight path. This means that farms closer to venues that regularly host events where lanterns are released may be affected more frequently by lantern debris than others in more 'remote' areas.

On the basis of the evidence presented, the project team concluded that the contribution of sky lantern debris to overall environmental littering is small. By comparison, other potential impacts of sky lanterns – most notably potential fire risks and risks to aviation - are of much greater significance.

Helium balloons

Concerns regarding balloon litter *per se* are largely associated with the negative visual impacts to beaches, amenity areas and wildlife habitats, etc. and with the associated clean-up costs. The wider impacts of balloon littering, such as risks to animals, wildlife and marine life, are discussed in an earlier section of this report.

The balloon and party industry organisations including the National Association of Balloon Artists and Suppliers (NABAS), the Balloon and Party Industry Association (BAPIA) and the European Balloon and Party Organisation (EBPA) are aware of the potential impacts of helium balloons as litter. They advocate the use of 100% natural latex balloons for races and similar mass launches, because this is claimed to biodegrade more rapidly than foil (see also Section 4.3) and no ribbon or string attached. Where foil balloons are used (normally for party decorations and as children's toys), it is recommended that these should be attached to a suitable weight to ensure they are not released into the environment.

Evidence of the extent of balloon littering has been drawn from two separate sources. The Marine Conservation Society's 'Beachwatch' survey provides valuable and quantifiable information on balloon litter on UK beaches. This survey is conducted by volunteers on a representative sample of beaches in the UK on the third weekend in September every year. Whilst balloon litter rose from an average of 3.4 items/km beach surveyed in 1996, to a peak of 11.5 items/km beach surveyed in 2007, it has subsequently fallen back in recent years to 9.5 items/km recorded in 2011 (MCS, 2012). In the most recent survey, rubber items as a whole (including balloons, tyres, gloves, etc) constituted 2.3% of all litter, of which balloons made up 0.5%.

Further independent investigation on balloon litter is provided from surveys undertaken by Keep Wales Tidy (KWT) and the Marine Conservation Society (MCS). KWT conduct regular litter surveys within local authority areas of Wales as part of the Local Environmental Audit and Management System (LEAMS). These surveys involve analysing 50 metre sections of randomly-selected adopted highways, representing 8% of the total highways in Wales. In one local authority area in the 2008/09 survey year, balloon litter was found on 17% of surveyed streets. In the 2010/11 survey, balloon litter was found on 1% of all streets surveyed for litter. It is worth noting that the LEAMS survey does not include any green areas such as parks or gardens.

The potential impacts of helium balloon debris have long been recognised, and work by Burchette (1989) suggested that 'latex rubber balloons degrade about as fast as oak tree leaves under a wide range of exposure conditions in the environment including sunlight, weathering, soil, and water exposures'. Burchette further suggested that from a typical release of 500 balloons, only 10% would fall back to earth as litter and as such the density of balloon fall would be no greater than one balloon in over 15 square miles. This evidence has been used previously to suggest that latex balloons do not pose a significant threat to the environment in terms of littering. The evidence provided by Burchette has since been evaluated by KWT in a policy paper (2008). The critique raises concerns over the methodology of the original work and casts doubt over the speed at which balloon litter degrades. The latter finding was supported by work done by the MCS, which suggests that even 'biodegradable' latex balloons can take several months or even years to break down.

On the basis of the evidence presented, there have been some increases in balloon litter in recent years. However when compared to other forms of litter (e.g. plastic bags, etc.), the number of items found is relatively small, with balloons making up less than 1% of all litter found. As a source of litter *per se*, the project team has concluded that helium balloons are therefore of only minor significance. Speed of degradation of balloon debris is important both from the perspective of littering but more particularly from the standpoint of risks to animals,

wildlife and marine life. Currently available evidence on speed of latex balloon degradation is considered inconclusive, in view of the doubts cast by KWT on the work reported by Burchette.

Marine debris

Evidence from outside the UK suggests that the presence of marine debris can lead to movement of invasive species into new marine ecosystems which could in turn cause potential damage to the species already established there (Derraik *et al.*, 2002). Marine debris may also have an impact on parts of delicate underwater habitats such as coral reefs that are critical to the survival of many species. Although this is not directly applicable to UK seas, it is possible that marine debris of any kind could potentially have a negative impact upon marine ecosystems.

Because much of the focus of the available information was on the effects of plastics and other marine debris in general, it is difficult to draw robust and specific conclusions for sky lanterns and helium balloons. For example, Schuyler *et al.* (2012) highlighted studies where over 267 species worldwide have become entangled or have ingested marine debris, theoretically including debris from sky lanterns and helium balloons. A Belgian study by Cuykens *et al.* (2011) reported that around 95% of the corpses of all northern fulmars found along the Belgian beaches contained plastics, likely to have originated from domestic and commercial sources. Party balloons were described as commonly floating litter in the survey area, and while no specific mention was made of sky lantern debris, this could not be entirely ruled out.

Overall, the contribution of sky lanterns and helium balloons to marine litter is not well documented, although the evidence suggests that any contribution to the overall mix of marine and shoreline litter material, which surveys indicate has a high plastic content, is likely to be small.

3.4 Risks to aviation

Evidence on the possible risks to aviation from sky lanterns and helium balloons was compiled from a number of sources including news articles, scientific journals and information released by the Civil Aviation Authority (CAA) and individual airports. These have all contributed to the evidence base and are included in Appendix 5.4.

According to the CAA, sky lanterns pose a safety risk to aviation due to possible ingestion into engines whilst airborne. On the ground, sky lantern debris can delay departures or potentially cause damage to aircraft. The risks from helium balloons are considered to be from manoeuvring aircraft to avoid concentrations of these objects; ingestion into an engine is considered to be unlikely to cause damage. The CAA maintain that the risks from sky lanterns and helium balloons, although small, should be taken into account when making an assessment for any release (see CAA, 2011 '*Operation of directed light, fireworks, toy balloons and sky lanterns within the UK*').

The CAA has provided quantifiable evidence to the study. This is in the form of Mandatory Occurrence Reports (MORs) filed by airports with the CAA. The scope of these includes light aircraft, helicopters and large passenger planes. The objective of the MOR scheme is to contribute to the improvement of aviation safety by ensuring that relevant information on safety is reported, collected, stored, protected and disseminated. Any incident which endangers an aircraft, or which, if not corrected, would endanger an aircraft, its occupants or

any other person should be reported to the CAA as an MOR². MORs are filed by all airports/airfields by individual operators although they tend to differ in their level of detail and description of the incident reported.

Overall, there have been a total of 48 MORs involving sky lanterns and helium balloons reported by the CAA over the period from 2001 to 2012. Of the eight MORs involving helium balloons, four were confirmed as being attributed to toy balloons, as opposed to weather balloons or similar (the latter being outside the scope of this study).

Sky lanterns

Since 2001, 40 MORs have been filed with the CAA in relation to incidents involving sky lanterns (see Appendix 5.4). Some 18% of these related to sky lanterns passing over or near an airfield, 54% were in relation to the recovery of debris on the airfield, whilst the remaining 28% were incidents of sky lanterns passing close to an aircraft in flight. Incidents relating to lantern debris on runways and taxiways are classed in CAA reports as 'Foreign Object Debris' (FOD).

Reports relating to sky lanterns passing close to aircraft in flight mainly relate to take-off or the final approach to landing. None of the MORs reported any actual collisions between aircraft and lantern(s). Incidents of sky lanterns passing over or near an airfield were simply recorded as 'observations'.

The CAA recognises sky lanterns as a specific risk to aircraft safety whether they are airborne, or as FOD on an airfield. Given that the MOR is an incident which could endanger the safety of an aircraft and its passengers, it follows that all 40 MORs involving sky lanterns are deemed to be evidence of a potential risk to aircraft safety. To reduce the risk of sky lantern incursions, CAA guidelines³ state that sky lanterns should not be released within 10 nautical miles of an airfield. Whilst these requirements are covered in the '*Operation of directed light, fireworks, toy balloons and sky lanterns within the UK*' (CAA), it is unlikely that the casual user of sky lanterns will have access to this document and any guidance they may have received will inevitably be that provided with the lantern when purchased.

The number of MORs linked to sky lantern use also indicates that the 10 mile separation distance is not being met consistently for lantern release. This may not however reflect blatant disregard of CAA guidance by consumers because current product guidance provided with sky lanterns (Appendix 7a) states that CAA permission should be sought if lanterns are to be released within '5 miles of an airport or landing strip'. This apparent mismatch between CAA guidelines and instructions provided by lantern suppliers clearly points to the need for better consumer information from suppliers that is consistent with the CAA position.

² Information on MORs can be found in [CAA \(2011\) Mandatory Occurrence Reporting Scheme:
http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=214](http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=214)

³ Sky lanterns and toy helium balloons are not specifically covered within the Air Navigation Order 2009 and therefore minimum distances between launch of lanterns or balloons are *guidance* and not legal requirements. However all activities of this type are likely to be covered by paragraph 137 that deals with 'Endangering safety of an aircraft'. This states that 'a person must not recklessly or negligently act in a manner likely to endanger an aircraft, or any person in an aircraft'.

Helium balloons

The release of helium-filled toy balloons near airfields is deemed by the CAA to present a risk to aircraft safety, hence it is covered within the CAA guidelines '*Operation of directed light, fireworks, toy balloons and sky lanterns within the UK*'. The risks relate specifically to the risk of pilots having to manoeuvre aircraft to avoid concentrations of balloons. Although ingestion into aircraft engines is recognised as a possible outcome of contact between helium balloons and aircraft gas turbine engines, the CAA do not consider this to present a risk to safety.

MORs filed since the year 2000 confirm a total of eight incidents related to helium balloons. Of these, four are described as children's toy balloons (within the scope of this project), two are defined as 'met balloons' (outside the scope of this project) and for the remaining two incidents the type of helium balloon is not described. All of these are summarised in Appendix 5.4. The four events involving toy balloons all related to airborne incursions, the incidents involving collision with the aircraft and/or ingestion into an engine. However none of the events resulted in damage to aircraft.

Whilst the number of MORs related to helium balloons since 2000 is very small in number, mass release of balloons is recognised as posing a particular risk to aviation safety and releases near to airports (within 5 nautical miles as stipulated by the CAA) 'should be restricted'. Industry codes of conduct for balloon releases stipulate the need for compliance with CAA guidelines for balloon releases (BAPIA), or that the CAA should be consulted for all balloon releases over 5,000 balloons, or any release near to an airport (NABAS). Given the very small number of MORs reported in relation to helium balloon incursions, it would appear that CAA guidelines and supplier advice is largely being followed, whether inadvertently or otherwise.

On the evidence presented to the project team, it is concluded that current measures to manage the release of helium balloons seem to be largely effective in minimising collisions with aircraft and incursions onto airfields. Larger numbers of incidents involving sky lanterns may indicate a lack of adequate and appropriate guidance to consumers on safe release and this is an area that warrants further consideration.

3.5 Risks to coastal rescue services

Sky lanterns

The risks to coastal rescue services from sky lanterns arise from them being incorrectly identified as distress flares, particularly when **red** sky lanterns are deployed. This can trigger false call-outs, diverting essential emergency resources away from real emergencies and placing emergency services personnel at unnecessary risk. In addition, there can be significant financial costs associated with lifeboat launches and/or helicopter deployment and from diversion of merchant or navy vessels to provide emergency support.

The project team received nine separate responses on this subject, from a variety of sources most notably the Royal National Lifeboat Institute (RNLI), and the UK Maritime and Coastguard Agency (MCA). This information is summarised in Appendix 5.5. The MCA, responsible for HM Coastguard, provided information on the numbers of 'incidents' likely to be caused by sky lanterns. This is shown in Table 2 below.

Table 2 **The number of reported incidents likely to have been caused by sky lanterns**

Year	Number of incidents
2007	7
2008	49
2009	347
2010	754
2011	315
2012	207

Source: UK Maritime and Coastguard Agency

The incidents reported above range from those where the emergency operator has determined that the (supposed) red flare was actually a sky lantern and aborted any further action, to those where full deployment of search and rescue (SAR) vehicles was initiated. Following a peak number of incidents in 2010, numbers appear to have declined over the period 2011-2012.

Evidence from interviews and product information suggests that red distress flares typically burn for around 40 seconds, whereas sky lanterns may be visible for a much longer period. In theory, this should make it easier to differentiate between the two. However correct identification may be dependent on prevailing weather conditions. For example, a red sky lantern that disappears into cloud could more easily be misinterpreted for a distress flare than a lantern that stays visible in clear skies.

Whilst most of the evidence presented relates to sky lanterns causing false call-outs, the converse is that real distress flares may be 'ignored' because the observer mistakes them for sky lanterns and fails to report the incident. In terms of risk to human life, this scenario is of greater significance than the risk of false call-outs. This risk is mitigated to some extent at sea, because the 'default' position under international maritime law is for ships at sea to divert to investigate any form of red distress flare. The greater risk is in relation to an incident which is just off-shore and spotted by an individual on land.

The cost associated with false callouts includes the time taken by the operator to answer a call, through to deployment of lifeboats or helicopters. Costs for deploying vehicles range from £1,000 - £2,000 per hour for a lifeboat to between £7,000 and £10,000 per hour for an SAR helicopter to be deployed (excluding manned team costs). There can also be other costs associated with ships diverting to respond to a potential distress call. This economic loss can be substantial if for example, the ship fails to reach port when expected.

The project team concluded, on the basis of the well-documented evidence available, that sky lanterns do pose a significant risk to the proper and effective operation of coastal rescue services. This is based on the relatively large number of documented incidents where sky lantern use has given rise to false call-outs (although numbers may be decreasing) with associated impacts to human safety and financial costs of deploying rescue services.

Perhaps the most obvious mitigation to reduce the risk of false call-outs would be the introduction of a voluntary ban on the sale of red lanterns. Whilst this may not solve the problem entirely, it should bring about a significant reduction in false alarms. Increasing consumer awareness of the potential risk would undoubtedly help to reduce risks further irrespective of lantern colour. Some sky lantern suppliers already provide detailed consumer advice on the release of lanterns within five miles off the coast (see Appendix 8). However, given the number of cases still being recorded by the MCA, the indications are that this

information is not being provided universally to consumers and/or the guidance is not implemented consistently by those launching lanterns

Helium balloons

No evidence has been found, either through a literature search or by interview, of any adverse impacts on coastal rescue services from helium balloons.

Comparative impact of fireworks

Fireworks being discharged in coastal areas clearly have the potential to initiate false call-outs of the emergency services. The project team were not, however, able to gather specific information on the numbers of these false call-outs and so are unable to comment on the scale or extent of this particular risk or compare it directly to the number associated with sky lanterns.

Notwithstanding the lack of empirical information in this report, the fact that fireworks are well recognised as a particular risk has led to a variety of mitigation measures (both voluntary and statutory) being introduced. Amongst the most important are the requirements set out in the Firework Regulations 2004, SI no.1836. Included in these are statutory restrictions on when fireworks can be purchased and discharged. The most significant clause (paragraph 7) specifies a ban on firework use during 'night hours' (11pm to 7am) except on certain days of the year, such as November 5th and the Chinese New Year. Certain exceptions to this requirement are allowed, mainly in respect of professional operators and local authorities. In most situations, these requirements should significantly reduce the risk of false call-outs.

Without being able to directly compare the number of false call-outs associated with sky lanterns and fireworks, it is difficult to form a view as to whether statutory controls on sky lantern discharge (equivalent to those for fireworks) might be appropriate. However, the project team concluded that the most appropriate and proportionate approach to reducing this particular risk in the case of sky lanterns would be a voluntary ban on use of red lanterns and better consumer guidance.

3.6 Risks to consumer safety

Sky lanterns

There is very little evidence linking sky lanterns and helium balloons with risks to consumer safety. The project team were only able to identify one account from the BBC (2010) where a child suffered burns as a result of dripping hot oil and wax whilst standing underneath a lit sky lantern prior to release. The child suffered no lasting injuries.

The potential risk to human safety from a naked flame is recognised by the project team, emphasising the importance of carefully-worded product safety guidelines. Appendix 7a provides an example of instructions which stress the need for adults to supervise handling of the lantern and ignition of the fuel cell. Some sky lantern retailers have also developed non-drip fuel cells for lanterns for safer lighting.

Overall, the risk to consumer safety as a result of direct contact with sky lanterns is minimal. This is in marked contrast to the well-documented impacts of firework use on consumer safety which are summarised below.

Helium balloons

The project team were unable to find any reports impacts on consumer health caused by helium balloons.

Comparative impact of fireworks

The dangers of fireworks are well-recognised and have been extensively reported in the media and a variety of journals over many years. Appendix 5.6 includes a small number of references on the subject. Anecdotal evidence presented by BBC News in 2000 suggested that almost 830 people in Britain were treated for firework injuries in 1998. In 2005, a report by the Royal Society for the Prevention of Accidents stated that some 990 injuries were attributable to fireworks.

Over time, successive governments have introduced legislation⁴ in an effort to reduce the risks to consumer safety and to property posed by the use of fireworks, for example:

- The Firework Regulations 2004
- Manufacture and Storage of Explosives Regulations 2005
- The Pyrotechnic Articles (Safety) Regulations 2010

Whilst there is clear justification for legislative intervention in the case of firework use, by contrast, the evidence suggests that the risks to consumer health from the use of sky lanterns (and helium balloons) are so small as to make a similar approach inappropriate and unnecessary.

3.7 Helium resources

Helium is a finite resource which is used in a variety of medical, scientific and industrial applications. One of the main medical applications is in MRI scanners, although the largest consumer of helium is reported to be NASA who use it in 'huge quantities to purge potentially explosive fuel from its rockets'⁵.

There are an increasing number of reports in the media that warn of the depletion of helium reserves and the risks that this will pose to its future use in MRI scanners (for example). In addition, the use of this valuable finite resource in toy and party balloons has been widely questioned. It has been reported that the use of helium resources for filling party balloons constituted up to 10% of global helium consumption in 2009 (Wothers, Royal Institute Christmas lectures, 2012). There have been calls for party balloons to use hydrogen, rather than helium; whilst hydrogen is cheaper and more buoyant, helium is preferred because it is non-flammable and therefore safer.

In response to these concerns, the balloon industry has recently insisted that the helium used in party or toy balloons is recycled gas previously used in the medical industry and subsequently mixed with air. For this reason, the industry describes the material as 'balloon gas' rather than helium.

⁴ Further information is available at <https://www.gov.uk/fireworks-the-law>:

⁵The Independent, August 2010: <http://www.independent.co.uk/news/science/why-the-world-is-running-out-of-helium-2059357.html>

The project team has not been able to obtain a total figure for the use of 'balloon gas' by the UK industry, to compare with helium use in other applications. It has not been possible therefore to make an informed assessment of the impact on helium stocks from its current use in toy and party balloons. However, widely reported increases in the market price of helium, coupled with forecast reductions in availability may have a self-limiting effect on its use in 'non-essential' applications in the future.

4. Sky lantern and helium balloon industry

4.1 Consumer base and structure of the industry

Sky lanterns

Sky lanterns are widely-available via the internet (a simple internet search provided some 1,100 links). Sky lanterns are also supplied through individual retailers, ranging from event and party suppliers to budget 'pound' stores and similar outlets. They tend to be sold in multiple packs, rather than single units. The project team was not able to determine the relative importance of the two main sources of lanterns, although anecdotal information strongly points towards internet suppliers as being the major source.

As part of this study, five specialist sky lantern suppliers were contacted. Of these, three companies provided information to the project team. Two of the companies sold lanterns solely via the internet, the third sold products to stores and wholesalers in addition to website sales. A review of the respective websites of these three businesses revealed that one company sold sky lanterns in addition to other products, whereas the other two traded solely in sky lantern products. The companies described their main customer base as largely being individuals purchasing sky lanterns for particular events.

The sky lantern market is a relatively new one in the UK, and the industry is not currently represented by any particular bodies. Theoretically, sky lantern sellers would be eligible to join organisations such as the Balloon and Party Industry Alliance (BAPIA) and the Balloon Association (NABAS) as they are part of the 'party industry' but evidence suggests that few have done so.

Helium balloons

Helium balloons are used at individual parties and events, for business purposes (e.g. product advertising), and by charities raising awareness or funds.

The UK has an established market for helium balloons and the industry is well represented by member-based associations that respond to issues and lobby on behalf of members. Helium balloons are sold by a range of retailers, from large high street chain stores to individual 'party planners' who provide balloons as part of their overall service. There are a number of other businesses that rely (at least in part) on the helium balloon sector for a portion of their revenue. These include suppliers of helium ('balloon') gas and companies that print designs onto balloons.

4.2 Industry response to addressing safety, environmental and other impacts

Sky lanterns

Findings from this study indicate variable levels of awareness among sky lantern manufacturers and suppliers of the impacts of these products on health and safety and the environment.

The project team are aware of efforts made by some sky lantern suppliers to respond to environmental concerns linked to their products. For example, one of the companies surveyed worked with representatives of the NFU to respond to the impact of lanterns on livestock health. After dialogue, the company removed metal wire from all its lanterns and replaced it with fire retardant string.

The lack of a specific trade association for the sky lantern sector means there is no central and co-ordinating body to represent the interests of suppliers or to co-ordinate the development and implementation of standards of manufacture and consumer guidance across the sector. In practice, this is left to individual companies.

Those who are actively attempting to make their products more environmentally-friendly report frustration that cheaper lanterns (which incorporate metal wire for example) create a poor image for the industry. Lantern sellers on the internet often state that their products are '100% biodegradable', although the exact meaning of this is not precisely defined, and the time taken for them to degrade is not quantified.

Helium balloons

Helium balloon industry responses to environmental issues have been largely undertaken by the representative industry associations, BAPIA and NABAS in the UK and by the European Balloon & Party Council (EBPC) on a European scale. Responses to concerns on animal health and welfare, safety risks and environmental issues appear to have been addressed much more effectively than in the sky lantern sector.

These industry associations have produced codes of conduct, or best practice guides for their members. For example, all members of the EBPC have to comply with European safety measures with regard to:

- Labelling and safety warnings
- The Toy Safety Directive 2009/48/EC
- British Standard for Toy Safety BS EN71, now harmonised within European standards
- EU National regulations and environmental standards⁶

BAPIA also provide comprehensive guidance to members via their code of practice⁷ which covers all aspects of responsible deployment of balloons.

⁶ Taken from 'Report on Helium Balloons in the UK and European Markets, compiled by The European Balloon and Party Council' (2013)

⁷ <http://bapiaonline.com/codeofpractice>

The project team concluded that the helium balloon sector is well-represented by trade associations that demonstrate considered and tangible evidence of the sector's commitment to minimising all forms of risk from the use of toy and party balloons. What was less clear however was how effectively the measures contained in the respective codes of practice are being communicated to the final user.

4.3 Industry regulation of product quality

Whilst no specific product safety standards exist for sky lanterns or helium balloons, European legislation such as the Toy Safety Directive (2009/48/EC) and British Standard for Toy Safety EN71 provides overarching safety requirements and the guiding principles can be applied. Sky lanterns and helium balloons must also comply with the General Product Safety Regulations 2005. This means that they must be 'safe' when used 'normally'. A meeting of the European Commission Consumer Safety Network (2011) concluded that there was little support from major stakeholders in Germany, UK, France, Austria or Spain for the development of a European standard for sky lanterns.

To demonstrate compliance with EU toy safety legislation, a CE mark is affixed to a product by a manufacturer, importer or authorised representative. A leading sky lantern retailer in the UK reported to the project team that they had recently held discussions on this issue with their local Trading Standards department. They were advised not to use the CE mark for sky lanterns since they are not considered to be a toy, although they may be tested to a part of the Toy Safety Standards.

Sky Lanterns

Of the three sky lantern retailers interviewed, two indicated a desire to see increased regulation of product quality in order to raise standards, improve safety and eliminate or reduce risks.

Specific design issues that were cited as having scope for improvement include the use of fireproof paper / improved flame resistance and better fuel cells. Whilst improved designs of sky lantern are already widely available that incorporate these features, these have not been universally applied by manufacturers or specified by all UK suppliers. It is difficult to see how consistent standards of construction and consumer guidance will be achieved without concerted and collective efforts by UK suppliers, mediated through a representative trade body.

Helium balloons

Because there are fewer risks associated with helium balloons, issues of product design and quality are generally less relevant than they are with sky lanterns.

The key industry bodies (see Section 3.3) are however consistent in their requirement that all helium balloons intended for release should be manufactured from 100% natural latex since this is claimed to biodegrade more rapidly than non-latex equivalents. The industry bodies are also consistent in their requirement that foil balloons should not be released, because of the long term littering and environmental impacts of the foil material.

4.4 Market size, value and numbers employed

Sky lanterns

The market value of sky lanterns has been estimated from consultations with the three companies that provided information to the study. All evidence suggests that sky lanterns are manufactured overseas (usually the Far East), and then imported to the UK, where they are marketed and distributed.

Of the three companies interviewed, two were able to provide detailed sales figures, both of which suggested a decline in recent years:

- Company 1 has suffered a sustained decline in sales since 2009 (when they started to operate). Their turnover for sky lantern products decreased sharply from £450k in 2009 to £68k in 2012. The company reported a focus on reducing fire and environmental risks and ensuring good quality products;
- Company 2 started operating in 2005 and their sales reached a peak in 2010/11 when some 1.56 million sky lanterns were sold. However, in 2011/12 only 1.25 million were sold, which represents a 20% decrease in numbers sold, equivalent to a fall in sales of about £0.6m, based on an average lantern price of £2 per unit.
- Company 3 started operating in April 2010 and reported that they had seen no changes in sales or consumer behaviour since then.

It was estimated by the businesses interviewed that between three and eight million sky lanterns are sold each year in the UK. It should be noted that these sales estimates are considerably in excess of previous figures reported, for example 200,000 lanterns released per year (RSPCA, 2012).

The retail price of sky lanterns are reported to vary from as little as 50p up to £10 per unit. Average retail price however is reported to be around £2 for a 'good quality' lantern. Based on sales figures reported by the three companies interviewed, this would value the annual turnover of the UK market at between £6 million and £16 million based on an average retail price of £2 per balloon. Whilst these estimates vary substantially, they do at least provide an insight into the annual value of the UK market. To put this turnover into perspective, it would be broadly equivalent to that of a busy petrol station at the lower end (£6m) and to a medium size engineering company at the other (£16m).

There is evidence from sky lantern suppliers that the market, having expanded to a peak in 2009/10, has contracted in subsequent years. Whilst this may be purely coincidental, it mirrors the decline in the number of false call-outs reported by the UK Maritime and Coastguard Agency (see Section 3.5). The reasons for the decline in sales are unclear. Increased consumer awareness of the problems caused by sky lanterns, highlighted in press articles and through campaigns has been cited as a possibility. One sky lantern importing/retailing company specifically mentioned that "*the negative press is having a dramatic effect (decline in sales) on the sky lantern market*".

Evidence provided to the project team suggested that the companies supplying lanterns tend to be very small in terms of the number of employees. One of the three companies interviewed only employed one person, the second employed five people and the third employed four full time employees, plus some occasional part-time staff. The company with five employees estimated that their market share is around 15% of the industry with annual sales of over one million lanterns. Whilst empirical information on the total numbers employed was not available, it is clear that the sky lantern sector is not a major employer of staff in the UK, accounting for (perhaps) fewer than 100 individuals across the entire sector.

Helium balloons

The market value of helium balloons has been estimated and based on figures and information provided by EBPC (The European Balloon & Party Council), which represents more than 30 key players in the balloon and party industry in Europe.

According to EBPC, the estimated retail size of the balloon and party industry in Europe was £2.5 billion in 2012, with the UK having the largest market share. The estimated UK retail market size was £500 million in 2012. Balloons account for some 60% of this market and helium balloons account for about 30%. The current UK market value for helium balloons is estimated to be £150 million. The EBPC has estimated the number of businesses reliant on the helium balloon market in the UK and this is shown in Table 3.

Table 3 Businesses associated with the helium balloon market in the UK⁸

Type of business	Number of businesses
Balloon manufacturers	8
Gas suppliers	4
Distributors	25
Printers	23
Online	>100
Independent retailers	>3,000
Retailers with multiple stores	>20
Decorators/party planners	900
Ancillary e.g. training, media, accessories	<50
Total	4,130 (approx.)

Source: EPBC

The data presented in the table above are reported by EBPC to be based on industry intelligence and member/customer databases. However there may be some duplication and it is not clear whether the numbers quoted relate to businesses that are *solely* engaged with the balloon industry.

The EBPC has also estimated that the industry employs some 21,750 people as shown in Table 4 below. It was not clear from the information provided whether this relates to full-time equivalent staff or whether it includes all staff, even if only part of their time is directly associated with balloon-related activities.

⁸ 'Report on Helium Balloons in the UK and European Markets, compiled by The European Balloon and Party Council' (2013)

Table 4 Numbers employed within the helium balloon sector in the UK

Type of business	Numbers employed
Balloon manufacturers	300
Gas suppliers	500
Distributors	200
Printers	250
Online	400
Independent retailers	14,000
Retailers with multiple stores	4,000
Decorators/party planners	2,000
Ancillary e.g. training, media, accessories	100
Total	21,750

Source EBPC

The EBPC estimated that four groups of retailers could be affected by any future changes in the sector:

- Independent party stores: This is the largest group of retailers of helium balloons and there are over 3,000 such stores in the UK. It is estimated by EBPC that a typical store employs about four people. Balloons, nearly all of which are inflated with helium, account for 30-60% of their business. It is reported that very few of these stores would be able to survive without sales of helium balloons (based on personal communications with EBPC).
- Independent card stores: This is the second largest group of retailers and there are around 1,000 of these stores in the UK. Many have turned to balloons in response to an increasingly competitive market for greeting cards. Balloons typically account for 10-25% of turnover and are described by EBPC to be their fastest growing product line. Filling helium balloons is labour-intensive and some of the larger businesses in this group employ additional staff at busy times for this purpose.
- Multiple retail groups: These stores are reported by EBPC to sell high volumes of helium filled balloons. The labour-intensive nature of filling balloons suggests that some jobs would be vulnerable if this service was not provided.
- Events and party planners: These are usually small family businesses that are mainly home-based. They supply balloons for corporate events, the hospitality market and private functions - most notably weddings. There are around 2,000 active businesses in the UK. Without helium balloon sales, the EBPC view is that many of these businesses would not be able to adapt or to diversify into different products or services and would not therefore be able to survive.

Should a ban on helium balloons be imposed (as has been proposed by some lobby groups) there would inevitably be a loss of revenue to the Exchequer. The EBPC has estimated that over £1.5 million of corporation tax per year would be lost from the manufacturing and gas companies alone, together with over £25 million of VAT.

Much of the evidence provided to the project team in relation to industry value, staff numbers and impacts of possible future controls on helium balloons has been provided by the EBPC. As a lobby group representing the balloon industry, the project team recognise that they inevitably have a vested interest in protecting the interests of their members. That said, the evidence provided was deemed to be relevant and largely empirical and demonstrated that the sector makes an important contribution to the UK economy and employs (either fully or in part) a significant number of staff.

5. Control measures for sky lanterns and helium balloons in England and Wales and in other EU Member States

Various measures have been taken at local, national and international level to control the release of sky lanterns and helium balloons and/or to reduce the risk of negative impacts associated with their release. In England and Wales, any controls are currently voluntary as existing legislation does not prohibit the deployment of sky lanterns or helium balloons. CAA guidance provides details of minimum distances from airfields that should be met when launching sky lanterns and helium balloons. Whilst these are not statutory requirements they are underpinned by the Air Navigation Order 2009 (paragraph 137) that covers 'endangering the safety of an aircraft'.

Much of the existing relevant guidance from the CAA (for example) has been incorporated to a greater or lesser extent into consumer advice provided with lanterns and helium balloons.

Elsewhere across the EU, a number of countries have introduced legislative controls on the deployment of sky lanterns and helium balloons.

5.1 Local initiatives

Across England and Wales, 17⁹ local authorities (15 in England; 2 in Wales) have applied a voluntary ban on the release of helium balloons from council-owned land. In many cases, this voluntary ban also includes sky lanterns. These controls are only active on council-owned land (i.e. recreation grounds and parks) and they are described by councils as being purely voluntary bans – they are not able to take legal action against infringements. Under current legislation set out in the Clean Neighbourhoods and Environment Act (2005) or the Environmental Protection Act (1990), waste from balloons or sky lanterns is not classified as litter and as such, no specific legal action can be taken against releases.

Based on discussions with a number of local authorities that have already instigated a ban, it seems that this action has been most successful in preventing mass releases of balloons. The evidence suggests that where local authority bans are in place, they have served to raise public awareness of the risks associated with the release of both sky lanterns and helium balloons as well as targeting specific stakeholders likely to be involved in the mass release of balloons or lanterns as part of specific events. These typically include charity fundraising groups, community groups and businesses promoting sales or products.

Making consumers aware of the risks associated with sky lanterns and helium balloons appears to be the key to achieving a more responsible approach to their deployment and from the evidence available to the project team, this seems to have been one of the main benefits of individual local authority action to date. Whilst acknowledging the positive outcomes of these existing initiatives, the potential weaknesses are that they are purely local, they rely on co-operation from the public and professional operators and appear to focus largely on mass-release of helium balloons. Potential ways of extending the benefits of current initiatives are as follows:

⁹ District Councils in England (6) – Braintree, Maldon, Rochford, South Hams, Thanet, Windsor & Maidenhead
City and Borough Councils in England (10) – Carlisle, Ipswich, Lancaster, Oxford, Plymouth, Redbridge, Reigate & Banstead, Swindon, Tonbridge & Malling, Wandsworth
County Councils in England (1) Worcestershire
Welsh local authorities (2) – Cardiff City Council, Conwy Council

- By encouraging all local authorities in England and Wales to review their policies on the use of sky lanterns and helium balloons against nationally-agreed objectives, in consultation with relevant stakeholders (e.g. CAA, MCA and the industry). It is suggested that these should be *risk-based* reviews rather than (for example) blanket bans on the release of sky lanterns or helium balloons. It is accepted that as there is currently no representative body, methods of engagement with the sky lantern industry will not be straightforward.
- After individual risk-based assessments, encouraging all local authorities to publish clear guidelines for the deployment of sky lanterns and helium balloon, backed-up with local campaigns to create publicity.

5.2 National initiatives

5.2.1 No release campaigns

A number of bodies have instigated campaigns to discourage organisations, professional operators and members of the public from releasing balloons and sky lanterns. The most notable of these is the Marine Conservation Society's (MCS) 'Don't Let Go' campaign, which has targeted businesses, local authorities and members of the public.

MCS has been pro-active in contacting organisations in order to change their policies on balloon releases. In some cases, large organisations such as banks, food retailers and others have agreed not to release balloons as part of marketing activities. Additionally a number of charities have also committed to not releasing balloons as part of their campaigns. The MCS booklet http://www.mcsuk.org/downloads/pollution/dlg/Dont_Let_Go_Booklet.pdf contains information on the 'Don't Let Go' campaign, on alternatives to balloon releases and details on how to prevent local releases.

Evidence from this study suggests that local and national campaigns have had an impact, either in discouraging the release of sky lanterns or helium balloons or at least raising awareness of issues for consumers to take into account when purchasing them.

Although much of the evidence is anecdotal, the project team have identified a number of possible links between publicity e.g. from national campaigns and individual local authority initiatives and reported trends in design, use and incidents. In summary:-

- Two out of the three of the sky lantern companies interviewed reported a decline in sales in recent years (see section 4.4);
- Two out of the three sky lantern companies interviewed have taken measures to respond to negative publicity and the negative image of sky lanterns, by improving the design, material and quality of their products and providing instructions for reducing risks (see section 4.2);
- Sky lantern industry representatives report that consumers are increasingly enquiring whether products are wire-free and whether they are safe – in general, customers are asking more questions before they decide to purchase;
- Evidence provided by the UK Maritime and Coastguard Agency suggests that the number of sky lantern incidents has fallen sharply since 2010 (section 3.5);
- The MCS 'Beachwatch' survey indicates that the level of littering by balloons is now lower than it was in 2007 (section 3.3).

5.2.2 Measures taken in other EU countries on sky lanterns

The potential risks associated with the use of sky lanterns in other Member States are largely the same as those cited in England and Wales, although greater emphasis is generally placed on fire risk. The precise policies adopted differ between countries, with decisions largely being based on ‘perceived’ risks. However some countries including Malta, the Netherlands and Spain have carried out risk assessments using the RAPEX assessment model¹⁰:

EU Member States that have banned or put restrictions on the sales and/or the use of sky lanterns include Austria, Malta, Germany and Spain. Others (including Denmark, the Netherlands and Finland) have engaged with sky lantern importers or have implemented other voluntary measures. Following requests from the project team for information from these countries, responses have been received from Austria, Malta, Germany, Spain and Finland. Findings have been incorporated into evidence tables in Appendix 6.

In the Netherlands, sky lanterns were banned from sale in 2008. However following design improvements specified by importers in 2010 (e.g. removal of wire, use of flame-retardant paper, etc.) and improved consumer guidance, the risks were deemed to be lower. Accordingly, the Dutch authorities allowed sales to recommence from the end of 2010. Whilst this is a good example of an industry working in partnership with government to address a specific issue, the evidence suggests that it did require a blanket ban to ‘force’ the industry into action. Clearly, a better way forward would be to elicit action without the need to introduce national legislation.

Sky lanterns have also been voluntarily withdrawn from the market in Finland in 2009. This action was based on the grounds of consumer safety concerns and fire risks of sky lanterns guided by guidelines of “Safety requirements for candle products and certain products that constitute a fire hazard” and the Consumer Act jointly developed by the Finnish Safety and Chemicals Agency (Tukes) and the Finnish Fire Rescue Authorities.

The approach taken in Malta and Spain has been to introduce a complete ban on the sale and use of sky lanterns in December 2011 (Malta) and in January 2012 (Spain). Whilst this has (presumably) eliminated the risks of sky lantern use discussed in this report, it is unclear what the scale of the industry was before the ban and it is not possible therefore to comment on the impact on the industry in those countries in terms of lost turnover and employment.

Most of the countries (Malta, Austria, Spain and Finland) consulted reported that the measures adopted had been effective, although this was largely based on consultee statements on effectiveness of measures in individual countries. In particular, no consultee provided evidence such as sky lantern sales figures/trends or number of incidences caused by sky lanterns. However, evidence in Austria suggests that where there is a ban on *sales*, but not on the *use* of sky lanterns, some consumers may still buy lanterns from suppliers in other countries.

A summary of the policy actions adopted in selected Member States is set out in Table 5 below.

¹⁰ <http://europa.eu/sanco/rag/public/index.cfm?event=home&CFID=1951289&CFTOKEN=3e3ec6b7f3ed24ba>

Table 5 Summary of actions against sky lanterns taken in other Member States

Option	Basis	Implemented in
National ban on sales and use of sky lanterns	High risks (fire, consumer safety, aviation)	Malta, Spain
National ban on sales	Fire risk, consumer safety	Austria
Regional/local actions	Varies in different regions - fire, consumer safety, aviation	Germany
Voluntary ban	Fire risk (sky lanterns are not widely sold)	Finland
Impose safety requirements (e.g. raised product quality standards; warnings against use during unfavourable weather conditions; change of design, material to reduce the flammability of the lantern body; restrictions on method of use – for example, attaching the lantern to a fixed point with a proper, durable and non-electricity conducting wire)	Lower quality products present higher risks	Netherlands, Denmark

It is difficult to draw any firm conclusions from actions taken in other Member States, in terms of their potential application in England and Wales. This is largely because of the range of different measures taken, geography and climatic differences (e.g. increased fire risk in hot, dry countries such as Spain and Malta) and the relative importance of the sky lantern industry. Imposing a ban in a country with a well-established and ‘significant’ industry is clearly much more problematic than it would be in a country where the industry is very small or otherwise ‘insignificant’.

6. Conclusions

This study was commissioned to identify and assess the risks associated with sky lanterns and helium balloons and to establish an evidence base to help inform future policy decisions. After carrying out a review of relevant literature, structured telephone interviews with a wide range of stakeholders and an analysis of the information gathered, this section sets out the project team's conclusions in relation to the present situation in England and Wales.

6.1 Review of Impacts

6.1.1 Risks to livestock and animal health (including marine animals)

Anecdotal reports and media coverage suggest widespread concern from farming groups and others over the impacts of sky lanterns on the health and welfare of livestock and horses. However, the evidence reviewed by the project team indicates that the number of cases reported each year of animals affected through panic and fright and of ingestion of sky lantern debris is very small. It is recognised that there may be a significant level of under-reporting at present and that the true impacts may be higher. Local factors may be important for some individual businesses, for example if they are close to and downwind of an event location. Such businesses may be more vulnerable but conversely they may have greater awareness of the risks and have mitigating measures in place. On the basis of the evidence presented in this report, while recognising the impact of individual cases it is difficult to conclude that the overall impact of sky lanterns on livestock and animal health is anything other than of minor significance.

The main concern regarding helium balloons is in relation to ingestion by animals. Whilst there may again be a significant level of under-reporting, the current evidence indicates that the impact is very small and confined to only a small number of isolated incidents.

Any harm to marine life often goes unseen, given the inaccessibility of habitats and this is difficult to overcome. However more detailed diagnosis (e.g. through post-mortem examination of animals) and improved recording of land-based incidents in future would enable the extent of the risks to be more accurately quantified.

In addition, it appears that little is known about the flight behaviour of lanterns or balloons. Further controlled tests could be carried out which may in turn influence future product design and provide clearer instructions for users. The benefits of this may help to reduce the risks to livestock and also risks to aviation and to coastal rescue services. It may also reduce the threat of fire (sky lanterns only).

6.1.2 Fire risk (sky lanterns only)

Fire risks from sky lanterns are mainly to agricultural crops, buildings and moorland. Incidents in which sky lanterns were said to be directly implicated in starting fires have been reported to the project team from a variety of sources, including the Chief Fire Officers Association (CFOA). Given that any one of these individual incidents has the potential to cause significant disruption, loss of property and risk to human and animal life, the project team has concluded that fire risk associated with the use of sky lanterns is significant. Further consideration is required regarding potential mitigation options. These should consider both the *use* and the *design* of sky lanterns. Whilst some manufacturers have sought to improve sky lantern design and thus reduce the associated fire risk, others have been less proactive. A significant issue is that there is no single trade body to represent and

co-ordinate the activities of sky lantern suppliers at present and to work with approved testing and inspection bodies to set safety standards.

6.1.3 Impacts on the environment, littering on land and at sea

On the basis of the evidence presented, the project team concluded that the contribution of sky lantern debris to overall environmental littering is small and less significant than potential fire risks and risks to aviation and coastal rescue services. However, the localised effects of littering can be large e.g. in the vicinity of an event location or if large numbers of lanterns are simultaneously released from a single point.

Recent surveys (e.g. from 'Beachwatch') have enabled evidence to be collected in relation to helium balloons and from these the project team has concluded that litter is only of minor significance. Representative bodies are aware of potential litter issues and therefore advocate the use of latex (not foil) balloons for races or mass launches, because these are claimed to biodegrade more rapidly. Speed of degradation of balloon debris is an important factor from the perspective of littering (and also in relation to risks to farm animals, wildlife etc.). The currently-available evidence on the rate of latex degradation is considered inconclusive and clarification would provide useful evidence of the extent to which balloon litter is likely to contribute to the overall environmental impact.

6.1.4 Risks to aviation

The Civil Aviation Authority (CAA) has provided quantifiable evidence to the study in the form of Mandatory Occurrence Reports (MORs). A total of 48 of these were reported to be due to sky lanterns and helium balloons between 2001 and 2012, with sky lanterns accounting for the vast majority (40). Only four of the remaining eight were due to small helium balloons which are the focus of this report.

Sky lanterns pose a safety risk to aviation due to possible ingestion into engines when airborne. Whilst aircraft are on the ground, sky lantern debris can pose a risk to taxiing aircraft and cause delays to take-off and landing. CAA guidelines state that sky lanterns should not be released within 10 nautical miles of an airfield, but it is unlikely that the casual user is aware of this. Furthermore, there is an inconsistency between these guidelines and typical product guidance provided with sky lanterns. These state that CAA permission should be sought if lanterns are to be released within five miles of an airport or landing strip. We conclude that there is a clear need for better consumer information from suppliers that is consistent with CAA guidelines.

The risk to aviation from helium balloons is due to aircraft manoeuvring to avoid them. Mass release of balloons is seen as a potential problem but industry codes of conduct stipulate the need for compliance with CAA guidelines. No information was presented to the project team to suggest that additional control measures are needed.

6.1.5 Risks to coastal rescue services

The project team has concluded on the basis of well-documented evidence received that sky lanterns do pose a significant risk to the proper and effective operation of coastal rescue services. In particular, data from the UK Maritime and Coastguard Agency (MCA) indicates that the number of reported incidents likely to have been caused by sky lanterns increased to a peak in 2010, with reported incidents being lower in subsequent years. The risk is due to sky lanterns being incorrectly identified as distress flares. It is concluded that the most practical mitigation to reduce the risk of false call-outs would be the introduction of a voluntary ban on the sale of red lanterns, which are most commonly mistaken for distress flares.

No evidence has been found of any adverse impacts of helium balloons on coastal rescue services.

6.1.6 Risks to consumer safety

There is very little evidence to link either sky lanterns or helium balloons with risks to consumer safety at present. This is in marked contrast to the well-documented consumer-safety risks associated with fireworks.

6.1.7 Helium resources (helium balloons only)

Public concerns over the possible depletion of helium reserves to inflate balloons are countered by industry insistence that the helium is sourced from recycled gas previously used in the medical industry, subsequently mixed with air. It has not been possible to make an informed assessment of the impact on helium reserves but widely-reported increases in the market price of helium may have a self-limiting effect on non-essential uses, including balloon filling, in the future.

6.2 Sky Lantern and Helium Balloon Industry Representation

The helium balloon sector is well-represented by trade organisations that demonstrate considered and tangible evidence of the sector's commitment to minimising risks. These organisations are consistent in their requirement that all helium balloons intended for release should be manufactured from 100% natural latex. It was less clear as to how effectively the measures contained in the respective codes of practice are being communicated to the final users.

As noted above, the sky lantern sector does not have a dedicated trade body to represent and co-ordinate the activities of suppliers and facilitate sector-wide initiatives. Improved designs are already widely-available but have not been universally adopted by all manufacturers. Specific issues that were cited as having scope for improvement include the replacement of wire, the use of fireproof paper, improved flame-resistance and the re-design of fuel cells.

6.3 Scale, Turnover and Number of Employees

Based on sales figures provided for this study, the annual turnover of the UK sky lantern market is variously valued at between £6 and £16 million per annum, based on an estimated average retail price of £2 per unit. There is evidence that the size of the market has contracted from a peak in 2009/10 and negative press reports may be a factor in this trend. Evidence provided to the project team indicated that the companies supplying sky lanterns tend to be small in terms of the number of their employees. It is concluded that there are probably fewer than 100 individuals directly employed within the sector in the UK.

The retail value of the UK market for helium balloons was estimated to be around £150 million in 2012. Data has been provided on the number of businesses involved and people employed but there may be a degree of duplication and it is not clear that the numbers quoted relate to businesses that are solely engaged with the balloon sector. Nevertheless, this sector is associated with a significant level of economic activity.

APPENDIX 1 Introductory project letter sent by Defra and Welsh Government to stakeholders on 15 January 2013

ADAS study of the environmental and other impacts of the use of sky lanterns and helium balloons

Releasing sky lanterns is increasingly popular at festivals, weddings and other celebrations across the country. But after floating for many miles and falling to earth the burnt-out remnants can injure livestock, create fire risks and litter the areas in which they land.

The Department for Environment, Food and Rural Affairs and the Welsh Government have therefore asked ADAS to carry out an independent study to assess the risks that sky lanterns and helium balloons may pose to livestock, crops and the environment. ADAS's work will help to establish if any further action is needed to address the concerns that people have about them.

The study will begin on 14 January 2013 and aims to investigate:

- the impact sky lanterns and helium balloons are having on the environment, livestock and crops;
- what local authorities in England and Wales and authorities in other EU Member States are doing to address concerns arising from their use; and,
- the value of the market for sky lanterns in England and Wales.

ADAS may contact your organisation to help inform their study. Any input that you are able to provide would be extremely valuable. The project leader is David Moorhouse.

The final project report will be published in March 2013 and will be in the public domain. It will include the names of organisations that have contributed to the study, but it will not provide the names, addresses or contact details of individuals.



APPENDIX 2 Follow up letter sent by Defra and Welsh Government to stakeholders on 4 February 2013



ADAS study of the environmental and other impacts of the use of sky lanterns and helium balloons

The Department for Environment, Food and Rural Affairs and the Welsh Government have commissioned ADAS to carry out an independent study to assess the risks that sky lanterns and helium balloons may pose to livestock, crops and the environment.

An email has already been sent to your organisation on 15th January stating that ADAS may contact you to help inform the study. Any input that you are able to provide would be extremely valuable.

The study aims to investigate:

- The impact sky lanterns and helium balloons are having on the environment, livestock and crops;
- What local authorities in England and Wales and authorities in other EU Member States are doing to address concerns arising from their use; and,
- The value of the market for sky lanterns in England and Wales.

The final project report will be published in March 2013 and will be in the public domain. It will include the names of organisations that have contributed to the study, but it will not provide the names, addresses or contact details of individuals.

Due to the narrow timescale in which to consult all relevant organisations, ADAS are asking those who have a specific interest in this area, and feel they could provide evidence to inform the study, to contact the project team directly to express their interest in being contacted.

If you are interested in being contacted, please respond directly to Steven Tompkins, project consultation lead by ***Monday 11th February.***

Yours Sincerely,

Steven Tompkins (consultation lead)

INTERVIEW GUIDE WITH STAKEHOLDERS



Introduction

Good morning/afternoon. My name is.... calling from ADAS. We are conducting a study on behalf of the Department for Environment, Food and Rural Affairs (Defra) and the Welsh Government (WG) to assess the risks that sky lanterns and helium balloons may pose to livestock, crops and the environment. We are speaking to a wide of range of stakeholders and organisations to develop a dependable evidence base. This study will help to establish if any further action is needed to address any concerns that people might have about them.

Name of interviewer	
Contact details of the interviewee	
Date of interview	

Section 1: General information

1. Name of the interviewee	(Should know beforehand)
Job title/ position	(may also know beforehand)
Organisation	(Should know beforehand)

2. Is your organisation generally negative, neutral or positive about the release of sky lanterns and helium balloons?

	Negative	Neutral	Positive
Sky Lanterns	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3
Helium Balloons	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3

Could you explain why this is and give an OVERVIEW of your organisations position regarding the release of sky lanterns/helium balloons?

--	--

What evidence, if any, does your organisation have to support its position?

Details of evidence (title, date, link, etc.):

--	--

Section 2: Evidence of Risks and Impact

3. From the perspective of your organisation, do you think there are potential risks or negative impacts related to release sky lanterns/helium balloons?

	No Risks or negative impacts	Some risks/negative impacts	Very negative impacts
Sky Lanterns	<input type="checkbox"/> 1 (GO TO Q5)	<input type="checkbox"/> 2	<input type="checkbox"/> 3
Helium Balloons	<input type="checkbox"/> 1 (GO TO Q5)	<input type="checkbox"/> 2	<input type="checkbox"/> 3

4. What do you think the key risks are and have you got any direct evidence, or evidence based on experiences for any of these? *Ask respondent to document the number of incidences, and impact.*

	List Risks/Negative Impacts	Evidence available for no. of incidences	Evidence available for impact
Sky lanterns		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Helium Balloons		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
		<input type="checkbox"/> Yes	<input type="checkbox"/> Yes

Detail evidence (1):

- Incidences relate to: Sky Lanterns Helium Balloons
- Main types of incidences
- Is there any documented evidence of the incidences or impact?
- Do you have any evidence on the cost of these impacts?
- Any more information

Detail evidence (2):
IF THE INCIDENTS ARE RELATED TO FIRE, ANIMAL HEALTH IMPACTS, OR LITTERING, do you have any evidence on the impacts in comparison with other types of device (e.g. firework) or litter (e.g. plastic bags, metal cans or barbed wire)?

Incidences relate to: Sky Lanterns Helium Balloons

Detail evidence (3):
IF THE INCIDENTS ARE RELATED TO sky lanterns and human accidents, do you have any evidence on the number of incidences in comparison with fireworks over the last couple of years?

Incidences relate to: Sky Lanterns Helium Balloons

5a Are you aware of any activities or actions promoted by the Government, Local Authority, press or media to raise the public profile of the risks presented by uncontrolled use of sky lanterns or helium balloons?

YES

1

NO

2 (GO TO Q6)

Details of actions of mentioned (source)?

5b Do you have any evidence on the impact of these awareness raising activities?

YES

1

NO

2

Details of evidence (source, link, etc.)

6. (ONLY ASK IF IT IS LOCAL AUTHORITY)

Have you got an estimate on the number of mass releases of sky lanterns/helium balloons that have taken place in the past few years in your county?

	Period covered	Please tick if yes	No. of releases	Source of information
Sky lanterns	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>
Helium Balloons	<input type="text"/>	<input type="checkbox"/>	<input type="text"/>	<input type="text"/>

Details on the basis of estimates:

7a Has your organisation taken any actions to discourage or ban the release of sky lanterns and/or helium balloons or minimising any potential risks?

Type of activities	Please tick all that apply	Specify the action	Start and end date of the action
A formal ban on releasing sky lanterns/helium balloons	<input type="checkbox"/>		
A no-release campaign	<input type="checkbox"/>		
Encouraging people to report a release of sky lantern/ helium balloon	<input type="checkbox"/>		
Promotion of sky lantern/ helium balloon alternatives	<input type="checkbox"/>		
Guidance on the safe use of sky lanterns	<input type="checkbox"/>		
Other	<input type="checkbox"/>		
None	<input type="checkbox"/>	GO TO Q8	
Details of actions:			

7b How effective have these measures/actions been in discouraging the release of sky lanterns and/or helium balloons or minimising their potential negative impacts? Is there any evidence for their effectiveness?

Type of activities	Please tick what was mentioned at 6A	Effectiveness				Don't know	Evidence available?
		Not effective	Somewhat effective	Very effective			
A formal ban on releasing sky lanterns/helium balloons	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes	
A no-release campaign	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes	
Encouraging people to report a release of sky lantern/ helium balloon	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes	
Promotion of sky lantern/helium balloon alternatives	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes	
Guidance on the safe use of sky lanterns	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes	
Other	<input type="checkbox"/>	<input type="checkbox"/> 1	<input type="checkbox"/> 2	<input type="checkbox"/> 3	<input type="checkbox"/> 4	<input type="checkbox"/> Yes	
Detail evidence:							

Section 3: Any additional evidence/comments

8. Do you have any other comments?

Sky lanterns:

Helium
Balloons:

Section 4: Approval for future contact

9. Are you happy to be contacted again if we need to confirm a few details?

YES

 1

NO

 2

IF YES, are
preferred to be
contacted by
phone or email?
Record details
of email or
phone numbers

APPENDIX 3b Interview Guidance Form for Sky Lantern and Helium Balloon Suppliers and Distributors

INTERVIEW GUIDE WITH SKY LANTERN AND HELIUM BALLOON SUPPLIERS



Introduction

Good morning/afternoon. My name is.... calling from ADAS. We are conducting a study on behalf of the Department for Environment, Food and Rural Affairs (Defra) and the Welsh Government (WG) who are responsible for implementing policy on the environment and animal welfare. The purpose of this study is to establish a dependable evidence base on the use of sky lanterns and helium balloons. As an independent consultancy, we are keen to gather factual evidence from the industry so we can adequately reflect both sides of the debate within the evidence base that we have been asked to establish through this project. It is also important to understand the market value of the industry and how important it is to the UK economy.

Name of interviewer	
Date of interview	

Section 1: General information

1. Name of the interviewee	(Should know beforehand)
Job title/ position	(may also know beforehand)
Company	(should know beforehand)

2. Could you briefly describe your business? (Product range, and what is your company's role in the supplier chain- importer, distributor, wholesaler, retailer...)

Sky Lanterns

Helium Balloons

3. What are the key types of sky lanterns/ helium balloons that you are supplying? Could you give a brief description of each type?

Number of key types

TYPE 1:

TYPE 2:

TYPE 3:

TYPE 4:

TYPE 5:

Section 2: Industry Response and Impact

4. Are you aware of any recent call for action on sky lanterns and helium balloons?

Sky Lanterns Yes No
Helium Balloons Yes No

IF YES:

4a What actions against sky lanterns and helium balloons are you aware of?

4b What's your company's response to these actions?

4c What are the impacts of these actions to your business? (ASK FOR EVIDENCE)

5a Have there been any changes in sales of sky lanterns or helium balloons in the past 5 years? (BY KEY TYPES OF PRODUCT)-RECORD SALES FIGURES for 2012 and/or percentage changes, compared to 2011 and five years ago.

		2012*	% change compared to 2011		% change compared to 2007	
OR: TYPE	TYPE 1			%		%
	TYPE 2			%		%
	TYPE 3			%		%
	TYPE 4			%		%
	TYPE 5			%		%
	ALL				%	

*: Volume of sales and/ or value.

Description of changes and explain the changes

5b Are there changes in consumer behaviour? (for example, are there more people enquiring about sustainability issues/safety issues etc. before purchasing? Etc.)

6a Are you aware of any potential risks/negative impact that sky lanterns/helium balloons may have to human health and safety, well being of livestock, wildlife, crops and the environment?

Sky Lanterns Yes No
Helium Balloons Yes No

Details of risks mentioned:

6b IF YES, have you taken any actions or make changes to the products to mitigate risks?

Sky Lanterns Yes No
Helium Balloons Yes No

Details of actions /changes:

6c IF ACTIONS TAKEN/CHANGES MADE, how effective are these measures to mitigate those risks? ASK FOR EVIDENCE TOO.

Sky Lanterns Yes No
Helium Balloons Yes No

Details of effectiveness and evidence:

7. Have you got any additional comments regarding sky lanterns and helium balloons?

Section 3: Information about the Company

8a In which year did the company start operating?

Details

8b How many employees do you have?

Details

8c What's the market share of your company in England and Wales?

Details

8d Who are your main customers?

Details

8e Which are the main regions that you are supplying? How many sales outlets do you have in each? And their shares of sales?

Details

8f What's your annual revenue from sales of sky lanterns /helium balloons?

Details

OR Select from the following bands:

- Under 20k
- 20k-50k
- 50k-100k
- 100k-200k
- 200k-500k
- Over 500k

Section 4: Approval for future contact

9 Are you happy to be contacted again if we need to confirm a few details?

YES

NO

12

**IF YES, are preferred to be contacted by phone or email?
Record details of email or phone numbers**

APPENDIX 4 List of Stakeholders Consulted

Consulted organisations- risk and impacts

Agrical
British Cattle Veterinary Association (BCVA)
British Horse Society (BHS)
British Veterinary Association (BVA)
British Veterinary Zoological Society (BVZS)
Chief Fire Officers Association (CFOA)
Civil Aviation Authority (CAA)
Conwy County Council
Defra Rural Farming Networks (RFN)
Department for Business, Innovation and Skills (BIS)
England & Wales Wildfire Forum (EWWF)
Farmers Union Wales (FUW)
Goat Veterinary Society (GVS)
Heather Trust
Keep Wales Tidy (KWT)
Manchester Airport
Marine Conservation Society (MCS)
Maritime and Coastguard Agency/HM Coastguard
Milton Keynes Council
National Farmers Union (NFU)
NFU Mutual
Staffordshire County Council
Women's Food and Farming Union (WFU)

Consulted organisations- suppliers and industry

The Balloon Association (NABAS)
Balloons and Party Industry Alliance (BAPIA)
European Balloon & Party Council (EBPC)
Individual sky lantern retailers (names withheld for confidentiality)

APPENDIX 5 Literature and Interview Evidence Summary Tables

The search results from the desk review and telephone interviews were summarised in note form, as shown in Appendices 5.1 to 5.7 below. The validity of the data was assessed for:

- **Independence**- the quality of the evidence based on the independence of the author;
- **Reliability**- the quality of the evidence based upon the information behind it, i.e. anecdotal or study based;
- **Robustness**- the quality of the evidence based on whether there are clear causal links with sky lanterns or helium balloons.

A number-based scoring system was used, based on a 1 to 3 scale, whereby 1 was lowest and 3 was highest for that particular criterion. As an example, for **Independence**:

- A score of 1 was given to a source produced by an organisation such as a lobby group, charitable or member - based organisation with specific interests;
- A score of 2 was given to sources published by independent bodies;
- A score of 3 was given to a source produced in a scientific peer-reviewed journal or publication.

The scores for these criteria were not averaged into an overall score for each piece of evidence, as this would potentially be misleading.

A score of 1 was given to all news articles. Although the source reporting the incident may be independent, the actual evidence presented was often quoted without references and it was therefore difficult to determine the true independence of the evidence presented.

APPENDIX 5.1 Risks to animals and marine life

Table 5.1.1 Source summary- risks to animal health and welfare (literature)

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
RSPCA (Oct 2005)	RSPCA wildlife factsheet	Helium balloons	Factsheet focusing on the impacts of helium balloons to wildlife, suggested actions to be taken	1	1	2
Chester Chronicle (10 Feb 2010)	Cheshire farmer Huw Rowlands call for Chinese lantern ban after cow death	Sky lanterns	News article looking at the impact of sky lanterns on cattle	1	1	2
BBC news (24 August 2010)	Farmers in Wales start 'lantern patrols'	Sky lanterns	News article describing the potential risks from lanterns	1	1	2
BBC news (13 September 2010)	Chinese lanterns: tranquillity masks a threat	Sky lanterns	News article looking at the impact of sky lanterns on livestock	1	2	2
Welsh Government (1 Dec 2010)	Welsh Chief Vet warns of Chinese lantern danger	Sky lanterns	Article released by Welsh Government looking at the impact of sky lanterns on livestock health	2	2	2
BBC news (23 Feb 2011)	Tiverton farmer put magnets in cows stomachs	Sky lanterns	News article looking at a method to reduce impacts of sky lanterns on livestock	1	1	2
Daily Telegraph (5 May 2011)	Farmer wins compensation after Red Nose Day balloon kills cow	Helium balloons	News article where farmer wins successful insurance claim against school as a result of cattle death from balloon	1	2	3
Farmers Guardian (2 May 2012)	Battle against Chinese lanterns intensifies after cow deaths	Sky lanterns	News article detailing effects of sky lanterns on livestock health	1	1	2
RSPB (25 May 2012)	Celebrate safely this summer for animals' sake	Sky lanterns	Website article looking at effects of sky lanterns on wildlife	1	2	2
Horse and Hound (27 July 2012)	Fresh warnings over danger of Chinese lanterns to horses	Sky lanterns	Website article looking at impacts of sky lanterns on horses	1	2	2

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
BBC news (31 August 2012)	Conwy council's lantern, balloon ban bid to protect wildlife	Helium balloons	News article looking at impacts of balloons on wildlife	1	2	2
RSPCA (Oct 2012)	RSPCA wildlife factsheet	Sky lanterns	Factsheet focusing on the impacts of sky lanterns on wildlife, suggested actions to be taken	1	1	2
The Daily Telegraph (2011)	Farmers call for ban on sky lanterns	Sky lanterns	News article detailing impact of sky lanterns on the environment, livestock and horses	1	1	2

Table 5.1.2 Source summary- risks to animal health and welfare (interviews)

Source			Score		
Reference	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
Penrose (2002) Marine Conservation Society referring to 2002 Marine Environmental Monitoring report	Helium balloons	Incident of a dead juvenile green turtle in Blackpool. Turtle died from oesophageal and stomach impaction resulting from ingestion of plastic including a large balloon fragment	3 (survey conducted by professional body)	3 (evidence supported by documented post mortem report)	2 (other plastic debris was consumed by the animal as well as a balloon fragment)
British Horse Society (2013)	Sky lanterns	9 reports from November 2010-Jan 2013 of sky lantern impacts on horse behaviour	3 (evidence provided by members without prompt)	2 (evidence supported by other accounts)	2 (most likely that horses were frightened by sky lanterns but no definitive causal link can be made from evidence)
British Horse Society (2013)	Sky lanterns	Two reports from British Horse Society members posted on www.horseaccidents.org.uk a live forum for recording incidents – describes injuries sustained to horses from sky lanterns	3 (evidence provided by members without prompt)	2 (evidence supported by other accounts)	3 (causal links to sky lanterns)
British Horse Society (2013)	Sky lanterns	Reports from members of the British Horse Society posted on www.horseaccidents.org.uk a live forum for recording incidents - 4 reports of sky lanterns landing in hay fields	3 (evidence provided by members without prompt)	2 (evidence supported by other accounts)	3 (causal links to sky lanterns)
Staffordshire County Council (2013)	Sky lanterns	Anecdotal evidence from a number of farmers regarding health impacts of sky lanterns on livestock - describes livestock death	2 (anecdotal evidence but not substantiated)	2 (evidence of impact, and plausible based on other impacts)	2 (anecdotal evidence of livestock impacts)
Hudson (2010) Staffordshire County Council	Sky lanterns	Report by Staffordshire County Council - Impact of sky lantern on animal health	3 (fact, based on impartial literature review)	3 (evidence supported by references)	2 (presence of links to sky lanterns, but these are not confirmed)

Source			Score		
Reference	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
Women's Food & Farming Union (2011)	Sky lanterns	Impact of sky lanterns on livestock health - 10 reports of cattle death and 1 sheep death confirmed by post mortem to be caused by sky lanterns	2 (reported to be based on individual farmer accounts)	2 (evidence said to be confirmed by post mortem or veterinary reports but not verified by project team)	2 (causal links implicated, but not verified by project team)
Farmer/ personal communication (2013)	Sky lanterns/ helium balloons	Anecdotal evidence of sky lanterns and helium balloons found in farmers fields	2 (not necessarily unbiased judgement)	1 (evidence but not supported)	2 (presence of causal links)
NFU Members Report (2013)	Sky lanterns	Anecdotal evidence based on reports posted to NFU regional offices - 18 reports of sky lanterns landing in cropped areas	2 (not necessarily unbiased judgement)	2 (evidence supported by other accounts)	2 (causal links implicated, but not verified by project team)
Goat Veterinary Society (2013), personal communication	Sky lanterns	Anecdotal report of thin wire found at post mortem of a goat - 'probably' due to sky lantern	2 (source is based on 'second hand' information)	2 (evidence allegedly supported by post mortem but not confirmed)	1 (source only documented thin wire being found, not confirmed to be related to a sky lantern)
Goat Veterinary Society (2013), personal communication	Helium balloons	Anecdotal evidence of goat choking on helium balloon	2 (source is based on 'second hand' information)	1 ('second hand' evidence not supported)	2 (source said to be related to helium balloons but not confirmed)

Table 5.1.3 Impact on marine life (literature)

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
Lucas, Z (1992)	Monitoring persistent litter in the marine environment on Sable Island, Nova Scotia	Plastics mainly	Scientific journal describing impacts of beach litter (abstract only)	3	3	1
Lutacavage ME, Plotkin P, Witherington B, Lutz PL (1997)	Human impacts on sea turtle survival	Plastics mainly	Scientific journal describing impacts on sea turtles	3	3	1
Kent Local Government (2004)	Marine & coastal litter	Plastics mainly	Article released by local government looking at causes, descriptions and impacts of marine littering in UK	2	3	2
WWF (2005)	Marine Health check 2005	Plastics mainly	Yearly review by WWF on marine conservation issues	1	2	2
The Green Blue (2009)	What we know about litter in the marine environment	Plastics mainly	Fact sheet detailing extent of marine litter and tips on reducing it	1	2	2
Hyrenbach, DW, Nevins, H, Hester, M, Keiper, C, Webb, S and Harvey, J (2009)	Seabirds indicate plastic pollution in the marine environment: quantifying spatial patterns and trends in Alaska	Plastics mainly	Non UK scientific paper associated with marine pollution through littering	3	3	1
The Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR) (2009)	Marine Litter in the North East Atlantic region	Plastics mainly	Scientific paper looking at marine debris and harm to marine life	3	3	1
Ten Brink <i>et al</i> (2009)	Guidelines on the use of market-based instruments to address the problem of marine litter	Plastics mainly	Scientific paper looking at marine debris issues and harm to wildlife	3	2	1
Ribic, CA, Sheavly, SB, Rugg, DJ and Erdmann, ES (2010)	Trends and drivers of marine debris on the Atlantic coast of the US 1997–2007	Plastics mainly	Scientific paper describing patterns of marine debris	3	3	1

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
KIMO International (2010)	Economic Impacts of Marine Litter	Plastics mainly	Document on economic impacts by an environmental organisation.	1	3	1
Vanhooren, S, Maelfait, J and Belphaeme, K (2011)	Moving towards an ecological management of beaches	Plastics mainly	Journal on management of beaches with focus on the damage caused by mechanical beach cleaners and mention of balloons	3	3	3
Cuykens Ann, B, Claessens, M, Maelfait, H, Dewitte, E, Goffin, A, Stienen, EWM and Janssen, CR (2011)	Sea, beach and bird: plastics everywhere	Plastics mainly	Scientific paper (non UK) looking at plastic debris in the Belgian marine environment	3	2	2
Scottish Government, (2012)	Marine litter issues, impacts and actions	Plastics mainly	Website article looking at a wide variety of impacts of marine debris and possible remediation initiatives	2	3	2
Schuyler <i>et al.</i> (2012)	To eat or not to eat? Debris selectivity by marine turtles	Plastics mainly	Scientific paper looking at marine debris and harm to marine life, in particular sea turtles	3	3	3
Lusher, AL, McHugh, M, Thompson, RC (2013)	Occurrence of microplastics in the gastrointestinal tract of pelagic and demersal fish from the English channel	Plastics mainly	UK based study on effects of micro plastic litter on pelagic & demersal fish	3	3	1
EPA - Environmental Protection Agency	National Marine Debris Monitoring Program. Lessons learned	Plastics mainly	Scientific paper (non UK) evaluating marine debris monitoring scheme in US	3	2	2
Marine Conservation Society (MCS) position statement (undated)	MCS Pollution Policy and Position Statement	Plastics mainly	Document detailing MCS position on litter and pollution	1	2	3

APPENDIX 5.2 Fire risk

Table 5.2.1 Source summary- fire risk (literature)

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
BBC news (2006)	Cathedral fire alert over lantern	Sky lanterns	News article detailing impact of sky lanterns on property damage	1	2	3
BBC news (2009)	Sky lanterns 'posing fire risk'	Sky lanterns	News article detailing impact of sky lantern fire on risk to human safety/health	1	2	2
BBC news (2010) ^a	Chinese lantern causes crop fire near Woodstock	Sky lanterns	News article detailing impacts of sky lanterns and crop damage due to fire	1	2	3
BBC news (2010) ^b	Leicestershire farmer saves crop from being destroyed by lanterns	Sky lanterns	News article detailing impact of sky lanterns on crop damage	1	2	2
BBC news (2011)	Lantern warning after Holy Island dunes fire	Sky lanterns	News article detailing impact of sky lanterns on fire risk to environment	1	2	2
BBC news (2011)	Michael Eavis calls for UK ban on Chinese lanterns	Sky lanterns	News article detailing impacts of sky lanterns on crop damage and livestock death	1	1	2
Stourbridge News (2011)	Wordsley family has lucky escape after lantern starts car blaze	Sky lanterns	News article detailing impact of sky lanterns on human health	1	2	2
The Daily Telegraph (2011)	Latest fire caused by Chinese sky lanterns increases calls for a ban	Sky lanterns	News article detailing impact of sky lanterns on property damage and human health risk	1	2	2
BBC news (2011)	Chinese lantern blamed for Somerton fire	Sky lanterns	News article detailing impact of sky lanterns on property damage	1	2	2
The Daily Telegraph (2011)	Fire-fighters called 100 times to deal with burning Chinese lanterns	Sky lanterns	News article detailing impact of sky lanterns on fire-fighter call-outs	1	1	2
The Daily Telegraph, (2011)	Fire-fighters call for ban on sky lanterns	Sky lanterns	News article detailing impact of sky lanterns on the environment, livestock and horses	1	1	2
BBC news (2012)	Lantern causes Flintshire conservatory fire	Sky lanterns	News article detailing impact of sky lanterns on property damage	1	2	2
BBC (2012)	Pembroke Dock new year firework sparks blaze in three homes	Firework	News article which describes property fire as a result of fireworks	2	1	2

Table 5.2.2 Source summary- fire risk (interviews)

Source			Score		
Reference	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
Women's Food & Farming Union (2013)	Sky lanterns	Reports submitted to WFU (anecdotal evidence). Two incidences of sky lanterns landing in domestic properties. Fire put out, no damage caused	2 (reported to be based on individual accounts)	2 (evidence supported by 1 other account)	2 (presence of causal links but not completely verified)
Women's Food & Farming Union (2013)	Sky lanterns	Reports submitted to WFU (anecdotal evidence backed up by press articles in some cases). Three incidences of sky lanterns landing in fields of straw or crops (barley) and setting them alight, confirmed by fire officer as caused by sky lanterns	2 (reported to be based on individual accounts)	2 (evidence on one case said to be confirmed by insurance claim and fire officers report not seen by project team)	2 (presence of causal links but not completely verified)
NFU (2013)	Sky lanterns	Anecdotal evidence based on reports posted to NFU regional offices of caravan damage due to sky lantern fire	2 (not necessarily unbiased judgement).	2 (evidence supported by other accounts)	2 (presence of causal links but not completely verified)
NFU (2013)	Sky lanterns	Anecdotal evidence based on reports posted to NFU regional offices of lanterns landing alight among hay bales, lanterns extinguished before damage caused	2 (not necessarily unbiased judgement).	2 (evidence supported by other accounts)	2 (presence of causal links but not completely verified)
EWFF (2013), personal communication	Sky lanterns	Anecdotal evidence of wildfire incidents caused by sky lanterns. In all, 8 wildfire incidents in Dorset, and 3 in Northumberland caused by sky lanterns	1 (anecdotal evidence based on personal communications)	1 (evidence not supported)	2 (presence of causal links)
CFOA (2013), personal communication	Sky lanterns	UK survey conducted from 2009 to 2011 for a BBC programme in July 2011. 60 Fire and Rescue Services asked to take part in survey and 42 responded (70% participation)	2 (evidence based on personal communication by independent body)	2 (evidence supported by other accounts)	3 (presence of sky lanterns specifically)

APPENDIX 5.3 Littering on land and at sea

Table 5.3.1 Source summary - littering on land and at sea (literature)

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
MCS (2009)	Don't Let Go	Helium balloons	Paper associated with organisation looking at the effects of balloon releases as littering	1	3	3
NABAS, Code of conduct (2009)	NABAS code of conduct for balloon release	Helium balloons	Position paper highlighting guidelines for helium balloon release	1	2	2
Burchette (1989)	Study of the effects of balloons on the environment	Helium balloons	Scientific journal looking at effects of helium balloon releases on littering	1	1	2
Keep Wales Tidy (2008)	Keep Wales Tidy Position Paper	Helium balloons	Position paper detailing impact of balloon releases as litter	2	2	3
The Guardian (2009)	What is the environmental impact of a sky lantern?	Sky lantern	News article detailing environmental impact of sky lanterns	1	2	3
Vanhooren <i>et al</i> (2011)	Moving towards an ecological management of beaches	Helium balloons	Scientific journal looking at cost of beach clean up and litter sources on beaches	3	3	2
Keep Wales Tidy update (2013)	Keep Wales Tidy information on balloons and lanterns	Helium balloons and sky lanterns	Updated position paper looking at balloon releases as a source of littering	2	3	3

Table 5.3.2 Source summary- littering on land and at sea (interviews)

Source			Score		
Reference	Sky lanterns / helium balloons	Description of evidence	Independence	Reliability	Robustness
Marine Conservation Society (2012)	Helium balloons	MCS Beach-watch results confirming balloon litter increase from 3.4 items/km of beach in 1996 to 9.5 items/km of beach in 2011	3 (survey conducted by volunteers, assumed unbiased reporting)	3 (evidence of impact, and plausible based on other impacts)	3 (clear links of balloon litter)
Conwy County Council (2013)	Sky lanterns and helium balloons	Anecdotal evidence from councils cleansing department relating to more balloon and sky lantern debris left in hedges, roadsides etc	2 (anecdotal evidence but not quantified)	2 (evidence of impact, and plausible based on other impacts)	2 (anecdotal evidence of balloon litter)
KWT (2013), personal communication (extracted from survey data)	Helium balloons	Survey data from KWT's Local Environmental Audit and Management System (LEAMS) confirming balloon litter found on 1% of streets surveyed by KWT in the 2010-11 survey year	3 (survey conducted by volunteers), assumed unbiased reporting)	3 (evidence of direct impact)	3 (clear survey methodology to ensure robustness).
WFU (2013)	Sky lanterns	A vegetable for Tesco contacted WFU to say that he routinely spent every Monday morning picking up sky lantern litter from fields	2 (personal communication)	1 (evidence but not supported by anything other than anecdotal 'third party' account)	2 (presence of causal links but no sound basis to estimate impact)

APPENDIX 5.4 Risk to aviation

Table 5.4.1a Source summary- risks to aviation (literature)

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
CAA (2011)	Operation of directed light, fireworks, toy balloons and sky lanterns within UK airspace	Sky lanterns, helium balloons, also fireworks	Article released by UK organisation focusing on the impacts of fireworks, laser light, sky lantern and helium balloons on aviation.	2	2	3
BBC news (2011)	Sky lantern warning issued by Manchester Airport	Sky lanterns	BBC news article that focuses on impacts of sky lanterns on aviation safety	1	2	3

Table 5.4.2 Source summary- risks to aviation (interviews)

Source			Score		
Reference	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
Manchester Airport (2013), personal communication	Sky lanterns	A mandatory occurrence report (MOR) ¹¹ filed by Manchester Airport. An outbound passenger plane reported a sky lantern on the runway of Manchester airport which delayed an outbound departure, no inbound traffic affected	3 (fact, reported as an official incident by aircraft)	3 (confirmed evidence as sky lantern on runway)	3 (clear causal link)

¹¹ The objective of the MOR Scheme is to contribute to the improvement of flight safety by ensuring that relevant information on safety is reported, collected, stored, protected and disseminated. This is administered by the Civil Aviation Authority (CAA).

APPENDIX 5.5 Risk to coastal rescue services

Table 5.5.1 Source summary- risks to coastal rescue services (literature)

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
RNLI (2010)	Chinese lanterns spark search for red flares off Skegness	Sky lantern	RNLI article detailing sky lanterns and coastguard call-outs	2	2	3
RNLI (2011)	Sunderland RNLI Lifeboat launches after flares sighted off Hendon	Sky lantern	RNLI article detailing effects of sky lanterns and coastguard call-outs	2	2	3
HSE (2012)	Working together on firework displays	Sky lantern	Health and safety document detailing regulations and guidance around firework displays	2	3	3
RNLI (2012)	Newquay RNLI chief in new plea over lights in the night sky	Sky lantern	RNLI article detailing effects of sky lanterns and coastguard call outs	2	2	3
BBC news (2008)	Paper lantern sparks major search	Sky lantern	BBC news article detailing effects of sky lanterns and coastguard call-outs	1	2	3
BBC news (2010)	Chinese lantern 'sparks sea search' in Sussex	Sky lantern	News article reporting on false coastguard call out due to sky lantern	1	2	3
Maritime and Coastguard Agency (2009)	Public urged to inform coastguard when using Chinese lanterns	Sky lantern	Article released looking at impacts of sky lanterns and coastguard call-outs	2	2	2
Farming UK (2010)	Chinese Lanterns: think twice says the NFU	Sky lanterns	Website article looking at impacts of sky lanterns on livestock and coastal risk	1	2	2

Table 5.5.2 Source summary- risks to coastal rescue services (interview)

Source			Score		
Reference	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
Maritime & Coastguard Agency (2013) , personal communication	Sky lanterns	Documented false call outs due to red sky lanterns mistaken as red flares. Number of incidents reported as; 2007 - 7 2008 - 49 2009 - 347 2010 - 754 2011 – 315 2012 – 207	3 (fact, source based on held records)	3 (evidence supported by held data)	2 (presence of causal links but it is impossible to say that all of these events were definitely related to sky lanterns)

APPENDIX 5.6 Risk to human safety

Table 5.6.1 Source summary- human health risk (literature)

Source				Score		
Reference	Title	Sky lanterns/ helium balloons	Description of evidence	Independence	Reliability	Robustness
BBC (2010)	Warning as child burnt by Chinese lantern in Wrexham	Sky lantern	News article looking at sky lanterns and human safety	1	2	2
BBC (2000)	Youth killed by fireworks	Firework	News article which describes human death as a result of fireworks	1	1	2
MSN news article (2011)	Baby burned in firework accident	Firework	News article which describes human injury as a result of fireworks	1	1	2
BBC (2011)	Fireworks blast into Blandford festival crowd	Firework	News article which describes human injury as a result of fireworks	1	1	2
BBC (2012)	Lewes bonfire celebrations: scores treated by medics	Firework	News article which describes human injury as a result of fireworks	1	2	2
Elmbridge Borough Council Website	How many people are injured by fireworks each year?	Firework	Information page discussing human injury as a result of fireworks	2	3	3
Royal Society for the Prevention of Accidents	Firework injuries in Great Britain 2005	Firework	News article which describes human injury as a result of fireworks	2	2	2

APPENDIX 5.7 Risk to helium resources

Table 5.7.1 Helium as a resource (literature)

Source			Score		
Reference	Title	Description of evidence	Independence	Reliability	Robustness
The Guardian, Science (2012)	Helium stocks run low – and party balloons are to blame	News article which focuses on value of helium as a resource	1	2	2
The Independent (August 2010)	Why the world is running out of helium	News article focused on US selling off stocks of the world's largest helium reserves by 2015	1	2	2
The Daily Mail on line (August 2010)	Scientists say earth's helium reserves 'will run out within 25 years' (and party balloons should cost £65 each)	News article focused on depletion of helium reserves and belief of some scientists that such a scarce resource is being squandered on non-essential uses	1	1	2
The Royal Institution of Great Britain (Dec 2012)	Chemist calls for ban on helium balloons this Christmas	Website article publicising Christmas lectures by Dr Peter Wothes and expressing concern over scarcity of helium reserves. It goes on to describe use of helium for party balloons taking up 10% of global supplies (2009 data)	2	2	2
Daily Telegraph (Sept 2012)	The end of the party: don't use helium balloons, demands academic, as gas shortage threatens medical equipment	News article confirming that 75% of helium reserves are produced in US as a by-product of the oil refining industry	1	2	2
New Scientist (Aug 2010)	We are running out of helium	Journal article warning of depleted helium reserves and need to avoid non essential uses e.g. party balloons	2	2	2

APPENDIX 6 Member State Information

Table 6.1 Member State tabular information

Member State	Action taken	Incidents	Legislation	Comments
Austria	Sales ban	<p>Several minor incidents</p> <p>-One major incident (fire was set most probably by a sky lantern on the waste paper storage of a paper mill – some hundred tons of waste paper were burned)</p> <p>-Generic risk assessment (it is not acceptable to let a flame float uncontrolled over two or three kilometres etc.)</p> <p>-Concerns by the air control authorities</p> <p>-Concerns by farmers because of the wires (threat to cattle)</p>	Regulation based on Austrian product Safety Act	<p>Private purchases from distance-sellers in other EU-members states are not covered by the regulation.</p> <p>New type of "tied" lantern – diverging risk assessments between Austria and Germany</p> <p>The sales ban seems to be quite effective: before the ban, a lot of sky lanterns can be seen at New Years Eve, now very few can be seen.</p> <p>The existing fire regulations in Austria require careful handling of open fire – therefore, the use of sky lanterns could be illegal even without the sales ban.</p>
Denmark	Import and use of sky lanterns is not prohibited in Denmark by national regulation but if enquiries received, the Danish Safety Technology Authority informs that sky lanterns are not considered safe and may not be placed on the market.	No reports on incidents or accidents although Danish Coast Guard receives a number of false alarms each year.	<p>There is a Danish regulation on the use of open fires.</p> <p>Import and use of sky lanterns is regulated by the Danish Product Safety Act that transposes the General Product Safety Directive.</p>	<p>Attaching the lantern to a fixed point with a proper, durable and non-electricity conducting wire could eliminate or minimize the inherent risks of the product to an acceptable limit. If the product can be made safe and this can be documented, the Danish Safety technology Authority would accept the product.</p>
Finland	In 2009, the Finnish importer withdrew voluntarily products from the market and recalled from consumers.	The Finnish Safety and Chemicals Agency (Tukes) has received no information of serious incidents caused by these lanterns simply because sky lanterns have not been widely sold in Finland, whereas Tukes has been informed of accidents occurred elsewhere in EU, in such countries where it has been possible to sell sky lanterns.	There are many uncontrollable risks involved in the use of lanterns that are freely airborne ("sky lanterns" or "flying lanterns") and these products are considered to pose a serious risk of fire. Freely airborne lanterns pose a serious risk because it is difficult, if not impossible, to make sure they will not get in contact with combustible materials. Because of their lightness, airborne lanterns may be	This action was based on guidelines concerning sales of sky lanterns in Finland. These guidelines are presented in "Safety requirements for candle products and certain products that constitute a fire hazard" published by Tukes. These guidelines were prepared together with the Finnish Fire Rescue Authorities. The main feature is, that these lanterns pose a serious risk for fire and such a way lanterns are regarded as dangerous products in the

Member State	Action taken	Incidents	Legislation	Comments
			transported by wind or air currents to buildings, trees, etc. Such airborne lanterns with a naked flame are regarded as dangerous in the manner referred to in section 10 of the Consumer Safety Act (section 6 of Act 75/2004). Dangerous airborne lanterns may not be placed on the market.	manner referred in the Consumer Safety Act (Section 3 of Act 920/2011). Finnish authorities consider there are many uncontrolled risks related to the use of sky lanterns and they pose a risk to the safety and health of consumers Tukes has considered sky lanterns, found from Finnish market, as dangerous consumer products and these products are withdrawn, when it has found out that these items are being sold in stores or in the internet in Finland.
Germany ¹²	Since 2010, in all German Länder legislation came in force prohibiting the use of sky lanterns. However, the placing on the market of sky lanterns is not prohibited.	In June 2009 there was a death in connection with a sky lantern in flames.	The regulations are issued primarily on the basis of legislation on public order and safety, fire protection rules, and in some cases on the basis of the Aviation Law.	
Malta	The sales and use of sky lanterns has been banned by the Malta Standards Authority (Source: press release on Dec. 17 2009), followed by a risk assessment using the RAPEX assessment model	A risk assessment carried out on the use of sky lanterns in Malta gave a serious risk profile. Hence these products were banned from sale and use in and around Malta. Relevant aspects for having such a risk profile are the size of the Maltese islands and hence the affect such products can have on planes landing in or taking off from Malta. Moreover, the dry weather prevalent in Malta can easily cause fields and wooden fittings on buildings to catch fire. Malta being so densely populated, the probability of a lighted lantern falling onto residential areas is considered high. As yet, no accidents have been known to occur due to Chinese lanterns in Malta.	No. 634 Product Safety Act (Cap . 427) Use of Sky Lanterns Banned The Malta Competition and Consumer Affairs Authority is hereby banning with immediate effect the use of Sky Lanterns, sometimes also referred to as Chinese Lanterns or Wish Lanterns. These products have been deemed unsafe and pose a serious risk to consumers.	Sky lanterns were deemed unsafe and posed a serious risk to consumers Once inflated, the lanterns are released into the atmosphere where they float haphazardly out of control of the human user. Such mode of operation may cause the lantern to glide onto flammable or highly combustible materials such as houses, fields and cars, thus posing an obvious risk to third party individuals and property. These products have also caused problems related to false alarms for coastguards. Incidences of fire caused by sky lanterns in other EU countries.

¹² Disparity in information, our consultation with Germany suggested that there was not a national policy in restricting the use of sky lanterns although it is illegal to launch a sky lantern in most parts of Germany.

Member State	Action taken	Incidents	Legislation	Comments
Netherlands	Meetings with importers, research and risk assessments carried out by NL authorities using RAPEX assessment model as provided in the RAPEX guidelines.		Commodities Law General Product Safety (consumer safety and safety of goods) Regulation kites and small unmanned balloons (flight safety)	Sky lantern on the market since 2007. Risk assessment concludes that current Sky Lantern does not comply with article 3 of the GPSD; it poses a medium risk; changes to the product might lead to a low risk product. Following innovation by importers in 2010, a new design of lantern has been on the market since the end of 2010 which takes into account certain safety requirements and other aspects to reduce risks. These include warnings against use during unfavourable weather conditions and a reduction in the flammability of the lantern.
Spain	Ban on a brand of British made flying lanterns from the market due to their fire hazard. (Source: NFU online, 12 January 2012 ¹). Sky Lanterns originating in the UK have been withdrawn from the market by the authorities due to the product posing a risk of burns and injuries. After launching, the lanterns fly in the air without control rendering it difficult or impossible to avoid the lanterns coming into contact with flammable material. (Source; RQA Group-product recall case studies ²)		Market surveillance authorities decided in 2007 that the product can create risks for the consumer. Spain considers that the Commission should apply Art. 13 of the GPSD	The Spanish authorities claimed that flying lanterns posed a risk of burns and fire because, after launching, they fly through the air without control. (Source: Farmers Guardian. 11 January 2012 ³ .) The Spanish authorities said the lanterns fly in the air without control making it impossible to avoid the lanterns coming into contact with flammable material such as dry vegetation or buildings. (Source: NFU online, 12 January 2012 ⁴ .)
<p>¹ - http://www.nfuonline.com/Our-work/Campaigns-and-Lobbying/Brussels/Spanish-ban-hazardous-%E2%80%98flying-lantern%E2%80%99/; ² - http://www.rqa-group.com/product-recall-case-studies.php?page_number=6&type=1; ³ - http://www.farmersguardian.com/home/latest-news/spain-bans-sky-lanterns/44056.article; ⁴ - http://www.nfuonline.com/Our-work/Campaigns-and-Lobbying/Brussels/Spanish-ban-hazardous-%E2%80%98flying-lantern%E2%80%99/;</p>				

Source: Compiled and developed by the ADAS research team based on consultations with EU countries, published sources and the information on the position of Member States provided by contact at Electronic, Materials, Chemicals and Product Regulations in BIS.

APPENDIX 7a Sky Lantern Release Product Safety Guidelines



Release Instructions



- ★ A minimum of two Adults are required to light a lantern.
- ★ Take out the folder sky lanterns carefully from the plastic wrapping, being very careful not to tear or rip the delicate paper.
- ★ Before lighting the lantern, hold it by the bamboo rim and gently fill the lantern with air to expand it fully and remove the creases in the tissue paper.
- ★ To light the lantern, hold it by the top and the bamboo rim whilst another person lights the wick by holding a naked flame against it for a few seconds.

**TAKE CARE - BEFORE THE LANTERN IS LAUNCHED
THE NAKED FLAME MUST BE SUPERVISED AT ALL TIMES**

- ★ The lantern will fill with hot air from the lit touch paper and be ready to be released within approximately 30 seconds.
- ★ Hold the lantern by the bamboo rim until the lantern is full of hot air and is ready to float gently into the sky. Do not release it prematurely as the lantern will fall to the ground.





Safety Instructions

- ★ Familiarise yourself with the lanterns before lighting and launching them. Please refer to the release instructions for more information.
- ★ Do not launch in wind conditions that make lighting the lantern difficult. In any case ensure that the wind is not stronger than 5mph (please refer to a weather forecast for approximate wind speeds in your area such as www.bbc.co.uk/weather).
- ★ Before the lantern is launched, the naked flame must be supervised at all times.
- ★ Launching a lantern in strong winds, that is torn or has burn holes in may cause premature landing and fire at the point of grounding.
- ★ Check the wind direction prior to releasing the lanterns – obstacles such as buildings and trees should not be in the direct flightpath of the lantern and must be at least 30 metres away.
- ★ Prior to use, all lanterns should be kept in a dry, secure place a way from children. Ensure that all children are kept under supervision and away from the source of ignition during the release.
- ★ Always ensure that any naked flames are supervised and never left unattended. Make sure you have water and/or fire extinguishers at hand.
- ★ Do not light and release the lanterns wearing flammable clothing in case the flame from the wick ignites the clothing. For additional safety, protective gloves can be worn.
- ★ Launching sky lanterns in an appropriate surroundings or weather conditions or after they have been damaged may cause fires. It could make you liable to criminal charges or civil claims for damages
- ★ Releasing large numbers of lanterns, or within a five mile radius of an airport or landing strip? Please contact the Civil Aviation Authority to check air space safety in your area:
Airspace Utilisation Section, Directorate of Airspace Policy
702 CAA House, 45-59 Kingsway, London, WC2B 6TE.
Tel: 0207 453 6599 - Fax: 0207 453 6593
Email: ausops@caa.co.uk
- ★ Sky Lanterns must not be released within two miles of a major road or motorway.
- ★ Sky Lanterns must not be released within a 5 mile radius of Farmers Fields and Live Stock.
- ★ If you are planning to release the lanterns within five miles of the coast please notify the Maritime and Coastguard Agency to avoid the lanterns being recognised as distress signals.
<http://www.mcga.gov.uk/c4mca/mcga07-home/aboutus/contact07.htm>

IMPORTANT: 'Party Delights' and manufacturer 'Light a Lantern' take no responsibility for personal injuries, damage or legal issues resulting from the release of these sky lanterns.

Enjoy yourself and be safe!

APPENDIX 7b Guidelines and Code of Conduct for Balloon Releases (NABAS)



Guidelines and Code of Conduct for Balloon Releases

The Guidelines and Code of Conduct is designed for anyone who is planning a Balloon Release. We believe this should be strictly adhered to in the interest of safeguarding the environment

Highway House, Ashford Park Avenue,
Rush-on-Wye, Herefordshire, HR3 5AN
Tel: 01989 761204 Fax: 01989 587 616
email: admin@nabas.co.uk website: www.nabas.co.uk

CODE OF CONDUCT FOR BALLOON RELEASES

NABAS is very aware of its responsibilities to the environment. This Code of Conduct was produced to formalise the principles for balloon releases, which have long been the standard for the industry. It is extremely important that everyone adheres to this code in the interest of safeguarding the environment.

1. Only natural latex rubber balloons will be used for Releases.

Latex, being an organic product degrades naturally in the environment. Balloons made of any material other than latex and in particular foil balloons *should not* be used for Releases. It is forbidden to use balloons containing any metallic pigment eg bronze, silver, gold etc.

2. All components used in balloon releases must be biodegradable.

Balloons *must* be hand tied, plastic valves *should not* be used. Any attached labels *must* be of paper, preferably recycled.

3. Only helium gas should be used to inflate the balloons.

Helium is an inert lighter-than-air gas. As the balloon rises, the gas expands until eventually the balloon bursts producing small fragments, which aid decomposition.

4. No ribbons or strings must be attached to the balloons.

Ribbons and strings represent a potential problem and *must never* be used in balloon releases. Labels should be attached via the hand tied balloon knot.

5. Balloons must always be launched singly.

Single balloons disperse easily and quickly. They *must never* be tied together in bunches for balloon releases.

6. Full approval must be obtained from the relevant authorities.

Releases exceeding 5000 balloons should not take place unless they have been cleared in advance with all relevant air traffic and local authorities. The Authorities must be notified *in writing* at least **28 days prior** to the release.

7. Maximum balloon size.

Balloons larger than 12" cannot be released.

8. All balloons sold near balloon releases must be weighted.

Any balloons sold in the vicinity of a balloon release *must be* sold with a weight attached to ensure they cannot escape. Foil balloons *must never* be released. Latex balloons with a plastic valve and ribbon must also be weighted.

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GUIDE TO BALLOON RELEASES

This information and the Guidelines and Code of Conduct are provided for people and organisations planning their own balloon release for fund raising or any other purpose. We **strongly recommend** that only a small balloon release should be attempted without professional assistance. Small being defined as anything up to 1000 balloons. This guidance is designed to minimize the risk of any potential danger to animals, sea creatures and the general environment.

What happens when a balloon is released?

A scientific survey carried out in 1989 revealed that on release a balloon will float up to a height of approximately 5 miles and then it becomes brittle and shatters into minuscule pieces falling back to earth at a rate of circa one piece every 5 square miles. Problems can arise when a balloon is not inflated properly or fully or is carrying too much weight and therefore does not reach the height at which shattering occurs. This situation causes a potential danger to wildlife and the environment.

What can I do to reduce this risk?

The Balloon Industry has produced a Code of Conduct, with input from leading environmental organisations; you should follow this advice to the letter.

Conclusion

Balloon releases are fun, spectacular and have a variety of promotional and fundraising objectives. However if best practice is not followed major problems can occur.

If you require any further clarification or need advice please contact NABAS, The Balloon Industry's only independent association on 01989 762 204.

Applying for permission from the Civil Aviation Authority.

It is a requirement that if you are releasing more than 5,000 balloons you must apply in writing for permission to the Civil Aviation Authority (CAA) at least 28 days in advance of the release because balloons can interfere with air traffic. The CAA must also be informed of any balloon releases up to 5,000 balloons if the release is in the vicinity of an airport or airfield.

A form can be obtained by calling either the NABAS office on 01989 762 204 or the Airspace Utilization Section of the CAA on 020 7453 6589

ADDITIONAL INFORMATION

Our Environment & Latex Balloons

- Q. What are balloons made of?**
- A.** There are basically two types of balloons - foil balloons and latex balloons. The foil balloons often referred to as mylar, are a bladder made of nylon that is covered with a layer of aluminium that is 0.015 of an inch thick. Latex balloons are made from the sap of rubber trees - a completely natural substance.
- Q. Are latex balloons biodegradable?**
- A.** Yes. Latex is the product of rubber tree sap, it breaks down when exposed to the elements of nature.
- Q. How long does it take for a balloon to biodegrade?**
- A.** Degradation is the first step in the breakdown of a latex balloon and it begins within approximately one hour of inflation. Degradation is visible in some types of balloons as a cloudy appearance. This is most evident when the balloon is exposed to direct sunlight, heat or normal outdoor conditions.
- Research was carried out in July 1988 with a variety of balloons under various conditions to accurately gauge the time needed for the latex to degrade. Results from the study indicate that the decomposition time for balloons is about the same rate as an ash leaf (5 months).
- Q. Is it true that balloons have been found ingested by sea animals?**
- A.** Some cases have been reported, but balloon fragments are unlikely to cause harm if accidentally ingested. This is because latex and the dyes used in latex colouring are non-toxic. However problems may occur if a partially inflated balloon is ingested, causing possible blockage of the alimentary tract.

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