

DISABLED AIRCRAFT REMOVAL PLAN

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Aerodrome Safety Publications are published by the CAAS for purposes of promulgating supplementary guidance materials to the Standards and Recommended Practices (SARPs) in the Manual of Aerodrome Standards. The publications are intended to provide recommendations and guidance to illustrate a means, but not necessarily the only means, of complying with SARPs. Aerodrome Safety Publications may explain certain regulatory requirements by providing interpretive and explanatory materials.

1 Purpose

- 1.1 The purpose of this Aerodrome Safety Publication (ASP) is to provide supplementary guidance material to aerodrome operators in formulating the disabled aircraft removal plan. This Publication provides guidance on what is acceptable to demonstrate compliance with the regulatory requirements in the Manual of Aerodrome Standards (MOAS) Section 13.2.3 – Disabled aircraft removal.
- 1.2 This ASP recommends and explains elements of a disabled aircraft removal plan, in particular, planning, response and responsibilities of the relevant parties.
- 1.3 The appendices provide guidance to aerodrome operators in establishing an effective disabled aircraft removal plan for their respective aerodromes. **Appendix A** presents an outline of a disabled aircraft removal plan and **Appendix B** offers a general review and guide to assist in the aircraft removal process.

2 Applicability

- 2.1 This ASP applies to all aerodrome operators certified under paragraph 67 of the Singapore Air Navigation Order (ANO). Aerodrome operators should examine each item carefully, by considering the size, complexity and scope of operations at the aerodrome to determine what applies.

3 Cancellation

- 3.1 This ASP supersedes ASP 04/2010.

4 Effective Date

- 4.1 This ASP takes effect on 5 April 2017.

5 Introduction

- 5.1 An aircraft accident can occur at any time and in any weather conditions with varying degrees of magnitude and the aircraft involved may likely require assistance to remove it from the site. The aircraft removal event can range from minor debogging¹ to major events including damaged or missing

¹ Debogging refers to the removal of an aircraft that has left the hard surface and got bogged down in sand or mud but has not sustained any significant damage.

landing gear.

- 5.2 Disabled aircraft will affect many parties. The traveling public, other aircraft operators, the aerodrome operator and the operator of the incident aircraft will be affected to varying degrees. The resultant runway and taxiway closures can substantially reduce the number of arrivals and departures and restrict movement around the aerodrome. Therefore, disabled aircraft that interfere with the normal activity of an aerodrome should be removed expeditiously. The recovery process may take from a few hours to many days depending on the severity. While recovery incidents cannot be predicted, they can be anticipated and prepared for.

6 Objective

- 6.1 The objective of a disabled aircraft removal plan is to specify the roles and responsibilities of all parties involved so as to aid the appropriate management in ensuring that the removal of aircraft is executed as speedily as is consistent with the safety of personnel concerned and with the avoidance of further damage to the aircraft.

7 Legislation

- 7.1 Paragraph 6 of the Singapore Air Navigation (Investigation of Accidents and Incidents) Order [AN(IAI)O] states that:

“Where an accident or serious incident occurs in Singapore -

- (a) no person other than the Chief Inspector, the investigator-in-charge or an authorised person shall have access to the aircraft involved in the accident or serious incident, the contents thereof or the site of the accident or serious incident.*
- (b) no person shall move or interfere with the aircraft, its contents or the site of the accident or serious incident except under the authority of the Chief Investigator or the investigator-in-charge.”*

Notwithstanding the above paragraph, a damaged aircraft may be removed or interfered with to such extent as may be necessary for all or any of the following purposes:

- (a) extricating persons or animals;
- (b) removing any mail, valuables or dangerous goods carried by the aircraft;

- (c) preventing destruction by fire or other causes;
- (d) preventing any danger or obstruction to the public, air navigation or other transport; and
- (e) if the aircraft is wrecked in water.

8 Disabled Aircraft Removal Planning

- 8.1 MOAS clause 13.2.3.1 requires the aerodrome operator to establish a plan for the removal of an aircraft disabled on, or adjacent to, the movement area, and a coordinator designated to implement the plan, when necessary.
- 8.2 The disabled aircraft removal plan (See **Appendix A**) should be based on the characteristics of the aircraft that may normally be expected to operate at the aerodrome, and include among other things:
 - a) a list of equipment and personnel on, or in the vicinity of, the aerodrome which would be available for such purpose; and
 - b) arrangements for the rapid receipt of aircraft recovery equipment kits available from other aerodromes.
- 8.3 With effect from 1 January 2017, the aerodrome operator shall possess, or have access to the necessary capability and resources to execute the aircraft recovery plan to remove disabled aircraft as soon as practicable. If the execution of the recovery plan involves engaging services from external parties, then this arrangement shall be formalised.
- 8.4 MOAS clause 6.2.10.2 recommends that information in the form of a disabled aircraft removal plan on the capability to remove a disabled aircraft on or adjacent to the movement area should be made available.
- 8.5 Information regarding the capability to remove a disabled aircraft should be expressed in terms of the largest type of aircraft which the aerodrome is equipped to remove. For instance, this information can be reported as an Airbus A380 or a Boeing B737 being the largest type of aircraft which the aerodrome is equipped to remove.
- 8.6 This capability should be based on the equipment available at the aerodrome and on equipment which can be available at short notice. Should the disabled aircraft removal plan take into account an airline pooling arrangement, the determination of the capability to remove a disabled aircraft should also take into consideration the specialized aircraft recovery kits available from the aerodromes.

8.7 The telephone/telefax number(s) of the office of the aerodrome coordinator of operations for the removal of an aircraft disabled on or adjacent to the movement area must also be made available to aircraft operators as required by MOAS clause 6.2.10.1.

9 Response

9.1 The removal of disabled aircraft can be complex and involve a number of specific procedures including multipart leveling and lifting actions. These procedures can be dangerous and safety precautions must take precedence over all other constraints. Prevention of secondary damage must also be a priority. In some cases, the removal process may not be able to commence until investigation by the Transport Safety Investigation Bureau (TSI) has been completed and the aircraft is formally released. Because of these issues, it is not always possible for the aerodrome to be cleared as quickly as hoped for by the aerodrome operator.

10 Responsibilities

10.1 For an aircraft removal operation to complete as quickly as possible, all parties should be expeditiously facilitated and already have the proper procedures in place. An efficient removal operation requires sufficient planning and readily accessible recovery equipment.

10.2 Aerodrome operator

10.2.1 Where the aircraft accident or serious incident occurs on or adjacent to an aerodrome, the aerodrome operator shall notify TSIB as soon as reasonably practicable and the CAAS Aerodrome and ANS Regulation Division (AAR) within 24 hours of the occurrence.

10.2.2 The aerodrome operator should have:

- an officer designated to coordinate the aircraft recovery operation;
- a disabled aircraft removal plan available; and
- a copy of aircraft operators' removal plan on file, for every regular user of the aerodrome.

10.2.3 The aircraft should be removed in a timely and efficient manner. The aerodrome operator may take over the responsibility and contract the removal to a third party in the event that the aircraft operator is unable to recover the aircraft or could not proceed in timely manner

10.2.4 The aerodrome operator should hold regular tabletop exercises with the aircraft operators to anticipate and prepare for various aircraft removal scenarios and their projected outcomes.

10.2.5 Aircraft recovery operations may be conducted while an aerodrome is still in operation. However, recovery devices such as mobile cranes may penetrate the obstacle limitation surfaces or interfere with radio navigational aids. Therefore, risks associated with the recovery operations should be mitigated to ensure aerodrome operational safety.

10.3 Aircraft operator

10.3.1 It is crucial that the aircraft operator notifies TSIB of the incident as quickly as possible. Paragraph 4 of the AN(IAI)O requires the relevant person, which includes aircraft operator to inform TSIB as soon as practicable after he becomes aware of the accident or serious incident.

10.3.2 It is the responsibility of the registered owner or aircraft operator to remove the disabled aircraft. The operator's insurance representative should also be notified of the accident or incident.

10.3.3 The aircraft operator should have an aircraft recovery process document available for review. The document should include information on who the aircraft operator will use to remove the aircraft and all relevant contact numbers. A copy of the document should be provided to the aerodrome operator.

10.4 Insurance underwriter

10.4.1 The aircraft operator is ultimately responsible for his aircraft, which includes its removal after an accident. The insurance underwriter may be involved in the aircraft removal process through a representative. The aircraft operator, with the assistance of the underwriter will arrange for the removal of aircraft and, in the case where the aircraft operator possesses the necessary expertise, the operator will perform the aircraft removal. Every effort should be made during the recovery operation to avoid further damage to the aircraft as well as the accident site.

11 Conclusion

11.1 An established command structure and clear lines of communication between various parties is essential to the efficient removal of disabled aircraft. While tabletop exercises can help to anticipate and prepare for

various aircraft removal scenarios, a post mortem of an actual disabled aircraft removal event should be conducted to examine areas where improvements can be made.

- 11.2 Periodic review of the disabled aircraft removal plan should be conducted by the aerodrome operator to ensure that the plan is in line with the aerodrome operator's own safety policy and in compliance with the requirements found in the MOAS and in tuned to the latest technology, where possible.

12 Reference

Singapore Air Navigation Order (ANO);
Singapore Air Navigation (Investigation of Accidents and Incidents) Order [AN(IAI)O];
Manual of Aerodrome Standards (MOAS);
ICAO Annex 13;
ICAO Annex 14, Volume I;
Doc 9137 – Airport Services Manual, Part 5, Removal of Disabled Aircraft;
and
Doc 9859 – ICAO Safety Management Manual.

13 Queries

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Outline of a disabled aircraft removal plan

An outline of a disabled aircraft removal plan is given below. It is intended as a guide on basic matters to be covered in the plan as well as action to be taken by main responsible parties for the overall aircraft removal operation. In general, the disabled aircraft removal plan should be structured to take into account the principal functions shown in **Appendix B**.

1. Responsibilities

- 1.1 Removal of a disabled aircraft or parts thereof.
 - Identify person or agency (usually the aircraft owner or operator) responsible for the removal of the aircraft, and define procedures in the event of failure to comply with such directions.
- 1.2 Notification of the aircraft accident or serious incident to TSIB.
 - Identify person or agency (usually the aircraft owner or operator or, the aerodrome operator) responsible for notifying TSIB. List the details to be notified, such as aircraft operator, time, passengers and extent of damage.
- 1.3 Preservation of aircraft, mail, cargo and records.
 - Identify person or agency (normally the aircraft owner or operator) responsible for preserving, the aircraft and parts thereof, cargo, mail, and all records. Define procedures to be followed when it is necessary to disturb or move the aircraft or parts thereof (i.e. photographs, marks on the ground and diagram of the accident site).

2. Action required by main responsible parties

- 2.1 Aerodrome operator should, amongst other things:
 - (a) issue required NOTAM as may be appropriate;
 - (b) coordinate all aerodrome operations with the air traffic service units for continuation of aircraft operations, when possible;
 - (c) determine if the serious incident or accident created any obstacles and, as a result, consider whether any section of the movement area should be closed;
 - (d) provide for security of the accident site and co-ordinate with TSIB on measures to be taken before the aircraft removal operation is initiated;
 - (e) provide advance vehicles and personnel to escort airline equipment to the site;
 - (f) establish a removal command post at the site, if necessary;

- (g) inspect all areas prior to resumption of normal aircraft operations;
- (h) convene a removal operation debriefing of all interested parties. The debriefing may include a review of TSIB's requirements, the coordinator's chronological report, and a discussion of the procedures and equipment during the recovery operation;
- (i) amend the disabled aircraft removal plan to overcome problems identified under h); and
- (j) participate in the removal operation debriefing.

2.2 Aerodrome coordinator of disabled aircraft removal operations should, amongst other things:

- (a) convene a meeting with the aircraft operator representative, TSIB investigators, representatives of resident oil companies, heavy equipment contractors and other parties as may be necessary, to discuss the most appropriate removal operation and agree upon a broad plan of action. This should cover the following points:
 - 1) escort routes between the aircraft operator's area and the event site;
 - 2) defuelling to lighten the mass of the aircraft;
 - 3) requirements and availability of equipment for the removal of the aircraft;
 - 4) use of aerodrome and aircraft operator's equipment;
 - 5) dispatch of aircraft operator ancillary support devices to the scene;
 - 6) weather conditions, particularly when crane lifting or pneumatic lifting bag operation is necessary;
 - 7) lighting of the site; and
 - 8) contingency plan, should difficulties develop in the initial plan;
- (b) provide for rescue and fire fighting vehicles, when necessary;
- (c) supervise aerodrome personnel and equipment assigned to the removal operation;
- (d) report further penetrations of obstacle limitation surfaces due to the maneuvering of cranes or other equipment during the lifting of the aircraft;
- (e) monitor weather forecasts;
- (f) maintain a chronological summary of the removal operation;

- (g) have photographs of the removal operation taken where possible;
- (h) where excavations are necessary, check with the appropriate aerodrome maintenance services for underground utilities;
- (i) keep CAAS and other aircraft operators informed of the progress of the aircraft removal operations;
- (j) arrange for removal of mail, baggage and cargo, it being understood that authority to remove these items must be secured from TSIB; and
- (k) participate in the removal operation debriefing.

2.3 Aircraft operator's representative should, amongst other things:

- (a) implement the aircraft operator's removal plan for such an emergency;
- (b) meet with the aerodrome coordinator, TSIB investigator and other relevant parties to develop a comprehensive plan for the removal of aircraft;
- (c) decide on the need for consultation with aircraft airframe and engine manufacturers, or other aircraft operator representatives experienced in such accidents; and
- (d) participate in the removal operation debriefing.

3. Information on equipment, personnel and facilities

3.1 Equipment and personnel available.

3.1.1 List of equipment and personnel on or in the vicinity of the airport that would be available for the removal operation. The list of equipment should include information on the type and location of heavy equipment or special units needed, and the average time it will take to get them to the aerodrome.

3.1.2 The list of personnel should also contain information on the availability of human resources for road making and other duties. Names, addresses and telephone numbers of personnel and equipment representatives should be given.

3.2 Access routes.

3.2.1 Include information on access routes to any part of the airport. A grid map of the type referred to in Annex 14, Volume I, Attachment A, Section 18, may be useful for this purpose.

3.3 Security.

3.3.1 Define means of maintaining security for the aircraft removal operation.

3.4 Aircraft removal equipment kits.

3.4.1 Describe arrangements for the rapid receipt of aircraft removal equipment kits available from other airports. This should be coordinated with the airlines operating at the aerodrome.

3.5 Aircraft data.

3.5.1 Describe arrangements to make available, at the aerodrome, manufacturer's data pertaining to aircraft removal for the various types of aircraft which normally use the aerodrome.

3.6 Aircraft defuelling.

3.6.1 Describe arrangements with the resident oil companies to ensure that the defuelling, storage and disposal of the aircraft fuel, including contaminated fuel, can be done at short notice.

3.7 Responsible representatives.

3.7.1 List names, addresses and telephone numbers of responsible representatives of each aircraft operator, as well as of the nearest representatives of aircraft and engine manufacturers.

Planning chart

The attached chart is intended as a general review and guide to assist in the aircraft removal process. It is not anticipated to be used as step-by-step instructions in dealing with a removal event.

<i>Basic Recovery Steps</i>				
<i>1. Survey</i>	<i>2. Plan</i>	<i>3. Prepare</i>	<i>4. Recover</i>	<i>5. Report</i>
Aircraft condition: <ul style="list-style-type: none"> - Recover or salvage - Attitude - Landing gear - Structure - Damaged components - Missing components - Unserviceable components - Cargo and fuel Site: <ul style="list-style-type: none"> - Terrain - Soil - Access routes Weather: <ul style="list-style-type: none"> - Current - Forecast Equipment availability: <ul style="list-style-type: none"> - Preparation - Levelling - Lifting - Moving - Stabilizing Manpower availability: <ul style="list-style-type: none"> - Number - Skills Environmental issues: <ul style="list-style-type: none"> - Fluid spills - Hazardous materials 	Rapid recovery: <ul style="list-style-type: none"> - Important - Not important Weight and balance: <ul style="list-style-type: none"> - Calculate weight of fuel and cargo - Calculate centre of gravity Weight reduction: <ul style="list-style-type: none"> - Unload cargo - Defuel - Remove major components Recovery: <ul style="list-style-type: none"> - Reduce weight - Prepare site - Level - Lift - Stabilize - Move Schedule equipment and manpower required: <ul style="list-style-type: none"> - Confirm delivery plan Secondary damage: <ul style="list-style-type: none"> - Prevent or - Accept to reduce recovery time 	Monitor and record: <ul style="list-style-type: none"> - Loads - Actions performed Assemble equipment and manpower: <ul style="list-style-type: none"> - Confirm arrival dates Weight reduction: <ul style="list-style-type: none"> - Unload cargo - Defuel - Remove major components Prepare site: <ul style="list-style-type: none"> - Clear - Excavate - Fill - Stabilize Roadway: <ul style="list-style-type: none"> - Clear - Excavate - Fill - Stabilize - Manufacture temporary roadway 	Monitor and record: <ul style="list-style-type: none"> - Loads - Actions performed Stabilize: <ul style="list-style-type: none"> - Tether - Ground anchors - Jacks - Shoring Level/lift: <ul style="list-style-type: none"> - Jacks - Airbags - Cranes - New technology equipment Debogging: <ul style="list-style-type: none"> - Confirm a lifting method Move: <ul style="list-style-type: none"> - Tow on gear - Move on suitable trailer 	Report: <ul style="list-style-type: none"> - Include in aircraft technical history: - recovery details - repair details - record of loads