

**ESSENTIAL REQUIREMENTS FOR THE SAFETY AND INTEROPERABILITY
REGULATION OF AERODROMES**

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EXPLANATORY MEMORANDUM ON ESSENTIAL REQUIREMENTS

I. DESCRIPTION OF THE ESSENTIAL REQUIREMENTS

a - Introduction

1. This explanatory memorandum describes how essential requirements (ERs) for aerodrome safety have been developed in consultation with stakeholders. It has for main objectives to explain:
 - what essential requirements are;
 - the process of hazard identification, followed by risk assessment and, if necessary, risk mitigation used to draft the ERs;
 - how the ERs compare with ICAO standards and recommended practices.
2. As their name already indicates, “*essential requirements*” are the conditions to be fulfilled by a product, an infrastructure, a person or an organisation to ensure as much as possible that the public is not unduly affected by their use, operations or activities. They address therefore the means by which risks associated to a specific activity shall be eliminated or reduced to an acceptable level, when reasonably probable. In other words they do not constitute a legal obligation to certain quantitative results (e.g. Tolerable Level of Safety), but on the contrary an obligation for certain means to be implemented¹ to mitigate unacceptable risks. In this context it must be made clear that verification of compliance (certification or approval processes) are not mitigating measures; they are the verification that a mitigating measure is being implemented.
3. To specify such means, it is necessary to identify the hazards associated to the analysed activity and to evaluate the related risks. The essential requirements are then the means to be used to reduce these risks to an acceptable level. The process is as follows:
 - Identification of any potential event which could initiate a sequence dangerous for aviation safety: i.e. identification of the hazards;
 - Assessment of the possible consequences, and categorisation of their “severity”;
 - Assessment of the probability of occurrence, in the absence of any safeguards (i.e. “probability”);
 - Judgement on the tolerability of the risk (i.e. only extremely remote probability is acceptable if a catastrophic severity is possible; greater probability is allowed in the face of less severe consequences);
 - Definition of mitigating measures to reduce the probability of a hazard occurring or to reduce the severity of the consequences, when the risks associate to a hazard is unacceptable.
4. As far as mitigating measures are concerned, it is also important to insist that they must be proportionate to the safety objective. This means that they must not go beyond what is necessary to achieve the expected safety benefit without creating undue restrictions that are not justified by that objective. In the present case the objective was therefore limited to providing for an appropriate mitigation of unacceptable risks related to the operation of a single aircraft operating on or near an aerodrome. Mitigating the risks associated with the possible collision of moving aircraft has been considered to be a different issue that will be addressed separately

¹ Obligation of means as compared to obligation of results

when considering the risks associated to the provision of air traffic management from a gate to gate perspective².

5. The Agency therefore, together with GASR³ experts, undertook a study to identify hazards linked with the activity of a single aircraft landing on, taxiing on, or taking off from, an aerodrome. After assessment of the potential risks, the necessary mitigation measures (i.e. the safety objectives or essential requirements) have been elaborated to eliminate those risks or reduce them to an acceptable level. They have then been grouped in clusters corresponding to the persons responsible for their implementation:
 - physical characteristics, infrastructure and equipment (i.e. aerodrome design);
 - operations and management;
 - aerodrome surroundings.
6. It must indeed be kept in mind that, as stated in the consultation document (NPA 06/2006), the owner and the operator of an aerodrome may be very different legal persons. With the growing trend towards liberalising the provision of aerodrome services, it is likely to become common practice that public entities responsible for organising the provision of such services prefer outsourcing these on the basis of limited duration contracts while remaining owner of the infrastructure. It would then be unfair to put on the operator obligations that the owner is the only able to fulfil. In the same way, the entities in charge of the provision of these services may not have the power to take measures to safeguard the environment out of the aerodrome perimeter. Member States themselves must then be required to ensure that such measures can be taken as appropriate. For the sake of clarity and legal certainty it is therefore necessary to clearly identify who is responsible for compliance with each of the essential requirements.
7. To validate the results of the “top down” approach described here above, a “bottom up” review was made to examine why particular essential requirements were imposed; which risk such requirements were mitigating; and whether the means used were proportionate to the safety objective. These essential requirements, were also compared with the provisions of ICAO Annex 14, Volume I “Aerodrome Design and Operations” and Volume II “Heliports”, to verify that they allowed Member States complying with their ICAO obligations as regards interoperability and aerodrome safety at global level.
8. Care has been taken to ensure that the envisaged essential requirements are suitable for, and proportionate to, all kinds of aircraft regulated under the EASA system, including rotorcraft and general aviation, all types of aviation activities (commercial, business and recreational) at or near any aerodrome (e.g. single runway, multiple runways, heliports⁴, water aerodromes) and under any flight rules (instrument or visual)⁵, so as to be consistent with the total system approach underpinning Community policy in the field of civil aviation safety. Of course the necessary distinctions will be introduced at the level of implementing rules and acceptable means of compliance (AMCs) in due time.
9. Last but not least, the ERs have been drafted with the view to allowing direct implementation, for certain types of activity. It would be possible therefore, not only to regulate through binding implementing rules, but also using more flexible and non-binding acceptable means of

² The Agency has been required by the European Commission to work on this issue, consistent with whereas clause 2 of Regulation 1592/2002, and to make proposals on the safety regulation of air navigation services and air traffic management. Work therefore has been initiated and the Agency intends to publish a notice of proposed amendment in November 2007.

³ Group of Airport safety Regulators

⁴ i.e. an aerodrome or part thereof, designed to be used for the arrival, departure and surface movement of rotorcraft

⁵ As per ICAO Annex 2 – Rules of the Air.

compliance to be implemented by industry, operators and authorities through their own safety management systems, consistent with new principles for better regulation in aviation safety.

b - Physical characteristics, infrastructure and equipment of an aerodrome

(i) Movement area

10. An aerodrome is composed of at least a take-off and landing area. One of the first concerns one must have, when designing this area, is to ensure it has sufficient dimensions to accommodate aircraft expected to use the facility. Otherwise an aircraft may overrun or not fit into the area, thus creating a risk of damage to the aircraft or, if the velocity is great enough, of injury and death of the occupants of the aircraft or to people on the ground, which would constitute an unacceptable risk. This concern is addressed through essential requirement (ER) A.1.a.i, which imposes suitable dimensions for the area. The manner in which this paragraph is written allows current practice to continue while providing for the development of implementing rules that comply for instance with ICAO Annex 14, Volume I, Paragraphs 3.1.6 and 3.1.9.
11. Furthermore, the landing and take-off area needs to be able to withstand the repeated load of the aircraft that are planned to use the area. Indeed, the frequent use of such an area by aircraft that is too heavy for it may lead to rapid deterioration of the take-off and landing area. At some stage this may in turn induce consequences, such as loss of control of an aircraft, which may lead to an accident. For this reason ER A.1.a.ii mandates sufficient bearing strength for the landing and take-off area. It is worded of course to exclude water aerodromes, whose bearing strength depends on natural characteristics. This point is also consistent with ICAO Annex 14, Volume I, paragraphs such as 3.1.20.
12. Also this landing and take-off area, if on ground or man-made structure, must not retain standing water or suffer from insufficient or inefficient drainage. An abnormal accumulation of water, particularly for airplanes, may lead to aquaplaning, for instance, that may cause a loss of control and lead to an accident, which is an unacceptable risk. The intent of ER A.1.a.iii is then to require that such an area be designed in a way suitable to ensure the efficient drainage of water. This point mirrors the intent in ICAO Annex 14, Volume I, paragraph 3.1.18.
13. Of course, the landing and take-off area must not have longitudinal or lateral slopes that could limit the visibility of the crew or that could make the usage of the area dangerous due to excessive slopes or change in slopes. A landing and take-off area designed without taking such elements into account could cause a significant reduction in the safety of the aircraft using it. This risk is addressed by ER A.1.a.iv, which also matches with ICAO Annex 14, Volume I, paragraphs such as 3.1.12 to 3.1.19.
14. Another hazard that must be taken into consideration comes from the surface characteristics of the area. An airplane may suffer from insufficient friction, which may reduce braking efficiency and lead to overrunning or veering off the takeoff or landing area. Another example would be where surface irregularities may adversely affect the take off or landing of an aircraft by causing excessive bouncing, pitching, vibration or other control difficulties. The consequence of the above could even be an aviation accident with fatalities. Therefore, the only practicable way to reduce such unacceptable risks is to mandate appropriate surface characteristics, in order to prevent the lead events to occur. Such is the aim of ER A.1.a.v, which mirrors ICAO Annex 14 SARPS such as those contained in Volume I, paragraphs 3.1.21 to 3.1.25.
15. If a hazardous object is left or installed (e.g. non frangible markers or visual aids of too conspicuous dimensions) on a landing and take-off area, the aircraft may hit it causing damage to the aircraft or even, if this occurs at a high enough speed, injury or death to the occupants of

the aircraft. ER A.1.a.vi requires therefore that landing and take-off areas be free from objects that may cause unacceptable risks, consistent with ICAO Annex 14 paragraphs, such as those in Volume I, Chapter 9.9, and Chapter 10.2.

16. In cases of an aerodrome with more than one landing and take-off area, a potential risk exists of an aircraft going too close to another landing and take-off area, and hence disrupting the operations on it. Without prejudice to operational measures, such as restriction of tactical air traffic management, these kinds of hazards can be mitigated by an appropriate design of the aerodrome layout, including adequate minimum distances between landing and take-off areas, depending on the operational procedures on how these runways are planned to be used. ER A.1.b has been developed to cater for the related design mitigation means. It allows the development of implementing measures that comply also with provisions such as those specified in ICAO Annex 14, Volumes I, Paragraphs 3.1.10 and 3.1.11., and the helicopter separation distances required in Annex 14, Volume II.
17. During the last phase of landing or the first in taking-off, the aircraft are so near from the ground that appropriate measures have to be taken to eliminate any unacceptable objects (e.g. non frangible antennas for radio navigation) with which they could collide. ER A.1 c. and its subparagraphs i, ii, iii and iv, therefore mandate the establishment of safety areas around the landing and take-off area that have adequate physical characteristics and are free from unacceptable objects. These areas are indeed intended to protect aircraft flying over them during take-off or landing operations, or inadvertently landing short, running off the side, or overrunning the end, of the take-off and landing area. These provisions allow for the development of more specific implementation measures while being compliant with relevant paragraphs of ICAO Annex 14, Volume I and II, Chapter 3.
18. Depending on the intended use of an aerodrome on the ground or on a man made structure, the landing and take-off areas may need to be supplemented with areas to be used for taxiing and/or parking of aircraft. Even when taxiing at a relatively low speed, hitting an obstacle or losing control on a slippery surface, as well as insufficient bearing strength, may lead to an accident. To mitigate this risk, such areas must be designed to permit a safe operation of aircraft under all foreseeable conditions. Criteria for these areas are referred to in ER A.1.d. and its subparagraphs i, ii, iii, iv and v, again with reference to bearing strength, water drainage, slopes, surface characteristics and presence of hazardous objects. To avoid imposing on these areas, through subsequent implementing rules, the same stringent physical characteristics as for the landing and take-off areas, the subject is dealt with separately. These provisions allow for compliance with the related paragraphs of ICAO Annex 14, Volume I and similar requirements in Volume II, Chapter 3, also relevant when allowing helicopter operations on an aerodrome intended primarily for aeroplanes.
19. The very same principles, as explained in the previous paragraph, also apply to the other infrastructure such as stands, air-bridges or other equipment that may, in case of collision, cause an accident. ER A.1.e addresses this issue while allowing compliance with the principles of ICAO Annex 14, Volume I, Chapter 3.
20. More and more aerodromes are the centre of many activities, which may be purely commercial in nature and targeted towards passengers or other aerodrome users not actually involved in aircraft operations. Specific constructions, buildings or equipment may well be needed for these purposes. These activities, in themselves, although not directly critical to aviation safety, could, however, inadvertently, create induced safety hazards. For example, a new building, even if not constituting an obstacle as such, may cause induced turbulence for an aircraft that could lead a pilot to lose control. Other examples of potential hazards caused by such developments are: infringement of separation distances; blocking visibility for ATC or aerodrome users; waste

from storage areas creating foreign object damages; areas of glass or other polished surfaces causing sun reflection; building design causing radar reflection, navigation aid interference or multipath or background lighting interference to pilot's vision... All of which could potentially lead to the loss of an aircraft. Mitigation is provided by ER A.1.f, which also reflects SARPS contained in ICAO Annex 14.

21. Finally, due to the high speed of aircraft landing or taking-off, hitting a person, an animal or a vehicle may lead to an accident. ER A.1.g mitigates this risk while ensuring compliance with the provisions of ICAO such as those included in ICAO Annex 14, Volume I, Chapter 3.

(ii) *Obstacle clearance*

22. Statistics on aviation safety show that landing and take-off are the most critical phases of flight. It is indeed during these phases of flight that aircraft have to operate at low altitude on or over the area surrounding the aerodrome. It is necessary then to ensure that useable arrival and departure trajectories can be defined that provide for sufficient clearance above the ground and obstacles, inside or outside the aerodrome perimeter, when landing or taking-off. The related routes or areas constitute an integral part of the design of the aerodrome, as there would no possibility to safely use an aerodrome if no trajectory that can be followed by the average aircraft using that aerodrome provided such clearances. Such is the objective of ER A.2 and its subparagraphs a) and b). It mirrors ICAO Annex 14, Chapter 4 on obstacle restriction and removal and ICAO Doc 8168, Departure, Arrival and Landing procedures.

(iii) *Visual and Non-visual Aids and Aerodrome Equipment*

23. In the case of flight crews operating on an aerodrome with which they are not familiar or in reduced visibility, signs, markers, markings and other visual or non visual aids must provide unambiguous information without any possible confusion. If this were not the case, there could be aircraft landing in the wrong part of the landing and take-off area; aircraft deviating from taxiway centerlines; or parking in the wrong place, which could increase the risk of an accident taking place. Such information moreover must be unambiguously presented to any aircrew at any aerodrome worldwide to avoid unfamiliar aircrew executing wrong manoeuvres. It is therefore necessary to require by law that the aerodrome design include the aids and markings that are necessary to mitigate these risks. Such is the aim of ER A.3.a, which reflects requirements from various paragraphs of ICAO Annex 14, Chapter 5. It should be noticed that the wording is applicable also to radio navigation aids, since their function contributes as well to aerodrome safety and interoperability. Duplication of implementing rules, AMCs and related rulemaking processes, will be avoided, through strict coordination with the work programme of the "Single European Sky".

24. Experience shows that considerable damages are being caused to aircraft during taxiing and parking operations⁶ because of failure or degradation of the above mentioned aids and equipment (e.g. by providing information not sufficiently accurate or through a sudden interruption of service); implementation, operation and maintenance of aerodrome equipment is therefore an integral part of aerodrome safety. Therefore ER A.3.b has been introduced to mitigate the related risks.

25. Furthermore, many of the visual or non-visual aids are systems whose continuous functioning is dependant on electrical power supply. Any disruption in power supply must not create a situation which degrades the essential information provided for flight crews. An unacceptable risk situation could develop in the event of a low-visibility departure if the runway lights went off, or for a landing aircraft at night if the approach lighting system went off suddenly. The

⁶ See: http://www.flightsafety.org/gap_home where the Flight Safety Foundation (FSF) estimates a total burden from such accidents or incidents in the range of 10,000 million US \$ (2006)/year. The subject is further analyzed in the Regulatory Impact Assessment.

same applies to radio navigation signals. That is why a mitigation measure in case of power supply disruption of visual and non-visual aids has been included in ER A.3.c, complying also with principles established in Chapter 8 of ICAO Annex 14, Volume I, covering electrical power supply systems for all air navigation facilities. As already mentioned above, possible duplication with the “Single Sky” will be avoided when developing detailed implementing rules and verification processes.

26. Complementing the two paragraphs above, aiming to ensure failsafe operations of visual and non-visual aids, a protection against external factors should also be provided. Intentional disturbance or sabotage could suddenly damage a navigational beacon. This situation could potentially lead to an unacceptable risk. The purpose of ER A.3.d is to mitigate such risk. It also matches provisions of Chapter 9 of ICAO Annex 14, Volume I.
27. In addition, sources of radiation or moving objects may cause anomalies in the radio navigation signals used by aircraft. Many sources of radiation are implemented inside the aerodrome perimeter, since they are necessary to assist air navigation and there are also of course vehicles moving on the aerodrome and even on the movement area. So ER A.3e) aim at mitigating the unacceptable risks that these factors may induce as also required by ICAO Annex 10, protecting radio navigation aids. This ER should also be seen in conjunction with ERs B.1.b and C.1., which are addressed to the operator and the public authorities and aim at mitigating the same risk when it is under their control.
28. Finally, staff operating or using aerodrome equipment which may cause unacceptable risks to aviation safety must be provided with appropriate information and clear indication of the potentially unsafe conditions. ER A.3.f has been devised to that purpose.

(iv) *Aerodrome Data*

29. Aerodrome data must be established and contain information on the various physical characteristics of the aerodrome, such as its location, elevation of the different critical points, the direction and dimensions of the landing and take-off areas, dimensions of maneuvering areas and the existence and location of different kinds of visual or non-visual aids. This data must be correct at all times to ensure the safe operations of aircraft using the aerodrome. Hence all the relevant data must be kept up-to-date. Incorrect information given to flight crew would create a significant risk, for example of colliding with an obstacle that is not mentioned in the data. This is the reason for ER A.4.a, which in turn is consistent with Chapter 2 of Annex 14, Volume I.
30. The previous paragraph speaks about the need to establish relevant aerodrome data and to keep them up-to-date. However, this is in itself not enough. Flight crew must also receive suitable, readable, complete and unambiguous data. As for the requirements presented in (iii) immediately above, such data available to aviators with sufficient accuracy and in a standardised format, will contribute to both safety and interoperability. Therefore the accuracy, the integrity and the format of such data is very important, particularly for modern navigation equipment databases. If the data is ambiguous, misleading or corrupted they cannot convey the necessary information resulting in the same risk as if there was no data at all or even worse, the data may be misinterpreted and create an unsafe situation. This is stated in ER A.4.b, which complies with the provisions of Chapter 2 of Annex 14, Volume I.
31. To complement the framework for aerodrome data described above, it is also essential to establish ways and means for its communication to take place expeditiously and without altering its contents. The hazard created by having erroneous data or receiving such data too late is evident from what is stated above. The purpose of ER A.4.c is to ensure expeditious and

incorruptible transmission of data and again this ER matches ICAO provisions in Annex 14, Chapter 2.

c - Operations and Management of an aerodrome

(i) Requirements applicable to all aerodrome operators

32. The wording of the essential requirements has been carefully drafted to avoid establishing obligations of results (to ensure) that would be beyond the capabilities of operators. The verb “to demonstrate” has been used instead to leave open the choice between various options to satisfy the requirement, such as for instance:
- Carrying out directly and documenting the associated tasks;
 - Establishing a contract and if necessary a service level agreement with a different company;
 - Providing evidence, e.g. stemming from legitimate decision of the public Authority, that the function is carried out by a competent entity (e.g. the designated Air Traffic Service Provider for Control Tower services, or RFFS provided by public organisations) in accordance with appropriate arrangements.
33. The main responsibility of an operator is to ensure that the aerodrome is always used in the optimal safety conditions. This statement is recalled in ER B.1. It requires in turn that the aerodrome operator has the necessary means, spanning from human resources, material and equipment, organisation and procedures, proportionate to the size, complexity and type of aircraft operations served by the aerodrome. This is reflected in ER B.1.a.
34. The aerodrome operator must then verify that the aerodrome continuously complies with the requirements in Section A of the ERs. If something occurs that makes the aerodrome, or part of it, non-compliant, even temporarily, the aerodrome operator must take remedial action or put in place the necessary mitigating measures and communicate the related information to aircraft operators. Such measures stem from closing the aerodrome to adapting procedures to compensate for temporary hazards. This basic principle is laid down in ER B.1.b, which reflects provisions contained in paragraph 2.9 of ICAO Annex 14 and in paragraph 4.5 of Appendix 1 of the ICAO Manual for the Certification of Aerodromes.
35. If an aircraft, when landing or taking-off, hits an animal or bird, this may cause damage to the aircraft and thus can cause an accident. For these reasons it is important that aerodrome operators establish and implement systems or procedures to monitor and control birds and animals on and around the aerodrome to ensure that they have no detrimental impact on aircraft safety. This obligation is reflected in ER B.1.c and is also in line with the ICAO SARPS in Annex 14, Volume I, Paragraphs 9.4 and 9.10.
36. Furthermore, procedures for coordinating the movement of vehicles and persons on the movement area and other operational areas have to be developed and used to avoid collisions and damage to aircraft. These objectives and clarifications are the basis of the ER B.1.d. From substance point of view the line taken here is fully compliant with ICAO Annex 14, Volume I, Chapter 9.
37. For very obvious reasons an aerodrome should not be operated in adverse weather conditions, reduced visibility or at night without the proper operational procedures and necessary provisions being put in place and equipment being available. The absence of such measures, if applicable to an aerodrome intended to be operated under the mentioned conditions, could lead to an accident. Therefore, ER B.1.e was developed, which also mirrors similar principles as defined by paragraph 4.16 of Appendix 1 to the ICAO Manual on certification of aerodromes.

38. The safe operation of an aircraft at an aerodrome may be affected by a number of different actors. The aerodrome is one of these actors, whose own operations have to be interfaced and coordinated with those by other relevant actors in the service chain. This is the case in particular of air operators themselves, ground handling companies, fuel providers and other service providers whose activities may cause unacceptable risks to aviation safety. The significance of coordination in relation to safe operations has made it necessary to require this on a legal level, as reflected in ER B.1.f. This is also reflected in paragraph 2.2 e) of the ICAO manual on certification of aerodromes.
39. It is true that at a number of aerodromes ground handlers provide refuelling services to aircraft, not under the responsibility of the aerodrome operator. But it is also true that the latter could be responsible for fuel storage areas and/or pipelines. Therefore paragraph B.1.g has been included, where again the verb “demonstrate” is used in order to cater for different organisational models.
40. Finally it is obvious that safety related aerodrome equipment (e.g. RFFS, visual and non-visual aids etc) must be properly maintained and inspected, in order to remain fit for use. Therefore proper instructions shall be in place and applied in practice, as reflected in ER B.1.h.

(ii) *Emergencies and Rescue and Fire Fighting*

41. Aerodrome emergency planning is a process of preparing for an emergency occurring at the aerodrome or in its vicinity. This preparation is an essential measure to mitigate the severity of possible accidents. This plan must provide for the coordination of the response of all actors able to assist in such a case. An incident initially benign could become very serious and lead to loss of life if not properly handled. It is therefore essential to mitigate related risks with emergency measures planned beforehand. These measures are mandated in paragraph B.1.i also reflecting provisions in ICAO Annex 14, Volume I, Chapter 9.1. Even if this plan is part of an overall plan managed by entities beyond the aerodrome operator, nevertheless the latter should establish and apply minimum procedures to cope with arising emergencies (e.g. instructions and information to responsible staff to establish contacts with other parties planned to quickly intervene).
42. An obvious means to cope with such emergency situations is to put in place and keep operational, appropriate Rescue and Fire Fighting Services (RFFS) as required by ICAO SARPs⁷. Such services must be commensurate to the aircraft using the aerodrome, both as regards staffing and extinguishing means, but the Agency considers necessary, taking into account comments received, to provide for sufficient flexibility to balance costs and safety needs when dimensioning the said services. ER B.1.j has therefore been worded to accordingly.

(iii) *Aerodrome personnel*

43. Just as for the members of air crew, persons involved in aerodrome operations or maintenance whose activities may impact aircraft operations’ safety, must also be subject to proportionate training, qualification and continuous competence requirements related not only to their specific tasks, but more generally to the aviation safety rules and procedures applicable to aerodrome operations. Moreover, whatever the level of competence needed, the knowledge of these people should be kept up-to-date in relation to significant changes in aerodrome operations. That is why paragraph B.1.k introduces the need for such persons to be trained, qualified and continuously competent to execute their safety-related duties. This principle is already established by paragraph 3D.2 of the ICAO Manual on certification of aerodromes.

⁷ I.e. 4th Edition of Annex 14, plus amendment 7 dated 11 July 2004 and amendments 8 & 9 dated 11 Jul 2006, where the aerodrome category for RFFS is determined on the basis of the aeroplanes “normally using” the aerodrome.

44. Any person permitted unescorted access to the movement area or other operational areas may create an unacceptable risk to aircraft operations if not appropriately trained to, or informed of, established safety procedures related to these areas. This applies not only to the employees of the aerodrome operator or of its contractors, but also to other entities (e.g. ground handlers) authorised to operate on the apron or other operational areas. This is the purpose of ER B.1.l, applicable also to the drivers of any vehicle on the aerodrome. This ER is fully compliant with the relevant provisions in Chapter 9 of ICAO Annex 14, Volume I.
45. Of course also the Rescue and Fire Fighting Services mentioned in (ii) above, shall employ personnel not only generally trained for similar activities, but specifically trained and medically fit to operate in the aviation environment. This is reflected in ERs B.1.m and n.

(iv) *Safety Management System (SMS)*

46. As demonstrated by the above list of Essential Requirements under the operators' responsibility, safe aerodrome operations require a number of mitigating measures to be implemented in various fields by appropriately trained persons in a carefully co-ordinated manner. When an aerodrome reaches a certain level of complexity, this can only be achieved by putting in place and implementing an appropriate management system covering safety and quality at the necessary level of performance. Such a system must aim at continuous improvement, based on continuous incident analysis and accident prevention, as well as promotion of a real safety culture. This is already widely accepted in the aerodrome international community and reflected by ICAO Standards 1.5.3 in Annex 14, which requires a formal safety management system (SMS) for all certificated aerodrome operators. Such system must of course meet appropriate criteria as described by Chapter 1.4 of the same Annex.
47. As explained in the Opinion itself, there is in Europe a wide support for certifying operators of all aerodromes open to public use. It is however also agreed that small organisations can hardly implement a genuine SMS; imposing such a burden on small aerodromes' operators would also be disproportionate with the actual risks related with their operation. While ICAO requires such a system, it must be borne in mind that the above mentioned standard only applies to aerodromes used for international operations, which are rarely small aerodromes. The Agency considers therefore that only operators of relatively complex aerodromes should be required to implement an SMS.
48. To define that level of complexity, taking into account the comments received on proposals contained in NPA 06/2006, while being consistent with ICAO obligations, a simple solution could be to only impose an SMS to operators of aerodromes used for international commercial air transport. This however may create difficulties in the Community context where all aerodromes open to public use are by definition open to intra-Community air traffic. It is therefore necessary to be more specific if we want to really limit the requirement to the complex aerodromes. The Agency considers that this can be achieved by interpreting "used for commercial operations" as meaning aerodromes serving scheduled air services⁸. This is the intent of ER. B.2.

⁸ COM (2006) 396 of 18 July 2006 – "Proposal for a Regulation of the EP and of the Council on common rules for the operations of air transport services in the Community (recast)" proposes the following definition:

Scheduled air service means a series of flights possessing all the following characteristics:

- (a) On each flight, seats and/or capacity to transport cargo and/or mail are available for individual purchase by the public (either directly from the air carrier or from its authorised agents);
- (b) It is operated so as to serve traffic between the same two or more airports, either:
- according to a published timetable; or
 - with flights so regular or frequent that they constitute a recognisably systematic series.

d - Aerodrome environment

49. As explained in paragraph 6 some important elements necessary to mitigate hazards near aerodromes, can simply not be legally imposed to the aerodrome owner or operator. The reason for this is that these hazards originate in areas outside of the aerodrome perimeter and can not be directly controlled and mitigated by aviation actors. The Agency considers therefore that the extension of the Basic Regulation offers an appropriate instrument to address the related risks by requiring Member States to ensure that appropriate measures shall be put in place to address safety hazards, which cannot be solved by the aerodrome owners or operators. Section C contains therefore the essential requirements to be implemented by Member States, which remain of course free to decide on the means to be used to achieve the required objectives.
50. A defined airspace around an aerodrome has to be maintained free from obstacles so as to permit an aircraft to land and take-off safely. This concerns essentially obstacles outside of perimeter of the aerodrome, which could affect its design or operations. In the case of changes or developments, it must be verified whether the safety of aircraft landing or taking-off at this aerodrome may be reduced. If it is assessed as potentially dangerous, either the obstacle should not be created or removed or the arrival and/or the departure procedures should be amended to mitigate the effect of this new obstacle. Conditions on its creation, such as lighting, may also be imposed. This evaluation and the enforcement of its conclusions require proper consultations with the relevant aviation authority, aerodrome owner or aerodrome operator and the local land use public authority and timely mitigation measures to be taken. That is the objective of ER C.1, which mirrors the recommendation in ICAO Annex 14, Volume I, Chapter 4.
51. Other types of activities, which might create safety hazards for aerodrome operations, also need to be controlled. New developments in land use may affect the geographical data used as a basis when developing the arrival and departure routes. New buildings or other constructions, even if not identified as obstacles, may create dangerous effects of induced turbulence. Laser lights and other non-aeronautical lights may cause dazzling of, or be confusing to, the flight crew. Large solar photovoltaic panels or wind turbines, in addition to possibly being hazardous obstacles, might respectively create dangerous intense light reflections or interference to radio navigation signals. Human activities may also attract wild life to the vicinity of an aerodrome and so create increased risks for aircraft operations taking place there. For such reasons ER C.2 has been developed, in order to require Member States to take measures to protect aircraft from such activities, as described in Annex 14, Vol. I, Chapters 5 and 9, and associated parts of Volume II.
52. Essential requirement B.1.i requires an emergency plan to cope with emergencies occurring at the aerodrome or in its immediate vicinity. Experience shows that a large part of accidents at take-off or landing happen outside the perimeter of the aerodrome where the aerodrome operator has no direct responsibility. There is therefore a need to establish emergency plans for such emergency situations, as the means are shared between the aerodrome and the local rescue and fire services. Therefore, ER C.3 imposes on the Member State to ensure the coordination of the emergency services. This is also described in ICAO Annex 14, Volume I, Chapter 9.
53. While regulations applicable to air operations require air operators to abstain using aerodromes that are not adequate for the type of aircraft and operations concerned, it happens that some do so nevertheless. This practice, which may not only damage the infrastructure but also create unacceptable risks for persons and properties on the aerodrome, shall be forbidden. Enforcement in such cases is however not easy as the competent authority of the operator and that of the aerodrome usually are different bodies, frequently also from different countries. While it is not contested that the decision to use an aerodrome should be left entirely to the air operator, particularly in case of emergency, abuse should be punished. Such is the objective of ER C.4, which require the Member State to act in such cases.

II . ESSENTIAL REQUIREMENTS

A - Physical Characteristics, Infrastructure and Equipment

1) *Movement Area*

- a) An aerodrome must have a designated area for the landing and take-off of aircraft.
 - i) The landing and take-off area must have dimensions suitable for the aircraft intended to use the facility.
 - ii) The landing and take-off area, where applicable, must have a bearing strength sufficient to support the repetitive operation of the intended aircraft. Those areas not intended for repetitive operations only need to be capable of supporting the aircraft.
 - iii) The landing and take-off area must, where applicable, be designed to drain water and to prevent standing water becoming an unacceptable risk to aircraft operations.
 - iv) The slope and slope changes of the landing and take-off area must not create unacceptable risk to aircraft operations.
 - v) The surface characteristics must be adequate for use by the intended aircraft.
 - vi) The landing and take-off area must be free from objects which might constitute an unacceptable risk to aircraft operations.
- b) Where there are several landing and take-off areas, they must be such that they do not create an unacceptable risk to aircraft operations.
- c) The landing and take-off area must be surrounded by defined areas. These areas are intended to protect aircraft flying over them during take-off or landing operations, or to mitigate the consequences of inadvertent short landing, running off the side, or overrunning the take-off and landing area.
 - i) These areas must have dimensions appropriate to the aircraft operations anticipated;
 - ii) The slope and slope changes of these areas must not create unacceptable risk to aircraft operations.
 - iii) These areas must be free from objects which might constitute an unacceptable risk to aircraft operations. This should not preclude frangible equipment to be located in those areas, if required to assist aircraft operations.
 - iv) Each of these areas must have a bearing strength sufficient to serve its purpose.
- d) Those areas of an aerodrome, with their associated immediate surroundings, that are to be used for taxiing or parking of aircraft, must be designed to permit the safe operation of aircraft expected to use the particular facility under all the conditions planned for:
 - i) These areas must have a bearing strength sufficient to support repetitive operations of the intended aircraft, except for those areas which are expected for only occasional use which need to be capable of only supporting the aircraft.
 - ii) These areas must be designed to drain water and to prevent standing water becoming an unacceptable risk to aircraft operations.
 - iii) The slope and slope changes of these areas must not create an unacceptable risk to aircraft operations.

- iv) The surface characteristics of these areas must be adequate for use by the intended aircraft.
- v) These areas must be free from objects which might constitute an unacceptable risk to aircraft. This should not preclude equipment required for that area to be parked in specifically identified positions or zones.
- e) Other infrastructure, intended for the use of aircraft, must be so designed that use of that infrastructure must not create an unacceptable risk to aircraft using them.
- f) Constructions, buildings, equipment or storage areas must be located and designed so as not to create an unacceptable risk for aircraft operations.
- g) Suitable means must be provided to prevent the entrance to the movement area of unauthorized persons, unauthorized vehicles or animals large enough to constitute an unacceptable risk to aircraft operations, unless the related risk can be mitigated by other means. The latter providing an equivalent level of safety.

2) *Obstacle clearances*

- a) To protect an aircraft proceeding to an aerodrome for the purpose of landing, or for its departure from an aerodrome, arrival and departure routes or areas must be established. Such routes or areas must provide aircraft with the required clearance from obstacles located in an area surrounding the aerodrome.
- b) Such obstacle clearance must be appropriate to the phase of flight and type of operation being conducted. It must also take into account the equipment being used for determining the position of the aircraft.

3) *Visual and Non-visual Aids and Aerodrome Equipment*

- a) Aids shall be fit for purpose, recognizable and provide unambiguous information to users under all intended operational conditions.
- b) Aerodrome equipment must function as intended under the foreseen operating conditions, without needing exceptional skill or strength. Under operating conditions or in case of failure, aerodrome equipment must not cause unacceptable risk to aviation safety.
- c) The aids and their electrical power supply system must be designed such that failures do not result in inappropriate, misleading or insufficient information being given to users, or in interruption of an essential service.
- d) Suitable means of protection must be provided to avoid damage or disturbance to such aids.
- e) Sources of radiation or the presence of moving or fixed objects shall not interfere with or adversely affect the performance of aeronautical communications, navigation and surveillance systems.
- f) Information on operation and use of aerodrome equipment shall be provided to relevant staff, including clear indication of the conditions which may cause unacceptable risks to aviation safety.

4) Aerodrome Data

- a) Data relevant to the aerodrome and the available services must be established and kept current.
- b) The data shall be accurate, readable, complete and unambiguous. Appropriate integrity levels shall be maintained.
- c) The data must be made available to the users in a timely manner, using a sufficiently secure, incorruptible and expeditious method of communication with the users.

B – Operations and Management

- 1) An aerodrome operator is responsible for the operation of an aerodrome. The responsibilities of an aerodrome operator are the following:
 - a) The aerodrome operator must have directly or through contracts all the means necessary to sustain safe operation of aircraft at the aerodrome. These means include, but are not limited to, the following: facilities, personnel, equipment and material, documentation of tasks, responsibilities and procedures, access to relevant data and record-keeping.
 - b) The aerodrome operator must verify that the requirements of Section A are complied with at all times or take appropriate measures to mitigate the risk associated with the non-compliance. Procedures must be established and applied to make all users aware of such measures in a timely manner.
 - c) The aerodrome operator shall establish and implement an appropriate aerodrome wildlife risk management programme.
 - d) The aerodrome operator must demonstrate that the movement of vehicles and persons on the movement area and other operational areas, is coordinated with the movement of aircraft to avoid collisions and damage to aircraft.
 - e) The aerodrome operator shall demonstrate that procedures to mitigate risks related to aerodrome operations in adverse weather conditions, reduced visibility or at night, if applicable, are established and implemented.
 - f) The aerodrome operator shall establish arrangements with other relevant organisations to ensure continuing compliance with these essential requirements for aerodromes. These organisations, include, but are not limited to, aircraft operators, air navigation service providers, ground handling service providers and other organisations whose activities or products may have an effect on aircraft safety.
 - g) The aerodrome operator must demonstrate that procedures exist and are applied to provide aircraft with fuel uncontaminated and of the correct specification.
 - h) Manuals for maintenance of aerodrome equipment shall be available, applied in practice and cover maintenance and repair instructions, servicing information, trouble-shooting and inspection procedures.
 - i) The aerodrome operator shall establish and implement an aerodrome emergency plan, covering emergency scenarios that may occur at the aerodrome or in the immediate vicinity. This plan shall be coordinated with the local community emergency plan.

- j) The aerodrome operator must demonstrate that aerodrome rescue and fire fighting services for the critical aircraft planning to use the aerodrome as origin or destination are provided. Such services must respond to an incident or accident with due urgency and shall include at least equipment, extinguishing agents and a sufficient number of personnel.
- k) The aerodrome operator must use, for aerodrome operations and maintenance, only trained and qualified personnel and implement and maintain training and check programmes for the continuing competence of all relevant personnel.
- l) The aerodrome operator must demonstrate that any person permitted unescorted access to the movement area or other operational areas is adequately trained and qualified for such access.
- m) The rescue and fire fighting personnel shall be properly trained and qualified to operate in the aerodrome environment. The aerodrome operator shall implement and maintain training and check programmes for the continuing competence of these personnel.
- n) All rescue and fire fighting personnel potentially tasked to act in aviation emergency situations must periodically demonstrate medical fitness to satisfactorily execute their functions, taking into account the type of activity. In this context medical fitness, comprising physical and mental fitness, means not suffering from any disease or disability, which could make these personnel unable:
 - (i) to execute the tasks necessary to operate in aviation emergency situations;
 - (ii) to perform assigned duties at any time;
 - (iii) to perceive correctly his/her environment.

Where medical fitness cannot be fully demonstrated, mitigation measures that provide equivalent safety may be implemented.

2) Whenever an airport is open to public use and serves scheduled air services:

- a) The aerodrome operator must implement and maintain a management system to sustain compliance with these essential requirements for aerodromes and to aim for continuous and pro-active improvement of safety and quality. The management system shall include organisational structures, accountabilities, competencies, policies and procedures.
- b) The management system shall include an accident and incident prevention programme, comprising an occurrence reporting and analysis scheme. The analysis shall involve the parties listed in point 1.g above, as appropriate.
- c) The aerodrome operator must develop an aerodrome manual and operate in accordance with that manual. Such a manual must contain all necessary instructions, information and procedures for the aerodrome, the management system and for operations personnel to perform their duties

C - Aerodrome environment

- 1) The airspace around aerodrome movement areas must be safeguarded from obstacles so as to permit the intended aircraft operations at the aerodromes to be conducted without the creation of unacceptable risk by the development of obstacles around the aerodrome. Obstacle monitoring surfaces must therefore be developed, implemented and continuously monitored to identify any infringing penetration.

- a) An infringement to these surfaces will require an assessment to identify whether or not the object constitutes an unacceptable risk. Any unacceptable risk shall be removed or mitigated.
 - b) Any remaining of such obstacles must be published, and according to the need be marked and, where necessary, provided with lights.
- 2) Hazards related to human activities and land use, such as but not limited to items on the following list, must be monitored and controlled. The risk caused by them shall be assessed and mitigated as appropriate:
- a) any development or change in land-use in the aerodrome local area
 - b) the possibility of building induced turbulence
 - c) the use of hazardous, confusing and misleading lights
 - d) the dazzling caused by large and highly reflective surfaces.
 - e) the creation of areas that might encourage wild life activity in the surrounding of the aerodrome movement area.
 - f) Sources of non-visible radiation or the presence of moving or fixed objects, which may interfere with, or adversely affect, the performance of aeronautical communications, navigation and surveillance systems.
- 3) A local community emergency plan must be established for aviation emergency situations occurring in the aerodrome local area.
- 4) Except for aircraft emergency situations, when diverting to an alternate aerodrome, or under other conditions specified in each case, an aerodrome or parts thereof must not be used by aircraft for which the aerodrome design and operating procedures are not normally intended, without the consent of the aerodrome operator.