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Hangar 11 Manufacturing Support Facility Permit Application

Supplementary Technical Information Report for Marshall of Cambridge Aerospace Ltd

09 November 2022

Document Control

Client Marshall of Cambridge Aerospace Ltd **Principal Contact** Duncan Watts

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Prepared By: Adam Dawson

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Registered Office: 23 Coldharbour Road, Bristol BS6 7JT Tel: 0117 974 1086

24 Greville Street, Farringdon, London EC1N 8SS Tel: 020 3873 4780

6 Bankside, Crosfield Street, Warrington WA1 1UD Tel: 01925 937 195

Non-technical summary

Purpose of this report

This document supports the application by Marshall of Cambridge Aerospace Ltd for a Standard Rules Environmental Permit (SR 2009 No2) to operate a Part A(1) low impact installation containing an activity involving the use of cadmium under the Environmental Permitting (England and Wales) Regulations 2016, as amended, at Cambridge City Airport. This document provides supporting information to demonstrate the proposed activities meet the criteria for a low impact installation.

Site location

The regulated activity will take place in the special processes area of the Manufacturing Support facility in Hangar 11 at the Airport.

Name:	Hangar 11 Manufacturing Support Facility
Address:	Cambridge City Airport
	Newmarket Road
	Cambridge
	Cambridgeshire
	CB5 8RX
Grid reference:	TL 48334 58757

Hangar 11 is located in the main area of onsite aircraft maintenance operations. There are residential areas to the north and north-west, with the nearest residential receptor approximately 120 m away on Sunnyside. The nearest ecological sites are Coldham's Common and Barnwell Local Nature Reserves (LNR) and Wilbraham Fens Site of Special Scientific Interest (SSSI). These sites are 400m and 2.8 km from the site, respectively. The nearest European designated site (Wicken Fen Ramsar) is over 12 km to northeast of the site.

Process description

The proposed regulated activities are already undertaken by the Operator in the existing Manufacturing Support Facility in the Newmarket Road North Works Site under an extant permit (ref. CP3836SK). Due to a phased demolition programme of the Newmarket Road North Works site to make way for the Marleigh development, there is a need to relocate the current Manufacturing Support to the extant Hangar 11 on the Newmarket Road South Works site. Once relocated, the permit for the existing operations at the Newmarket Road North Works site will be surrendered.

The Manufacturing Support relocation project is a relocation only, not an increase in capacity or capability. Hence, operations taking place in Hangar 11 will be entirely consistent with those currently taking place at the Newmarket Road North Works site.

The cadmium process is a very small scale, low volume and low impacting activity, involving the use of cadmium for electroplating metal aircraft components. The process is required to utilise cadmium's superior lubricity and anti-corrosion properties to add protection to these components. The installation's normal operations are to plate metal with a surface area no greater than 630 cm^2, with the operations typically occurring for less than 10 hours of operation in a year. Based on current operations, approximately 0.5 kg of cadmium solution is expected to be consumed in a typical year.

The plating process is applied using a hand held pen under electrolysis to apply the cadmium solution to a metal component. This is undertaken within a standard stainless steel kitchen sink arrangement, which drains into a 10 litre waste drum below the sink, all of which is fully bunded and contained. Once the 10-litre drum becomes full it is decanted into a larger 240 litre waste drum for ultimate collection and disposal by a licensed waste management company. The cadmium plating installation area also includes a material storage cabinet for neat cadmium solution and associated cleaning equipment.

Managing the activities

The Operator is an AS9100 certified company and operates the Manufacturing Support processes under a Business Management System (BMS). AS9100 is a widely adopted and standardised quality management system for the aerospace industry. The BMS documents all the necessary control procedures required to operate the processes in a safe and controlled manner. Environmental consideration is a core component of the BMS and procedures for spillage, waste management etc., are all documented.

The BMS is considered to fulfil the same objectives of ISO 14001 but it is not yet accredited to that standard. However, the Operator is currently undertaking gap analysis to apply for ISO 14001 certification and hopes to gain accreditation to this standard by the end of 2023.

Emissions and monitoring

There will be no emissions to the environment during normal operation, and consequently, no routine monitoring of emissions is proposed. The Operator will monitor various process related aspects, such as raw material consumption, energy consumption, waste generation etc., under the BMS and permit conditions.

Impact assessment

Potential impacts to the environment through the proposed cadmium operations are assessed as not significant and the activities are below the criteria set out in the Environment Agency's low impact installation checklist.

Contents

Tables

1 Introduction

1.1 Purpose of this document

This document supports the application by Marshall of Cambridge Aerospace Ltd (the 'Operator') for an Environmental Permit to operate a Part A(1) installation containing an activity involving the use of cadmium under the Environmental Permitting (England and Wales) Regulations 2016, as amended (EPR), at Cambridge City Airport.

The facility is proposed to be permitted as a low impact installation under Standard Rules SR 2009 No2 and this document serves to provide evidence demonstrating the low impact installation criteria, specified in the Environment Agency's Part B1 form low impact installation checklist, are fulfilled, in addition to providing wider supporting information required by the Environment Agency to determine the application.

This document should be read in conjunction with Environment Agency application forms Part A, B1 and F1, which are provided as Appendix A1 to this supporting technical information report.

1.2 Application structure

The application process, as prescribed by the Environment Agency, requires the completion of a number of forms. These require information on the Operator, technical information about the installation, and the financial implications for the Operator.

The nature of the information required for several sections of these forms means that a more comprehensive response, in terms of detailed descriptions and assessments, is needed than can be entered onto the forms. Therefore, in order to submit coherent and logical descriptions of the proposed application to the Environment Agency, this report contains appropriate supporting information which provides responses to the application form sections.

Table 1-1 outlines the remaining structure of this report, with Table 1-2 and Table 1-3 identifying where the relevant information required by application forms A and B1 can be located in this report.

Table 1-1 Supplementary technical information report structure

Section reference	Title	Description of content
2	About the application	Provides a description of the Operator, the site, the activities taking place at the installation and guidance reviewed when developing the application.
3	Managing the activities	This section provides a description of the environmental management system arrangements for the installation and information on the use of raw materials and water, waste management, energy efficiency, accidents and environmental risks, permit surrender and closure, and security measures.

Section reference	Title	Description of content
4	Operations	Provides detailed descriptions of the operations taking place at the installation.
5	Impact assessment	Assesses the environmental impacts of emissions from the installation. This follows the structure of Form B1's low impact installation check list.
Appendix A1	Application forms	Completed copies of Application Forms A, B1 and F1.
Appendix A2	Pre-application consultation	Copies of the pre-application correspondence with the Environment Agency.
Appendix A3	Site plans and drawings	Provides plans and drawings including the installation boundary.
Appendix A4	Environmental Risk Assessment	Copy of the H1 software tool providing an environmental risk assessment for the installation
Appendix A5	Management system certificates	Copies of the management system certificates for Marshall
Appendix A6	Site Condition Report	The report that establishes the baseline soil and groundwater conditions within the installation boundary in accordance with Article 22(2) of the Industrial Emissions Directive
Appendix A7	MSDS	Contains the MSDS for Dalic cadmium solution

Table 1-2 Location of information required for environmental permit application form A

Application form section	Where addressed in this report
1 About you	Included in form A in Appendix A1
2 Applications from an individual	N/A
3 Applications from an organisation of individuals or charity	N/A
4 Applications from public bodies	N/A
5 Applications from companies or corporate bodies	
5a Name of the company	Included in form A in Appendix A1
5b Company registration number	Included in form A in Appendix A1
5c Details of directors	Found in supplementary document "Director Details.docx"
6 Your address	
6a Your main registered address	Included in form A in Appendix A1

6b Main UK business address	Included in form A in Appendix A1
7 Contact details	
7a Who can we contact about your application?	Included in form A in Appendix A1
7b Who can we contact about your operation?	Included in form A in Appendix A1
7c Who can we contact about your billing or invoice?	Included in form A in Appendix A1

Table 1-3 Location of information required for environmental permit application form B1

Application form section	Where addressed in this report
1 About the permit	
1a Discussions before your application	Appendix A2
1b Is the permit for a site or mobile plant?	Included in form B1 in Appendix A1
2 About the site	
2a What is the site name, address, postcode and national grid reference?	Included in form B1 in Appendix A1 and Section 2.2
3 About this application	
3a Standard facilities	Included in form B1 in Appendix A1
3b SR 2009No8 Management of inert extractive wastes at mines and quarries	N/A
3c SR 2009No4 Combustion of biogas in engines at a sewage treatment works	N/A
3d SR 2015No39 Deposit for recovery	N/A
3e SR 2010Nos 2 or 3 Discharges to surface water	N/A
3f SR 2015Nos 17 and 18 ELV depollution and dismantling operations	N/A
3g Low-impact installations	Included in form B1 in Appendix A1
4 General Information	
4a Provide a plan or plans for the site	Appendix 3
4b Provide the relevant sections of a site condition/baseline report	N/A
4c Provide a fire prevention plan if the standard rule set you are applying for requires one	N/A

Application form section	Where addressed in this report
5 Your ability as an operator	
5a Relevant offences	Included in form B1 in Appendix A1
5b Technical ability	N/A
5c Finances	Included in form B1 in Appendix A1
5d Management systems (all)	Section 3 and Appendix A5
6 How to contact us	Included in form B1 in Appendix A1
Appendix 1 – Low impact installation checklist	Included in form B1 in Appendix A1 and Section 5

2 About the application

2.1 The Operator

The Operator of the proposed activity and holder of the permit will be Marshall of Cambridge Aerospace Ltd. Marshall of Cambridge Aerospace Ltd is a wholly owned subsidiary of Marshall of Cambridge (Holdings) Ltd.

Marshall of Cambridge (Holdings) Ltd operates across multiple sites throughout the UK specialising in aerospace and land systems engineering activities. These site activities range from design and manufacture, modification and test, routine maintenance and repair, and surface treatment (including spray painting) of aerospace and land system applications.

2.2 The Site

The regulated activity will take place in the special processes area of the Manufacturing Support facility in Hangar 11 at the Airport.

Name:	Hangar 11 Manufacturing Support Facility
Address:	Cambridge City Airport
	Newmarket Road
	Cambridge
	Cambridgeshire
	CB5 8RX
Grid reference:	TL 48334 58757

The Operator holds a mixture of waste exemption, Local Authority (Part B) and Part A Installation Permits for their current activities at the Airport. Until recently, Hangar 11 was associated with the Hangar 17 paint installation, regulated by Cambridge City Council as a Part B installation (permit No. 2005/28), and formed part of the installation boundary for that permit. However, a recent variation (VAR 12) to the paint installation permit removed Hangar 11 from its installation boundary.

Hangar 11 is located within the main area of onsite aircraft maintenance operations. There are residential areas to the north and north-west of the operation, with the nearest residential receptor approximately 120 m away on Sunnyside.

The nearest ecological sites are Coldham's Common and Barnwell Local Nature Reserves (LNR) and Wilbraham Fens Site of Special Scientific Interest (SSSI). These sites are 400m and 2.8 km from the site, respectively. The nearest European designated site (Wicken Fen Ramsar) is over 12 km to northeast of the site.

The site location and installation boundary figures are provided in Appendix A3.

2.3 Activities

Marshall Aerospace undertakes the maintenance, deep overhaul, modification and repair of fixed wing aircraft. This cannot be fulfilled without the input from Manufacturing Support to ensure that the capability of customers aircraft remains at a standard which is cost effective and safe.

The Manufacturing Support facility contains a variety of specialist activities; specifically, the Special Processes section, which undertakes a number of surface treatment and curing processes to support the metal fabrication of a variety of finished aerospace components specifically for the Aerospace maintenance activity.

The existing Manufacturing Support facility is located on the Newmarket Road North Works site. However, due to a phased demolition of this site as part of the Marleigh development (a proposal to develop up to 1,300 homes north of Newmarket Road) the facility is required to relocate to Hangar 11 on the south side of Newmarket Road and within the airport operational boundary.

The Manufacturing Support relocation project is a relocation only, not an increase in capacity or capability. Other activities within the Manufacturing Support Facility e.g., surface treatment of metal components, paint respraying etc., will remain below the relevant activity thresholds in the EPR, as confirmed during pre-application consultation with the Environment Agency.

Consequently, the proposed regulated activities within Hangar 11, for which this permit application is being made, centre around the use of Dalic cadmium solution for brush electroplating. The use of cadmium is a Schedule 1 installation activity, as defined under Section 4.2 Part A(1)(e) of the EPR.

There are no Directly Associated Activities being applied for with the permit application. The full list of regulated activities are described in Table 2-1.

Table 2-1 Installation activities

Activity Reference	Activity listed in Schedule 1 of the EPR	Description of specified activity
AR1	Section 4.2 Part A(1)(e)	Unless falling within any other Section, any manufacturing activity involving the use of mercury or cadmium or any compound of either element or which may result in the release into the air of either of those elements or their compounds.

2.4 Pre-application consultation

Enhanced pre-application discussions were held with the Environment Agency on 02/08/2022. The notes from these discussions are provided in Appendix A2. The pre-application consultation confirmed that the other activities within the relocated Manufacturing Support facility were below the thresholds for a regulated activity, and that SR 2009 No2 would be appropriate for the cadmium electroplating process.

2.5 Applicable guidance

Table 2-2 summarises the applicable legislation, guidance and technical standards that have been reviewed when developing this application.

Table 2-2 Applicable legislation, guidance and technical standards

Publisher / Document Type	Title	Version / Date Published
Defra Legislation and Guidance	Environmental Permitting (England and Wales) Regulations 2016 (SI 2016 No. 1154)	December 2016
	Environmental Permitting (England and Wales) (Amendment) Regulations 2018 (SI 2018 No. 110)	January 2018
	Environmental Permitting Guidance, Core Guidance for the Environmental Permitting (England and Wales) Regulations 2016	March 2020
	Guidance: The Inorganic Chemicals Sector (EPR 4.03) https://www.gov.uk/government/publications/environmental-permitting-charges-guidance/environmental-permitting-charges-guidance	February 2009
Environment Agency Guidance	Guidance : A1 installations: environmental permits https://www.gov.uk/guidance/a1-installations-environmental-permits	November 2022
	Guidance: Legal operator and competence requirements: environmental permits https://www.gov.uk/guidance/legal-operator-and-competence-requirements-environmental-permits	June 2019
	Guidance: RGN2: Understanding the meaning of regulated facility https://www.gov.uk/government/publications/rgn-2-understanding-the-meaning-of-regulated-facility	May 2019
	Guidance: Best available techniques: environmental permits https://www.gov.uk/guidance/best-available-techniques-environmental-permits	February 2016
	Guidance: Risk assessments for your environmental permit https://www.gov.uk/guidance/risk-assessments-for-your-environmental-permit	August 2022

Publisher / Document Type	Title	Version / Date Published
	Guidance: Air emissions risk assessment for your environmental permit https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit	July 2022
	Guidance: Environmental permitting charges guidance https://www.gov.uk/government/publications/environmental-permitting-charges-guidance/environmental-permitting-charges-guidance	July 2020
	Guidance: Noise and vibration management: environmental permits https://www.gov.uk/government/publications/noise-and-vibration-management-environmental-permits/noise-and-vibration-management-environmental-permits	January 2022
	Guidance: Control and monitor emissions for your environmental permit https://www.gov.uk/guidance/control-and-monitor-emissions-for-your-environmental-permit	May 2021
	Guidance: Environmental permitting: H4 odour management https://www.gov.uk/government/publications/environmental-permitting-h4-odour-management	April 2011
	Guidance: Develop a management system: environmental permits https://www.gov.uk/guidance/develop-a-management-system-environmental-permits	August 2022
Environment Agency Application Forms	Form A	August 2020
	Form B1	January 2021
	Form F1	August 2020

3 Managing the activities

3.1 Management systems

3.1.1 General

The inherent and intrinsically low impact nature of the proposed activities means that significant management effort is not required to ensure significant environmental impacts do not occur. Nonetheless, as a responsible operator, activities at the installation will be managed under documented management procedures described below to ensure that the Environment Agency's requirements for management systems are met.

The Operator is an AS9100 certified company and operates the Manufacturing Support facility under a Business Management System (BMS). AS9100 is a widely adopted and standardised quality management system for the aerospace industry. The BMS documents all the necessary control procedures required to operate the processes in a safe and controlled manner.

Environmental is a core component of the BMS and procedures for spillage, waste management etc., are all documented. For example, Procedure E10.511D_EMS003-02-03A_Emergency Plan provides a documented procedure for responding to spills which categorises spills according to their severity and substance, and ensures that adequate spill kits are available. Site personnel are trained in accordance with this plan and all other relevant procedures of the BMS.

The BMS contains elements of ISO 14001 objectives but it is not yet accredited to that standard. However, the Operator is currently undertaking gap analysis to apply for ISO 14001 certification, and hopes to gain accreditation to this standard by the end of 2023.

Copies of the AS9100 accreditation certificates are provided in Appendix A5.

3.1.2 Operations and maintenance

The dedicated special processes operations department includes a highly skilled team of staff to ensure correct operating procedures are followed. These teams are overseen by an Operations Manager who reports directly to the Operations Director.

The BMS and its associated procedures describe how to operate in accordance with environmental compliance and avoid, or minimise, environmental risks. In addition, the BMS also includes procedures relating to the inspection of environmentally critical equipment and operational logs which support compliance with permit conditions and minimise environmental impact.

Maintenance of the Facility is expected to be undertaken by a combination of internal resources and specialist qualified external contractors dependent on the specific activity required.

Prior to any work being undertaken by external contractors, the contractor will be required to submit for approval a method statement, risk assessment, liability insurance, company health, safety and environmental policies and how compliance with the site operating procedures will be met. The contractor will be required to sign a form to confirm that they understand and will comply with the permit to work system described above.

3.1.3 Competence and training

The competency of resources to operate the process in compliance with permit conditions requires several steps linked to operational procedures. These include:-

- Defining roles and responsibilities.
- Defining competency requirements.
- Competency assessment.
- Training needs analysis.
- Training provision.
- Training records and register.
- Periodic competency and operational review and assessment.

Procedures will be in place to identify the minimum competencies required for each role at the Facility. These will then be applied to recruitment and training processes for both internal resources and external contractors. Job specifications will be defined which, amongst others, will provide details on relevant qualifications and experience required.

As part of the initial induction training, staff will be made aware of the relevant control procedures, and the importance of operating to these requirements. Managers will continue to identify and monitor staff training needs and competency levels as part of an ongoing appraisal system. Training will be delivered using a combination of on-the-job training, mentoring, internal training courses and external training courses/events as required. Training records will be stored and maintained on the HR system. These records will include, as a minimum, the date, type of training, training provider and any associated assessment scores.

3.1.4 Accidents, incidences and non-conformances

The BMS addresses a range of issues including emergency response and managing the consequences of accidents. An initial assessment of the potential accident risks associated with the operation of the Facility is presented in Section 3.2.

The BMS provides a process which addresses the detection, response and investigation of the causes of operating conditions that may give rise to incidents, or any non-conformances with the procedures in the BMS. This will define the short-term actions to return the Facility to normal operation, and long-term actions to prevent the same incident or non-conformance occurring again.

In respect of managing complaints concerning the environmental impact of the installation activities, any complaints will be referred to the appropriate Manager (as defined by the BMS), or a nominated responsible individual in their absence who will initiate an investigation of the complaint as soon as possible. The complaint will be recorded on a complaint log form, and the time/date it was received, the outcome of the investigation, and any remedial steps taken to address the complaint.

The complainant will be contacted by the appropriate Manager to confirm the details of the complaint, the outcome of the subsequent investigation and any remedial steps taken. This feedback and communication will be recorded on the incident management reporting system. Contact will also be made with the Environment Agency in accordance with permitted conditions and notification requirements.

3.1.5 Organisation and environmental responsibilities

The key organisational and environmental management roles and responsibilities are described below:

- The Operations Director will have overall responsibility for the management of the Facility and compliance with the permit. This will be an individual with significant experience and track record of managing the operation of similar facilities;
- The Operations Manager will have day-to-day responsibility for the operation of the Facility, ensuring that the Facility is operated and maintained to the standard operating procedures and requirements of the BMS and environmental permit; and
- The HSE Manager will be responsible for tracking compliance with the permit and BMS, development of key performance indicators (KPIs) and their assessment, and producing the periodic and annual reports required by the Environment Agency under the conditions of the permit.

The Environment Agency's guidance and indicative standards for EMS[1] is summarised below, along with a comparison of how the installation will be managed by the Operator against this guidance.

Table 3-1 Environment Agency Standards for Environmental Management Systems

No	Indicative Standard	Controls expected to be adopted by the Operator
1	The EMS and associated management arrangements must have the means available to provide the required standards of environmental protection.	The Operator is an AS9100 certified company and operates the Manufacturing Support facility under a Business Management System (BMS). The BMS documents all the necessary control procedures required to operate the processes in a safe and controlled manner. Environmental is a core component of the BMS and procedures for spillage, waste management etc., are all documented. The BMS contains elements of ISO 14001 but it is not yet accredited to that standard. However, the Operator is currently undertaking gap analysis to apply for ISO 14001 certification, and hopes to gain accreditation to this standard by the end of 2023.
2	Equipment must be designed and installed to a suitable standard.	The design and operation of the Facility will ensure that equipment is designed and installed to a suitable standard.
3	All equipment whose failure may lead to pollution must be operated and maintained so that it continues to operate effectively.	Planned maintenance procedures will be established to ensure all key plant components that have the potential to affect the environmental performance of the Facility, or compliance with the environmental permit, remain in good working order.
4	Potential accidents must be identified, any necessary measures to minimise the chances of them happening put in place and plans to	An initial appraisal of the potential accident scenarios, associated environmental risks, and relevant mitigation measures appropriate for the design and operation of the Facility is provided in Section 3.2.

[1] https://www.gov.uk/guidance/develop-a-management-system-environmental-permits

No	Indicative Standard	Controls expected to be adopted by the Operator
	minimise the effects if the worst occurs put in place.	
5	Sufficient staff must be provided, they must be adequately trained in those aspects which could lead to pollution and they must know how to deal with accidents and understand the responsibilities of the permit.	Staffing levels for the Facility will be defined by the Operator based on its extensive experience operating the existing Manufacturing Support facility at its current location without incident. Formal training will take place, both during induction, but also as part of ongoing refresher training, that will explain the importance of operating the Facility in accordance with the requirements of the environmental permit and the operational procedures in the BMS, including responding to any accident, incident or operational non-conformance that may have an associated environmental impact. Ongoing training needs will be identified as part of ongoing employee appraisals.

3.2 Accidents

An initial outline of the potential accident scenarios and an assessment of their potential risk to the environment is provided in the following sections.

3.2.1 Risk assessment methodology

The methodology used for the identification and assessment of accidents and associated environmental risks follows the requirements of Environment Agency Guidance[2]. The potential environmental risks as a result of credible accident scenarios were evaluated using the following approach:

1. Hazard - what accident event has the potential to cause an environmental impact (harm)?
2. Receptor - what environmental receptor is at risk and needs protecting?
3. Pathway - what is the environmental pathway by which the hazard can reach the receptor?
4. Risk management - what measures are proposed to be implemented to reduce the risk of the hazard reaching the receptor? If the hazard reaches the receptor, who is responsible for responding to mitigate the hazard?
5. Probability of exposure – how likely is the hazard to reach the receptor such that the contact (receptor) is exposed?
6. Consequence – what is the harm that can be caused to the receptor if exposure occurs?
7. What is the overall risk – after the implementation of the risk management measures, what is the risk that still remains? This takes into account the balance between probability and consequence.

The probability of exposure is an assessment of the probability of the selected source and receptor being linked by the identified pathway. The consequence provides an indication of the sensitivity of a given

[2] https://www.gov.uk/guidance/develop-a-management-system-environmental-permits#accident-prevention-and-management-plan

receptor to a particular source or contaminant of concern under consideration. It is a worst-case classification and is based on full exposure via the particular linkage being examined. The overall risk column is an overall assessment of the actual risk, which considers the likely effect on a given receptor, taking account of the controls present on site. The criteria are set out in Table 3-2.

Table 3-2 Risk assessment criteria

Factor and definition	Description
Probability of exposure	
High likelihood	An event that could result in exposure of the contact / receptor is very likely to occur in the short term and is almost inevitable over the long term.
Likely	It is probable that an event that could result in exposure of the contact / receptor will occur. It is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	Circumstances are possible under which an event that could result in exposure of the contact / receptor could occur. It is by no means certain that even over a longer period such an event would take place, and less likely in the short term.
Unlikely	It is improbable that an event that could result in exposure of the contact / receptor would occur even in the very long term.
Consequences	
Severe	Acute harm to human health. Immediate pollution impact of sensitive water resource (e.g. major spillage into controlled waters). Impact on controlled waters e.g. large-scale pollution or very high levels of contamination. Catastrophic damage to buildings or property (e.g. explosion causing building collapse). Ecological system effects – irreversible adverse changes to a protected location. Immediate risks.
Medium	Chronic harm to human health. Pollution of sensitive water resources (e.g. leaching of contaminants into controlled waters). Ecological system effects – substantial adverse changes to a protected location. Significant damage to buildings, structures and services (e.g. damage rendering a building unsafe to occupy, such as foundation damage).
Mild	Non-permanent health effects to human health. Pollution of non-sensitive water resources (e.g. pollution of non-classified groundwater). Damage to buildings, structures and services (e.g. damage rendering a building unsafe to occupy, such as foundation damage). Substantial damage to non-sensitive environments (unprotected ecosystems e.g. crops).
Minor/negligible	Non-permanent health effects to human health (easily prevented by appropriate use of PPE) or loss of amenity rather than health effects. Minor pollution to non-sensitive water resources. Minor damage to non-sensitive environments (unprotected ecosystems e.g. crops). Easily repairable effects of damage to buildings, structures, services or the environment (e.g. discoloration of concrete, loss of plants in a landscaping scheme).
Overall risk	

Factor and definition	Description
Very high risk	Severe harm to a receptor may already be occurring OR a high likelihood that severe harm will arise to a receptor, unless immediate remedial works/mitigation measures are undertaken.
High risk	Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions/mitigation measures are undertaken. Remedial works may be required in the short term, but likely to be required over the long term.
Moderate risk	Possible that harm could arise to a receptor, but lower likelihood that such harm would be severe. Harm is likely to be medium. Some remedial works may be required in the longer term.
Low risk	Possible that harm could arise to a receptor. Such harm would at worse normally be mild and temporary.
Very low risk	Low likelihood that harm could arise to a receptor. Such harm unlikely to be any worse than mild.

The potential overall risk for each accident is calculated from the following matrix included as Table 3-3. A classification of 'Moderate/Low' overall risk and above is considered not acceptable and requires possible further remedial measures / control mechanisms to mitigate the overall risk to an acceptable level.

Table 3-3 Overall risk definition

Potential consequence	Probability of exposure			
	Unlikely	**Low likelihood**	**Likely**	**High likelihood**
Minor / negligible	Very Low	Very Low	Low	Moderate/Low
Mild	Very Low	Low	Moderate/Low	Moderate
Medium	Low	Moderate/Low	Moderate	High
Severe	Moderate/Low	Moderate	High	Very High

Notes: Unacceptable risk level shaded in red.

3.2.2 Risk assessment

Table 3-4 provides an assessment of the accidents associated with the operation of the cadmium activities that may cause harm to the environment. For all identified potential accident scenarios, there will be a number of risk management measures in place to avoid such events and/or mitigate their impacts should they occur. The final column (Overall Risk) comments on the acceptability of the risk and whether further control measures are required.

Table 3-4 Risk assessment of accidents and associated environmental consequences

Hazard What has the potential to cause harm?	Receptor What is at risk? What needs protection?	Pathway How can the hazard get to the receptor?	Risk management What measures are in place to reduce risk? If it occurs, who is responsible?	Probability of exposure How likely is this contact?	Consequence What is the harm that can be caused?	Overall Risk What is the risk that still remains? The balance of probability and consequence
Raw materials handling and storage						
Loss of containment of Dalic cadmium solution during storage/ operator error	Local population – protection from fumes	Air dispersion	The main risk reduction measure is the inherent characterises of the substance (low volatility) and the negligible quantities used onsite (typically less than 2 litres per year). Spillage containment and management procedures, including provision of spill kits, will be used. The Dalic cadmium solution will be stored in a secure, COSHH cabinet.	**Unlikely**	Local population – fume exposure - **Medium**	**Low**
	Surface and Ground Water	Direct discharge of contaminated water to surface or ground water.	Excess cadmium solution is drained to an interim 10 litre storage vessel directly below the cadmium containment sink. It is then decanted to a larger 240 litre storage vessel and, when full, this vessel is removed offsite by an approved hazardous waste carrier. All these operations are undertaken on impermeable hardstanding within a bunded area of the hangar. Any spillages within the bund are directed to the special processes hazardous waste storage tank. The integrity of the hardstanding and bund will be subject to regular checks and pro-active maintenance under procedures in the BMS.	**Unlikely**	Contamination of local surface or ground water water - **Medium**	**Low**

Hazard What has the potential to cause harm?	Receptor What is at risk? What needs protection?	Pathway How can the hazard get to the receptor?	Risk management What measures are in place to reduce risk? If it occurs, who is responsible?	Probability of exposure How likely is this contact?	Consequence What is the harm that can be caused?	Overall Risk What is the risk that still remains? The balance of probability and consequence
General site issues						
Site flooding, resulting in contaminated waste and other materials entering surface water drains	Surface Water	Direct discharge of contaminated water to surface water.	Site is located within flood zone 1, hence the risk is inherently low. Cadmium solution stored in COSHH cabinet with waste cadmium solution stored in sealed storage vessels within bunded area.	**Unlikely**	Large Contamination of local surface water. Cadmium could leak into local drainage system or soil - **Medium**	**Low**
Fire in cadmium process area	Local population – protection from fumes	Air dispersion	Dalic cadmium solution stored in COSHH cabinet. Cadmium solution is not inherently flammable. Only limited volumes of solution stored on-site at any time and annual consumption is low (typically 2 litres per year). Emergency plan contains measures to ensure that any fire is extinguished in the shortest timeframe possible.	**Unlikely**	Local population – fume exposure **Medium**	**Low**

Hazard What has the potential to cause harm?	**Receptor** What is at risk? What needs protection?	**Pathway** How can the hazard get to the receptor?	**Risk management** What measures are in place to reduce risk? If it occurs, who is responsible?	**Probability of exposure** How likely is this contact?	**Consequence** What is the harm that can be caused?	**Overall Risk** What is the risk that still remains? The balance of probability and consequence
Site security breach resulting in vandalism, damage to plant / equipment, (e.g. storage tanks, etc) causing accidental releases.	Surface Water	Direct discharge of contaminated water to surface water.	Site perimeter secured by fence and lockable access gates. Site manned full time, by operators and/or security staff. Hangar buildings have controlled access to authorised staff only. Comprehensive CCTV monitoring.	**Unlikely**	Contamination of local surface water. Cadmium could leak into local drainage system or soil - **Mild**	**Very Low**

3.3 Energy efficiency

The Environment Agency's energy efficiency standards for industrial plants requires that an installation be operated under basic energy efficiency measures. This requires evidence to be provided that basic, low-cost, physical energy efficiency techniques have been included in the design to avoid gross inefficiencies relating to excessive heating or cooling losses. Examples of how such requirements will be addressed are provided below.

Energy management and monitoring

As part of the operational procedures in this system, energy use will be monitored throughout the operational lifetime of the Facility.

The operating procedures will include preventative measures specifically aimed at maximising the energy efficiency of the Facility. In the case of the proposed cadmium operations, only one process appliance consuming electricity is required and will only be used during the intermittent and periodic electroplating process. As a result, the procedure for maximising the energy efficiency will be to ensure that the device is properly switched off following use.

There will be no process heat source for the installation.

Use of high efficiency lighting

All internal and external lighting within Hangar 11 will make use of high efficiency LED lighting.

Energy consumption for the installation as a whole is anticipated to be negligible due to the limited nature of operations. At the existing Manufacturing Support facility, energy consumption was metered at 0.65 kWh in the last reporting year.

3.4 Efficient use of raw materials and water

3.4.1 Raw materials

The only raw material required is the Dalic cadmium solution. These solutions will be kept onsite in minimal quantities (typically less than 1 litre at any one time) and will be stored within a COSHH cabinet. Training will be provided to ensure that only the required amount of the solution is used to minimise waste generation.

Table 3-5 provides more information on this raw material.

Table 3-5 Main raw material inventory

Raw material	Nature and composition	Expected usage	Nature of storage and capacity	Fate	Environmental Effects	Alternatives
Dalic cadmium solution	Aqueous solution containing cadmium sulphate (15.9%) and ethylenediamine (< 15%)	500 grams of cadmium equivalent	Stored in a COSHH cabinet in small quantities (one litre etc.) within a bunded area.	Forms cadmium coating on aircraft components or excess stored in special processes hazardous waste tank for offsite removal	Toxic to human, animal and aquatic life.	None – cadmium is a specialist material for aircraft components.

3.4.2 Water use

Mains water may be used to clean up following use of the Dalic cadmium solution in the cadmium preparation sink. However, water use will be negligible and all efforts will be made to reduce water consumption by appropriate operator training.

3.5 Avoidance, recovery and disposal of waste

Whilst the inherent nature of the operations results in negligible waste generation, nonetheless some wastes will be produced. The main waste generated by the onsite activities will be a hazardous liquid waste stream containing cadmium originating from application of excess Dalic solution or from wastewater produced during clean-up of the cadmium preparation sink.

From the cadmium preparation sink, this waste stream will gravity drain to an interim 10 litre storage vessel directly beneath the sink before being transferred to a larger 240 litre storage vessel. When nearing capacity, this storage vessel will be removed offsite for disposal by an appropriately licensed hazardous waste carrier.

Solid waste may also be produced which will take the form of rags or nitrile/latex gloves for clean-up. These will be disposed of in a solid waste bin within the special processes area. When the bin is nearing capacity, it will be removed by an approved hazardous waste carrier.

These waste streams will be minimised by appropriate operator training, ensuring that the use of excess solution or spillages within the cadmium preparation sink are minimised.

Table 3-6 provides the estimated quantities of waste types generated by the Facility and their disposal/recovery route.

Table 3-6 Waste generation, storage and disposal/recovery routes

Waste type	Estimated quantity (t/y)	Storage location and capacity	Disposal/recovery route
Liquid waste containing cadmium	< 5 kg	Initially stored in interim 10 litre storage vessel before being transferred to a larger 240 litre storage vessel. All storage is within a bunded area.	Sent off-site to a suitably licenced facility for disposal.
Waste from cleaning operations (e.g., gloves, rags)	< 10 kg	Stored within an appropriately marked and designated waste bin.	Sent off-site to a suitably licenced facility for disposal or energy recovery.

3.6 Permit surrender and closure

The extent of the proposed activities for which this permit is being applied is small, with minimal infrastructure.

Whilst the unavoidable presence of raw materials and residues does present some risk, however slight, of an impact to the soil or groundwater beneath the site, the design and operational intent is to avoid such impacts occurring through appropriate design measures, such as those described in Section 3.2.2. The site condition report in Appendix A6 describes the baseline conditions of soil and groundwater within the installation boundary and the Operator will ensure the site is returned to a satisfactory state based on these data.

The length of service of the cadmium electroplating equipment is unknown and will depend on the continued requirement for cadmium coated parts within the aerospace industry. If closure of the plant is required, the plant will be decommissioned and the permit will be surrendered. This decommissioning will involve the disposal of any remaining cadmium Dalic solution using an appropriately licensed hazardous waste disposal company (most likely the company that handles the current cadmium waste) and recycling of the electroplating device at an authorised waste electrical and electronic equipment recovery facility.

3.7 Security

Security for the cadmium process will be governed by the security plan for the wider airfield operations at the Airport. Security for the wider Airport site includes the site being enclosed by a security fence, a security barrier and control room for access to airfield operations will be manned at all times, and CCTV and security lighting will be installed. Hangar 11 itself will be monitored by CCTV, and access will be restricted to authorised personnel only.

4 Operations

4.1 Overview and process description

The activity that involves the use of cadmium will be electroplating. This uses cadmium's inherent lubricity and anti-corrosion properties to add superior protection to aircraft components. Despite cadmium's toxicity, cadmium electroplating is an essential process for some aircraft components where their failure could affect the operation of an aircraft.

In this case, brush electroplating will be used. This is the method of electrolysis by coating the metal with an anode (in this case, the Dalic cadmium solution) using a metallic wand, rather than submerging both anode and cathode (metal required for coating) within an electrolyte solution. An electric current is passed through the wand and metal requiring coating, with the cadmium in the solution reducing and precipitating to form a protective coating on the metal component.

The installation's normal operations will be to plate metal components no larger than 630 cm^2, with the operations occurring approximately twice per month and typically no more than 10 hours per annum in aggregate. This results in a dedicated area where cadmium is required to be used being no greater than 15m^2 in area.

The metal aircraft component(s) that requires coating will be placed into a designated container and then placed within the cadmium preparation sink. The Dalic cadmium solution will be taken from the COSHH cabinet and poured into a smaller container within the cadmium preparation sink. The electroplating brush is dipped into the Dalic cadmium solution within the cadmium preparation sink and rubbed onto the metal (again, within the cadmium preparation sink) for a period of 10 minutes.

Following the process, the metal is left to dry while clean-up is undertaken. Any excess Dalic cadmium solution is poured down the sink along with any water used for clean-up. The sink gravity drains to a 10 l vessel directly below. Once full, or the operation has finished, this vessel is emptied into a 240 l liquid waste vessel used for hazardous liquid waste for all special processes operations. The Dalic cadmium solution is placed back within the COSHH cabinet, and any clean up rags are disposed of within a solid hazardous waste bin.

The cadmium process area is located in a bunded area within an enclosed building (Hangar 11) on impermeable hardstanding.

4.2 Ancillary equipment

There is no other ancillary equipment required.

5 Impact assessment

The following section seeks to describe and assess the environmental impact resulting from the proposed cadmium activity at the installation. As the application being made is for a low impact Part A installation standard rules permit (SR 2009 No2), the assessment follows the structure required in Form B1 to demonstrate that the required low impact installation criteria are met.

5.1 Management Techniques

The site will not rely on any complicated procedures or significant management effort to ensure the environmental impacts will be low. These are controlled primarily by the inherent low risk nature of the process. As detailed in Section 3, the largest risk to the offsite environment is through an uncontrolled release of the Dalic cadmium solution or associated liquid waste in an accident scenario. However, this scenario is assessed as low risk and the following measures ensure the activity is intrinsically simple and significant environmental effects are unlikely:

- The cadmium process takes place within an enclosed building (Hangar 11) on impermeable hardstanding, with the area within Hangar 11 encompassing the cadmium activity being bunded with no connection to the surface water drainage system;
- Minimal quantities of cadmium are stored and used (typically less than 0.5 kg used per year);
- Cadmium solution is stored within a COSHH cabinet in the cadmium process area;
- The process of disposing waste cadmium solution is relatively simple (see Paragraph 4.1); and
- An appropriately licensed waste management company removes waste offsite.

Furthermore, there are no start up, shut down, or abnormal operating conditions that will result in additional environmental risk.

5.2 Aqueous Waste

In 2021, the current cadmium operations at the existing Manufacturing Support facility produced approximately 2 litres of aqueous waste. This is well below the required threshold of 50 m^3 per day of water required to meet the criteria of a low impact installation.

It is anticipated that generation of aqueous will not materially change due to the relocation of the cadmium activities.

5.3 Abatement Systems

The cadmium activity will not require any abatement systems to be installed to prevent releases to the environment that exceed the insignificance criteria in Environment Agency guidelines or government objectives. No onsite odour abatement, scrubbers or air filtration will be required, with all aqueous waste disposed of offsite by a suitably licensed waste management company.

5.4 Ground Water

There are no planned releases to groundwater. To prevent fugitive or accidental releases to ground or surface water, the cadmium electroplating process takes place in a bunded area with impermeable hardstanding. This will be regularly inspected under documented maintenance and inspection procedures.

5.5 Producing waste

The amount of waste produced will be minimal and anticipated to be well below the low impact criteria of one tonne of Directive waste or 10 kg of hazardous waste per day, averaged over a year, or 20 tonnes of Directive waste or 200 kg of hazardous waste being released in any one day. Total waste production is likely to be less than 10 kg per year.

5.6 Energy consumption

Energy consumption for the existing cadmium process was recorded at 0.65 kWh during 2021. Based on the actual 8.4 hours of operation per annum, this equates to a typical energy consumption rate of 80 W. This is well below the low impact criteria threshold of 3 MW.

For context, the power for the electrolysis machine is powered through mains power using a 230V three pin plug. An energy monitor will be attached to the device to record energy consumption.

5.7 Preventing Accidents

As detailed within Section 3 of the report, the primary potential release to the environment is through release of cadmium solution or associated aqueous waste to surface/ground water in an accident scenario. However, as detailed previously, the cadmium electroplating process takes place in a bunded area within an enclosed building with impermeable hardstanding. The bund and hardstanding surface will be subject to routine inspection and maintenance under procedures developed by the BMS.

Small spillages within the bunded area will be cleaned up using spill-kits. Larger spillages will drain to the main special processes area regeneration tank. This is an integrally bunded 30,000 litre storage tank serving the operations in the main special processes area of Hangar 11. It has not been included in the proposed installation boundary as its use by the cadmium activity is subservient to the main use by the special processes area. Furthermore, the volumes discharged to the tank during a larger spill would still represent a negligible fraction of the tank storage volume. Assuming, in a worst-case scenario, a spill involving the full 2 litres of aqueous waste expected to be generated in a year, the cadmium activity would only contribute 0.007% of the overall storage volume. This tank will still be operational irrespective of the cadmium process being permitted.

The consequences of an accident are inherently small due to the negligible quantities of cadmium used in the process. With a typical consumption of less than 0.5 kg per annum, the amount of cadmium stored on-site at any time is considerably less than 5% of the lower tier threshold as set out in Schedule 1 of the Control of Major Accident Hazards Regulations 2015.

5.8 Noise

There are no major sources of noise associated with the proposed cadmium electroplating activity. The electroplating process may generate a very low volume noise associated with the current generating device. This, however, will be localised to the cadmium electroplating area itself and unlikely to be distinguishable above other noise generated by activities occurring within the special process area of Hangar 11. Any noise generated will certainly not be detectable at the nearest noise sensitive receptors 100 m away.

This was confirmed during a site visit and supported by the absence of complaints from the Manufacturing Support Facility that has receptors within 20 m of the process building.

5.9 Emissions of polluting substances

As cadmium metal exists in air primarily as fine suspended particulate matter, it is reliant on the volatility of the solution it is suspended in as its pathway to air. As Dalic cadmium solution has a boiling point of 100°C, its pathway to the atmosphere relies on it being heated to near this temperature. As the cadmium electroplating activity, or its storage conditions, do not require the Dalic cadmium solution to be heated to this temperature, there should be no, or very minimal, pathway for cadmium to enter the atmosphere.

However, as a conservative measure, to assess the resultant risk if there was a fire, which may result in cadmium in the Dalic cadmium solution being released to the atmosphere as its combustion product, cadmium oxide, an assessment using the H1 screening tool has been undertaken below.

The assessment is based on the 2021 annual cadmium use in the existing Manufacturing Support facility, which was less than 0.5 kg.

5.9.1 Methodology

Air emission risk assessments for environmental permits require a three-stage approach to assessing the significance of emissions to atmosphere. The first stage is to 'screen out' insignificant emissions to air using the H1 screening tool; these are emissions which are emitted in such small quantities that they are unlikely to cause a significant impact on ground level concentrations. The Environment Agency's guidance suggests that emissions are insignificant where the process contributions (PC) are less than:

- 1% of a long-term environmental standard; or
- 10% of a short-term environmental standard.

For those emissions that cannot be screened out as insignificant, the guidance indicates that further modelling of emissions may be appropriate for long term effects where the Predicted Environmental Concentration (PEC) is greater than 70% of the long-term environmental benchmark. For short-term effects, further modelling of emissions is required where the PC is more than 20% of the difference between twice the (long term) background concentration and the relevant short term environmental benchmark (i.e., more than 20% of the model 'headroom').

The above criteria apply to human receptors and ecological receptors, such as Special Protection Areas (SPAs), Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs) and Ramsar sites. However, as cadmium does not have applicable thresholds for their impacts on ecological sites through air, this assessment focussing on the impact of human receptors.

5.9.2 H1 Assessment Inputs

The H1 assessment uses a simple precautionary screening tool developed by the Environment Agency. As such, very little information is required as input data to screen impacts from further assessment. The input data for the assessment are presented in Table 5-1.

As the cadmium environmental assessment level (EAL) is based on an annual mean concentration, the emission rate is an annual averaged value, derived by dividing the 0.5 kg of cadmium used by 31.536 million, i.e., the number of seconds in a year. The results of the H1 assessment are provided in Table 5-2.

Table 5-1 H1 Inputs

Pollutant	Effective Height (m)	Efflux Velocity (m/s)	Total Flow (m^3/h)	Total Concentration (mg/m^3)	Emission Rate (g/s)
Cadmium	0.0	0.01	1000	0.000016	0.000016

Table 5-2 H1 Assessment Results

Pollutant	Emission Rate (g/s)	EAL ($\mu g/m^3$)	PC ($\mu g/m^3$)	% PC of EAL	>1% of EAL
Cadmium	0.000016	0.005	0.00000066	0.01	No (screens out)

The results of the H1 screening assessment indicate that the process contribution (PC) to the cadmium annual mean EAL would be less than 1%. Therefore, in accordance with Environment Agency guidance, the PC screens out from further assessment and, consequently, meets the requirements of a low impact installation. The completed H1 software tool is provided in in Appendix A4.

There are no short term EALs for cadmium, so this metric has not been assessed.

5.10 Odour

The MSDS for Dalic cadmium solution in Appendix A7 describes its physical and chemical properties as an odourless, colourless liquid. Consequently, there is a negligible potential for the regulated activity to generate odours.

This was confirmed during a site visit and supported by the absence of complaints from the existing Manufacturing Support Facility which has residential receptors within 20 m, compared to approximately 100 m for the relocated facility.

5.11 Compliance history

Marshall of Cambridge Aerospace Ltd has not received any environmental prosecutions, formal cautions, suspension notices or enforcement notices relating to any actual or potential environment incidents.

6 Appendices

A1 Application forms

A2 Pre-application consultation

A3 Site plans and drawings

A4 Environmental risk assessment

A5 Management system certificates

A6 Site Condition Report

A7 Material safety data sheets