Australian Government
Civil Aviation Safety Authority

ADVISORY CIRCULAR
AC 139.C-20 v1.0

Disabled aircraft removal

Date	June 2023
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Advisory circulars are intended to provide advice and guidance to illustrate a means, but not necessarily the only means, of complying with the Regulations, or to explain certain regulatory requirements by providing informative, interpretative and explanatory material.

Advisory circulars should always be read in conjunction with the relevant regulations.

Audience

This advisory circular (AC) applies to:

- aerodrome operators
- ARFFS (where applicable)
- emergency response personnel
- aircraft operators/airlines
- Airservices Australia
- Defence Aviation Safety Authority
- Australian Transport Safety Bureau
- ground handling agents (where applicable)
- runway safety teams.

Purpose

The purpose of this AC is to provide guidance to aerodrome operators when developing a disabled aircraft removal plan. Aerodrome operators should use this guidance to inform their decision-making process in meeting the requirements of the Part 139 of the *Civil Aviation Safety Regulations 1998 (CASR)*, and the Part 139 Manual of Standards (MOS).

Operators should always consider the context of their own current and future operational environment, and the operational needs of pilots, aircraft operators and associated stakeholders, including, but not limited to, the size and complexity of the aerodrome operations.

It is important to note that this guidance does not create or permit departure from regulatory requirements.

For further information

For further information, contact CASA's Personnel Licensing, Aerospace and Air Navigation Standards (telephone 131 757).

Unless specified otherwise, all subregulations, regulations, Divisions, Subparts and Parts referenced in this AC are references to the *Civil Aviation Safety Regulations 1998 (CASR)*.

Status

This version of the AC is approved by the Manager, Flight Standards Branch.

Version	Date	Details
v1.0	June 2023	Initial AC.

Contents

1 Reference material

1.1 Acronyms

The acronyms and abbreviations used in this AC are listed in the table below.

Acronym	Description
AC	advisory circular
AEP	aerodrome emergency plan
ATC	air traffic control
ATSB	Australian Transport Safety Bureau
CAR	*Civil Aviation Regulations 1988*
CASA	Civil Aviation Safety Authority
CASR	*Civil Aviation Safety Regulations 1998*
DARP	disabled aircraft removal plan
DASA	Defence Aviation Safety Authority
ICAO	International Civil Aviation Organization
MOS	Manual of Standards
OEM	Original Equipment Manufacturer
RMP	Risk Management Plan
SMS	Safety Management System
TSIR	*Transport Safety Investigation Regulations, 2021*

1.2 Definitions

Terms that have specific meaning within this AC are defined in the table below. Where definitions from the civil aviation legislation have been reproduced for ease of reference, these are identified by 'grey shading'. Should there be a discrepancy between a definition given in this AC and the civil aviation legislation, the definition in the legislation prevails.

Term	Definition
Aerodrome	A means an area of land or water (including any buildings, installations and equipment), the use of which as an aerodrome is authorised under the regulations, being such an area intended for use wholly or partly for the arrival, departure or movement of aircraft.
Aerodrome layout	the number of runways, taxiways and aprons at an aerodrome that are provided with lighting, in 1 of the following categories of aerodrome: a. basic — an aerodrome with 1 runway, with 1 taxiway to 1 apron area b. simple — an aerodrome with 1 runway, having more than 1 taxiway to 1 or more apron areas c. complex — an aerodrome with more than 1 runway, having more

Term	Definition
	than 1 taxiway to 1 or more apron areas.
Aerodrome Operator	means: a. for a certified aerodrome—the person who holds the aerodrome certificate for the aerodrome; or b. otherwise—the person who is responsible for the operation and maintenance of the aerodrome
Aerodrome vicinity	includes any facility, site or area which is identified as contributing to the risk at the aerodrome.
Air Traffic Control	means Air Traffic Services in its capacity as a provider of air traffic control services.
Airside	Means the following areas, access to which is restricted by the aerodrome operator, or by a Federal or State authority, to authorised persons only: a. the movement area of the aerodrome; b. where their purpose and use is to directly support aircraft operations - the terrain and buildings adjacent to the movement area, or particular portions of such adjacent terrain and buildings. **Note:** The word "landside" is used colloquially to denote areas of an aerodrome that are not airside, for example, passenger terminals.
aviation accident	An occurrence associated with the operation of an aircraft, which takes place between the time any person boards the aircraft with the intention of flight until all such person have disembarked, in which a person is fatally or seriously injured, the aircraft sustains damage or structural failure or the aircraft is missing or is completely inaccessible. If the aircraft is destroyed or severely damaged so that it must be written off, it is further defined as a hull loss accident (ICAO Annex 13).
aviation incident	An occurrence, other than an accident, associated with the operation of an aircraft which affects or could affect the safety of operation (ICAO Annex 13).
movement area	means that part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the manoeuvring area and the aprons.
NOTAM	means a notice issued by the NOTAM Office containing information or instructions concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to persons concerned with flight operations.
Obstacles	means fixed (whether temporarily or permanently) and mobile objects, structures, and parts of such objects and structures, that: a. are located on an area provided for the surface movement of aircraft; or b. extend above a defined surface designated to protect aircraft in flight; or c. stand outside the defined surfaces mentioned in paragraphs (a) and (b) and that have been assessed as being a hazard to air navigation
runway excursion	A runway excursion is an event in which an aircraft veers off or overruns the runway surface either during take-off or landing.
runway incursion	The Procedures for Air Navigation Services — Air Traffic Management (PANS-ATM, Doc 4444) defines a runway incursion as: “Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle or person on the protected area of a surface designated for

Term	Definition
	the landing and take-off of aircraft.”
Sealed	for a surface, means that the surface is wholly, or preponderantly, sealed with a surface treatment which may include bitumen, asphalt, concrete or another suitable treatment.
stakeholders	Those people and organisations who may affect, be affected by, or perceive themselves to be affected by a decision, activity or risk.
substantial damage	means damage or structural failure incurred by an aircraft by a wildlife strike that adversely affects the structural strength, performance, or flight characteristics of the aircraft and that would normally require major repair or replacement of the affected component.
Tabletop exercise	A theoretical discussion in which an emergency event is simulated, and relevant persons verbally describe how they respond to the emergency but without any physical demonstration of the actual response.

1.3 References

Legislation

Legislation is available on the Federal Register of Legislation website https://www.legislation.gov.au/

Document	Title
Part 139 of CASR 1998	Aerodromes
Part 139 (Aerodromes) Manual of Standards (MOS)	Aerodromes

International Civil Aviation Organization documents

International Civil Aviation Organization (ICAO) documents are available for purchase from http://store1.icao.int/

Many ICAO documents are also available for reading, but not purchase or downloading, from the ICAO eLibrary (https://elibrary.icao.int/home).

Document	Title
International Civil Aviation Organisation (ICAO) Annex 14	Aerodromes, Vol I (Aerodrome Design and Operations)
ICAO Doc 9981	Procedures for Air Navigation Services (PANS)-Aerodromes
ICAO Doc 9137, Part 5	Removal of Disabled Aircraft

Advisory material

CASA's advisory material is available at https://www.casa.gov.au/resources-and-education/publications-and-resources/guidance-material

Document	Title
AC 139.C-01	Aerodrome manual
AC 139.C-18	Aerodrome emergency planning
AC 139-16	Safety management systems for aerodromes
AC 139.C-27	Risk management plans for aerodromes
	Sample aerodrome manual template for Part 139 of CASR

2 Introduction

2.1 Background

2.1.1 The operators of aircraft, pilots and other aerodrome users are entitled to expect unhindered use of the aerodrome's movement area to enable them to manoeuvre in a safe and efficient manner.

2.1.2 However, occurrences that can affect many or all stakeholders at aerodromes do occasionally occur. A disabled aircraft on the aerodrome movement area is an example of an incident that can significantly impact an aerodrome environment.

2.1.3 A disabled, or immobilised, aircraft refers to an aircraft that is unable to continue its intended operation due to a mechanical failure, technical malfunction, or any other condition that renders it inoperable or unsafe to manoeuvre under its own means.

2.1.4 The disabled status can encompass various situations, ranging from minor issues that can be resolved relatively quickly to more severe incidents that require extensive repairs or the evacuation of passengers. Aircraft may become immobilised at airports for a variety of reasons; ranging from incidents such as tyre burst or runway or taxiway veer off, to a major accident incurring substantial damage to the airframe.

2.1.5 Disabling conditions can include engine failures, landing gear malfunctions, electrical system failures, control surface problems, fuel leaks, fires, tyre failures or other critical situations that compromise the aircraft's ability to move safely under its own power.

2.1.6 When an aircraft becomes disabled, it is likely to need intervention from ground personnel, maintenance crews, specialist engineers or emergency response teams to assess and rectify the issue. Depending on the severity of the problem, the disabled aircraft may need to be towed, repaired on-site, or in a worst-case scenario, dismantled and removed.

2.1.7 A disabled aircraft on the movement area is liable to impact safe and efficient aerodrome operations, and any damage to aerodrome infrastructure will require remediation. To reduce the impact on aerodrome operations and other aerodrome users, the prompt removal of disabled aircraft on the runway or on the adjacent movement area is critical for the resumption of unrestricted operations in a timely manner.

2.1.8 Some of the consequences arising from the presence of a disabled aircraft on an aerodrome movement area include:

a. reduced flight operations in the aerodrome (both arrivals and departures)
b. potential closure of runways, taxiways and perhaps cessation of all operations
c. substantial delays to flight schedules
d. increased risk to flight operations if more traffic is diverted to other runways and taxiways, due to the presence of a disabled aircraft
e. increased traffic flow and congestion in the airspace, and other aerodromes, resulting in higher workload for pilots and Air Traffic Control (ATC).

2.1.9 To manage the disruption created by disabled aircraft and to enable a quick return to safe operating conditions within the aerodrome, a Disabled Aircraft Removal Plan (DARP) needs to be established and implemented by the aerodrome operator.

2.1.10 The DARP should facilitate the safe and efficient handling of the site where an aircraft is disabled and enable a safe resumption of aerodrome operations, either in tandem with recovery work, or after removal of the disabled aircraft.

2.1.11 Certified aerodromes are required under Section 11.13 of Part 139 MOS to include procedures for removing disabled aircraft on or near the movement area of the aerodrome. The procedures may also be developed as a supplementary document and referred to in the aerodrome manual (refer to Advisory Circular (AC) 139.C-01 v1.0).

2.1.12 This advisory circular is aimed at providing a simple set of guidelines, to help aerodrome operators establish a plan for the removal of disabled aircraft from the movement area in a timely, safe, and efficient manner.

2.1.13 The procedures to manage disabled aircraft removal described in this advisory circular should be complementary to those scenarios dealing with disabled aircraft for those aerodromes required to have an aerodrome emergency plan (AEP) under Section 24.02, and conducting aerodrome emergency exercises under Section 24.05, of the Part 139 MOS.

3 Disabled aircraft removal

3.1 General

3.1.1 Disabled aircraft that interfere with the normal activity of an aerodrome require prompt removal.

3.1.2 As required under Section 11.13 of the Part 139 MOS, aerodrome operators are required to develop procedures for removing an aircraft that is disabled on or near the movement area of the aerodrome and include or link the document to the aerodrome manual.

3.1.3 Information that should be included in the aerodrome manual includes:

a. identify the roles of the aerodrome operator and the holder of the aircraft's certificate of registration
b. procedures for notifying the holder of the certificate of registration
c. procedures for liaising with the Australian Transport Safety Bureau (ATSB), the Defence Aviation Safety Authority (DASA), and air traffic control (ATC) if applicable
d. procedures for obtaining appropriate equipment and persons to remove the aircraft
e. processes for identifying:
    i. the names and roles of the persons responsible for arranging the removal of an aircraft
    ii. the telephone numbers for contacting the relevant individuals during and after normal working hours.

3.1.4 Relevant information regarding the coordination of aircraft recovery resources, and documenting and recording the removal process are included in the following module of the Training Australia's competency suite: AVIW5022 - Coordinate the removal of disabled aircraft.

3.1.5 Disabled aircraft removal and recovery involves a five-step process. Along with the five-step process, aerodrome operators should ascertain whether damage to aerodrome infrastructure has been incurred and, as necessary, deploy assets to assess and return affected facilities to service.

3.1.6 The process should follow these five steps in the sequence shown:

1. Survey.
2. Planning.
3. Preparation
4. Recovery.
5. Reporting.

3.1.7 In addition, aerodrome operators should inspect, survey and repair any damage to aerodrome infrastructure (i.e., runway pavement or lighting units) and ensure the serviceability of aerodrome facilities prior to the resumption of operations.

3.1.8 Prior to initiating the removal or recovery process, the reporting of incidents and accidents that qualify as reportable matters to the ATSB in accordance with the

Transport Safety Investigation Regulations 2021 (TSIR) should be completed. Additional reporting as specified in the aerodrome manual should also be completed.

3.1.9 All necessary steps to preserve evidence must be undertaken before initiating aircraft recovery operations. For instance, photographing the occurrence site, marking locations of all significant items from the site (such as the location of airframe, engines, and other major components) and a sketch/diagram of the entire site for future analysis.

3.1.10 In some cases, an investigating agency such as the ATSB may exercise their legal authority to require the protection and preservation of an occurrence site and the disabled aircraft along with other evidence. As such, following completion of any necessary emergency rescue, evacuation and firefighting activities, the disabled aircraft should be left undisturbed, and the site protected until the arrival of the accident investigation authorities.

3.1.11 The ATSB will provide a clearance for removal of the disabled aircraft once they have completed their on-site investigation; this may take some days. Once such authorisation is received, the disabled aircraft can be promptly removed in line with the relevant procedures established in the aerodrome manual so that flight operations can be resumed as soon as possible.

3.2 Concurrence from the affected aircraft owner

3.2.1 The aerodrome operator has no legal powers to order, or arrange for, the removal of a disabled aircraft without prior agreement from the aircraft owner. A claim for damages could follow an attempt to move a disabled aircraft if it was proven the act of moving worsened the damage to the aircraft. Therefore, only the aircraft owner, operator, or their appointed representative should be permitted to act as the recovery coordinator.

3.2.2 The aerodrome operator should liaise with the pilot, or representatives of the airline or aircraft operating company to establish the recovery controller, and brief owners on their responsibilities during the initial stages. Where the owner agrees for aerodrome operator to remove, or assist in the removal of the disabled aircraft, the aerodrome operator should ensure that the owner provides a written indemnity. An example indemnity template has been included as Appendix A of this AC.

3.2.3 Aircraft operators may have an aircraft removal or recovery plan to quickly and safely remove an aircraft that is disabled. The aerodrome operator should work with the aircraft operator, or their representative, in removing the disabled aircraft.

3.2.4 Depending on the level of the aircraft operator’s presence at the affected aerodrome, the aircraft operator or their representative may not be able to remove a disabled aircraft from an aerodrome environment in a timely manner.

3.2.5 Under such circumstances, where an aircraft owner or operator is unable to execute the removal of their aircraft, the aerodrome operator should lead the process following their established procedures. Alternatively, the aircraft operator may request the aerodrome operator to lead recovery operations with them playing a support role.

3.2.6 If the aircraft operator refuses to move the aircraft, it may be necessary for the aerodrome operator to direct the owner to remove the disabled aircraft. In such circumstances, the aerodrome operator will serve notice on the aircraft owner.

3.2.7 In cases where the aircraft owner is unable to effect removal of a disabled aircraft, the aerodrome operator may organise alternative arrangements, taking into account relevant legal responsibilities and the requirement for the aircraft owner to grant indemnity.

3.2.8 Regardless, all parties should establish open communication channels to engage with each other and arrive at an agreement on the modalities of the recovery process. To document suitable procedures and arrangements between relevant parties, the aerodrome operator may enter into written agreements with aircraft operators who routinely use the aerodrome.

4 Disabled aircraft removal planning

The removal of a disabled aircraft and subsequent resumption of normal aerodrome operations is likely to require a collaborative effort from multiple stakeholders in addition to the aerodrome operator.

4.1 Disabled Aircraft Removal Plan (DARP)

4.1.1 A disabled aircraft removal plan (DARP) is a comprehensive document that facilitates the efficient removal of immobilised aircraft and ensures the safe and speedy resumption of aircraft operations at the aerodrome.

4.1.2 An aerodrome operator, when developing the DARP, should involve representatives from various stakeholders, including aircraft operators, ATC (where available), and other agencies including those that possess specialised recovery equipment, etc.

4.1.3 Where an aerodrome is required to have an AEP (refer Section 24.02 of the Part 139 MOS), the DARP may form part of the AEP in relation to disabled aircraft management.

4.1.4 Ideally, a DARP should include the following as a minimum:

a. identify responsibilities:
   i. nominate a person or a position, that will act as a coordinator in implementing the plan and organising the recovery operations
   ii. the coordinator will provide information and facilitate liaison with relevant stakeholders, ATC (where available), DASA, CASA and the ATSB (where the occurrence is reportable in accordance with the TSIR
   iii. identify a person or position responsible for preserving aircraft, mail, cargo, and relevant records.
b. managing the occurrence site and enabling communications, including the steps involved in:
   i. caring for affected passengers
   ii. handling the affected aircraft
   iii. managing the occurrence site
   iv. handling evidence
   v. following procedures for issuing communications and publishing NOTAMS (when it a NOTAM is deemed required. Refer to the Airservices ‘NOTAM Data Quality Requirements for Aerodrome Operators’ for further information).
c. deploying suitably skilled personnel:
   i. identify the responsibilities of different stakeholders
   ii. identify and employ qualified personnel to handle the site and the removal process
   iii. include a list of nominated agents acting on behalf of each operator at the aerodrome
   iv. include a list of local contractors (with names and telephone numbers) able to supply heavy removal equipment on hire.
d. obtaining and readiness of recovery equipment:

i. identify sources of recovery equipment, including in-house, aerodrome tenants and through external arrangements. Include a stand-by list of equipment available on, or in the vicinity of, the aerodrome
ii. include equipment available from crane hire, local plant and equipment hire companies.
iii. include a list of additional equipment available from other aerodromes on request
iv. include a statement of the airlines' arrangements for the use of pooled specialist equipment, where applicable (Airline pooling arrangement for specialised aircraft recovery kits - International Airlines Technical Pool (IATP) pool for recovery kit).

4.1.5 When developing the DARP the aerodrome operator should consider the different terrain and topographic conditions of the movement area. Airside access gates, emergency assembly areas and hazards and risks to DARP response agencies should be included in the plan. Pictures and drawings depicting emergency gate locations, hazardous areas, and any other necessary information should be included in the plan.

4.1.6 Efforts should be made to establish and implement a DARP that considers all stakeholders operating at an aerodrome. Aircraft operators may also have disabled aircraft recovery plans to enable safe recovery of their aircraft and its occupants. This may include Defence resources where military aircraft frequent the aerodrome. The availability of operator and Defence recovery plans should be referenced in the DARP.

4.1.7 Aerodrome operators are encouraged to include aircraft recovery information published by aircraft original equipment manufacturers with or supplementary to their DARP.

4.1.8 Once the DARP is developed, it is imperative to share the document with all relevant stakeholders and enable them to understand their roles and responsibilities during a disabled aircraft event.

4.1.9 To ensure all parties have a clear understanding of their obligations within the scope of the DARP, periodic field or tabletop exercises may be conducted with participation from all stakeholders. This helps familiarise stakeholders with their duties and assists with analysing the efficiency of the plan for a given scenario. For aerodromes that are also required to have an AEP, note the requirement for regular emergency exercises to test the AEP, including disabled aircraft removal arrangements, under Section 24.05 of the Part 139 MOS.

4.1.10 The DARP should be reviewed periodically based on the feedback of such exercises or owing to changes in the aerodrome operating environment.

4.1.11 Aerodrome operating environments are susceptible to change. Therefore, the plan should be revisited and reviewed when a change or perceived change has occurred in the operating circumstances. For instance, the following circumstances should prompt a review/an update to the plan:

a. Operation of different aircraft types than previously considered when developing the plan.
b. Change in the aerodrome infrastructure.

c. Addition or removal of airlines and other agencies such as ground handling agencies operating in the aerodrome environment.
d. Changes to nominated personnel for specific responsibilities.

5 Disabled aircraft removal process

As identified in Section 3.1.4 of this AC, the DARP should generally consist of the following five-step process:

1. Survey.
2. Planning.
3. Preparation
4. Recovery.
5. Reporting.

5.1 Step 1: Survey

5.1.1 Survey is the first step in the sequence of the removal/recovery process of a disabled aircraft.

5.1.2 Ideally, the process would start immediately after the investigation authority (such as the ATSB) issues the clearance to remove the disabled aircraft from the occurrence site. However, some steps may be initiated while awaiting communications or approval for removing the aircraft from the site, without disturbing any evidence at the site.

5.1.3 A more detailed survey should be conducted once the investigation authority has formally released the aircraft.

5.1.4 The purpose of the survey step is to assess the condition of the aircraft, surroundings, and environment, while also planning the requirements for resources (including skilled personnel) and recovery equipment.

5.1.5 Essentially, the survey process involves inspecting:

a. aircraft condition
b. site condition (occurrence site condition)
c. access points and site accessibility
d. weather
e. equipment availability
f. availability of skilled personnel
g. environment issues (if any)
h. hazardous materials
i. hazards and risks to responders and recovery personnel.

5.1.6 Further information is included in Appendix B of this AC for guidance on actions performed in each of the preceding steps in the initial survey process.

5.2 Step 2: Planning

5.2.1 After the survey step is completed, a clear plan should be prepared for how the recovery process will be accomplished.

5.2.2 During the planning process, consideration should be given to:

a. order of recovery
b. aircraft weight and balance

c. assessment of weight to offload
d. plans to stabilise, lift, level and move aircraft.

5.2.3 The planning process requires technically skilled personnel from the aircraft operator's organisation, or their designated agent, and the aerodrome operator.

5.2.4 Managing the weight and balance of the aircraft is key to successful and safe aircraft removal. Experts from the aircraft operator organisation or designated contractors will assess the aircraft balance. They will also provide information on items that can be removed to reduce aircraft weight before initiating a recovery process. If required, they will also inform the planning of temporary structures to move the aircraft.

5.2.5 Aircraft recovery manuals may be available from the aircraft manufacturer. When developing a DARP, aerodrome operators should consider developing a library of recovery manuals for the range of aircraft that routinely operate to the aerodrome.

5.2.6 Additionally, aircraft maintenance engineers nominated by the aircraft operator or contracted agent, will support assessments of aircraft components, electrical systems, fuel on board, ballistic parachute recovery systems (where fitted) and composite fibres and radioactive materials etc., in addition to assisting in aircraft weight management activities.

5.2.7 Where necessary, experts from the aerodrome operator will assess the prevailing conditions on and around the occurrence site and develop action plans, including temporary structures and access routes. Similarly, experts from ATC (where available) can participate in designing the recovery path without affecting other facilities or continuing operations.

5.2.8 Based on the inputs offered by the above experts, personnel identified to perform recovery tasks (removing the aircraft to the planned location) will organise suitable recovery equipment. Where the necessary plant and equipment/tools are not available at the occurrence location, arrangements should be made to obtain items as per the DARP.

5.2.9 By the end of the planning phase, a definitive summary of existing damage and secondary damage should be known. Secondary damage is considered the likely damage caused to the aircraft during the removal operation.

5.2.10 The recovery process should take reasonable endeavours to avoid any further damage to an aircraft. However, where it is not feasible to avoid secondary damage due to recovery operations, the aircraft operator should be informed.

5.2.11 The finalised recovery and removal plan should be reviewed and acknowledged by the aircraft operator where the recovery process is not undertaken by them. It is advisable that the aerodrome operator obtain documented approval from the aircraft owner or aircraft operator prior to commencing recovery and approval actions.

5.3 Step 3: Preparation

5.3.1 The preparation phase is used to arrange the readiness of the aircraft, surrounding terrain, personnel involved, recovery equipment and other resources, as identified during the planning phase.

5.3.2 The preparation process involves the following steps. However, circumstances may demand additional actions and or limit others:

a. onsite briefing to all participants on the preparation works
b. preparing the aircraft:
    i. weight and balance management - mounting of tethers and shoring to stabilize the aircraft to avoid sudden movements during the removal process which can be hazardous
    ii. offloading of fuel, baggage, and cargo as part of weight management
    iii. dismantling engines and any other heavy assemblies of the disabled aircraft if needed before moving the main structure
    iv. removing components that are damaged and may hinder the recovery process
    v. ensuring serviceability of landing gear, to enable safe movement of the aircraft.
c. preparing the site:
    i. preparing (excavation, filling, and stabilisation) the occurrence site to facilitate removal.
    ii. where necessary, preparing a temporary road or hardstand for the removal of the aircraft from the occurrence site to a repair or inspection facility.

        Note: The basic requirement for a constructed roadway or hardstand is that generally it must be capable of supporting the weight of the aircraft and the recovery plant and vehicles used to extract it.

d. communication process:
    i. establishing communication channels and providing equipment (such as 2-way radios) to key personnel in the process
    ii. where crossing active movement areas (e.g. runways, taxiways, etc) is required, proper communication procedures with ATC unit (where available) through VHF frequency should be followed.
e. Toolbox talk or safety briefing:
    i. short briefing sessions may be held regularly to keep all groups involved in the removal operation aware of the procedures and progress, and to alert them to any anticipated hazards and dangers.

5.3.3 The preparation phase should enable an effective aircraft recovery by addressing anticipated issues that may arise during the process. This should also help to minimise further damage to the aircraft structure and components during the removal.

5.4 Step 4: Recovery

5.4.1 Recovery is the phase where a disabled aircraft is moved from the occurrence site to the planned safe location i.e. to an apron or hard surface. The safe location may be an aircraft maintenance hangar or a parking position.

5.4.2 Suitable stabilising, leveling, or lifting procedures, identified in the planning phase, should be used to execute the movement. Use of specialised equipment and skilled personnel should be ensured by the organisation responsible.

5.4.3 For example, an aircraft tipped to one side has to be levelled with air bags or jacks, before being lifted with slings and a crane. If the aircraft is on a slope, it may need to be moved with a winch. Once on a hard, level surface, the aircraft may be towed using the landing gear if this is still serviceable. Due consideration should be given to the structural damage identified and the centre of gravity calculated in the planning phase.

5.4.4 Aircraft recovery manuals may be available from the aircraft manufacturers in which information on lifting and jacking may be available.

5.4.5 The disabled aircraft recovery and moving process may involve any of the following operations, to bring the aircraft to a preferred location:

a. lifting aircraft with cranes or jacks
b. de-bogging, where an aircraft is bogged down in sand or mud
c. positioning it to a suitable location:
    i. moving the aircraft with serviceable landing gear when the chosen recovery pathway is readily suitable for aircraft and recovery vehicle movements, or an adequate temporary surface is created
    ii. moving an aircraft with unserviceable landing gear using cranes, flatbed trailers, general purpose multi-wheel trailers, specialised aircraft recovery transport systems, etc.
    iii. winching or towing when surface suitability and aircraft conditions permit.

5.4.6 It is advisable to record the entire recovery process. The medium of recording may be pictures, videos, and notes. Attention to detail would be highly beneficial to the occurrence investigation process, as well as for external agencies like insurance companies, Original Equipment Manufacturers (OEMs), etc.

5.5 Step 5: Reporting

5.5.1 Recording the aircraft recovery process and offering information to relevant stakeholders is strongly recommended.

5.5.2 As discussed earlier, recording the occurrence site and details of gathered evidence will add significant value to the occurrence investigation process, in recognition that the focus of the investigation process is to uncover the core reasons that led to the incident.

5.5.3 Furthermore, recorded information also provides crucial insights for the aircraft operator, their maintenance organisation (where the aircraft maintenance is contracted to a different organisation), the OEM and insurers.

5.5.4 This information is also required to perform inspections and take corrective actions prior to releasing the aircraft back into service.

5.5.5 The entire package of data and information related to the aircraft condition, damage observed, actions performed to recover and remove the aircraft and any repairs required or performed may become part of the aircraft’s technical history.

5.5.6 The following information from the recovery process should be recorded as a minimum:

a. the initial survey and inspection report, including diagrams and photographs
b. initial calculations of the aircraft weight, anticipated loads, and centre of gravity calculations
c. information on the weight reduction procedures
d. the technique used to level and lift the aircraft, i.e., jacks, cranes, lifting bags or a combination thereof
e. loads imposed during levelling and lifting
f. loads imposed on tethers
g. loads imposed on the landing gear during the movement of the aircraft to a hard surface
h. details on any resultant secondary damage.

5.5.7 Beyond recording aircraft information, it is also vital to record information about the aerodrome infrastructure, such as:

a. damage identified
b. changes to infrastructure (including sub-surface modifications if any) in order to enable the aircraft recovery/removal process
c. new temporary surfaces created to support the recovery process
d. repairs and re-works carried out to recommission the facility for aircraft operations.

5.6 Aerodrome serviceability

5.6.1 Following this 5-step process should lead to a complete and safe removal or recovery of a disabled aircraft but may not necessarily provide a safe flight operating environment at the aerodrome. It will often be the case that although the disabled aircraft blocking the movement area of an aerodrome has been removed, aerodrome infrastructure should be checked or repaired to ensure it is able to be returned to service.

5.6.2 Inspection and remediation of aerodrome infrastructure by the aerodrome operator may overlap, as appropriate, the 5 step process with the objective of repairing any damage to aerodrome infrastructure and ensuring the aerodrome it is fully serviceable. In some cases, iterative remediation may be necessary, for example the temporary imposition of a displaced threshold or reduced runway length to enable limited operations until the full runway length can be made available.

5.6.3 Further information summarising the key points of each of the five steps listed above is included in Appendix C of this AC.

Appendix A

Indemnity and release - Movement of disabled aircraft

To: **Name of aerodrome operator**

I, the undersigned, being the owner or duly authorised representative of the owner of the aircraft described below hereby agree to provide this indemnity and release on the conditions set out below.

1. I agree and consent to **Name of aerodrome operator**, its servants, agents, contractors and employees moving the aircraft described below for the purposes of restoring aerodrome serviceability.

2. In consideration of **Name of aerodrome operator** moving the aircraft, I agree to indemnify and keep indemnified **Name of aerodrome operator** against all and any loss damage cost charge expense or other liability however suffered paid or incurred by or threatened against Name of aerodrome operator in relation to or arising out of or in consequence or any action, proceeding, claim or demand which is or may be brought made or prosecuted or threatened against **Name of aerodrome operator** in respect of any loss of or damage to property, loss of life or personal injury or other loss that may arise in any way from the moving of the aircraft by **Name of aerodrome operator**.

3. I further agree to release **Name of aerodrome operator** from all claims actions, causes of actions, proceedings and demands which I or the owner now has or but for this indemnity and release would or might at any time in the future have against **Name of aerodrome operator** and from all present and future liability of **Name of aerodrome operator** to me and or the owner however caused in relation to or arising out of or in consequence of the moving of the aircraft.

4. I confirm that it is the intention of this indemnity and release that each servant, agent, contractor and employee of **Name of aerodrome operator** obtain the benefits expressed in their favour under this indemnity and release and be entitled to enforce such benefits.

5. I confirm that I am the owner have abided by all applicable laws including without limitation acts, regulations, by-laws, directions and determinations relating to or made by the Civil Aviation Safety Authority, the Australian Transport Safety Bureau, the Department of Infrastructure, Transport, Regional Development and Communications, the Commonwealth of Australia, **Name of aerodrome operator** and any other relevant authority or body which has authority in relation to interference with or movement of an aircraft.

Description of Aircraft: .....

Type of Aircraft: .....

Registration: .....

Signed by: .....

Full Name: .....

In the presence of: .....

Date: .....

Appendix B

Planning chart for the removal of disabled aircraft

Table 1: Basic recovery steps

1. Survey	2. Plan	3. Prepare	4. Recovery	5. Report
Aircraft condition: • Recover of salvage • Attitude • Landing gear • Structure • Damage components • Missing components • Unserviceable components • Cargo and fuel **Site:** • Terrain • Soil • Access routes **Weather:** • Current time • Forecast **Equipment availability:** • Preparation • Levelling • Lifting • Moving • Stabilising	**Rapid recovery:** • Important • Not important **Weight and balance:** • Calculate weight of fuel and cargo • Calculate centre of gravity **Weight reduction:** • Unload cargo • Defuel • Remove major components **Recovery:** • Reduce weight • Prepare site • Level • Lift • Stabilise • Move **Schedule equipment and personnel required:** • Determine resources required • Confirm delivery plan **Secondary damage:**	**Monitor and record:** • Loads • Actions performed **Assemble equipment and personnel:** • Confirm arrival dates • Confirm arrival times **Weight reduction:** • Unload cargo • Defuel • Remove major components **Prepare site:** • Clear • Excavate • Fill • Stabilise **Roadway:** • Clear • Excavate • Fill • Stabilise • Manufacture temporary roadway	**Monitor and record:** • Loads • Actions performed **Stabilise:** • Tether • Ground anchors • Jacks • Shoring **Level/Lift:** • Jacks • Airbags • Cranes • New technology equipment **Debogging:** • Confirm lifting method **Move:** • Tow gear • Trailer and transport equipment	**Report:** • Capture information to include in aircraft history: • Recovery details • Repair details • Record of loads

1. Survey	2. Plan	3. Prepare	4. Recovery	5. Report
Personnel availability: • Number • Skills **Environmental issues:** • Fluid spills • Hazardous materials	• Prevent consequential damage • Acceptance of additional damage • Damage recording			

Appendix C

Disabled aircraft removal inspection and survey requirements

C.1 Inspection and Survey

C.1.1 Aircraft condition

C.1.2 Prior to operating in near proximity to, or from inside, the aircraft for its recovery, a visual inspection of the aircraft condition should be performed to ascertain the condition of the airframe.

C.1.3 A hazard analysis should commence. Hazards include equipment included in the aircraft, information from aircraft manifests, and a review of runway or taxiway incursions or excursions that may be of high risk such as damaged aircraft tyres, and any other matters that may represent a hazard or risk to persons involved in recovering the aircraft.

C.1.4 A visual inspection may lead to identifying obvious structural failures/damages such as:

a. cracked, creased, buckled, distorted or torn fuselage and wing skin panels
b. broken and missing fasteners
c. signs of overheating of any fuselage or wing panels or other components.

C.1.5 Any such damage observed could indicate a weak structure that should be considered questionable for any further loading/levelling/lifting/balancing process.

C.1.6 Any loose or damaged components or parts such as landing gear, engines, control surfaces, and other non-structural parts should be clearly identified during the survey process and plans should be drawn to remove them before recovering the aircraft.

C.1.7 Other systems that should be thoroughly inspected for any substantial damage or harmful leaks include:

- Inspection of the electrical system is warranted if structural damage to the aircraft is evident. The decision to disconnect the aircraft's main batteries should not be taken without consideration, as it can greatly affect the recovery process.
- Leaks that include fuel, hydraulic fluid, wastewater, potable water or cargo. Other than potable water, fluid leaks must be immediately reported in order for a quick response by the hazardous materials clean-up crew. Fuel leaks of any kind would mandate the refuelling of the aircraft as a primary task.

C.1.8 Serviceable landing gear should be identified and secured with down-lock pins for safe operations. Precautions should be ensured for enabling safe extension of landing gears in the initial phases of the recovery/removal process.

C.1.9 Any visible damage or fluid leaks must be recorded. This documentation, which forms part of the recovery records, can be in the form of photographs, sketches, measurements, and notes, etc.

C.2 Occurrence site survey

C.2.1 A thorough inspection of the area surrounding the occurrence site should be carried out.

C.2.2 The recovery team should endeavour to bring the aircraft to a hard surface in the safest possible manner and earliest possible time. To accomplish this, a thorough understanding of the surrounding terrain and soil characteristics is required.

C.2.3 Aerodrome maps, and pavement surface information including strength, existing pavement condition and potential of damage should be sought from the airside maintenance team. Underground installations like electrical cabling pits and ducts and stormwater ducts, should be considered when planning the recovery process.

C.2.4 When establishing a removal route for the aircraft, it is necessary to evaluate the distance to the nearest apron or hard surface that can withstand the aircraft load.

C.2.5 Further consideration should be given to the best possible route. The chosen pathway should not affect adjacent airside operations and should cause minimal damage to airside infrastructure.

C.3 Weather

C.3.1 General weather conditions play a major part in the recovery process.

C.3.2 Current and forecast weather conditions must be considered in properly planning the recovery process. These weather conditions include:

- Precipitation.
- Temperature.
- Wind.

C.4 Equipment availability

C.4.1 An analysis of required recovery equipment should be developed and initial communications by stakeholders as per the DARP, should be commenced.

C.4.2 Safety equipment for personnel engaged in the process should be provided by the agency identified as responsible in the plan.

C.5 Skilled resources

C.5.1 Part of the initial survey is to assess the requirements for skilled resources (both specialised and general).

C.5.2 Accountable agencies identified in the DARP to offer and provide resources should be contacted to arrange the provision of personnel according to the plan.

C.6 Environmental issues, hazards and risks to personnel and hazardous materials

C.6.1 The inspection and survey should identify the presence of hazards and risks to those personnel working on and near the aircraft and hazardous materials, to ensure the safety of aircraft recovery personnel and others.

C.6.2 The aerodrome operator should handle identified hazardous materials as per the processes and procedures they have established.

C.6.3 Some examples of hazards include:

- cracked, broken and torn metals from aircraft and its components.
- ballistic parachute recovery systems

- any dangerous goods that were carried onboard
- composite materials and carbon fibre
- biohazard items
- onboard oxygen systems, electrical and fuel systems.

C.6.4 Plans should be devised to handle such materials during the recovery process by trained personnel.