Ministry of Defence

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SWECO

Report

EIA Scoping Report
Project DARC – Cawdor Barracks

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1 Introduction

1.1 Overview

1.1.1 Sweco has been commissioned to produce an Environmental Impact Assessment (EIA) Scoping Report on behalf of the Ministry of Defence (MOD) for the potential Deep Space Advanced Radar Capability (DARC) facility (hereafter referred to as the 'proposed development'). The project is currently at the final site selection stage and this document forms the Cawdor Barracks EIA Scoping Report.

1.1.2 Cawdor Barracks is being considered for the location of the proposed development ('the Cawdor Barracks site'), located near St David's in Pembrokeshire, Wales. This is within the jurisdiction of Pembrokeshire County Council (PCC). For the purposes of EIA scoping, the spatial extent of the Cawdor Barracks site has been assumed to be all land within the MOD ownership boundary of the existing Cawdor Barracks, and is indicated by the site boundary on Figure 1.1. The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares).

1.1.3 The DARC Programme forms part of a wider effort to enhance the United States of America's (USA) and Allies' Space Domain Awareness and overall Space Surveillance Network. The DARC Program is intended to ultimately comprise three globally dispersed radar sites providing global coverage and capacity to track objects from launch to final orbit. One of the DARC radar sites is proposed to be located within the UK. The proposed development is discussed further in Chapter 2 and overall this capability has the potential to make a significant contribution to UK national security, with benefits to both UK and regional economies.

1.1.4 Cawdor Barracks is currently occupied by the British Army's 14 Signals Regiment. Planned closure and military withdrawal from Cawdor Barracks were announced by the MOD in 2013, initially proposed to take place in 2024. Subsequently this decision was updated in November 2021 and DIO's (Defence Infrastructure Organisation's) anticipated disposal date for Cawdor Barracks is now 2028. DIO has considered a range of uses for the site following withdrawal of 14 Signals Regiment. The MOD is assessing the potential to utilise the Cawdor Barracks site to host the UK DARC facility on behalf of the United States Space Force (USSF). Prior to the signature of an international Memorandum of Understanding (MOU) (potentially in Summer 2023) the UK's role in the DARC programme is not formally in the public domain and therefore discretion around this project is requested by the MOD.

1.1.5 The MOD intends to submit a full planning application for the preferred site of the proposed development; this is discussed further in Chapter 2. Current US Space Force timelines require construction to commence from October 2024 for the UK site to be operational early in 2027.

1.2 Purpose of the EIA

1.2.1 This EIA Scoping Report has been prepared for submission to PCC to request a Scoping Opinion under Regulation 15 of the Town and Country Planning (EIA)

(Wales) Regulations 2017 (hereafter referred to as the 'EIA Regulations'). The Scoping Opinion will set out the scope of the EIA to be reported in the subsequent Environmental Statement (ES) for the proposed development.

1.2.2 The aim of the EIA process is to ensure that the proposed development has due regard for the environment, minimising adverse environmental effects, identifying environmental enhancement opportunities, and identifying measures to avoid what might otherwise have been significant adverse effects. The report prepared at the end of the EIA process, the ES, will provide sufficient information regarding environmental effects of the proposed development to allow PCC to make an informed decision on the planning application.

1.2.3 This Scoping Report explains the proposed approach to the EIA and provides a formal opportunity for PCC to gain opinions and comments from statutory consultees. It reviews the possible environmental impacts that may be associated with the proposed development, including those that could affect sensitive receptors. It subsequently identifies potential impacts which may result in significant environmental effects and would, therefore, need to be assessed within the EIA. This report also provides details of the methodologies that are proposed to assess those effects.

1.3 Report Structure

1.3.1 The structure of the EIA Scoping Report is outlined in Table 1.1.

TABLE 1.1: STRUCTURE OF THE EIA SCOPING REPORT

Chapter	Title	Content
1	Introduction	Introduction to the objectives and structure of the EIA Scoping Report.
2	Cawdor Barracks and the Proposed Development	A brief description of the Cawdor Barracks site (size, location, topography and surrounding area) and the key elements of the proposed development.
3	The EIA Process and Scoping	Overview of the EIA process and the proposed methodology, including for the assessment of significance and cumulative effects. Overview of the methodology for the scoping of potential environmental effects and a summary of disciplines proposed to be included within the EIA scope.
4	Transport and Access	Chapters 4 to 16 provide technical information and preliminary analysis on each of the environmental disciplines. For each discipline, sensitive receptors are identified, and the likelihood of potentially significant effects considered. Where it is not considered likely that there would be a significant effect this discipline is 'scoped out' of the EIA. Where there is the potential for a significant effect this discipline is 'scoped in' to the EIA and the chapter further outlines the proposed methodologies for the assessment of potential effects associated with the discipline.
5	Air Quality	
6	Noise and Vibration	
7	Biodiversity	
8	Landscape and Visual Impact	
9	Archaeology and Built Heritage	
10	Ground Conditions and Contaminated Land	
11	Water Environment, Flood Risk and Drainage	
12	Health	
13	Socio-economics	

Chapter	Title	Content
14	Climate	
15	Heat and Radiation	
16	Major Accidents and Disasters	Description of the potential effects of the proposed development associated with Major Accidents and Disasters
17	Cumulative Assessment	Description of the approach to cumulative impact assessment in the EIA
18	Conclusions	Summary of key conclusions from the EIA Scoping Report, including proposed structure of the ES.

2 Cawdor Barracks site and the Proposed Development

2.1 Introduction

2.1.1 This chapter provides details of the Cawdor Barracks site, describes the surrounding area, and outlines the proposed development.

2.1.2 The design of the proposed development is currently at conceptual design stage.

2.2 Cawdor Barracks site

2.2.1 The Cawdor Barracks site location and boundary for the purposes of EIA scoping is provided in Figure 1.1. The extent of the Cawdor Barracks site encompasses the existing boundary of Cawdor Barracks. The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares though confirmation required as to adequate size of the developed area as the design progresses).

2.2.2 As such, the EIA Scoping exercise has been undertaken using a conservative worst case approach, surveying the entire Cawdor Barracks site, although the design will seek to maximise the existing hard standing associated with the redundant runways and areas immediately adjacent where possible. The design development will also seek to avoid areas of environmental sensitivities or constraints within the wider Cawdor Barracks site.

2.2.3 Cawdor Barracks is presently used as a working military base, and occupied by 14 Signals Regiment. This is the site of the former airfield RAF Brawdy. It is located within the jurisdiction of PCC. The Cawdor Barracks site measures approximately 300 ha and is centred at OS Grid Reference SM 85206 25339, with the nearest on-site post code being SA62 6AT. The entirety of the Cawdor Barracks site is owned by the MOD, and managed by DIO.

2.2.4 The Cawdor Barracks site is located within a rural area on St David's peninsula in Pembrokeshire, South Wales. The Cawdor Barracks site is approximately 1.2 km northeast of the coast. The Cawdor Barracks site is to the north of the A487 between Haverfordwest and St David's. The nearest settlements are the villages of Solva (4.5 km to the southwest) and Newgale (2 km to the south).

2.2.5 The current primary vehicular access to the Cawdor Barracks site is from the unclassified road (U3017). The U3017 has a junction with the A487 on the southern boundary of the Cawdor Barracks site. In recent years, the section of the A487 to the east at Newgale has become unpassable due to tidal flooding. A 'managed retreat' stance has now been taken which may limit access moving forward, with options for a new road currently being appraised.

2.2.6 The Cawdor Barracks site can be split into three main areas: airfield; Technical Area, and Barracks. These areas are identified in the Site Location Plan in the Phase 1 Land Quality Assessment Report, provided in Appendix C.

2.2.7 The airfield comprises three redundant runways and associated infrastructure including dispersals, and a redundant Explosives Storage Area (ESA). A ground to air beacon is located centrally within the airfield. Former infrastructure in the airfield includes bulk fuel installations (BFIs), oil-water interceptors (OWI) and aircraft hangars. Such features have largely been demolished. Additionally, a spoil heap, tip/burning area, and former fire training area have been identified in the airfield. The airfield is now used by the army for training. A sports field and assault course has been established in the southwestern area of the airfield and a cross country running course has been set up in the northern area. Arms training is undertaken in the ESA in the north of the airfield. Due to the remote nature and spatial extent of the airfield, the 14th Signal Regiment use this area for specialist electronic warfare training exercises.

2.2.8 Two clay pigeon shooting ranges are present within the airfield. Live ammunition is deployed at these locations. A rally track has been set up, as demarked by old tyres, in the northeastern part of the airfield. The airfield is also used by radio-controlled airplane club. Access by the public is limited at these events to members. Grassed areas on the airfield are mown under licence by three local farmers but there are also areas of dense scrub vegetation. A number of infilled quarries have been recorded within the airfield.

2.2.9 The Technical Area and Barracks area are located within a secured compound. The technical area features a range of ancillary buildings and structures, including a secure compound used by the United States military. An operational BFI and paints, oils, and lubricants (POL) points are also located within the Technical Area. There is one vehicle washdown area currently in use. The Technical Area also features a 25m live firing range.

2.2.10 The Barracks area consists of a series of accommodation blocks, mess halls and married quarters. The buildings are arranged in the lower area of the site and generally follow the site topography. There are approximately 400 people currently based at the site with existing provision for up to 600 people.

2.2.11 Potable water enters the site at three metered points from the Welsh Water Potable water main. There is no potable water treatment or storage on site. There are three Emergency Water Storage (EWS) Tanks situated on the barracks which are used for firefighting purposes. There are 33 Fire Hydrants which are supplied by the potable water system which can used for firefighting. There are no dedicated firefighting mains.

2.2.12 Foul Sewerage drains to the Sewage Treatment Works adjacent to the barracks. There is a single sewage pumping station which lifts sewage to the foul sewerage system from areas which would not drain freely. Cawdor Barracks has a sewage treatment works which also treats the sewage from the adjacent Brawdy Business Park. The STW is situated 'outside the wire' but there is full right of way to it. The Sewage Treatment Works is a Condor Clereflow and Ammonia Removal plant. However, the works is under designed and fails to meet its consent so effluent is pumped to the head of the old biological filter bed to be treated again through this works.

2.2.13 Surface water passes by gravity through a surface water drainage system which incorporates oil water interceptors situated around the barracks. Surface water is discharged to either soak away or local watercourse.

2.3 Surrounding area

2.3.1 The immediate surrounding area is characterised predominantly by agricultural farmland with the Pembrokeshire coastline and Newgale Beach to the south. Some small, isolated villages are situated sporadically in the surrounding area including Penycwm and Newgale to the south; Llandeloy to the north and Trefgarn Owen to the east. In addition, the Pembrokeshire Coast National Park is situated immediately south of the Cawdor Barracks site extending around the coastline.

2.3.2 A high-level overview of local designations and key environmental constraints is provided within Figure 2.1.

2.4 Proposed development

2.4.1 The proposed development will include construction and operation of the DARC facility and all associated ancillary infrastructure.

2.4.2 The Cawdor Barracks site boundary is shown in Figure 1.1. The indicative layout of the DARC facility within the wider Cawdor Barracks site will be refined throughout the iterative design process and consideration of site-specific information and consultation feedback during the EIA process.

2.4.3 In summary the proposed development is anticipated to comprise the following, although this will be confirmed as the design progresses:

- Approximately 6 transmit radar antennas with associated:
    - antenna foundation;
    - ground foundation;
    - additional maintenance pavement;
    - antenna patrol roads;
    - array perimeter fencing; and
    - Lighted warning signs.
- Approximately 21 receive radar antennas with associated:
    - antenna foundation;
    - ground foundation;
    - additional maintenance pavement;
    - Chiller unit;

- additional electronic equipment shelter;
- patrol roads;
- exterior lighting; and
- perimeter fencing.

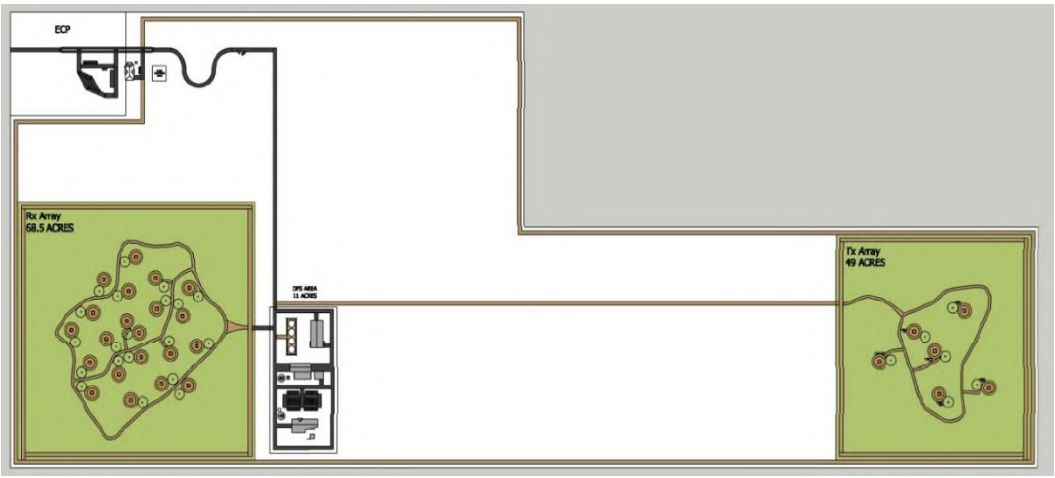
- Radar antenna operations area (proposed to be within the receiver array area) with associated:
  - above-ground storage fuel tanks;
  - system spares building; and
  - generator building.
- Sub-station and grid connection.

2.4.4 Once operational, it is anticipated there could be in the region of 60 members of staff working at the facility on a given day. These staff members would likely be based on site and the surrounding area, with possibility of some remote staff working elsewhere, however this will be confirmed as the design progresses.

Antenna array footprint

2.4.5 The receiver antenna array footprint will be in the region of 25 ha, and the transmit array footprint will be approximately 2 ha. Additionally, the transmit array will be situated a minimum of 0.5 km away from the receiver array. Diagram 2.1 shows an indicative layout for the DARC facility (subject to change as the design progresses).

Diagram 2.1: Indicative sketch showing an example overview of the DARC Facility design



Antenna parameters

2.4.6 The transmit and receive antenna height (above existing ground level) will be approximately 20 m, with an antenna dish diameter of approximately 15 m. Diagram 2.2 shows an image of similar radar dishes from a different site in the United States.

2.4.7 Each antenna will likely have a concrete foundation, composed of an antenna foundation and a ground foundation. The foundation requirements will be determined as the design progresses and site-specific ground conditions are established.

2.4.8 Each receiver antenna has an approximately 36' (11 m) radius collision zone, and an additional 14' (4.3 m) radius clear zone for safety.

Diagram 2.2: Example Radar Array (U.S. Space Force)

Ancillary infrastructure

<u>New hardstand and roads</u>

2.4.9 Surrounding the antenna ground foundation would be an additional width of pavement on each side to be used by maintenance vehicles.

2.4.10 The patrol road and all roads internal to the arrays are anticipated to be of base course construction, however will be confirmed as the design progresses.

<u>Chiller units</u>

2.4.11 Each transmit antenna will have a chiller unit and an additional electronic equipment shelter. This is anticipated to be located within the transmitter array area.

Warning signs

2.4.12 All transmit array areas internal to the bounds of the patrol road shall be the subject of suitable health and safety protocols while the transmit antennas are in operation. Warning signs shall be posted to that effect, and lighted signs at each entry to the transmit array footprint will be activated whenever the array is transmitting.

Operations area

2.4.13 The operations area is anticipated to be situated within the receiver array area and contain most of the regularly occupied facilities on the installation. These facilities would include the system operations building, the system spares building, and the backup generator building with above ground storage tanks.

System spares building

2.4.14 The system spares building would serve as a warehousing function for both arrays, contain equipment repair functions for various pieces of equipment from those arrays, and serve as a warehousing function for the overall proposed development. The generator building would provide environmental protection to the centralised power generators for the entire proposed development. The above-ground storage tank fuel farm would include storage for approximately 160,000 gallons of diesel fuel, in double bunded above-ground tanks. The fuel storage is to be used for emergency back-up generators only.

Demolition requirements

2.4.15 It is likely that there will be some demolition required as part of the works, such as break out of some areas of redundant runway. The extent of any required demolition will be determined as part of the ongoing design process and reported in the Environmental Statement (ES). The footprint of the works will be minimised as far as possible to avoid unnecessary land take and associated impacts within the wider Cawdor Barracks site.

Flexibility of design

2.4.16 The Environmental Statement (ES) will provide an indicative site layout showing proposed locations of all new radar antennae and associated infrastructure.

2.4.17 It is anticipated that detailed ground investigation and geotechnical surveys will be undertaken as part of the design process following consent of the proposed development. The final siting of the proposed new radar antennae and associated infrastructure will be dependent on the particular geotechnical conditions found on-site.

2.4.18 In absence of this ground investigation information, the application will aim to provide an allowance for flexibility in the siting of the proposed radar antennae and associated infrastructure. The ES will assume the following micro-siting allowance:

- Micro-siting will not exceed 40 m in any direction from that indicated within the indicative ES site layout;

- Micro-siting between 20 m and 40 m will only be permitted following written approval from the Local Planning Authority in consultation with appropriate stakeholders; and
- The above micro-siting allowances will apply to all proposed radar antennae and associated new infrastructure as described in the ES.

2.5 Construction programme and phasing

2.5.1 Construction is due to commence in October 2024 and is anticipated to take approximately 20 months to complete. A more detailed construction programme will be provided in the ES.

2.6 Construction Methodology

2.6.1 A detailed construction methodology for the proposed development is yet to be confirmed and will be provided in the ES. Some high-level assumptions have been prepared for the purposes of this scoping exercise based on experience of similar scale developments, which will be subject to change and updated as the design develops, as follows.

2.6.2 The daily construction workforce will vary during the construction programme, but for the purpose of scoping it is anticipated to peak at circa 150 staff per day at the peak of construction. It is anticipated that the typical working day shift could be 07:30 to 18:00 hours Monday to Friday and 07:30 to 13:00 hours on a Saturday, however the working hours will be agreed with the local authority as the design progresses.

2.6.3 Further high-level construction traffic assumptions are reported in Chapter 4 (Traffic and Transport).

2.7 Form of Application

2.7.1 An application for full planning permission will be sought should the Cawdor Barracks site be taken forward as the preferred site.

2.8 Planning Policy Context

Future Wales – the National Plan

2.8.1 Future Wales – the National Plan has been prepared by Welsh Government (Welsh Government, 2021). This is a spatial plan and is the National Development Framework for Wales to the year 2040. This is the overarching plan upon which Welsh Strategic and Local Development plans have been based.

Local Development Plan

2.8.2 PCC's current Local Development Plan (LDP) (PCC, 2013) was adopted in 2013 and will remain in effect until replaced by the emerging Local Development Plan 2 (LDP2). The current LDP comprises the following:

- A Written Statement outlining:

- Strategic Policies, and
- General Policies.

- A Proposals Map showing the geographical location and extent of site-specific development and protection policies.

General Policies and Proposals Map

2.8.3 The LDP Proposals Map indicates the following development and protection policies associated with the Cawdor Barracks site:

- Sand and Gravel Resource (Policy GN. 22) – associated with agricultural land immediately west, and immediately east of the Cawdor Barracks site;
- Hard Rock Resource (Policy GN. 22) - associated with agricultural land immediately south, and immediately east of the Cawdor Barracks site;
- Mineral Quarry Sites Buffer (Policy GN. 25) – a buffer zone associated with an existing mineral working site immediately east of the Cawdor Barracks site. This buffer zone encroaches onto the Cawdor Barracks site.

2.8.4 LDP policy GN.22 Prior Extraction of the Mineral Resources states:

"*Where new development is permitted in an area of mineral resource, prior extraction of any economic reserves of the mineral must be achieved, wherever appropriate in terms of economic feasibility and environmental and other planning considerations, prior to the commencement of the development.*"

2.8.5 LDP policy GN.25 Buffer Zones around Mineral Sites states:

"*New mineral extraction and new sensitive development will not normally be permitted within Buffer Zones around mineral working sites, where such uses would potentially have an adverse impact on one another because of their close proximity.*"

Strategic Policies

2.8.6 The LDP outlines a number of Strategic Policies (SPs) of relevance. The following is not an exhaustive list, and the individual ES technical chapters will consider a review of SPs as required:

2.8.7 SP 9 Welsh Language

"*Development will be managed sensitively in areas where the Welsh Language has a significant role in the local community. This may include phasing, signage and / or other appropriate mitigation measures.*"

2.8.8 SP 16 The Countryside

"*The essential requirements of people who live and work in the countryside will be met whilst protecting the landscape and natural and built environment of*

Pembrokeshire and adjoining areas. Development which minimises visual impact on the landscape and relates to one of the following will be promoted:

1. Enterprises for which a countryside location is essential;

2. Opportunities for rural enterprise workers to be housed in suitable accommodation that supports their employment; and

3. The re-use of appropriate existing buildings."

Emerging Local Plan

2.8.9 PCC are in the process of producing a new local plan which, when adopted, will supersede the policies identified above. Work on the new plan has been delayed as a result of findings from Natural Resources Wales (NRW) in January 2021 regarding guidance on phosphates level for the Riverine Special Areas of Conservation (SAC).

2.8.10 As a result of this, the local plan has not moved beyond consultation on the Deposit Plan which were consulted on between 15 January and 18 March 2020.

2.8.11 Given the hiatus in the plan making process no weight is attributable to the document as a material consideration in considering the proposed development.

2.8.12 Notwithstanding this, it is highlighted that draft Policy GN 5 related to the Cawdor Barracks site and allocated 11.27 ha of the site for a solar photovoltaic array.

References

Welsh Government (2021). National Plan has been prepared by Welsh Government

Pembroke County Council (2012). Local Development Plan

3 The EIA Process and Scoping

3.1 Need for an EIA

3.1.1 For certain types of development, the EIA Regulations require that an EIA must be undertaken before planning permission can be granted.

3.1.2 The proposed development does not fall under the description of a Schedule 1 Development, as defined by the EIA Regulations, which would automatically require an EIA. However, the extent of land included and individual component parts of the proposed development may trigger the thresholds of Schedule 2 development. This includes:

- Schedule 2(10)(b)(i) and (iii) – Urban Development Projects of over 1 hectare of non-dwellinghouse development; or over 5 hectares which is triggered by the Cawdor Barracks site area.

3.1.3 The area of the Cawdor Barracks site and proposed development exceeds the thresholds stated in column 2 of Schedule 2 of the EIA Regulations. Based on the nature and scale of the proposed development, it is considered that an EIA is required in order to ensure that the proposed development has due regard for the environment, minimising adverse environmental effects and identifying opportunities for environmental enhancement. As such, an ES will be submitted alongside the planning application for the proposed development.

3.2 The EIA Process

3.2.1 The EIA process, as set out in the EIA Regulations, aims to ensure that the competent authorities and the public properly understand the likely significant environmental effects, and the scope for reducing them, before a decision on the application for planning permission is made.

3.2.2 The EIA process consists of a number of defined steps, of which the Scoping stage forms one part. Diagram 3.1 illustrates this process.

3.2.3 As shown in Diagram 3.1, EIA is an iterative process. An initial impact assessment of the proposed development is undertaken, on the basis of which mitigation and enhancement measures are identified and incorporated into the design of the development, where possible. Such measures that become incorporated into the design are termed ‘design interventions’.

3.2.4 The revised design then undergoes a further impact assessment and, on the basis of this, additional mitigation and enhancement measures (which are not incorporated into the design and/or relating to the construction and management of the proposed development) are identified. The ES will include an assessment of residual effects which are those likely to arise after the proposed mitigation and enhancement has been applied.

3.2.5 The site selection process and alternatives sites considered will be reported in the ES within the consideration of alternatives section. Evolution of the design of the proposed development will also be discussed as part of consideration of alternatives within the ES, and within individual technical chapters of the ES as appropriate.

3.2.6 To inform the proposed methodologies and assessment areas of the EIA, consultation with stakeholders will be undertaken throughout the EIA process. Consultation is a statutory requirement and will form part of the planning process.

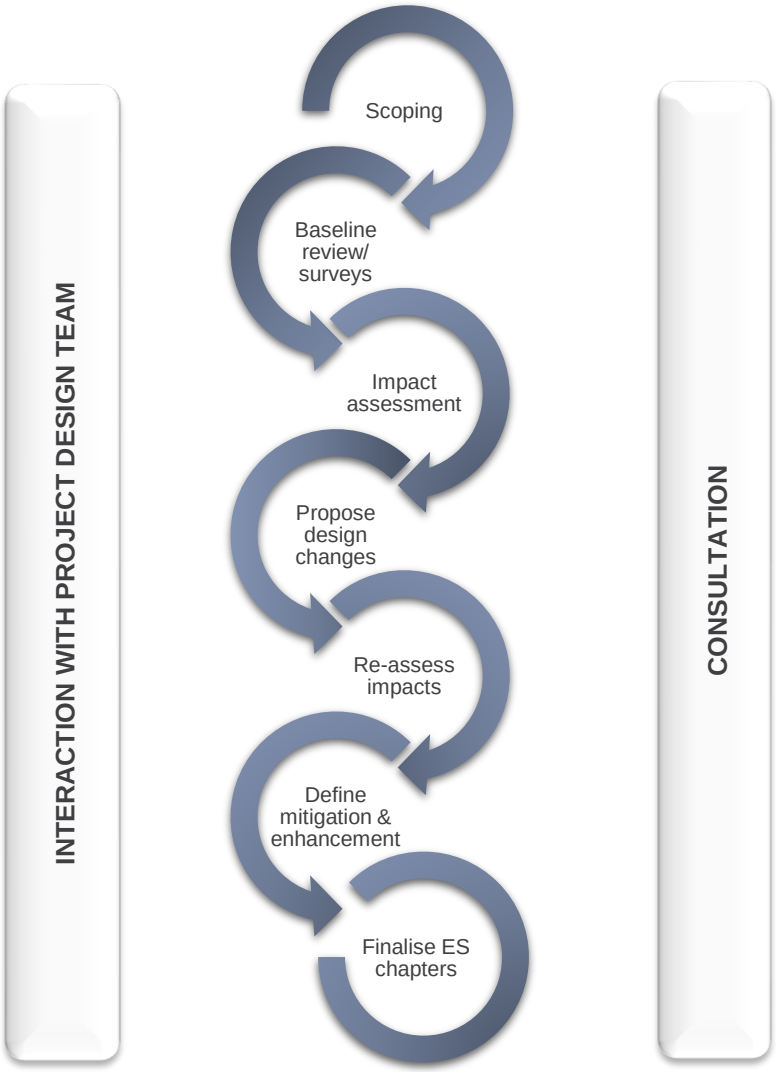
3.2.7 This EIA Scoping Report will be submitted to PCC and made available, by PCC, to statutory consultees for formal consultation. Comments received by PCC will be used to inform the Scoping Opinion and subsequent scope of the EIA.

3.2.8 Technical discipline chapters within this EIA Scoping Report will provide commentary on:

- Identified receptors and a description of current **baseline conditions**
- Assessment of the **sensitivity of the receptors** to change
- Assessment of the likely **potential impacts** associated with the proposed development

3.2.9 Chapters conclude with a paragraph stating whether the discipline will be considered further in the EIA. If scoped into the EIA, the methodology, cumulative effects, and climate change (resilience and adaptation) consideration will be set out.

Diagram 3.1 The EIA approach



Assessing a Detailed Planning Application

3.2.10 Should the Cawdor Barracks site be taken forward as the preferred site, planning permission would be sought via a detailed application. The EIA will assess the environmental effects associated with construction and operational phases individually. The Cawdor Barracks site boundary for the purpose of the EIA scoping is shown in Figure 1.1.

3.2.11 The parameters set out in Section 2.4 have informed the approach proposed by this Scoping Report. The detailed planning application drawings would form the basis for the EIA.

3.3 Sensitive Receptors

3.3.1 Sensitive receptors for each technical discipline are specified within the respective chapters of this scoping report. Receptors which are identified by multiple disciplines include:

- Existing site users;
- Future site users;
- Adjacent residents;
- Adjacent commercial occupants;
- Construction workers;
- Controlled waters (surface water and underlying aquifers);
- Ecological designations and receptors;
- Landscape designations and receptors;
- Soils; and
- Archaeology and Heritage assets.

Assessing the Significance of Effects in the EIA

3.3.2 This section sets out the significance criteria that have been applied by the technical disciplines in their assessment.

3.3.3 The EIA process is concerned with determining whether the likely impacts associated with the proposed development are deemed to have significant effects or not.

3.3.4 For some technical EIA disciplines, specific guidance exists, which details how the impact of a development should be assessed. In general, this involves an element of professional judgement with regard to the application of the guidance to the specific site under consideration.

3.3.5 These guidance documents are often accepted as best practice and therefore will be used where available and appropriate in the EIA, along with professional judgement. The specific methodology to be adopted will be described within the relevant technical chapters.

3.3.6 However, overall the main approach will be based on the technical approach that significance reflects the relationship between two factors:

- The value or sensitivity of the affected receptor; and
- The nature, magnitude or severity of the impact (i.e. the predicted change taking place to the environment).

3.3.7 The sensitivity, importance or value of the receptor is normally derived from:

- Its designated status within the land use planning system;
- The number of individual receptors, such as residents;
- An empirical assessment on the basis of characteristics, such as rarity or condition; and
- The ability of the receptor to absorb change.

3.3.8 In this report, 'impact' is used to describe the predicted magnitude or extent of environmental or social change as a result of the proposed development. The term 'effect' is used to describe the consequences of the impact in combination with the sensitivity of the affected receptor.

3.3.9 Therefore, 'effect' is based on a function of the two components: the magnitude of the impact x the sensitivity of the receptor. It is an important distinction that 'impact' is a constituent part of 'effect'.

3.3.10 The magnitude of an impact represents a level of certainty and the degree by which a particular receptor is compromised. Magnitude is often quantifiable in terms of, for example, the extent of land take, loss of biodiversity or predicted change in noise levels.

3.3.11 Thus, significant effects occur where valuable or sensitive receptors are subject to impacts of considerable magnitude. Effects are unlikely to be significant where low value or non-sensitive receptors are subject to minor impacts.

3.3.12 For all technical assessments where specific best practice guidance is not provided, the significance of the effects will be assessed using professional judgement based on the magnitude of the potential impact and the relative sensitivity of the identified receptors.

3.3.13 Table 3.1 sets out how impact magnitude and receptor sensitivity interact to provide the significance of the effect. This has been developed through professional experience on similar schemes as an example of the methodology used for the technical assessments. Where this differs for a particular topic, this is reported in the respective technical ES chapter. In general, effects are considered to be significant if they are 'moderate' or above. Where this differs for any particular topic, this is outlined in the respective technical chapter.

TABLE 3.1: EXAMPLE SIGNIFICANCE MATRIX –SIGNIFICANT EFFECTS HIGHLIGHTED BOLD

	Impact Magnitude			
Receptor Sensitivity/ Value	**Negligible**	**Minor**	**Moderate**	**Major**
Low	Negligible	Negligible	Negligible	Slight
Medium	Negligible	Negligible	Slight	**Moderate**
High	Negligible	Slight	**Moderate**	**Substantial**
Very High	Slight	**Moderate**	**Substantial**	**Substantial**

3.3.14 The EIA Regulations stipulate that an ES should, where possible, identify, describe and assess the likely significant effects of the proposed development on the environment, including the consideration of:

- Beneficial and adverse effects;
- Short, medium and long term effects;
- Direct and indirect effects;
- Permanent and temporary effects; and
- Cumulative effects and impact interactions.

3.3.15 The above considerations and terminology will be used when considering the significance of effects.

3.3.16 The assessment identifies and assesses the likely significant effects in relation to both the construction and operational phases of the proposed development. Environmental effects have been predicted with reference to definitive standards and legislation where available. Where it has not been possible to quantify effects, qualitative assessments have been carried out, based on available knowledge and professional judgement. Any associated limitations and uncertainties have been noted in the relevant assessment chapters.

Assessment of Cumulative Effects in EIA

3.3.17 Chapter 17 describes in detail the approach to cumulative assessment which will be taken within the ES for the proposed development.

3.3.18 The requirement to refer to the cumulative effects of a proposed development is included in Paragraph 5(e), Schedule 4 of the EIA Regulations. Paragraph 5 of Schedule 4 also requires an ES should include: 'The description of the likely significant effects on the factors specified in regulation 4(3) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term, and long-term, permanent and temporary, positive and negative effects of the development'.

3.3.19 In the absence of applicable existing guidance for Cumulative Effects Assessment, Advice Note Seventeen for Cumulative effects assessment relevant to nationally significant infrastructure projects (NSIP) (Planning, 2019) has been used. Although the proposed development is not considered to classify as an NSIP, Advice Note Seventeen will be followed as it provides a robust and defendable framework.

3.4 EIA Scoping

Purpose of Scoping in the EIA Process

3.4.1 The primary purpose of the scoping stage is to define the extent of the subsequent EIA, ensuring that only potentially significant environmental effects are carried forward to the assessment. This enables the EIA to be focused on the most important environmental issues pertinent to the study area.

3.4.2 The scoping stage determines the topics or areas of potential likely impacts to be addressed, and the geographical area and timeframe over which they will be considered.

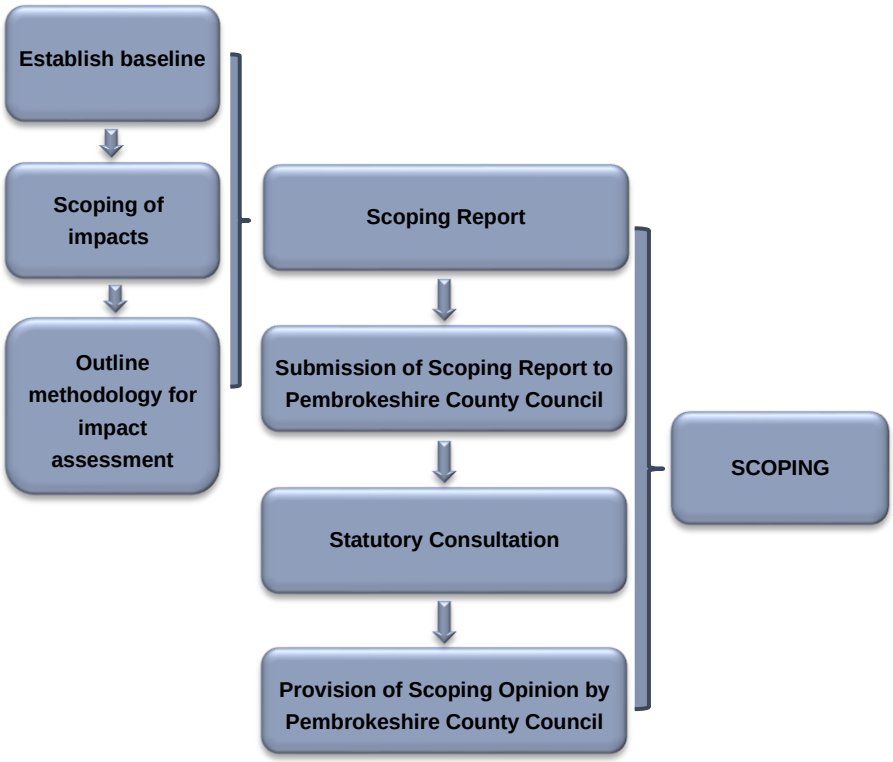
3.4.3 It also sets out the methods to be used by the EIA to determine the likely significant environmental effects, both temporary and permanent, that will arise during the project's construction and operation. The scoping process also enables certain potential impacts to be scoped out, as not being likely to give rise to significant environmental effects.

3.4.4 Part 4, Regulation 14 of the EIA Regulations provides the MOD with the opportunity to seek a Scoping Opinion from the relevant planning authority, to confirm the information to be contained within the ES. This report sets out the proposed scope of the ES, and will be submitted to PCC and consulted upon, so that PCC can provide a Scoping Opinion. Therefore, this Scoping Report will form the basis for on-going consultation on the EIA with statutory authorities and other relevant stakeholders. Its contents, having taken account of comments received during consultation, will be incorporated within the ES.

Scoping Methodology

3.4.5 The stages of EIA scoping are illustrated in Diagram 3.2 and the methodology for determining which impacts from the proposed development should be assessed in the EIA is described in subsequent sections.

Diagram 3.2: EIA Scoping Process



Establishing the Baseline

3.4.6 Initial baseline identification has been undertaken using desk-based searches of available information and surveys undertaken to date. A number of site walkovers have also been undertaken. Sensitive receptors are also identified through this activity.

Scoping of Effects

3.4.7 Within this Scoping Report, potential effects resulting from the proposed development have been identified on the basis of the following:

- Current understanding of the proposed development (including its operation and construction);
- Site surveys and walkovers;
- Review of readily available baseline information made available by DIO and MOD;
- A site specific Envirocheck report compiled in late 2022, and issued to Sweco on 14th December 2022;

- Reference to published guidance documents;
- Reference to existing surveys, assessments, and associated reports undertaken to date (made available by DIO and MOD); and
- Knowledge, expertise and previous experience of the project team.

3.4.8 A qualitative assessment of the potential effects has been undertaken to determine which of the effects could be potentially significant and therefore, should be taken forward and assessed in the subsequent EIA. The qualitative assessment has been undertaken in terms of the relationship between two factors:

- The magnitude of the potential impacts (direct or indirect), including the consideration of duration and reversibility; and
- The importance of the receptor (the entity that is vulnerable to the effects of the impact), in terms of its value and sensitivity to the impact.

3.4.9 A list of sensitive receptors on which potentially significant effects could occur, as a result of the magnitude of the impact and the sensitivity of the identified receptor, is also provided as appropriate.

3.4.10 Where items have been scoped out of the EIA, a justification for this is provided.

Methodology for Impact Assessment

3.4.11 A summary of the proposed methodology to be used for each technical discipline scoped into the report is outlined, in line with relevant guidance documents, within each individual chapter. The temporal, spatial and technical scope of the assessment is defined and reference to consultation made (as appropriate), where this is proposed or has already been undertaken.

3.5 Climate Change

3.5.1 The EIA regulations stipulate that the consideration of climate change is to be given within the EIA process. This includes assessment of the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change.

3.5.2 The UK Climate Projections provide regional climate projection information, within the Wales Administrative Region, in which the Cawdor Barracks site is located. The Wales region is predicted to experience changes in temperature, rainfall, and increase in frequency of extreme weather events as a consequence of climate change. These changes are predicted to occur under all emissions scenarios (i.e. low, medium and high levels of carbon emissions), which are incorporated into the climate change models used by the Inter-governmental Panel on Climate Change (IPCC). The general trend for the region is warmer, drier summers and milder, wetter winters.

3.5.3 Under the most conservative, highest impact emissions scenario (RCP8.5) for the 2080s (2080 to 2099), estimated changes in climatic conditions are as outlined in Table 3.2.

TABLE 3.2. UK CLIMATE PROJECTIONS FOR WALES REGION

Climate variables	Climate projections
Temperature	The average summer temperature is projected to increase by 5°C under the central estimate, which represents 'as likely as not' probability of change (50th percentile), and average winter temperature is estimated to increase by 4°C (50th percentile).
Rainfall	The average summer rainfall rate is projected to decrease by 30-40%, whereas the average winter rainfall rate is estimated to increase by 30-40% (in the 50th percentile or central estimate for both).
Wind	Climate projections for wind are more uncertain than those for temperature and precipitation, due to inherent difficulty in modelling future wind conditions. However, overall an increase in extreme weather including wind is projected (Committee on Climate Change, 2017).

Source: UKCP18 Climate Projections, Met Office

3.5.4 Responding to climate change has to be an integral and essential part of the development process. Therefore, the ES will consider the potential effects of the climate change projection, and where appropriate, demonstrate the design measures considered and incorporated for climate change resilience and adaptation.

3.5.5 The likely potential impact of the proposed development on Climate Change, and the vulnerability of the proposed development to the effects of Climate Change will be addressed in the ES Climate Chapter.

3.5.6 Furthermore, the MOD would commit to best practice measures during the demolition and construction stage to minimise potential climate change impacts. These measures would be set out within the CEMP and would be secured by means of a suitably worded planning condition.

3.6 Topics to be Assessed

3.6.1 The following technical disciplines are considered relevant to be addressed as part of this scoping exercise:

- Transport and Access
- Air Quality
- Noise and Vibration
- Biodiversity
- Landscape and Visual Impact
- Archaeology and Built Heritage
- Ground Conditions and Contaminated Land (including consideration of material assets and waste)
- Water Environment, Flood Risk and Drainage
- Health

- Socio-economics
- Climate
- Heat and Radiation
- Major Accidents and Disasters
- Cumulative Effects

3.7 EIA Topics Not Relevant to the Proposed Development

3.7.1 This section identifies the technical topics to be scoped out of the ES.

Radar and Telecommunications

3.7.2 The proposed development is anticipated to potentially interact with Radar and telecommunications (no earlier than January 2027) through the following:

1) Civil and Military Air traffic – assessment of potential impacts of the proposed radars on civil and military air traffic.

2) Interaction with local telecommunications – both civilian and military.

3.7.3 With regards to item 1 above, as part of the design and existing regulatory requirements outside the scope of the EIA regulations, a number of technical studies are being undertaken in conjunction with the UK Civil Aviation Authority (CAA) to assess the potential impacts on the above identified interactions. The MOD and the US Space Force design team are undertaking an assessment of potential impacts of the proposed development on civilian and military air traffic and an assessment of safety for military and civilian aircraft (following JSP 604, leaflet 3032). The design intent is to avoid impacts, thereby meaning that significant effects are unlikely.

3.7.4 In regards to item 2, local telecommunications, there is ongoing liaison between the MOD and the Office of Communications (Ofcom), who hold a central register of all civil radio communications operators in the UK and acts as a central point of contact for identifying specific consultees relevant to a site. A separate agreement with the CAA will be progressed to identify and mitigate any potential interactions with existing aviation telecommunications. Again, the design intent is to avoid impacts, thereby meaning that significant effects are unlikely.

3.7.5 On this basis, a detailed assessment of Radar and Telecommunications is not considered relevant for this EIA as it will be covered through other existing legislation and agreements, and will therefore be scoped out of the ES.

3.8 MOD Policies

3.8.1 The following MOD Policies are considered of potential relevance to the proposed development and will be given due regard as part of the design and assessment work:

- JSP 850 Infrastructure and Defence Estate Policy. This includes policy on:

- Biodiversity, Climate Resilience, Infrastructure Climate Resilience Delivery Plan, Climate Impact Risk Assessment Methodology, Electric Vehicle Charging Points,
- Environmental Management (JSP 418),
- Requirement for DREAM or CEEQUAL where relevant
- Health and Safety
- Historic Environment
- Innovation
- Net Zero -JSP 850 Part 2, BPS -0.1
- Sustainable procurement and social value- including Government Buying Standards
- Water management
- Whole Life approach

- HM Treasure Green Book
- MOD Net Zero Carbon Policy
- MOD Sustainable MOD Strategy Act & Evolve 2015-2025
- Sustainable MOD Strategy Waste Management 2015-2015
- Sustainability Appraisal Tools Handbook
- MOD Climate Change and Sustainability Strategic Approach
- JSP 315 Building Performance Standards BPS 0.1 Energy and Carbon

3.9 References

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4 Transport and Access

4.1 Introduction

4.1.1 This chapter of the Scoping Report identifies potential impacts with regard to transport and access that may occur during the construction and operation of the proposed development and outlines whether these will be addressed further in the Environmental Statement (ES).

4.1.2 The Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

4.2 Baseline

4.2.1 The Cawdor Barracks site is located within a rural area on St David's peninsula in Pembrokeshire, South Wales. The Cawdor Barracks site is situated approximately 1.2 km northeast of the coast and to the north of the A487 between Haverfordwest and St David's. As detailed in Chapter 2, the nearest settlements are the villages of Solva (4.5 km to the southwest) and Newgale (2 km to the south).

4.2.2 The primary vehicular access to the Cawdor Barracks site is via the main gate to Cawdor Barracks which is accessed from the unclassified road (U3017). The U3017 forms the minor arm of a ghost island priority junction with the A487 located to the south of the southern boundary of the Cawdor Barracks site .

4.2.3 Cawdor Barracks is home to 14 Signal Regiment, and it will remain in place until 2028.

4.2.4 During the construction phase, all construction traffic will be required to use a separate entrance to the primary vehicle access to minimise the impacts of construction heavy goods vehicles (HGVs) on current operations. Crash Gates, which provide direct access onto the airfield road network for emergency services vehicles, are provided on the perimeter of the Cawdor Barracks site. These provide connections to the 'C' classified road (C3010) which runs to the east. Potential access during construction would be via a temporary construction access formed on the C3010 in the vicinity of the southernmost Crash Gate, albeit that the Crash Gate route is currently overgrown or via use of the central Crash Gate. The locations of the potential construction accesses are shown in Figure 4.1. The construction access points are to be considered through the EIA process.

4.2.5 The study area for the assessment will be agreed with the PCC, as part of scoping discussions. In the absence of such discussions, it is proposed that the network of interest will comprise the following links and junctions, as shown in Figure 4.1:

- A487 (between U3017 and Haverfordwest);
- A487/C3010 junction;
- C3010 (Pen Y Cwm to Rhydygele);
- A487/U3017 junction; and
- U3017 (between its junction with A487 to and the Cawdor Barracks site).

A487

4.2.6 The A487 is a single carriageway road which varies in width but is typically 6 m wide along the section of interest. As it is generally rural in character, the speed limit is 60 mph for its length between St David's and Haverfordwest, with a reduction in the speed limit to 40 mph through Pen Y Cwm and Roch Gate and 30 mph through Newgale and Solva. There are no footways and no street lighting except along the sections through the villages.

4.2.7 The A487 to the east of the site has a constrained section where it is not possible for a car and a large vehicle to pass unhindered. This is located at Newgale where an informal shuttle working arrangement is in operation at a bridge crossing over Brandy Brook adjacent to the beach.

4.2.8 In recent years, the section of the A487 to the east at Newgale has become unpassable on several occasions due to tidal flooding. These flooding events have occurred in both winter and summer months and the Council expects this to become a more frequent and severe event with predicted rising sea levels in the future.

4.2.9 A preferred option for a new bypass road has been agreed and is currently being appraised. However, this scheme has been called in by the Welsh Government for a review against current policies. At the time of writing, it is understood that the outcome of this review is delayed. As such, there is some uncertainty as to the future delivery of the bypass scheme.

A487 / C3010 junction

4.2.10 The junction of the C3010 with the A487 is a simple priority junction. Immediately to the west of the junction there is an uncontrolled pedestrian crossing with central refuge on the A487. Beyond the crossing, on the eastbound side of the A487 there is a layby for the properties adjacent to the junction. On the westbound side of the A487 there is a bus stop layby. Immediately to the east of junction there is another priority controlled junction for Erw Lon unclassified road. There is tactile paving at each junction demarking the crossing point for pedestrians, however, there no raised footway between the junctions with only a solid white line demarking the footway from the carriageway. Bollards are present at the crossing points.

Unnamed Road (C3010)

4.2.11 The unnamed C3010 is a classified road which connects the A487 with unclassified rural roads to the north and east of the Cawdor Barracks site. It is a single carriageway road with a typical width of around 5.0 m as far as the proposed temporary construction access. Beyond this point the road generally continues with a width of around 5.0 m before narrowing to approximately 4.3 m at the point prior to where the road turns east away from the Cawdor Barracks site. Historically, it is understood that the C3010 was used as the access route for HGVs associated with a former quarry which was located approximately 1km to the north of Pen Y Cwm.

A487 / Unnamed Road (U3017) Junction

4.2.12 The primary vehicular access for the Cawdor Barracks site is from the unclassified road (U3017). The junction of the U3017 with the A487 is a typical ghost-island junction arrangement with the U3017 forming the minor arm.

4.2.13 The junction has approximately 3.2 m wide through lanes on the A487 and an approximately 3.5 m wide right turn lane that is around 40 m in length which enables up to six vehicles, (based on a length of 6 m per vehicle), to wait in the right turn lane without blocking the main A487 westbound lane. The unnamed road (U3017) has a flared junction mouth that will allow two vehicles (left and right turning) to wait at the give way line

Unnamed Road (U3017)

4.2.14 This unnamed road which connects the A487 to the primary vehicular access for the Cawdor Barracks site is a single carriageway road approximately 5.5 m wide. There is a narrow footway on the northern frontage throughout its length except for a short section prior to the junction with the A487. Street lighting is present for approximately 230 m starting from the security barrier at the site entrance.

4.2.15 The U3017 also provides a connection to another unnamed road (U3021) which leads around the western edge of the Cawdor Barracks site and provides access to the Park Hall Caravan Site and other properties located to the north.

4.3 Receptors

4.3.1 The key potential receptors that are sensitive to the potential impact of a traffic increase are identified as follows:

- People at home;
- People in work places;
- Sensitive groups such as children, elderly and disabled;
- Sensitive locations such as hospitals, churches, schools, historical buildings;
- People walking;
- People cycling;
- Open spaces, recreational sites, shopping areas;

- Sites of ecological/nature conservation value; and
- Sites of tourist/visitor attraction.

4.3.2 The above receptors are determined based on their interaction with the road network affected by the proposed development.

4.4 Scoping of Impacts

Construction Phase

4.4.1 It is anticipated that there will be an approximate 20-month construction programme commencing in October 2024.

4.4.2 The daily construction workforce will vary during the construction programme, but for the purpose of scoping it is anticipated to peak at circa 150 staff per day at the peak of construction.

4.4.3 It is anticipated that working hours for the Cawdor Barrack site will be in line with standard working hours in Wales namely 07:30 to 18:00 hours Monday to Friday and 07:30 to 13:00 hours on a Saturday. The working hours will be agreed with the local authority as the design progresses. Typically, however, contractor's staff could be expected to arrive prior to 07:30 hours to ensure that they are ready to commence work on time. Non-noisy activities undertaken prior to 07:30 hours could include safety briefings and preparation work for the day ahead.

4.4.4 At this stage, as the project is at the site selection and feasibility stage and the design is at the conceptual design stage, details on the construction process are not available. Construction activities would however potentially include excavation and export of material, soil remediation requirements, import of fill and granular material, import of concrete for foundations and the delivery of building materials.

4.4.5 Construction vehicle movements, namely daily HGVs and LGVs/cars, associated with the activities identified above and the movement of construction staff will be confirmed at a later stage. As with all MOD projects, a Construction Traffic Management Plan would be prepared prior to the construction phase along with a Green Travel Plan to avoid and minimise potential impacts arising during construction. However, in order to carry out the scoping process, estimates of construction traffic volumes are based on professional experience of similar projects and are provided below. These estimates will be updated as the design and construction information emerges.

4.4.6 It is assumed that all construction staff will travel to site daily at times outside of the network peak hours (i.e. arriving prior to 07:30 hours and departing after 18:00 hours, Monday to Friday). For the purpose of scoping, the peak construction staff volumes are assumed to be in the region of 50 staff vehicles arriving and departing during these times. All construction staff vehicles will park within the Cawdor Barracks site.

4.4.7 The daily civil and mechanical works traffic will vary over the construction period, however for the purposes of scoping, is anticipated to peak at circa 80 HGVs per day (40 arriving and 40 departing). Overall, this equates to in the region of four HGVs

arriving / four HGVs departing per hour throughout the working day on average. These figures provide a robust estimate of daily HGV traffic for scoping purposes.

4.4.8 It is also assumed, for the purposes of scoping, that there will be 20 LGVs arriving / 20 LGVs departing in total each working day. The equates to in the region of two LGVs arriving / two LGVs departing per hour throughout the working day on average.

4.4.9 No abnormal loads are expected as all equipment will be delivered on standard articulated HGVs in containers.

Operational Phase

4.4.10 Hours of operation and shift arrangements have not been determined at this stage. In order to carry out the scoping exercise based on a worst case scenario, it is assumed that the proposed development would operate 24 hours a day, seven days a week with a total of around 60 personnel. This information will be kept under review as the project progresses.

4.4.11 In addition to the personnel vehicle movements, it is assumed that there will be typically five HGVs and five LGVs, respectively, arriving and departing the site per day for general deliveries, fuel, waste collections, etc.

4.4.12 As indicated, Cawdor Barracks is home to 14 Signal Regiment, which comprises circa 400 personnel, and it will remain in place until 2028. As a result, the future operational traffic movements associated with Cawdor Barracks site are anticipated to be significantly lower than current levels.

4.4.13 As the future operational traffic levels are anticipated to be modest, the resulting traffic effects are not likely to be significant. Therefore, it is proposed that the operational phase is scoped out of further assessment.

Summary

4.4.14 Table 4.1 and Table 4.2 present a summary of the proposed scope of assessment. They identify which likely environmental effects, with respect to transport and access will be assessed in the EIA (i.e. considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e. scoped out). Professional judgement has been used to decide what is to be scoped in/scoped out of the assessment.

TABLE 4.1: POTENTIAL TRANSPORT AND ACCESS IMPACTS - CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Disruption to local traffic patterns	Yes	Implementation of traffic management arrangements to facilitate the formation of the temporary construction access junction which could increase driver delays on roads local to the Cawdor Barracks site.
Construction traffic	Yes	There may be noticeable traffic increases on roads local to the Cawdor Barracks site associated with the construction activities, which could result in short term increases in driver delay and potentially pedestrian severance.

TABLE 4.2: POTENTIAL TRAFFIC AND ACCESS IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Operational traffic	No	The traffic levels associated with the proposed development are anticipated to be modest and significantly lower than current traffic levels once 14 Signals Regiment leave the Cawdor Barracks site in 2028. An assessment of the operational impacts will therefore be scoped out.

4.5 Methodology for Impact Assessment

Scope

4.5.1 The scope of this assessment is to illustrate the routes to be used by traffic generated by all phases of the development, estimate traffic volumes, and provide an assessment of the resulting environmental impacts. It is anticipated that the most significant vehicle movements associated with the proposed development will occur during the construction phase.

4.5.2 Many construction traffic movements will occur outside of the traditional peak hours for background traffic reflecting the start and finish times for workers on site and the day to day construction operations. As such, it is unlikely that the addition of construction traffic will have a detrimental effect on the operation of the junctions or the highways serving the Cawdor Barracks site. Notwithstanding this, the assessment will examine the environmental impacts of construction generated traffic.

Guidance

4.5.3 The environmental impacts of the development generated traffic will be assessed with reference to the 'Guidelines for the Environmental Assessment of Road Traffic' (EART) (Institute of Environmental Assessment, 1992), which is recognised as the benchmark guidance for developments of this nature. The methodology for the assessment is also aligned to Design Manual for Roads and Bridges' (National Highways, Welsh Government, 2020) LA 104 methodology for environmental assessment in respect of sensitivity of receptors, magnitude of impact and the assessment of significance. In addition, professional judgement is applied where necessary.

4.5.4 Reference will be made to other guidance given in the DMRB and the 'Manual for Streets' (Department for Transport, HMSO, 2007), as required.

4.5.5 Potential impacts relating to noise and vibration, visual impact and air pollution generated by traffic from construction of the proposed development will be considered in their respective chapters of the ES.

Consultation

4.5.6 The assessment will consider the potential impacts on a highway network of interest defined during the scoping discussions to be held with PCC. The consultation will cover the highway network of interest, access strategy, the future year flow scenarios to be considered, consented and committed developments and trip distribution

methodology and cumulative impact assessment in respect of the any other developments in the local vicinity as agreed with PCC.

4.5.7 Once operational, the proposed development will be accessed via the current primary vehicular access off the U3017. The proposed access strategy and the form of the temporary construction access junction with the C3010 will be the subject of discussion and agreement with the Local Highway Authority, Pembrokeshire County Council (PCC). Any requirement for a standalone Transport Assessment (TA) to assess the wider traffic impact of the proposals will also be agreed with PCC during these scoping discussions.

4.5.8 The assessment will consider the need for mitigation works and routeing options during the construction phase to be agreed with PCC.

Approach to Assessment

4.5.9 As indicated, the environmental impacts of the development generated traffic will be assessed with reference to EART and using professional judgement, as appropriate. The data underpinning the assessment will be obtained from new traffic surveys as set out below.

4.5.10 There is limited baseline traffic data available for the surrounding highway network, as such, it is envisaged that turning count surveys covering the predicted construction staff arrival and departure times will be undertaken at the A487/C3010 junction. Furthermore, a series of ATC surveys on the C3010 and A487 between the proposed construction access and Haverfordwest are proposed to establish baseline traffic flows on the main construction route. A survey will also be undertaken at the primary site access to understand the current level of traffic using the site.

4.5.11 In addition, several site-specific baseline studies will be undertaken to inform the assessment, including:

- Site visits to identify the key characteristics of the highway network of interest;
- Details of public transport services;
- Details of existing pedestrian, cycle and equestrian routes;
- Personal Injury Accident statistics for the highway network immediately adjacent to the Cawdor Barracks site.

4.5.12 The construction assessment year and the respective flow scenario will be agreed with PCC as part of the scoping discussions. The assessment will take account of any agreed traffic flows for consented and committed developments in the vicinity of the Cawdor Barracks site as agreed with PCC.

Screening Assessment

4.5.13 The EART guidance recommends two rules to be considered when determining whether the impact of traffic should be assessed on a road link:

- Rule 1: Include highway links where traffic flows will increase by more than 30% (or the number of heavy goods vehicles will increase by more than 30%); and
- Rule 2: Include any other specifically sensitive areas where total traffic flows have increased by 10% or more.

4.5.14 The 30% threshold is based upon research and experience of the environmental effects of traffic, with less than a 30% increase generally resulting in imperceptible changes in the environmental effects of traffic. The guidance considers that projected changes in total traffic flow of less than 10% creates no discernible environmental effect.

4.5.15 Where the thresholds are exceeded, issues including severance, driver delay, pedestrian amenity, fear and intimidation, accidents and road safety will be assessed for their magnitude of change.

Consideration of Receptors and Sensitivity

4.5.16 The determination of the sensitivity of receptors to environmental effects will be based on best practice and DMRB guidance. In terms of transport impacts, receptors comprise people living, using facilities and transport networks in the area. Where appropriate, sensitivity to changes in transport conditions considers vulnerable user groups, which includes school children and the elderly. Table 4.3 summaries the general criteria for identifying receptor sensitivity by relating the presence of vulnerable groups to identifiable physical features within the environment.

TABLE 4.3: SENSITIVITY OF RECEPTORS

Sensitivity	Definition
Very High	Those receptors with high sensitivity with site-specific reasons for being particularly sensitive to changes in traffic flows (e.g. community with high incidence of mobility impairment requiring to cross roads to access essential facilities).
High	Receptors of greatest sensitivity to traffic flows (e.g. schools, colleges, playgrounds, accident black spots (with reference to accident data), retirement homes, urban/residential roads without footways that are used by pedestrians, etc)
Medium	Traffic flow sensitive receptors (e.g. congested junctions, doctors' surgeries, hospitals, shopping areas with roadside frontage, roads with narrow footways, unsegregated cycleways, community centres, parks, recreational facilities, etc)
Low	Receptors with some sensitivity to traffic flow (e.g. places of worship, public open space, nature conservation areas, listed buildings, tourist attractions and residential areas with adequate footway provision, etc)
Negligible	Receptors with low sensitivity to traffic flows and those sufficiently distant from affected roads and junctions.

Magnitude of Impact

4.5.17 Magnitude is defined in general terms in guidance contained in LA 104 of DMRB (National Highways, Welsh Government, 2020) and is summarised in the context of transport in Table 4.4.

TABLE 4.4: MAGNITUDE OF IMPACT

Magnitude of Impact	Description
Major	Substantial or total loss of capability for movement along or across transport corridors, loss of access to key facilities and loss of highway safety. Severe delays to travellers (Adverse).
	Large scale improvement in the capability for movement along and across transport corridors, major improvement in access to key facilities, in highway safety and in delays to travellers (Beneficial).
Moderate	Moderate loss of capability for movement along or across transport corridors, loss of access to key facilities and loss of highway safety. Severe delays to travellers (Adverse).
	Moderate improvement in the capability for movement along and across transport corridors, major improvement in access to key facilities, in highway safety and in delays to travellers (Beneficial).
Minor	Some measurable loss of capability for movement along and across transport corridors, some measurable loss of access to key facilities and some measurable loss of highway safety. Some measurable increases in delays to travellers (Adverse).
	Some measurable increase in the capability for movement along and across transport corridors, some measurable increase in access to key facilities and some measurable increase in highway safety. Some measurable increase in delays to travellers (Beneficial).
Negligible	Very minor loss of capability for movement along and across transport corridors, very minor loss of access to key facilities and very minor loss of highway safety. Very minor increase in delays to travellers (Adverse).
	Very minor increase in the capability for movement along and across transport corridors, very minor increase in access to key facilities and very minor increase in highway safety. Some measurable increase in delays to travellers. Very minor decreases in delays to travellers (Beneficial).
No change	No loss of capability for movement along and across transport corridors, no change of access to key facilities.

4.5.18 With particular relevance to severance for high trafficked roads the above categories of magnitude of impact can be defined by the percentage change ranges set out in Table 4.5. Table 4.5 is based on EART guidance.

TABLE 4.5: MAGNITUDE OF IMPACT ON SEVERANCE

Change in Traffic Flow	Magnitude (Adverse or Beneficial)
Change in total traffic or HGVs flows over 90%	Major
Change in total traffic or HGVs flows 60 - 90%	Moderate
Change in total traffic or HGVs flows 30 - 60%	Minor
Change in total traffic or HGVs flows of less than 30%	Negligible

Assessment of Significance

4.5.19 Transport environmental effects will also be assessed in terms of their duration, their frequency and in terms of their reversibility. These will be considered in identifying the significance of the transport environmental effects of the proposed development.

4.5.20 The significance of effects will be evaluated, taking into consideration the likely changes to baseline conditions. The significance levels will also be informed by the sensitivity and magnitude of effects and the significance matrix set out in Table 4.6.

TABLE 4.6: SIGNIFICANCE MATRIX

		Magnitude of Impact				
		No change	**Negligible**	**Minor**	**Moderate**	**Major**
Sensitivity	**Very High**	Neutral	Slight	Moderate or large	Large or very large	Very large
	High	Neutral	Slight	Slight or moderate	Moderate or high	Large or very large
	Medium	Neutral	Neutral or slight	Slight	Moderate	Moderate or large
	Low	Neutral	Neutral or slight	Neutral or slight	Slight	Slight or moderate
	Negligible	Neutral	Neutral	Neutral or slight	Neutral or slight	Slight

4.5.21 For the purpose of the assessment, those effects identified as being of 'moderate' or greater significance will be regarded as being significant. Effects of 'slight' or lesser significance will be identified but are not considered significant. Effects will either be adverse or beneficial.

4.6 Climate Change Adaptation and Resilience

4.6.1 The changes in climate that are predicted in the region are not anticipated to significantly affect the operation of transport in respect of the existing situation at the Cawdor Barracks site, or that associated with the proposed development.

4.6.2 It is acknowledged vehicle emissions are a key contributor to climate change, however this will be considered in more detail in Air Quality assessment discussed in Chapter 5 of this report.

4.6.3 Climate change is unlikely to have a material impact on the significance of effects.

4.7 References

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5 Air Quality

5.1 Introduction

5.1.1 This chapter of the Scoping Report identifies potential air quality impacts that may occur during the construction and operation phases of the proposed development and outlines whether these will be addressed further in the ES.

5.1.2 The other technical chapters in this Scoping Report provide an outline of the relevant legislation and guidance within the methodology sections following on from the scoping section, however for Air Quality this is reported upfront in Section 5.2 as it sets the appropriate context for the succeeding Air Quality baseline information. Section 5.2 introduces the air quality objectives, air quality management areas and local air quality management information.

5.1.3 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

5.2 Relevant Legislation and Guidance

Legislative Framework

5.2.1 The European Directive on Ambient Air Quality (2008/50/EC) (European Union, 2008) sets legally binding limits for ambient concentrations of air pollutants that impact public health such as particulate matter (PM10 and PM2.5) and nitrogen dioxide (NO2). The Directive and associate pollutant limit values were transposed into UK law under the Air Quality Standards Regulations 2010 (Environmental Protection Wales, 2010) and, following the UK's exit from the EU, The Environment (Legislative Functions from Directives) (EU Exit) Regulations 2019 (The Secretary of State, 2019).

5.2.2 The UK's Air Quality Strategy, published in July 2007 (DEFRA, 2007), established the framework for air quality improvements across the UK. The Strategy sets standards for key air pollutants that reflect levels of pollution thought to avoid or minimise risks to health or ecosystems. The associated air quality objectives are policy targets, expressed as maximum permissible outdoor concentrations of pollutants that take account of economic efficiency, practicability, technical feasibility and timescales.

5.2.3 The national air quality objectives for the aforementioned key pollutants considered in this assessment are enacted by the Air Quality Regulations (Wales) 2000 (Environmental Protection Wales, 2000), as amended in 2002, and are given in Table 5.1. The national objectives are numerically identical to the European limit values,

enacted through the Air Quality Standards Regulations 2010, with the exception of $PM_{2.5}$. For $PM_{2.5}$, the limit value was amended (tightened) in 2020 by the Environment (Miscellaneous Amendments) (EU Exit) Regulations 2020 (DEFRA, 2020).

5.2.4 Following the departure of the UK from the EU, the Environment Act 2021 (Office for Environmental Protection, 2021) makes provision about targets, plans, and policies for improving the natural environment, including air quality. The Act gives the Secretary of State power to set long-term, legally binding air quality targets of at least 15 years in duration. Long-term targets will be set by regulations subject to the affirmative procedure (requiring a binding vote in both Houses of Parliament). The first review will be published in 2023.

5.2.5 Under the *Environment Act 2021 (*Office for Environmental Protection, 2021) the environment secretary will be required to review the UK Air Quality Strategy at least every five years, and to publish an annual progress report to parliament.

5.2.6 Under Part IV of the *Environment Act 1995* (as amended) *(*UK Parliament, 1995), local authorities must review and document local air quality within their area by way of staged appraisals and respond accordingly, with the aim of meeting the air quality objectives defined in the Air Quality Regulations. This is referred to as the Local Air Quality Management (LAQM) regime. The LAQM regime requires that local authorities that identify exceedances of any air quality objective(s) within their geographical area must designate an Air Quality Management Area(s) (AQMA) and produce an Air Quality Action Plan (AQAP) setting out measures they intend to take to work towards the objectives.

TABLE 5.1: AIR QUALITY OBJECTIVES

Pollutant	Air Quality Objectives (µg/m^3)	Meausured as	Set for protection of:
Nitrogen Dioxide (NO_2)	40	Annual mean	Human health
	200	One hour mean, not to be exceeded more than 18 times per year (equivalent to the 99.79th percentile of hourly means)	
Particulate Matter (PM_{10})	40	Annual mean	
	50	24 hour mean, not to be exceeded more than 35 times a year	
Particulate Matter ($PM_{2.5}$)	20	Annual mean	
Oxides of Nitrogen (NO_x)	30	Annual mean	Ecosystems

National and Local Planning Policy

Planning Policy Wales (PPW) 2021

5.2.7 PPW (Welsh Government, 2021) is the revised National Planning Policy for Wales which is a vital tool in ensuring sustainable development. The primary objective of PPW is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales.

5.2.8 A well functioning planning system is fundamental for sustainable development and achieving sustainable places.

5.2.9 PPW recognises the impacts of air quality on people and ecosystems. The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air pollution alongside action to tackle high pollution hotspots. In doing so, it should consider the long-term effects of current and predicted levels of air pollution on people and the environment.

Welsh Technical Advice Notes

5.2.10 Planning Policy Wales (PPW) (Welsh government, 2021) sets out the land use planning policies of the Welsh Government. It is supplemented by a series of Technical Advice Notes (TANs). The following TANs are relevant to air quality:

- TAN5- Nature Conservation (Welsh government, 2009)
- TAN6- Sustainable Rural Communities (Welsh government, 2010)
- TAN18-Transport (Welsh government, 2007)

5.2.11 The TANs recognise the importance in considering air quality in the planning process.

Pembrokeshire County Council – Local Development Plan

5.2.12 The Local Development Plan (LDP) for Pembrokeshire was published in 2013 (PCC, 2013) and will be replaced by LDP2, when published.

5.2.13 The LDP provides a framework of decisions to be made on how land is used and developed. The Plan seeks to develop a network of strong urban and rural communities, with the distribution of new development reasonably balanced between urban and rural areas and directed to settlements in accordance with existing and anticipated infrastructure provision and levels of service provision.

Clean Air Strategy 2019

5.2.14 The UK's Clean Air Strategy 2019 (DEFRA, 2019) shows how we will tackle all sources of air pollution, making our air healthier to breathe, protecting nature and boosting the economy.

5.2.15 This document builds on an extensive consultation process which indicated broad-based support for many of the actions Defra are proposing. There was also a range of constructive feedback and challenge that has enabled Defra to improve and extend its ambition even further in certain key areas. A document summarising the responses to the consultation is published alongside the strategy.

5.2.16 The final strategy sets out these proposals in detail and indicates how devolved administrations intend to make their share of emissions reductions.

Guidance

Local Air Management Review and Assessment Technical Guidance (2022)

5.2.17 The Department for Environment, Food and Rural Affairs (Defra) has published technical guidance for use by local authorities in their review and assessment work. This guidance, referred to in this document as LAQM.TG22 (DEFRA, 2022), has been used where appropriate in the assessment presented herein.

Land-use Planning and Development Control: Planning for Air Quality (2017)

5.2.18 This guidance published by Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) (EPUK & IAQM, 2017) offers comprehensive advice on: when an air quality assessment may be required; what should be included in an assessment; how to determine the significance of any air quality impacts associated with a development; and the possible mitigation measures that may be implemented to minimise these impacts.

5.2.19 Specifically, for this assessment, the significance criteria contained within the EPUK and IAQM guidance will be applied to the local air quality impact assessment.

Guidance on the Assessment of Dust from Demolition and Construction (2016)

5.2.20 Guidance on the Assessment of Dust from Demolition and Construction published by the IAQM (IAQM, 2016) was produced to provide guidance to developers, consultants and environmental health officers on how to assess the impacts arising from construction activities. The emphasis of the methodology is on classifying sites according to the risk of impacts (in terms of dust nuisance, PM_{10} impacts on public exposure and impact upon sensitive ecological receptors) and to identify mitigation measures appropriate to the level of risk identified.

A Guide to the Assessment of Air Quality Impacts on Designated Nature Conservation Sites 2020

5.2.21 Environmental Protection UK (EPUK) and the Institute of Air Quality Management (IAQM) have published guidance to assist in the assessment of air quality impacts on designated nature sites. The guidance provides assessment criteria and deposition values to assess impacts on designated sites.

5.3 Baseline

5.3.1 Three sources of information have been used to provide an overview of baseline air quality across Cawdor Barracks site and surrounding area:

- Pollutant background maps for the key assessment pollutants, provided by the Defra background maps, with data provided at a 1km x 1km grid resolution;
- The most recent LAQM reports and associated air quality monitoring data published by PCC; and

- Ambient air quality monitoring data published by Defra as part of the national Automatic Urban and Rural Network (AURN) for air quality monitoring.

Local Air Quality

5.3.2 As discussed in more detail in Chapter 2, the immediate area surrounding the Cawdor Barracks site is predominantly characterised by agricultural farmland, with the Pembrokeshire coastline and Newgale Beach to the south. Some small, isolated villages are situated sporadically in the surrounding area including Penycwm and Newgale to the south; Llandeloy to the north and Trefgarn Owen to the east.

5.3.3 There are currently two AQMAs declared within PCC, both of which were declared in 2012 due to exceedances of the NO_2 annual mean air quality objective (40 µg/m^3):

- AQMA no. 1 encompasses several roads and adjacent properties within the centre of Haverfordwest and is located approximately 13 km to the southeast of the Cawdor Barracks site; and
- AQMA no. 2 encompasses parts of Westgate Hill and Main Street in the centre of Pembroke and is located approximately 25 km to the southeast of the Cawdor Barracks site.

Air Quality Monitoring

Automatic Monitoring

5.3.4 There is one Defra AURN automatic air quality monitoring site located in Pembrokeshire, located at Narberth, some 30 km to the southeast of the Cawdor Barracks site. The annual mean NO_2, PM_{10}, and $PM_{2.5}$ concentrations measured at Narberth between 2015 and 2019, which represents a rural location, are presented in Table 5.2.

TABLE 5.2: NARBERTH ANNUAL MEAN CONCENTRATIONS (µG/M^3)

Site	Site Type	Pollutant	NO_2 Annual Mean Concentration (µg/m^3)				
			2015	**2016**	**2017**	**2018**	**2019**
Narberth	Rural	NO_2	3	3	3	4	4
		PM_{10}	12	12	11	12	11
		$PM_{2.5}$	-	-	-	6	7

5.3.5 Monitored concentrations at the Narberth AURN site are well below the respective air quality objectives. Given that the Cawdor Barracks site is situated within a rural area and with similar surrounding land uses to those at Narbeth, with no significant sources of emissions to air in proximity, concentrations recorded at Narbeth are considered to be representative of ambient air quality conditions at the Cawdor Barracks site.

Diffusion Tube Monitoring

5.3.6 PCC measures NO_2 concentrations using passive diffusion tube monitoring at 48 roadside locations. The most recent Annual Progress Report (APR) published by the PCC in 2020 indicated that the measured annual mean concentrations across all sites were below the objective (40 µg/m^3) for the most recent year of published data (2019). It is noted that any data relating to years 2020 and 2021 are not likely to be representative of ambient concentrations due to national travel restrictions imposed during the Covid-19 pandemic.

5.3.7 The nearest diffusion tube monitoring sites to the Cawdor Barracks site are located approximately 13 km to the southeast within Haverfordwest. These diffusion tube sites represent urban roadside concentrations and are not representative of ambient conditions at or near to the Cawdor Barracks site. Notwithstanding, the 2019 measured NO_2 concentrations in Haverfordwest ranged from 12.2 µg/m^3 to 38.8 µg/m^3, all below the annual mean objective.

Background Pollutant Concentrations

5.3.8 The Defra background maps were used to assess the current background concentrations of NO_2, PM_{10} and $PM_{2.5}$ within and near to the Cawdor Barracks site. This resource provides estimated annual mean background concentrations at a resolution of 1x1 km across the country.

5.3.9 The background concentrations reported for the grid square encompassing the the Cawdor Barracks site for the current year (2023) and future opening year (2026) are summarised in Table 5.3. These data demonstrate that annual mean concentrations for the key pollutants are within the respective national air quality objectives (as per Table 5.1) for the current year and opening year.

TABLE 5.3: ANNUAL MEAN POLLUTANT DEFRA BACKGROUND CONCENTRATIONS (UNITS: µG/M^3)

Grid Square (km)	Year	NO_x	NO_2	PM_{10}	$PM_{2.5}$
184500, 224500	2023	4.0	3.3	10.2	5.9
	2026	**3.7**	**3.0**	**10.0**	**5.7**

5.3.10 The background concentrations outlined in Table 5.3 confirm that the monitored background concentrations at Narberth AURN are representative of ambient conditions at and near to the Cawdor Barracks site.

5.4 Receptors

5.4.1 Details of the type and number of receptors to be included in the air quality assessment cannot be determined in the absence of information relating to the construction programme, construction traffic data, operational phase traffic data, and details of the proposed back-up generators, given that these are required to define the study area for the assessment.

5.4.2 With respect to identifying sensitive receptors in relation to construction phase air quality impacts, the IAQM construction dust guidance states that focus should be on the following sensitive locations:

- 'human receptors' within 350m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s); and/or,
- 'ecological receptors' within 50m of the site boundary, or within 50m of the route(s) used by construction vehicles on the public highway, up to 500m from the site entrance(s).

5.4.3 It is within these distances that the impacts of dust soiling and increased particulate matter in the ambient air will have the greatest impact on local air quality at sensitive receptors.

5.4.4 In terms of sensitive receptors in relation to operation phase air quality impacts, Defra's LAQM.TG22 requires the assessment to consider places where members of the public are likely to be regularly present over the period of time prescribed in the Air Quality Strategy. For instance, on a footpath where exposure will be transient (for the duration of passage along that path) comparison with a short-term standard (i.e. 1-hour mean) may be relevant. At a school or adjacent to a private dwelling, where exposure may be for longer periods, comparison with a long-term standard (such as 24-hour mean or annual mean) will be more appropriate. Box 1.1 of LAQM.TG22 provides examples of the locations where the air quality objectives should/should not apply.

5.4.5 In the absence of the relevant information to enable the study area for the construction and operation phases to be defined, but with reference to the above guidelines, potentially sensitive receptors to changes in local air quality associated with dust emissions, vehicle emissions, and emissions from plant (e.g. back-up generators), identified in proximity to the Cawdor Barracks site, are likely to include:

- Sensitive habitats within national and internationally designated sites (ecological receptors), namely;
  - St. David's Peninsula Coast SSSI
  - St David's / Ty Ddewi SAC
  - Ramsey and St David's Peninsula Coast SPA
- Existing residential properties adjacent to the A487 and nearby local roads to the Cawdor Barracks site;
- Existing residential properties within the Cawdor Barracks site;
- Existing education facilities (e.g. schools, nurseries), such as Marlowe St David's Education Unit located adjacent to the Cawdor Barracks site; and

- Proposed, or approximate, locations of planned residential developments or other sensitive land uses.

5.4.6 As the proposed development details become available for the construction and operation phases, the extent of the study area and associated type and number of sensitive receptors will be confirmed, as applicable, with reference to the IAQM construction dust guidance (IAQM, 2016) and EPUK/IAQM planning for air quality guidance (EPUK & IAQM, 2017), respectively.

5.5 Scoping of Impacts

5.5.1 The potential air quality impacts associated with both the construction and operation phases of the proposed development have been identified to determine which impacts have the potential to result to likely significant environmental effects and will require further assessment (i.e. scoped in to the EIA) and those which do not have the potential to result in likely significant effects and will not require further assessment (i.e. scoped out).

5.5.2 Summaries of the scoping exercise for each phase are presented in Table 5.4 and Table 5.5 , respectively.

TABLE 5.4: POTENTIAL AIR QUALITY IMPACTS – CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Dust from demolition, earthworks, construction and trackout activities impacting sensitive receptors (human and ecological)	Yes	Demolition, earthworks, construction and trackout activities can impact local air quality and ambient levels of PM_{10}, deposit onto buildings/infrastructure causing a potential dust soiling nuisance, and deposit onto sensitive ecological receptors. The impact from construction activities will be assessed qualitatively with reference to the IAQM guidance (IAQM, 2016).
Emissions associated with construction phase traffic movements and construction plant affecting local air quality at identified receptors (human and ecological)	No (provisional, subject to outcomes of construction traffic screening exercise)	At present, detailed construction traffic volume and movements are not known. However, as an annual average, it is unlikely that more than 100 Heavy Duty Vehicles will be generated on a daily basis and, taking into account baseline air quality, there is no realistic potential for significant effects from vehicles. Similarly, given the short-term, transient nature of construction activities and taking into account baseline conditions, there is no realistic potential for significant effects from construction plant emissions. Appropriate control measures will be included within the Construction Environmental Management Plan (CEMP) or similar, but formal

Potential Impact	To be assessed in EIA	Reason
		assessment of impacts is not warranted. As such, the assessment of local air quality impacts from construction vehicles and plant emissions is provisionally scoped out. Notwithstanding, changes in traffic flows on the local roads during the construction phase will be screened against IAQM/EPUK screening criteria (see Table 5.6), once data are available, to confirm the above. If the screening criteria are exceeded, then further assessment may be required, and the methodology will be agreed with PCC.

TABLE 5.5: POTENTIAL AIR QUALITY IMPACTS – OPERATIONAL

Potential Impact	To be assessed in EIA	Reason
Changes in vehicle emissions associated with operational phase traffic movements affecting local air quality at identified receptors (human and ecological)	No	Changes in traffic flows on the local roads during the operational phase have been screened against IAQM/EPUK screening criteria (see Table 5.6). As the screening criteria are not exceeded, then further assessment of road traffic emissions is not required.
Change in pollutant concentrations resulting from emissions associated with proposed back-up diesel generators, affecting local air quality at identified receptors (human and ecological)	Yes	The level of assessment and assessment methodology will be determined when design and operation data relating to the back-up generators have been provided. The proposed assessment methodology will be discussed and agreed with PCC.

5.5.3 In summary, there is the potential for significant effects to occur at sensitive receptors from the construction and operational phase of the proposed development. As such, Air Quality will be scoped into the ES and the air quality impacts identified in the above tables will be considered further as part of the ES.

5.6 Methodology for Impact Assessment

Consultation

5.6.1 At the time of writing no consultation has been undertaken with PCC. However, this will take place prior to commencing the air quality assessment so that the proposed approach can be agreed.

Construction Phase

5.6.2 The potential impact of construction activities on local air quality and potential dust soiling nuisance will be assessed qualitatively using the IAQM Construction Dust Guidance. This assessment will characterise the likely risk and severity of potential dust impacts occurring during the construction phase at nearby sensitive locations within 350m of the site boundary and within 50m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

5.6.3 Based on the outcome of the risk assessment, appropriate and practicable dust control measures will be recommended to manage dust and other pollutant emissions during construction, with the aim of eliminating the risk of significant adverse impacts. A dust risk assessment will be undertaken in accordance with the IAQM guidance and reported within the air quality chapter of the ES for the proposed development.

5.6.4 At the time of writing this Scoping Report, details relating to construction traffic movements on the local road network and the number and type of stationary plant were not available. Screening of the construction traffic will be undertaken with reference to the EPUK/IAQM screening criteria, outlined in Table 5.6 below, to confirm that further assessment of the changes in vehicle emissions during the construction phase can be scoped out or whether further assessment is needed.

5.6.5 Given the location of the Cawdor Barracks site, the nature of the proposed development, and baseline air quality review, it is considered likely that the screening criteria will not be exceeded, thus further assessment of construction vehicle emissions is provisionally scoped out. In addition, within the context of baseline air quality conditions and the short-term, transient nature of construction activities, there is no realistic potential for significant effects from construction plant emissions on local air quality.

Operational Phase

Pollutants assessed

5.6.6 The air quality assessment will, in principle, focus on pollutants NO_2, PM_{10} and $PM_{2.5}$. Based on our current understanding of the proposed development and the above baseline review of local air quality, there will be no requirement to consider any other pollutants included within the UK Air Quality Strategy.

5.6.7 The spatial extent of the operation phase study area for the air quality assessment cannot be determined in the absence of relevant information relating to operational road traffic movements, including the affected road network, and/or details of the back-up generator plant proposed within the development.

Assessment of Road Traffic

5.6.8 The changes in road traffic movements associated with the proposed development operation have been reviewed with reference to the EPUK/IAQM planning guidance.

5.6.9 The EPUK/IAQM screening criteria considers the annual average daily traffic (AADT) change in light duty and heavy duty vehicles, as outlined in Table 5.6 below.

5.6.10 In line with the preliminary transport movement assumptions outlined in the Transport and Access chapter (Chapter 4) of this scoping report, the following operational transport movements are anticipated. These numbers are indicative, based on previous experience on other schemes of similar scale and therefore, subject to change as the design progresses, however considered robust for the purposes of scoping:

- the proposed development would operate 24 hours a day, seven days a week with a total of around 60 personnel;
- in addition to the personnel vehicle movements, approximately five (5no) HGVs, arriving and departing the site per day for general deliveries, fuel, waste collections, etc.;
- in addition to the personnel vehicle movements, approximately five (5no) LGVs, arriving and departing the site per day for general deliveries, fuel, waste collections, etc.

5.6.11 As such, the future operational traffic levels are anticipated to be modest. As the future operational traffic levels are anticipated to be well within the IAQM screening criteria outlined in Table 5.6, the resulting local air quality effects are not likely to be significant. Therefore, it is proposed that further assessment of air quality impacts from operational phase traffic is scoped out.

5.6.12 Further to the above, the existing operations at the Cawdor Barracks site, including the circa 400 personnel based on site, will have vacated the site by 2028. As a result, the future operational traffic movements associated with the Cawdor Barracks site are anticipated to be significantly lower than current levels.

TABLE 5.6: EPUK/IAQM AIR QUALITY ASSESSMENT SCREENING CRITERIA FOR ROAD TRAFFIC EMISSIONS

The development will:	Indicative Criteria given by EPUK/IAQM to Proceed to a Detailed Air Quality Assessment
1. Cause a significant change in Light Duty Vehicle (LDV) traffic flows on local roads with relevant receptors.	A change of LDV flows of *: - more than 100 AADT within or adjacent to an AQMA - **more than 500 AADT elsewhere**
2. Cause a significant change in Heavy Duty Vehicle (HDV) flows on local roads with relevant receptors.	A change of HDV flows of *: - more than 25 AADT within or adjacent to an AQMA - **more than 100 AADT elsewhere**.

The development will:	Indicative Criteria given by EPUK/IAQM to Proceed to a Detailed Air Quality Assessment
* Given that the nearest AQMA is approximately 13 km from the Cawdor Barracks site boundary, the criteria in bold text will be applied.	

Assessment of back-up generators

5.6.13 The proposed development will include the provision of back-up diesel generators. At the time of writing, there is limited information available on the nature, location, and frequency of operation of the generators. Therefore, the level of assessment that will be required cannot be defined at this stage.

5.6.14 Once further design and operating details for the back-up power generators become available, a supplementary scoping exercise will be undertaken to determine the level and extent of further assessment required, if any. The outcomes of this exercise and any associated proposed methodology for assessment will be communicated to, and consulted on, with PCC.

Impact description and significance

5.6.15 Construction impacts will be described in line with the IAQM Construction Guidance. The appropriate level of dust mitigation measures will be provided, based on risk of dust impacts identified, to ensure there are no residual significant effects.

5.6.16 For operational impacts, the significance of the changes in air pollutant concentrations at identified sensitive receptors representing human health, resulting from back-up generator emissions, will be considered within the context of the relevant air quality objectives. The associated local air quality impacts at each receptor will be described with reference to the impact magnitude descriptors reported in the EPUK/IAQM guidance.

5.6.17 Where it is determined that emissions from back-up generator operation require detailed assessment (i.e. air quality modelling), the respective pollutant contributions to sensitive habitats within relevant designated ecological sites will be assessed within the context of the appropriate pollutant critical levels (e.g. NO_x) and/or critical loads (nutrient nitrogen) specific to the habitat.

5.6.18 With reference to the IAQM guidance (EPUK& IAQM, 2020) should the change in concentration and/or nutrient nitrogen deposition, as a result of the proposed development (‘alone’ or ‘in-combination’ with other projects/plans), exceed 1% of the relevant critical level / load, it would not be possible to rule out the potential for significant effects on the sensitive feature(s). In this case, the results of the assessment would be passed to the project ecologist for the significance of effects to be determined. Where impacts are shown to be below the 1% screening threshold, the impacts would be treated as imperceptible, resulting in no significant effects.

Cumulative impacts

5.6.19 The assessment will consider the potential for cumulative impacts arising from other nearby developments with potential to impact local air quality, either with planning permission or those that are awaiting determination, in line with the requirements of the EIA Regulations A review of the relevant committed / planned developments will be undertaken to establish if they have the potential to release emissions to air via non-road sources (e.g. stack emissions from energy plant), which could contribute to a cumulative air quality impact in-combination with the proposed development. As the operational assessment of road traffic emissions has been scoped out, no cumulative assessment of road traffic emissions will be undertaken.

Climate Change Adaptation and Resilience

5.6.20 The potential air quality impacts identified in this chapter are not anticipated to change or be significantly influenced by hazards associated with climate change (e.g. extreme weather events). The use of back-up generators as part of the proposed development operation provides resilience in the event of power cuts that may be caused by extreme weather events.

5.6.21 The potential impacts associated with greenhouse gas emissions from the proposed development are considered within Chapter 14 (Climate) of this scoping report.

5.7 References

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6 Noise and Vibration

6.1 Introduction

6.1.1 This chapter of the Scoping Report identifies the potential impacts with regards to noise and vibration that may occur during the construction and operation of the proposed development and outlines whether these will be addressed further in the Environmental Statement (ES).

6.1.2 In the context of this report, noise is defined as unwanted or undesirable sound derived from sources such as road traffic, air traffic, plant or construction works that interfere with normal activities, including conversation, sleep or recreation. Vibration is defined as the transmission of energy through the medium of ground or air resulting in small movements of the transmitting medium, such as a building, which can cause discomfort to people or even damage to structures if the movements are large enough.

6.1.3 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

6.2 Baseline

6.2.1 The existing baseline noise conditions at the Cawdor Barracks site and the nearby adjacent sensitive receptors are likely to be mainly influenced by noise from road traffic using the local road network, such as the A487. The existing baseline noise level will be influenced by the relative distance, traffic volume and vehicle speeds on these roads.

6.2.2 Existing site activities, and existing plant at the barracks are likely to contribute to the surrounding noise climate, however these noise sources are likely to be local and not site-wide.

6.2.3 Due to the rural nature of the Cawdor Barracks site, baseline noise levels are expected to be low across most of the site. It is expected that there may also be noise from agricultural activity, as well as the sounds of nature.

6.2.4 Noise surveys at locations representative of the nearest existing noise sensitive receptors will further inform the baseline within the ES.

6.2.5 There are no apparent existing sources of significant vibration that currently affect the Cawdor Barracks site.

6.3 Receptors

6.3.1 The key potential receptors have been identified as follows (refer to Figure 6.1):

- R1 – residential receptor (single dwelling) to the northwest
- R2 – residential receptor (farmhouse) to the northeast
- R3 – residential receptor (Newgale Lodge guest house) to the east
- R4 – residential receptor (Farmhouse in Brawdy) to the southeast
- R5 – residential receptor (group of dwellings in Penycwm) to the south
- R6 – commercial receptor (Brawdy Business Park) to the southwest
- R7 – residential receptor to the west (Park Hall Village campsite) to the west
- R8 – residential receptor (single dwelling) to the west
- R9 – residential receptor (barracks) and potential commercial receptors (storage locations for sensitive equipment) on site

6.4 Scoping of Impacts

Tables 6.1 and 6.2 present a summary of the scoping exercise for the noise and vibration discipline. They identify which likely environmental impacts, with respect to noise and vibration will be assessed in the EIA (i.e. considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e. scoped out).

TABLE 6.1: POTENTIAL NOISE AND VIBRATION EFFECTS - CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Temporary effects due to construction noise (inc. construction traffic)	Yes	There are sensitive receptors near the Cawdor Barracks site boundary, and on the Cawdor Barracks site, which could be subject to temporary adverse effects due to construction noise. The number of construction vehicles that will be required is not known at this stage. It is possible that additional traffic movements during construction could result in noise increases on nearby road, and therefore noise sensitive receptors on those roads could be subject to temporary adverse effects due to traffic noise increase.
Temporary effects due to construction vibration	Yes	There are sensitive receptors near the Cawdor Barracks site boundary, and on the Cawdor Barracks site, which could be subject to temporary adverse effects due to construction vibration.
Temporary effects due to vibration from construction vehicles on the local road network	No	There is potential for adverse effects due to construction traffic vibration where sensitive receptors are in very close proximity to roads where baseline heavy vehicle flows are low. The receptors at which adverse effects could occur are expected to be the same receptors that are potentially adversely affected by changes in road traffic noise during the construction period. Mitigation measures implemented to minimise the effects of noise from construction

Potential Impact	To be assessed in EIA	Reason
		vehicles (i.e. via the Construction Traffic Management Plan) will also minimise the effects of construction traffic vibration. A separate section on vibration due to construction traffic is therefore not deemed necessary or proportionate.

TABLE 6.2: POTENTIAL NOISE AND VIBRATION EFFECTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Permanent effects due to noise from proposed new radar dishes and associated plant	Yes	New radar dishes and external plant are proposed. The radar dishes are motorised so that they can be rotated and will therefore cause external noise emissions. Details on the proposed plant are not available at this stage, however this could include cooling and power generation plant. Baseline background sound levels at existing sensitive receptors are likely to be low. Therefore, noise from new radar dishes and plant will need to be appropriately controlled to avoid adverse noise effects at the nearby sensitive receptors.
Permanent effects due to the changes in road traffic noise due to the proposed development	No	Operational traffic movements will be determined as the design progresses. However, for the purposes of scoping, traffic is assumed to approach the site via the A487 and enter via the southern site entrance In order to carry out the scoping exercise based on a worst case scenario, it is assumed that the proposed development would operate 24 hours a day, seven days a week with a total of around 60 personnel. As such, the future operational traffic levels are anticipated to be modest. This information will be kept under review as the project progresses.. In addition to the personnel vehicle movements, it is assumed that there will be typically five HGVs and five LGVs, respectively, arriving and departing the site per day for general deliveries, fuel, waste collections, etc. As the number of new vehicle movements is anticipated to be low, it is unlikely that significant effects will occur as a result of operational road traffic noise increase.
Permanent effects due to vibration	No	Any sources of significant vibration such as plant will be isolated at source and therefore significant vibration emissions offsite are not expected to occur.
Permanent effects due to changes in air traffic noise	No	It is possible that flight paths above the radar array may need to be altered to ensure they do not disturb operation. It is assumed that local, low flying aircraft are already forbidden from flying above the barracks, it is also assumed that any commercial flight paths near to the proposed development are at sufficient altitude so as not to significantly alter aircraft noise levels at ground level if minor alterations to the flight paths are required.

6.4.1 In summary, there is the potential for significant effects occurring at sensitive receptors due to the noise and vibration from the construction phases of the proposed development, or due to noise from the operational phase of the proposed development. As such, the potential for significant effect due to the noise and vibration impacts identified in the above tables will be considered further as part of the EIA.

6.5 Methodology for Impact Assessment

Overview

6.5.1 The proposed development has the potential to directly alter the noise and vibration baseline for several sensitive receptors both temporarily (during construction) and permanently (during operation). Further assessment is proposed in order to establish significant effects and to inform the mitigation strategy.

6.5.2 This assessment gives due regard to Technical Advice Note (TAN) 11, and the subsequent CL-01-15 updates. This assessment methodology is based on the standards that the TAN refers to. For further detail on how these standards can be used to determine effect significance, English Planning Policy is referred to (as this is not detailed in Welsh policy), which introduces the Lowest Observed Adverse Effect Level (LOAEL) which is "the level above which adverse effects on health and quality of life can be detected", and the Significant Observed Adverse Effect Level (SOAEL) which is the level "above which significant adverse effects on health and quality of life occur" for noise effects.

6.5.3 The environmental assessment of significant effects on human health and determination of mitigation measures will be completed in accordance with the IEMA: Guidelines for Environmental Noise Impact Assessment, 2014.

Policy, Standards, and Guidance

6.5.4 The following legislation, standards and best practice guidelines are considered to be relevant to the proposed development:

- Planning Policy Wales (Welsh Government, 2021)
- Planning Guidance (Wales) Technical Advice Note (Wales) 11 – Noise (Welsh Government, 1997)
- CL-01-15 Updates to Tan 11 Noise - Noise Action Plan (2013-18) Commitments (Welsh Government, 2015)
- The Noise Policy Statement for England (DEFRA, Noise Policy Statement for England, 2010)
- Sections 60 and 61 of The Control of Pollution Act (Environment, 1974)
- British Standard (BS) 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' (British Standards Institution, 2014)
- BS5228-2:2009 'Code of construction practice for noise and vibration control on construction and open sites - Part 2: Vibration' (British Standards Institution, 2014)

- BS 7385:1993 ‘Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground-borne vibration’ (British Standards Institution, 1993)
- Design Manual for Roads and Bridges (DMRB) LA111 ‘Noise and vibration’ (Highways England, May 2020)
- Calculation of Road Traffic Noise (CRTN) (Department of Transport, 1988)
- Guidelines for Noise Impact Assessment, Institute of Environmental Management & Assessment (IEMA) (Institute of Environmental Management & Assessment, 2014)
- BS4142:2014+A1:2019 ‘Methods for rating and assessing industrial and commercial sound’ (British Standards Institution, 2019)

6.5.5 The above list is not exhaustive and further guidance will be referred to if necessary.

Study Area

6.5.6 The study area for construction noise comprises the area within 300 m of the Cawdor Barracks site. The effects of noise from construction of the proposed development will be assessed within this Study area at the receptors described in Section 6.3.

6.5.7 The study area for construction vibration comprises the area within 100 m of the Cawdor Barracks site. The effects of construction vibration from the activities most likely to generate perceptible levels of vibration (such as compaction and piling) will be assessed at receptors within this Study area.

6.5.8 The study area for operational noise comprises the area within 600 m from the Cawdor Barracks site. The effects of noise from the operation of the proposed development will be assessed within this study area and at the receptors described in Section 6.3.

6.5.9 In some instances, potential effects due to road traffic noise increase outside the study area may be identified. The spatial extent of the scheme may be extended if traffic data indicates that an increase or decrease of at least 1 dB $L_{A10,18h}$ or 3 dB $_{LA10,18h}$ occurs on opening or in the long-term respectively. The extension would be applied to 50 m either side of the identified roads.

Defining the Baseline

6.5.10 Environmental noise surveys will be undertaken to quantify and describe the existing ambient noise conditions in and around the Cawdor Barracks site. The results of these surveys will form a baseline against which the effects of the proposed development will be assessed.

6.5.11 The baseline noise survey will be undertaken following the principles of BS 7445:2003 ‘Description and measurement of environmental noise’ (British Standards Institution, 2003), using Type 1 sound level meters in accordance with BS 61672:2013 ‘Electroacoustics, sound level meters, Part 1, Specifications’ (British Standards

Institution, 2013). The survey will be undertaken for a period of five days and will include both weekday and weekend periods.

6.5.12 Nominal proposed noise measurement positions are identified in Figure 6.2 and are as follows:

- MP1 – Representing the existing sensitive receptor at R1 and R2. Measurements at this location will be used to quantify the background noise levels to the north of the proposed development.
- MP2 - Representing the existing sensitive receptor at R3, R4, and R9. Measurements at this location will be used to quantify the background noise levels to the east, and within the proposed development.
- MP3 – Representing the existing sensitive receptor at R5 and R6. Measurements at this location will be used to quantify the background noise levels to the south of the proposed development.
- MP4 – Representing the existing sensitive receptor at R7 and R8. Measurements at this location will be used to quantify the background noise levels to the west of the proposed development.

6.5.13 The exact positions will be subject to access arrangements.

6.5.14 Each noise measurement position will be in free-field conditions at a height of 1.5 m above local ground level. The survey will be largely unattended, except for the setup and break-down periods. However, attended periods will be scheduled to be sufficient to observe and understand the baseline noise climate.

6.5.15 Weather conditions will be observed on setup and completion, monitored online, and weather data from the Milford Haven weather station (available online) will be referenced in the ES Chapter.

Receptors and Receptor Sensitivity

6.5.16 Sensitive receptors in the vicinity of the development have been identified through desk studies and are described in Section 6.3.

6.5.17 The sensitivity of receptors to noise and vibration depends on the potential effects that could occur and the type of noise or vibration source under consideration. The general principles of receptor sensitivity and shown in Table 6.3 in accordance with the IEMA Guidelines for Noise Impact Assessment.

TABLE 6.3: NOISE & VIBRATION SENSITIVITY CRITERIA

Sensitivity	Definition
High	Concert halls, recording studios, residential dwellings, schools, healthcare buildings with sleeping facilities
Moderate	Hotels, Healthcare buildings without sleeping facilities (e.g. GP's office), museums, libraries, places of worship

Sensitivity	Definition
Low	Commercial buildings (e.g. retail or office), research buildings, light industrial buildings
Very Low	Undeveloped land without a specific or future usage

6.5.18 The sensitivity of each receptor is considered in further detail where potentially significant effects are identified. For some noise effects, the sensitivity of the receptor can be influenced by the construction of the building and building envelope, the type of effect that could occur (e.g. sleep disturbance, interference with activities requiring concentration) and the time of day in which it could occur.

6.5.19 Additionally, for some noise and vibration effects (i.e. construction noise) the sensitivity of the receptor is accounted for in the definition of the magnitude of noise impact (i.e. lower construction noise limits apply to more sensitive receptor types).

Defining the Magnitude of Impact

6.5.20 The definition of impact magnitude for each source of noise and vibration are described using a semantic magnitude scale (negligible, minor, moderate or major) and a definition of the nature of the impact (i.e. adverse or beneficial).

6.5.21 The magnitude of impact for different sources of environmental noise depends upon factors including:

- the type of noise source being assessed;
- the time of day during which the environmental noise occurs;
- the type of receptor and the sensitivity of the receptor;
- whether defined absolute thresholds are exceeded by noise from the source being assessed; and
- whether there is a quantifiable change in existing noise levels due to the noise from the source being assessed.

6.5.22 The magnitude of impact for each type of noise source is defined with reference to relevant noise and vibration standards and guidelines as described in the following sections.

Construction Noise Assessment

6.5.23 For construction noise, the LOAEL should be determined with reference to baseline noise levels and SOAEL should be set at the threshold level determined in accordance with BS 5228-1:2009+A1:2014.

6.5.24 BS 5228 contains a number of example methodologies for identifying significant construction noise effects based on fixed thresholds or noise level changes. For the purposes of this assessment the ‘ABC’ method will be adopted (Table 6.4). This will

be clarified in consultation with the environmental health departments of the relevant local authorities in the area.

TABLE 6.4: EXAMPLE CONSTRUCTION NOISE THRESHOLD AT DWELLINGS

Assessment category & threshold value period	Threshold Value, in decibels (dB $L_{Aeq,T}$)		
	Category A	Category B	Category C
Daytime (07:00 – 19:00) & Saturdays (07:00 – 13:00)	65	70	75
Evening & Weekends (19:00 – 23:00 weekdays, 13:00 23:00 Saturdays & 07:00 – 23:00 Sundays)	55	60	65
Night-time (23:00 – 07:00)	45	50	55

6.5.25 Category A threshold values are to be used when ambient noise levels (when round to the nearest for 5dB) are less than these values. The same approach is taken for Category B and C.

6.5.26 Table 6.5 sets out the LOAEL and SOAEL threshold noise levels.

TABLE 6.5: CONSTRUCTION NOISE LOAELS AND SOAELS

Time period	LOAEL	SOAEL
Day (07:00 – 19:00 weekday and 07:00 – 13:00 Saturdays)	Baseline noise levels ($L_{Aeq,T}$)	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 (Replicated as Table 6.4)
Night (23:00 – 07:00)	Baseline noise levels ($L_{Aeq,T}$)	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 (Replicated as Table 6.4)
Evening and weekends (time periods not covered above)	Baseline noise levels ($L_{Aeq,T}$)	Threshold level determined as per BS 5228-1 Section E3.2 and Table E.1 (Replicated as Table 6.4)

6.5.27 Predictions of construction noise levels at the nearest noise sensitive receptors will be undertaken in accordance with BS 5228-1 based on the available construction plant data provided by the MOD, and assumed applicable construction noise data from BS 5228-1.

6.5.28 Additionally, where sufficient information is available, the likely change in road traffic noise due to construction traffic will be determined by applying the Basic Noise Level (BNL) prediction methodology detailed in CRTN. This methodology allows the change in road traffic noise to be determined at a notional road-side receptor at a distance of 10 m from the kerb and at a height of 1.5 m.

6.5.29 The assessment of road traffic noise during the construction period (due to construction traffic) shall consider the change in road traffic noise between the baseline scenario compared against the baseline scenario plus construction traffic. A

baseline traffic count is proposed, however the extent is not currently known, and therefore the assessment will be undertaken in a manner which reflects the extent of the available traffic data.

6.5.30 The construction noise impact magnitude shall be determined using Table 6.6 below in accordance with Design Manual for Roads and Bridges (DMRB) LA 111. Where the predicted construction noise level exceeds the appropriate category value, this is an indication of moderate or major adverse impact (which could result in a significant effect at a receptor).

TABLE 6.6: CONSTRUCTION NOISE IMPACT MAGNITUDE

Construction Noise Level, dB $L_{Aeq,T}$	Magnitude of Construction Noise Impact
Below LOAEL	Negligible
Above or equal to LOAEL and below SOAEL	Minor adverse
Above or equal to SOAEL and below SOAEL +5	Moderate adverse
Above or equal to SOAEL +5dB	Major adverse

6.5.31 The impact magnitude of the change in road traffic noise will be determined with reference to the Design Manual for Roads and Bridges (DMRB) LA 111.

TABLE 6.7: CONSTRUCTION TRAFFIC NOISE INCREASE IMPACT MAGNITUDE

Construction Noise Level, dB $L_{Aeq,T}$	Magnitude of Construction Noise Impact
Less than 1.0	Negligible
1.0 to 2.9	Minor adverse
3.0 to 4.9	Moderate adverse
Greater than or equal to 5.0	Major adverse

6.5.32 Construction noise and construction traffic is determined to be a potential significant effect where a moderate or major magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; or,
- a total number of days exceeding 40 in any six consecutive months.

Construction Vibration Assessment

6.5.33 The magnitude of vibration impacts due to the construction of the proposed development will be determined with reference to BS 5228-2:2009+A1:2014. This Standard presents a method of predicting and assessing vibration from distinct construction activities such as piling or compaction.

6.5.34 For construction vibration, the LOAEL is taken to be 0.3mm/s peak particle velocity (PPV) and for SOAEL, 1.0mm/s PPV.

6.5.35 The level of vibration from typical construction activities identified by the MOD will be estimated at typical distances at which vibration emissions become perceptible. Predictions of vibration will be carried out for relevant activities where a prediction method or historic empirical data is available.

6.5.36 Construction vibration levels will be determined in terms of the Peak Particle Velocity (PPV). The construction vibration impact magnitude shall be determined using Table 6.8.

TABLE 6.8: MAGNITUDE OF IMPACT DUE TO CONSTRCUTION VIBRATION

Construction Vibration Level (PPV, mm/s)	Description of Human Perception	Magnitude of Construction Vibration Impact
Below the LOAEL (0 to 0.2)	Vibration with a PPV of 0.14 mm/s might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration	Negligible
Above or equal to LOAEL and below SOAEL (0.3 to 0.9)	Vibration with a PPV of 0.3 mm/s might be just perceptible in residential environments.	Minor adverse
Above or equal to SOAEL and below 10mm/s (1 to 9)	It is likely that vibration with a PPV of 1.0 mm/s in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.	Moderate adverse
Above or equal to 10mm/s PPV (≥10)	Vibration with a PPV of 10 mm/s is likely to be intolerable for any more than a very brief exposure to this level in most building environments.	Major adverse

6.5.37 BS 7385 provides guidance on the levels of vibration that would be necessary to cause structural damage to different types of buildings. The Standard indicates that continuous PPVs of more than about 7 mm/s would be required to cause structural damage to residential buildings. Potentially vulnerable buildings and appropriate mitigation will be identified. For residential buildings, limits will be placed based upon levels at which there is a likelihood of complaint, these being considerably lower than those at which building damage may occur.

6.5.38 Construction vibration is determined to be a potential significant effect where a moderate or major magnitude of impact will occur for a duration exceeding:

- 10 or more days or nights in any 15 consecutive days or nights; or,
- a total number of days exceeding 40 in any six consecutive months.

Operational Radar Dish and Plant Noise Assessment

6.5.39 Radar dish and associated plant noise has the potential to result in adverse effects at existing noise-sensitive receptors. Operational plant noise will be assessed in line with the guidance within BS 4142:2014+A1:2019.

6.5.40 The approach within this Standard is the usual method of assessing sound of an industrial or commercial nature within the UK. The Standard provides a method of determining rating levels for sources of industrial or commercial sound for the purposes of determining the noise impact from new, modified, or additional sources of sound, and assessing sound at noise sensitive receptors.

6.5.41 The BS 4142 assessment approach, in summary, involves the following:

- The specific sound level (of commercial sound) is determined at each assessment location during time intervals that are representative of the period of interest. For a source that is not yet operating this is determined by calculation.
- The background sound level is measured at each assessment location (or equivalent representative location). A representative value of the background sound level is then determined for each period of interest. Observations and a description of the acoustic environment are required to understand the context in which the specific sound source is being assessed.
- The rating level of commercial sound is determined at each assessment location accounting for the expected character of the specific sound, by applying corrections for characteristics that attract attention (tonality, impulsivity, intermittency, any other distinctive features).
- The level and potential effects of uncertainty in the assessment are then reported.

6.5.42 BS 4142 states: “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs”. An estimation of the impact can be obtained by the difference of the rating noise level and the background noise level and considering the following:

- “Typically, the greater this difference, the greater the magnitude of the impact;
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the

background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

6.5.43 On this basis, the LOAEL for plant noise has been set at a rating level of 10 dB below the existing background noise level at a high sensitivity receptor. The SOAEL is set at 5 dB above the background noise level.

6.5.44 Radar dish and plant noise will be assessed using the noise modelling software CadnaA by Datakustik in accordance with the ISO 9613 prediction methodology.

6.5.45 The impact magnitude for operational radar dish and plant noise which occurs under normal conditions shall be determined as presented in Table 6.8.

TABLE 6.8: INDUSTRIAL & COMMERCIAL SOUND SIGNIFICANCE CRITERIA

Commercial Sound Level (BS 4142 Rating Level)	Description of Human Perception	Impact Magnitude for Commercial Sound
10 dB or more below the representative background sound level	Significantly below the level that would be deemed to be of low impact given the site context and expected character of the sound.	Negligible
Between 1 and 9 dB below the background sound level	Lower magnitude of impact	
Equal to background sound level	Low impact given the site context and expected character of the sound.	Minor adverse
Between 1 and 5 dB above the background sound level	Where the rating level is around 5 dB above the background sound level, commercial sound could result in a potential adverse effects when considering the site context and expected character of the sound.	
Between 6 and 9 dB above the background sound level	Where the rating level is around 5 dB above the background sound level, commercial sound could result in a potential adverse effects when considering the site context and expected character of the sound.	Moderate adverse
10 dB or above the representative background sound level	Potential significant adverse effect given the site context and expected character of the sound.	Major adverse

6.5.46 Radar and plant noise emissions are determined to be a potential significant effect where a moderate or major magnitude of impact is predicted.

6.5.47 It is possible that certain proposed plant items, such as back-up power generators, will not operate under normal conditions, and will only operate during testing, and during emergencies such as power outages. Where emergency systems are regularly tested,

the test conditions will be included in the assessment of normal operating conditions. Due to the short durations and rare occasions during which full emergency conditions occur, it is typical to assess them against less onerous criteria than noise which occurs regularly during normal operations.

6.5.48 Information on the proposed plant installations, and the operating profiles, is not available at this stage and therefore the type and duration of the noise cannot be defined. Where emergency operating profiles are proposed for short periods, the noise impact will be assessed by determining the levels that will occur outside and inside the nearest sensitive receptors and comparing against relevant guidelines, accounting for the duration that the noise is likely to occur.

Defining the Effect and Evaluating Significance

Potential Noise and Vibration Effects

6.5.49 The effects of noise and vibration are varied in nature and influenced by the sensitivity of the receptor being considered.

6.5.50 Potential effects include:

- Health effects (e.g. increased likelihood of cardiovascular disease);
- Sleep disturbance;
- Interference with activities requiring concentration, distraction;
- Interference with speech communication;
- Change of behaviour and avoidance of activities that would otherwise occur (e.g. closing windows, avoiding use of amenity areas while source occurs); and
- Complaint or adverse comment.

6.5.51 The general principles of defining the effect are presented in Table 6.11, which has been defined with reference to the IEMA: Guidelines for Environmental Noise Impact Assessment, 2014.

6.5.52 As noted above, the impact magnitude depends upon factors including the type of noise and/or vibration source being assessed. Therefore, separate scales of impact magnitude and significance have been defined for each source.

6.5.53 Effects that are generated as a result of the demolition and construction works (i.e. those that last for a specific construction phase) are classed as ‘temporary’. For activities occurring throughout the construction period, the resulting effects are classified as ‘short term’ effects. Effects that result from the completed and operational as of the proposed development are classed as ‘long-term’ effects.

6.5.54 Once the impact magnitude has been determined at a receptor, it is then necessary to consider other project-specific factors, such as the number of receptors affected and

the duration and character of the impact, to determine if there is a significant effect, as discussed below.

TABLE 6.11: GENERIC RELATIONSHIP BETWEEN IMPACT MAGNITUDE, EFFECTS & SIGNIFICANCE

Impact Magnitude	Description of Effect	Significance
Major beneficial	Marked change in receptor perception. Causes a material change in behaviour and/or attitude, e.g. individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character in area.	More likely to be significant
Moderate beneficial	Noticeable improvement in receptor perception. Improved noise climate resulting in small changes in behaviour and/or attitude, e.g. turning down volume of TV; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Minor beneficial	Just noticeable improvement in receptor perception. Noise impact can be heard but does not result in any change in behaviour or attitude. Can slightly affect the character of the area but not such that there is perceived change in the quality of life.	Less likely to be significant
Negligible	No discernible effect on the receptor.	Not significant
Minor adverse	Perceived as non-intrusive at the receptor. Noise impact can be heard, but does not result in any change in behaviour or attitude, e.g. turning up volume of TV; speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is perceived change in the quality of life.	Less likely to be significant
Moderate adverse	Perceived as intrusive at the receptor. Noise impact can be heard, and causing small changes in behaviour and/or attitude, e.g. turning up volume of TV; speaking more loudly; closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life.	
Major adverse	Perceived as disruptive at the receptor. Causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty getting back to sleep. Quality of life diminished due to change in character in area.	More likely to be significant
Severe Adverse	Perceived as physically harmful at the receptor. Significant changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Significant

Categorising Likely Significant Effects

6.5.55 Effects that are identified as having an impact magnitude of moderate or major adverse / beneficial at a sensitive receptor are classified as potentially significant effects. The effects are then deemed significant where, following a review of context (such as the number of receptors affected, the duration and character of the impact, and receptor sensitivity) and the type of effect that could potentially occur, there is no justification for modifying the impact magnitude or significance.

6.6 Cumulative Assessment

6.6.1 The cumulative assessment of noise and vibration will consider the potential cumulative construction noise impact of any sites proposed within the construction noise and vibration study areas. A qualitative assessment of potential cumulative construction noise effects will be presented.

6.6.2 No other cumulative noise and vibration assessments are considered necessary for identifying potentially significant effects.

6.7 Climate Change Adaptation and Resilience

6.7.1 Climate change is not expected to have a material impact on the significance of the noise and vibration effects. A qualitative assessment of the potential influence on the predicted noise and vibration effects will be presented.

6.8 References

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7 Biodiversity

7.1 Introduction

7.1.1 This section of the Scoping Report identifies potential impacts with regard to biodiversity that may occur during the construction and operation of the proposed development and outlines whether these will be addressed further in the Environmental Statement (ES).

7.1.2 The preliminary ecological appraisal report (65208061-SWE-XX-XX-T-EA-0001) that has been issued for this proposed development has been appended as Appendix A to this Scoping Report.

7.1.3 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

7.2 Baseline

7.2.1 This section outlines the ecological baseline information relevant to the Cawdor Barracks site. This information considers flora and fauna that may be affected by the proposed development. The following documents have been used to inform the baseline:

- Cawdor Preliminary Ecological Appraisal Report (Appendix A). The UK Habs survey of the site was undertaken from the 22nd to 24th of November 2022 by Leonora Hunt MSc (Sweco Ecologist) and Eleanor Unsworth MSc, BSc (Hons) (Sweco Graduate Ecologist); and
- Sweco UK Limited, “Strategic Environmental Technical Advisor Stage 4: Ecological Appraisal DIO Cawdor Barracks,” 2021.

7.2.2 Additionally, online resources have been used to provide additional information where required including the following, the date these were accessed and references are provided in the Preliminary Ecological Appraisal (PEA) Report in Appendix A:

- Data Map Wales (Welsh Government);
- British Trust for Ornithology Wetland and Breeding bird survey data (BTO);
- DEFRA interactive ‘MAGIC’ database (MAGIC, 2023);
- Pembrokeshire County Council “Pembrokeshire Local Biodiversity Action Plan”;

- West Wales Biological Information Centre (WWBIC);
- aerial photography; and
- the National Biodiversity Network atlas (National Biodiversity Network, 2022).

Designated Sites

7.2.3 Consultation of the MAGIC online interactive mapping tool[1] confirms the presence of six internationally designated sites within 10 km of the Cawdor Barracks site boundary and three nationally designated sites within 3 km of the Cawdor Barracks site boundary, summarised in Table 7.1. The study area Zones of Influence (ZOI's) are dependent on the specific receptor. All ZOI's are defined in the PEA methodology provided in Appendix A.

TABLE 7.1: SUMMARY OF RELEVANT DESIGNATED SITES

Site Name	Distance and Direction from Cawdor Barracks site	Description	Designation
Ramsey and St David's Peninsula Coast Special Protection Area (SPA)	0.65 km southwest	Species: red-billed chough (*Pyrrhocorax pyrrhocorax*)	International
St David's / Ty Ddewi Special Area of Conservation (SAC)	0.65 km southwest	Habitats: vegetated sea cliffs of the Atlantic and Baltic coasts; European dry heaths.	International
Pembrokeshire Marine / Sir Benfro Forol SAC	0.75 km southwest	Species: Floating water-plantain *(Luronium natans)*	International
West Wales Marine / Gorllewin Cymru Forol SAC	0.75 km southwest	Habitats: estuaries, large shallow inlets and bays, reefs, sandbanks, mudflats and sandflats, coastal lagoons, Atlantic salt meadows and sea caves.	International
North West Pembrokeshire Commons / Comin Gogledd Orllewin Sir Benfro SAC	4.35 km east	Species: grey seal (*Halichoerus grypus*), shore dock (*Rumex rupestris*), sea lamprey (Petromyzon marinus), river lamprey (*Lampetra fluviatilis*), allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*) and otter (*Lutra lutra*)	International
Afonydd Cleddau / Cleddau Rivers SAC	4.52 km north	Species: harbour porpoise (*Phocoena phocoena*)	International
St. David's Peninsula Coast Site of Special Scientific Interest (SSSI)	0.65 km southwest	Habitats: European dry heaths, transition mires and quaking bogs, northern Atlantic wet heaths with *Erica tetralix*, Molinia meadows on calcareous, peaty or clayey-silt-laden soils	National

[1] MAGIC, "Site Check," [Online]. Available: https://magic.defra.gov.uk/. [Accessed 04 2022]

Site Name	Distance and Direction from Cawdor Barracks site	Description	Designation
Arfordir Niwgwl - Aber Bach / Newgale - Little Haven Coast SSSI	2.7 km south	Species: floating water-plantain	National
Ysgeifiog Moor SSSI	3.0 km to the northwest	Habitats: water courses of plain to montane levels, active raised bogs, alluvial forests with alder (*Alnus glutinosa*) and ash (*Fraxinus excelsior*)	National

7.2.4 WWBIC identified no non-statutory sites such as local nature reserves or Areas of Importance for Nature Conservation within 5 km of the Cawdor Barracks site's central grid point.

7.2.5 Ramsey and St David's Peninsula Coast SPA and St. David's Peninsula Coast SSSI are designated for features of potential relevance to the Cawdor Barracks site. The close proximity of the development to all these designated sites has the potential to cause indirect impacts through air and water pollution during construction and operation and will therefore need further assessment.

7.2.6 In addition to the above, Table 7.2 identifies the priority habitats identified during the desk study within 2 km of the Cawdor Barracks site boundary.

TABLE 7.2: SUMMARY OF PRIORITY HABITAT RECORDS

Habitat	Source	Distance of Closest Parcel (km)	Number of Parcels
Lowland Heathland	Environment (Wales) Act 2016 – section 7	On site	15 (3 on site)
Purple Moor Grass and Rush Pastures	Environment (Wales) Act 2016 – section 7	0 km (adjacent to Cawdor Barracks site) to the northeast	228
Lowland Meadows	Environment (Wales) Act 2016 – section 7	0.53 km to the northwest	20
Lowland Fens and Reedbeds	Environment (Wales) Act 2016 – section 7	0.85 km to the northwest	14
Raised Bog	Environment (Wales) Act 2016 – section 7	1.0 km to the west	1
Lowland dry acid grassland	Environment (Wales) Act 2016 – section 7	1.7 km to the southeast	1
Ancient & Semi-Natural Woodland	Ancient Woodland Inventory	0 km (adjacent to Cawdor Barracks site) to the west	4

Habitats

7.2.7 The habitats described below are depicted in the UK HABS Map produced by Sweco (Drawing ref: 65208061-SWE-ZZ-XX-IEA-0001 in the appended PEAR).

7.2.8 The dominant habitat on the Cawdor Barracks site comprises mainly of modified grassland (g4). The grassland is primarily located adjacent to the runways and surrounding the buildings to the southwest. Some areas of modified grassland are scattered with shrubs, particularly adjacent to the northwest runway. It was within these sections that species of waxcap (*Hygrocybe*) species were recorded. Other species include hoary groundsel (*Packera werneriifolia*), clover (*Trifolium spp*.), greater plantain (*Plantago major*). There are scattered trees present around some of the buildings to the southwest of the Cawdor Barracks site, including rhododendron (*Rhododendron* spp.).

7.2.9 Other neutral grassland (g3c) is also present adjacent to the runways, some of which is scattered with scrub (including gorse (*Ulex spp.)* and bramble (*Rubus fruticosus*)). Species include cock's foot grass (*Dactylis glomerata*), yorkshire fog (*Holcus lanatus*), greater plantain and meadow thistle (*Cirsium dissectum*).

7.2.10 Holcus Juncus neutral grassland (g3c8) is also present on site to the west of the northern runway, surrounded by modified grassland and in a slight depression in the ground. The area is *Juncus* dominated, marshy, and bryophyte rich. A second area of Holcus Juncus neutral grassland, dominated by rushes, is present at the northern end of the east runway, directly next to the sealed surface and surrounded by bramble scrub.

7.2.11 The survey was undertaken outside the optimal time of year for grassland surveys. The extent and condition of the grassland was assessed as found. Due to this an NVC survey should be undertaken between May and August to ensure that habitat area and botanical composition are accurate.

7.2.12 Scrub habitats make up a large part of the Cawdor Barracks site, particularly along the north and western boundaries. Bramble scrub (h3d) makes up a large proposition of this although blackthorn dominated scrub (h3a) and mixed scrub (h3h) are also found in these locations. Two areas of west coast blackthorn scrub (h3ah) are found on site- one to the northeast, and the other to the southwest near the buildings.

7.2.13 An area of lowland heathland (h1a) is located to the north of the Cawdor Barracks site, surrounded by blackthorn scrub. Due to the dense scrub a full species survey was not possible.

7.2.14 Four types of woodland are found on site: wet woodland (w1d), comprised mainly of willow with bramble and bracken throughout; other woodland; broadleaved (w1g) that is made up entirely by mature sycamore (*Acer pseudoplatanus*) trees; other woodland; mixed (w1h) which consists of oak (*Quercus spp.)*, blackthorn and sycamore; and other coniferous woodland (w2c 48) which is comprised entirely of non-native coniferous species. The woodlands are primarily located to the southwest, in close proximity to the buildings.

7.2.15 Standing open water is found on site (r1) and includes two pools found formed in ground depressions. They both had turbid water with no visible aquatic vegetation. Two manmade concrete tanks located to the west, and north of the Cawdor Barracks site were also filled with water. Both were inaccessible, and the northern one was only visible from satellite imagery due to the presence of dense scrub.

7.2.16 There is one ditch (r2b 181) on site, that consists of a ditch and drain, which emerges in the south east of the Cawdor Barracks site and runs south east and south along the red line boundary for approximately 0.17 km before entering a pipe and going underground again. The water is low turbidity, however there are no floating plants present and the water level is shallow.

7.2.17 A large proportion of the Cawdor Barracks site is developed land, sealed surface (u1b), including the runways crossing through the centre of the Cawdor Barracks site and the majority of the western side of the Cawdor Barracks site which also contains the buildings. An area of developed land to the east of the Cawdor Barracks site has become overgrown with ruderal/ephemeral vegetation and scattered scrub including bramble, byophytes and grasses. The buildings are mainly located to the west of site, they are predominantly flat rooved, and consist of office areas, commercial and residential buildings.

7.2.18 Linear habitats on site include both hedgerows (h2b) and lines of trees (w1g6) that are mainly located to the southwest, within the more developed part of the Cawdor Barracks site. The hedgerow composition includes blackthorn, privet (*Ligustrum spp.),* and introduced shrub. Tree species include non-native pine, sycamore and hawthorn.

Protected Species

7.2.19 There are nine waterbodies within 500 m of the Cawdor Barracks site, including two concrete tanks. Suitable terrestrial habitat for great crested newt (GCN) is also present on site, such as the grassland, woodland, and scrub habitats. Four of the nine water bodies were accessible during the November 2022 walkover, all four of which were subject to HIS and scored “poor” (see PEAR in Appendix A or further details). There are eDNA surveys planned for 2023 on these waterbodies. The Cawdor Barracks site is also considered suitable for other amphibians such as common frog (*Rana temporaria*) and common toad (*Bufo bufo*).

7.2.20 Records of all four common reptile species including common lizard (*Lacerta vivipara),* slow worm (*Anguis fragilis),* grass snake (*Natrix helvetica),* and adder (*Vipera berus)* on site were provided by WWBIC. This highlights the Cawdor Barracks site as potentially of significant conservation importance for reptiles, meeting two of the Froglife advice sheet 10 criteria for a Key Reptile Site. Habitats on site, including the grassland and scrub, are considered suitable for reptiles and therefore surveys will be undertaken in 2023.

7.2.21 The walkover survey undertaken in November 2022 found no evidence of badger (*Meles meles*) activity within the Cawdor Barracks site. While no badger setts were identified during the survey within the airfield grassland, badger are understood to be present in the wider area with a sett reported in the north-west corner of the wider site (currently outside the proposed development footprint).

7.2.22 Bats are likely to use the Cawdor Barracks site for foraging and commuting, notably the woodland, heathland, scrub and neutral grassland habitats. It is currently anticipated that the buildings on site will not be impacted due to the proposals and therefore no impacts on roosting bats are anticipated. Should this change, appropriate

assessment of the buildings to be impacted would be required for their potential to support roosting bats.

7.2.23 Due to the size and suitability of habitats on site, most notably the grassland, and the proximity to the coast, monthly wintering bird surveys commenced in November 2022 and are expected to conclude in February 2023. These will confirm if any significant assemblages of wintering birds make use of the Cawdor Barracks site.

7.2.24 A significant population of breeding skylarks is known to be present on site. Therefore, breeding bird surveys will be undertaken in 2023.

7.2.25 Red-billed chough are only found within very specific parts of the UK - the Cawdor Barracks site is located within close proximity to one of these designated sites and provides suitable habitat for the species. Therefore, dedicated chough surveys will be undertaken in 2023.

7.2.26 Otter are known to be present in the nearby watercourse outside the current red line boundary. Whilst proposals remain within the extent of the existing grassland around the airfield, impacts on otter are not anticipated.

7.2.27 It is likely that the wider site also supports other mammal species such as brown hare (*Lepus europaeus*), European hedgehog (*Erinaceus europaeus*), Eurasian harvest mouse (*Micromys minutus*), stoat (*Mustela erminea*), weasel (*Mustela nivalis*) and polecat (*Mustela putorius*).

7.2.28 The grassland surrounding the runway was found to support waxcap fungi, with waxcap identified during the November 2022 walkover. Waxcap fungi are associated with good quality grasslands, where little or no disturbance (such as agricultural ploughing or nutrient loading) has taken place. JNCC SSSI guidelines (Chapter 14 – non-lichenised fungi) contains a list of waxcap and other grassland fungi of significant conservation value, with thresholds for conservation significance of waxcap grasslands. Fungi surveys through eDNA are scheduled for 2023 due to identification of a waxcap (*Hygrocybe sp.*) species on site during the November 2022 survey.

7.3 Receptors

7.3.1 The key potential receptors have been identified as follows:

- Statutory sites including Ramsey and St David's Peninsula Coast SPA / St David's / Ty Ddewi SAC, St. David's Peninsula Coast SSSI
- Great crested newt (and other common amphibians)
- Bats
- Reptiles
- Wintering birds
- Breeding birds in particular skylarks

- Red-billed chough
- Otter and water vole
- Other mammals of importance such as hedgehog and brown hare
- Fungi (waxcap grassland)
- Priority terrestrial and aquatic habitats
- Badger

7.3.2 Details of habitat suitability around the Cawdor Barracks site are detailed on the corresponding UKHabs map in Appendix A.

7.4 Scoping of Impacts

7.4.1 Table 7.3 and Table 7.4 present a summary of the scoping. They identify which likely environmental effects, with respect to biodiversity will be assessed in the EIA (i.e. considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e. scoped out).

TABLE 7.3: POTENTIAL ECOLOGY IMPACTS - CONSTRUCTION

Ecological Feature	To be assessed in EIA	Potential Impacts
Ramsey and St David's Peninsula Coast SPA / St David's / Ty Ddewi SAC	Yes	There is potential for pollution, run-off and dust from construction / impacts on species assemblages (chough) for which the Cawdor Barracks site is designated. As well as potential indirect impacts to red-billed chough, addressed below.
St. David's Peninsula Coast SSSI	Yes	There is potential for pollution, run-off and dust from construction / impacts on species assemblages (chough) for which the Cawdor Barracks site is designated.
Great Crested Newt	Yes	Potential loss of terrestrial habitat (including hibernation sites). Potential pollution of aquatic habitats. Disturbance through noise, dust and lighting which would discourage use of habitats.
Bats	Yes	Loss of foraging and commuting habitat or discouragement of use due to disturbance.
Reptiles	Yes	Potential injury/mortality from site clearance. Potential loss of habitat (including hibernation sites). Disturbance through noise, dust and lighting which would discourage use of habitats.
Wintering birds	Yes	Potential injury/mortality and loss of habitat (nest sites and foraging resource) from site clearance. Potential disturbance through noise, dust and lighting which would discourage use of habitats.
Breeding birds	Yes	Potential injury/mortality and loss of habitat (nest sites and foraging resource) from site clearance. Potential disturbance through noise, dust and lighting which would discourage use of habitats.
Red-billed chough	Yes	Potential injury/mortality and loss of habitat (foraging resource) from site clearance. Potential disturbance through noise, dust and lighting which would discourage use of habitats.
Barn Owl	Yes	Potential loss of foraging habitat from site clearance. Potential disturbance through noise, dust and lighting which would discourage use of habitats.

Ecological Feature	To be assessed in EIA	Potential Impacts
Priority mammal species (hedgehog, brown hare, stoat, weasel, harvest mouse)	Yes	Potential loss of foraging habitat, and potential loss of breeding habitat for some species. Disturbance through noise, dust and lighting which would discourage use of habitats.
Fungi (waxcap grassland)	Yes	Potential loss of habitat through direct loss, and damage through pollution such as noise, dust etc.
Priority habitats	Yes	Damage and/or disturbance through noise, dust and other potential pollution pathways which could impact these habitats in close proximity.
Badger	Yes	Potential loss of foraging habitat. Disturbance through noise, dust and lighting which would discourage use of habitats.

TABLE 7.4: POTENTIAL ECOLOGY IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
All receptors - radiation impacts from new infrastructure	Yes	The MOD have confirmed that all radiation will be non-ionising, which is non-radioactive. Scientific data provided by the MOD confirms a threshold at which impacts on birds from non-ionising radiation is not considered to be significant. As final data on frequency and power of radio waves from the proposed new radar arrays has not been provided, we cannot confirm if this threshold will be exceeded or not at this time. As such further information is required in order to determine whether the radiation produced is likely to have any significant effects on any ecological receptors at this time, and will be considered in the ES.
Ramsey and St David's Peninsula Coast SPA / St David's / Ty Ddewi SAC	Yes	Potential for pollution, run-off and dust from operational activities / impacts on species assemblages (chough) for which the Cawdor Barracks site is designated.
St. David's Peninsula Coast SSSI	Yes	Potential for pollution, run-off and dust from operational activities / impacts on species assemblages (chough) for which the Cawdor Barracks site is designated.
Great Crested Newt	Yes	Potential loss of terrestrial habitat (including hibernation sites). Potential pollution of aquatic habitats. Disturbance through noise, dust and lighting which would discourage use of habitats.
Bats	Yes	Loss of foraging and commuting habitat or discouragement of use due to disturbance from operational phase.
Reptiles	Yes	Loss of habitat (including hibernation sites). Disturbance through noise, dust and lighting which would discourage use of habitats.
Wintering birds	Yes	Potential disturbance through noise, dust and lighting which would discourage use of habitats both construction and operational phases.
Breeding birds	Yes	Potential disturbance through noise, dust and lighting which would discourage use of habitats.
Red-billed chough	Yes	Potential disturbance through noise, dust and lighting which would discourage use of habitats both construction and operational phases.

Potential Impact	To be assessed in EIA	Reason
Barn Owl	Yes	Potential loss of foraging habitat from site clearance. Potential disturbance through noise, dust and lighting which would discourage use of habitats.
Priority mammal species (hedgehog, brown hare, stoat, weasel, harvest mouse)	Yes	Potential loss of foraging habitat. Disturbance through noise, dust and lighting which would discourage use of habitats.
Fungi (waxcap grassland)	Yes	Potential loss of habitat through direct loss, and damage through pollution such as noise, dust etc.
Priority habitats	Yes	Damage and/or disturbance through noise, dust and other potential pollution pathways which could impact these habitats in close proximity.
Badger	Yes	Potential loss of foraging habitat. Disturbance through noise, dust and lighting which would discourage use of habitats.

7.4.2 Due to the potential for significant impacts from the proposed development to a number of ecological features, biodiversity will be 'scoped in' for assessment as part of the EIA.

7.5 Methodology for Impact Assessment

7.5.1 An Ecological Impact Assessment (EcIA) for the proposed development will be undertaken using baseline information derived from a desk study and field surveys where necessary. A Habitat Regulations Appraisal (HRA) screening, for impacts to the identified statutory designated sites will be undertaken in parallel to the EcIA. Should likely significant effects be identified within the HRA Screening or other reports, these will be reported upon in the EIA where appropriate and may trigger the need for a full HRA (sometimes referred to as an 'appropriate assessment').

7.5.2 The assessment will include:

- A desk study: encompassing all areas affected by the proposed development within 2 km of the perimeter of the Cawdor Barracks site. Data will be obtained through the following methods:
    - Nature conservation organisations will be consulted with for ecological information within the study area, publicly available information such as designated site citations and conservation objectives have been obtained.
    - A UK HABS survey of the Cawdor Barracks site has been undertaken which along with mapping the habitats within the Cawdor Barracks site determined the suitability of the Cawdor Barracks site for protected or notable species.
- Further protected species surveys are proposed for 2023. The current scope of further survey work includes:

- Bats;
- Birds (wintering and breeding);
- Fungi;
- Reptiles; and
- GCN.

- An assessment of the ecological impacts of the proposed development will be undertaken in the form of an EcIA in line with the Chartered Institute of Ecology and Environmental Management (CIEEM) 2018 guidance (CIEEM, 2018);
- With regard to lighting impacts, reference will be made to a Lighting Assessment which will be undertaken as a standalone technical assessment and will be appended to the ES.
- Consultation with statutory bodies e.g. Natural Resource Wales to discuss the key ecological considerations for the proposed development;
- Definition of the ecological value of the features in accordance with CIEEM guidance (CIEEM, 2018);
- Characterisation of the potential impacts on sensitive features – this will involve liaison with the design team to understand the proposed design and construction methods and liaison with relevant members of the EIA team in consideration of potential impacts upon ecological features as per CIEEM guidance (CIEEM, 2018);
- Determination of whether effects are ecologically significant using industry best practice methodologies, such as CIEEM's methods for EcIA (CIEEM, 2018). This includes determining the geographic level of importance of each of the features (international, regional, local etc), the characterisation of the effect (direct/indirect, frequency, reversibility etc) and whether the effect is significant or not;
- Consideration of the future baseline with regard to climate change;
- Recommendation of design intervention, mitigation and enhancement of biodiversity;
- Assessment of residual significance of effects; and
- A clear statement of the limitations of the baseline studies.

7.5.3 The output of the assessment will be an ES chapter presenting the baseline conditions of the Cawdor Barracks site, the potential impacts of the proposed development, design interventions, evaluation of effect significance as well as robust and

appropriate mitigation measures as required. An assessment of any residual impacts will also be provided.

Habitat Regulations Assessment

7.5.4 Due to the proximity of Ramsey and St David's Peninsula Coast SPA / St David's / Ty Ddewi SAC, St. David's Peninsula Coast SSSI, a HRA screening for likely significant effects to the European sites will be required

7.5.5 Information for the HRA will be collated during the EIA process, including the habitat and protected species surveys as well as other relevant EIA information such as drainage and air quality assessments.

7.5.6 The report will consider potential effects (if likely) on the Cawdor Barracks sites and their qualifying features and these will be reported in the ES where appropriate. The HRA Screening Report will consider the likely significance of these effects and the implications of the development on the conservation objectives of the SPA/Ramsar and their qualifying features. The report will consider potential effects both alone and in-combination with other relevant cumulative schemes.

7.5.7 The findings of the HRA screening will be submitted for consultation with Natural Resource Wales.

7.5.8 Should the screening report identify likely significant effects, an appropriate assessment (Stage 2 of the HRA process) will be required. The scope of any required further assessment will be identified within the screening report and agreed with Natural Resource Wales.

Biodiversity Net Gain

7.5.9 The proposed development is not currently committed to the principles of Biodiversity Net Gain (BNG) under Regulations 98 and 99, or Schedules 14 and 15, of the Environment Act 2021. Wider external MOD consultation has been undertaken on BNG within the Devolved Administrations and the original proposed strategy in relation to BNG has been amended. There is no indication that Welsh Government intend to adopt BNG at present. Currently it is proposed to proceed on the basis of development projects in Wales being subject to Net Benefits for Biodiversity. More information on this requirement can be found via CIEEM: https://cieem.net/wp-content/uploads/2022/08/Net-Benefits-briefing.pdf.

7.5.10 As part of the ongoing assessment work for the proposed development, there will be a consideration of providing biodiversity enhancements, as under the Environment (Wales) Act there is an enhanced biodiversity duty which includes consideration of ecosystem resilience. This will be considered further as part of the ES.

Climate Change Adaption and Resilience

7.5.11 Climate change is likely to affect biodiversity through changes to the timing of biological events (i.e. change in seasonality) (Thackeray, 2010), and through a shift in species range as a response to changes in precipitation or temperature (Chen, 2011) (Berry, 2005). These factors will have an influence on the future baseline environment

of the Cawdor Barracks site in a ‘do nothing’ scenario. Climate change will be considered in the ES by providing a description of the likely changes (such as those caused by possible changes to growing season, water flows, favorable weather) and how these affect the certainty of the impact assessments. Given the managed character of the Cawdor Barracks site, it is considered that human influences and decisions regarding biodiversity (for instance in implementing habitat management) are likely to mask the effects of climate change to some extent. The mitigation recommendations will acknowledge the need for enhancements to be appropriate to future climates.

7.6 References

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8 Landscape and Visual Impact

8.1 Introduction

8.1.1 This section of the Scoping Report identifies potential landscape and visual effects that are likely to occur during the construction and operation of the proposed development and outlines whether these will be addressed further in the Environmental Statement (ES).

8.1.2 The Landscape and Visual ES Chapter (referred to hereafter as the Landscape and Visual Impact Assessment (LVIA)) will be based upon the scope described within this Scoping Report and will further describe the baseline conditions and the methodology used to assess the effects of the proposed development.

8.1.3 It will address the landscape effects and visual effects separately, as recommended in the Guidelines for Landscape and Visual Impact Assessment (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013).

8.1.4 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

8.2 Baseline

Study area

8.2.1 Following initial desk-based studies, a study area covering a 5 km radius from the boundary of the Cawdor Barracks site has been selected. Any potentially significant landscape and visual effects are likely to be contained with a smaller 2 km radius from the Cawdor Barracks site boundary, however the selection of a larger study area ensures that all potentially significant landscape and visual effects are identified and takes into account the shape of the Cawdor Barracks site boundary which has a broadly north-south orientation.

General location and topographic context

8.2.2 Refer to Figure 8.1 for the Cawdor Barracks site's location context.

8.2.3 Cawdor Barracks is located in a rural and coastal location and the existing barrack buildings and infrastructure, including aircraft runways and accommodation buildings, comprise a notable built influence within the study area. The broader setting includes the Pembrokeshire coastal landscape to the south-west and undulating hills and valleys to the north, east and west. Settlement is generally sparse throughout the study area and is focused into small settlements, with the largest settlement

comprising the village of Solva located approximately 3 km west of the Cawdor Barracks site. Solva and Newgale, a village comprising a small number of properties located 1 km south of the Cawdor Barracks site, provide a local focus for recreational access to the coast. The Pembrokeshire Coast National Park, Pembrokeshire Coast Path National Trail, National Cycle Route 4 and Dewisland Cycle Trail all coincide with the study area.

8.2.4 the Cawdor Barracks site occupies a broad plateau landform as is typical of sites with aircraft runways and largely sits above the surrounding landscape of the study area. There is a very slight fall from the highest part of the Cawdor Barracks site, at the point at which the two runways converge within the centre of the Cawdor Barracks site , out towards its boundary edge. The midpoint of the Cawdor Barracks site peaks at around 110 m above ordnance datum (AOD); and the edges of the Cawdor Barracks site grade out at approximately 100 m AOD.

8.2.5 From the Cawdor Barracks site, the landform falls away to the north, east and west into a series of incised valleys ranging between 70 to 80 m AOD comprising the channels and tributaries of the River Solva to the west and Brandy Brook to the east. With regards occasional higher ground within the study area: a localised hill at 117 m AOD is located approximately 1 km to the east of the Cawdor Barracks site close to Trefgarn Owen. Just outside the study area, 4 km east of the Cawdor Barracks site, a ridgeline comprising Dudwell Mountain and Plumstone Mountain reach 178 m AOD.

Designations

8.2.6 The area approximately 200m to the south/southeast of the Cawdor Barracks site forms part of the Pembrokeshire Coast National Park, which in turn borders the South Pembrokeshire Heritage Coast. An area designated as a Landscape of Outstanding Interest, St David's Peninsula and Ramsey Head, is located approximately 4 km west of the Cawdor Barracks site. Consideration will also be given in the LVIA to other designated, recreation or policy areas as relevant to the study area, including:

- Conservation Areas
- Tree Preservation Orders
- Areas designed for recreational use

Landscape Character

National character context

8.2.7 The landscape character of the Welsh countryside has been described at a national level in Natural Resources Wales (NRW) National Landscape Character Areas (NLCA). The Cawdor Barracks site is located within NLCA 44: Taf and Cleddau Vales (NRW, 2014). The area immediately south of the Cawdor Barracks site associates with NLCA 43: West & North Pembrokeshire Coast (NRW, 2014). These areas will be reviewed fully as part of the LVIA.

Local character context

8.2.8 The focus of the landscape character will be at a local level to understand the key potential change to the landscape due to the proposed development. Local landscape character is described in the following:

- Pembrokeshire County Council Landscape Character Assessment (PCC LCA) (Consultation Draft) (Pembrokeshire County Council, 2019)
- Pembrokeshire Coast National Park Landscape Character Supplementary Planning Guidance (PCNP LCSPG) (Pembrokeshire Coast National Park Authority, adopted 2011)

8.2.9 The Pembrokeshire County Council (PCC) LCA identifies the Cawdor Barracks site as being located within Landscape Character Area 1: Treffynon, which is summarised as:

- "*This area generally comprises open rolling farmland of medium sized fields traversed by a network of lanes bordered by hedges/hedgebanks. Occasional small clumps of woodland and scrub belt exist throughout the area. Villages include the hilltop villages of Mathry, Croesgoch and Hayscastle Cross and Cawdor barracks at Brawdy (and the site of the former RAF Brawdy Airfield), as well as farmsteads and occasional hamlets. Several small-scale wooded valleys are relatively visually contained. The northern fringes and higher ground provide views to the coast. Brawdy former RAF base and airfield lies within the south-east of the area."*

8.2.10 The PCNP LCSPG identifies the Cawdor Barracks site as being located immediately north of LCA 12 St Bride's Bay and immediately northwest of LCA 13: Brandy Brook.

8.2.11 The special qualities of LCA12 St Bride's Bay character area are summarised as:

- *"This is a very large tract of landscape with a strong visual relationship to the coast from the broad views across St. Brides Bay and along the coastline, which is mostly undeveloped*
- *There is a high degree of exposure, especially along the higher ground and along the wide expanse of cobble beach that is Newgale Sands; there is more shelter within the lower areas of the rolling farmed landscape*
- *The sight and sound of this expanse of sea is a constant presence, a perception heightened by the sound of waves breaking onto the cobble beach when there is sufficient wind to raise the swell, and apparent in short, medium and long-distance views*
- *There are some landscapes of high ecological value with habitats of international importance*
- *The historical and archaeological features present result in a historical landscape with mostly high value and some outstanding value, which underpins the outstanding cultural value. The cultural value is further supported by the continuous tract of open access National Trust land along*

the northern stretch of coast running eastwards from Solva almost to the northern tip of Newgale Sands."

8.2.12 The special qualities of the LCA13 Brandy Brook character area are summarised as:

- *"This secluded area of low-lying wooded valleys cutting through rolling lowland is very settled sheltered, tranquil and inward-looking, with an intimate atmosphere in places*
- *There is a scattered settlement pattern consisting entirely of isolated farmsteads*
- *There is no link to the sea and views of the sea, although not far away, are only possible from the higher ground of the upper valley slopes. Views within the valley are generally short distance*
- *There is a strong visual relationship with the prominent local landmark of Roch Castle in the south-western corner of the LCA, which forms a skyline feature in many views from within the LCA*
- *There are some habitats of international importance, notably wet alder woodland as well as heathland and wet grassland areas*
- *The incidence of a number of historical and archaeological sites - especially the prehistoric survivals - results in a landscape of high historical value and outstanding cultural value."*

Visual Context

8.2.13 The broad plateau setting of the Cawdor Barracks site above a slightly lower surrounding landscape generally limits the potential for views across or into the Cawdor Barracks site but accentuates the potential for skylining of site buildings when viewed from the positions within the study area. Visibility of site buildings most immediately associates with views from minor roads passing close to the Cawdor Barracks site or from nearby isolated residential properties.

8.2.14 Tree cover is typically sparse but does include some small areas of woodland within and adjacent to the northern site boundary and which contribute to screening of the Cawdor Barracks site. More widely, tree cover grouped in plantations located around farmsteads and along valleys contribute to the filtering of views across an otherwise more typically open landscape. Hedgerow field boundaries, often combined with raised banks, notably limit views from roads and collectively break up views across the wider agricultural landscape.

8.2.15 The landscape setting to the south of the Cawdor Barracks site generally maintains its elevation through to the coastline before falling steeply down to sea level, therefore limiting intervisibility of the Cawdor Barracks site and its surroundings with the sea.

8.2.16 Views towards the Cawdor Barracks site within 2 km include from positions in the vicinity of Bwlch Mawr and Tremaenhir to the west, which comprise skyline views of the barrack buildings visible from minor roads, isolated properties and a small number

of footpaths. From the north and east, views towards the Cawdor Barracks site also comprise outlooks from minor roads, isolated properties and footpaths and notably from a local road immediately adjacent to the Cawdor Barracks site's eastern boundary which affords glimpses of the runway and site buildings.

8.2.17 Views from minor roads, scattered properties and footpaths on elevated ground 2 to 3 km north of the Cawdor Barracks site in the vicinity of Treffynnon and Treglemais include glimpsed views of site buildings set within an expansive landscape panorama.

8.2.18 Glimpsed views towards the Cawdor Barracks site are possible from within the Pembrokeshire Coast National Park and comprise positions along the coastal path 2 to 3 km southwest of the Cawdor Barracks site. From these positions the focus of the view is towards the sea and the inland view appears as an extensive panorama of rolling hills and scattered buildings. There is also a localised pocket of visibility at Penycwm (within 500 m south of the Cawdor Barracks site) and areas associated with elevated ground between Roch and Gignog 4 km east of the Cawdor Barracks site.

8.3 Receptors

Landscape receptors

8.3.1 Landscape receptors within the study area which may potentially be affected by the proposed development comprise the landscape character areas described within this scoping report. The LVIA will consider the landscape effects of the proposed development on these landscape areas as part of the detailed assessment process, including site studies.

Visual receptors

8.3.2 The visual receptors are people who would be affected by changes in views or visual amenity at different places, and they are usually grouped by what they are doing at that place (residents, motorists and recreational users). Effects on visual receptors will be supported by assessment viewpoints.

8.3.3 The key visual receptors which have the potential for views of the Cawdor Barracks site and will be considered in the LVIA are:

- Residents of properties in settlement groups closest to the Cawdor Barracks site at Penycwm, Trefgarn Owen, Llandeloy and at greater distance from the Cawdor Barracks site at Tryffynon and Roch;
- Residents of individual properties scattered throughout the study area, sometime in small clusters, or hamlets;
- Residents of properties, users of rights of way and users of roads within the Pembrokeshire Coast National Park;
- Positions used by recreational receptors along the Pembrokeshire Coast Path National Trail (and associated land-based interface with Pembrokeshire Heritage Coast);

- Recreational accommodation (holiday parks) and visitor facilities with discernible views of the Cawdor Barracks site;
- Positions within the eastern extent of St Davids Peninsula and Ramsey Head Landscape of Outstanding Interest;
- Users of National Cycle Network Route 4;
- Users of the Dewisland cycle trail; and
- Users of other rights of way within the study area with discernible views of the Cawdor Barracks site.

Representative viewpoints

8.3.4 The visual assessment will include the assessment of visual effects on a set of viewpoints which have been selected as they are representative of typical views of the Cawdor Barracks site from within the study area. Proposed representative viewpoints are illustrated on Figure 8.1 and listed in Table 8.1.

8.3.5 The ten viewpoints which have been identified have been informed by desktop Zone of Theoretical Visibility (ZTV) analysis and review of Google Earth aerial and street view imagery. Given the early stage of design development, the ZTV has been based on the 20 m height of a typical proposed structure as part of the proposed development. The ZTV is shown on Figure 8.1.

8.3.6 PCC have been contacted separately with the list of 10 representative viewpoints and, at the time of writing, they have yet to be agreed as the basis for assessment.

TABLE 8.1: PROPOSED REPRESENTATIVE VIEWPOINT LOCATIONS

No.	Name	Location	Reason for selection and notes
1	Ty Dewi	SM 83091 25276	Representative of residents/recreational users of the accommodation in the holiday park at Ty Dewi, users of National Cycle Network Route 4 and road users
2	Pembrokeshire Coast Path National Trail	SM 82217 23336	Representative of recreational users of the coastal path
3	Penycwm (within National Park)	SM 84990 23222	Representative of residents of properties at Penycwm, users of National Park, users of National Cycle Network Route 4 and road users
4	Brawdy Cottage (on edge of National Park)	SM 85838 24096	Representative of residents of the property at Brawdy Cottage and residents/recreational users of the accommodation in the holiday park
5	North of Roch Castle	SM 88015 21515	Representative of guest occupants and residents of Roch Castle Hotel, residents of properties in Roch and recreational users of footpath PP80/16/1
6	Country Lane Curlew's Rise	SM 84282 26173	Representative of residents of properties at Curlew's Rise and road users

No.	Name	Location	Reason for selection and notes
7	Dewisland Cycle Trail	SM 84627 26828	Representative of recreational users of the Dewisland cycle trail and road users
8	Trefaner Farm Bridleway PP39/9/3	SM 85200 26480	Representative of residents of properties at Trefaner Farm and recreational users of bridleway PP39/9/3
9	Llandeloy Footpath PP39/11/1	SM 85951 27182	Representative of recreational users of footpath PP39/11/1, residents of properties at Llandeloy and road users
10	Tregarn Owen Footpath PP5/16/1	SM 86715 25491	Representative of residents of properties at Tregarn Owen, recreational users of footpath PP5/16/1 and road users

8.3.7 A selection of the final viewpoints will be supported in the LVIA by the production of photomontages (also referred to as photo-realistic visualisations). The exact number and location of the photomontages will be agreed with PCC once initial assessments have been carried out to ensure that the viewpoints selected represent the key visual effects of the proposed development. Viewpoint photos and photomontages will be presented based on winter season photography which is considered to be a 'worse case' in terms of visibility of a proposed development as trees are not in lead during winter months, increasing the likelihood of views across a landscape.

8.4 Scoping of impacts

8.4.1 Table 8.2 and Table 8.3 present a summary of the impacts which are scoped into the assessment. The impacts below are considered to have the potential for significant landscape and visual effects and are therefore scoped in to the LVIA.

TABLE 8.2: POTENTIAL LANDSCAPE AND VISUAL IMPACTS - CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Earthworks associated with access, regrading of levels and storage of stripped materials	Yes	Temporary landscape character effects, including potential loss or change to landscape features, and visual effects
The presence of compounds and other construction equipment including hoardings, cranes and plant	Yes	Temporary landscape character effects, including potential loss or change to landscape features, and visual effects

TABLE 8.3: POTENTIAL LANDSCAPE AND VISUAL IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Permanent removal or change to existing built infrastructure on site and the introduction of new buildings and structures	Yes	The proposed development is likely to give rise to landscape character effects and visual effects. Effects will be assessed at opening year of the proposed development and 15 years post-completion, once any associated mitigation planting has reached a reasonable level of maturity such that it provides the mitigation function as designed
Permanent changes to landscape features on site, including vegetation cover	No	Taller vegetation on site is limited to areas along the Cawdor Barracks site boundary and it is not expected that the proposed development would require any substantial vegetation clearance other than grassland areas. The footprint of the works will be minimised as far as possible as the design progresses and where possible areas of hard standing would be used during construction and to locate the permanent development. There may be some localised vegetation clearance required at the temporary construction access point, however this will be limited. Therefore effects of changes to vegetation cover on the site will not be assessed further within the LVIA.
Permanent landform changes	No	No notable changes to the landform of the site are required as part of the proposed development and therefore effects of changes to landform on the site will not be assessed further within the LVIA.
Permanent influence of the proposed development on seascape	No	Due to the limited inter-visibility between the Cawdor Barracks site and seascape the potential for seascape or visual effects to arise from the proposed development is considered to be not significant. The impact of the development on the coastal landscape character is scoped into the assessment.

8.4.2 In recognition that the proposed development occupies a relatively open site and will result in the introduction of notable permanent built infrastructure, the assessment of Landscape and Visual effects is to be scoped into the EIA. The scope of assessment does not include for Seascape based on the physical and visual separation between the Cawdor Barracks site and sea environment. While the landscape character of the Cawdor Barracks site and study are partly defined by the position beside the Pembrokeshire Coast and there is potential for effects on landscape character areas which are influenced by the coastline, there is sufficient separation from the Cawdor Barracks site that there would be seascape effects which comprise a more direct impact on the sea environment.

8.5 Methodology for Impact Assessment

Introduction

8.5.1 The purpose of the LVIA is to identify and describe the likely landscape and visual effects of a development and to determine if they would be significant. The LVIA will

consider the effects of the proposed development on both the landscape as an environmental resource and on people's visual amenity. The intended use of this environmental information is to inform stakeholders and to assist decision making. An LVIA is undertaken in a sequence of iterative stages:

- Identification of aspects of the development that may give rise to significant effects on the landscape resource or on visual amenity;
- Description of baseline landscape and visual conditions. For the landscape assessment this provides an understanding of the character and value of the landscape resource and for the visual assessment this identifies the people in specific locations that may be visually affected;
- Identification of the landscape and visual receptors that may be affected by the development and an initial assessment of the likely significant effects upon them;
- With regard to lighting impacts, reference will be made to a Lighting Assessment which will be undertaken as a standalone technical assessment and will be appended to the ES.
- Identification of mitigation and enhancement measures appropriate to the development and its landscape context; and
- Assessment of the residual landscape and visual effects of the development incorporating mitigation and categorisation of their significance to decision makers.

*8.5.2 **Guidance***

8.5.3 LVIA does not follow prescribed methods or criteria. The LVIA will be based on the principles established and broad approaches recommended in the following documents:

- Landscape Institute and Institute of Environmental Management and Visual Impact Assessment (2013) *Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3)*
- Natural Resources Wales (2022) *Using LANDMAP in Landscape and Visual Impact Assessment GN46*
- Landscape Institute (2019) *Visual Representation of Development Proposals Technical Guidance Note*

*8.5.4 **Methodology***

8.5.5 The following comprises a brief overview of the proposed methodology for the LVIA. The methodology will involve desk study, field work and well-established assessment techniques to determine levels of effect and significance. A more detailed methodology will be provided within the LVIA.

8.5.6 The aim of the landscape assessment is to report on the potential effects of the proposed development on the distinctive character of the landscape and the characteristics that contribute to this, including physical features and aesthetic / perceptual aspects. The aim of the visual assessment is to report on the potential effects of the proposed development on views and how this affects the visual amenity of viewers.

8.5.7 The LVIA will be carried out in accordance with the principles contained in the GLVIA3 and visualisations will be produced in accordance with the Visual Representation of Development Proposals Technical Guidance Note (Landscape Institute, 2019).

8.5.8 A detailed analysis of the baseline landscape, views and visual amenity will be undertaken using OS maps, field survey and relevant published documents including previously mentioned landscape character assessments, and national and local planning policy documents.

8.5.9 The significance of effects assessed will be a result of the nature of the landscape and visual receptors (sensitivity) and the nature of the effect on those receptors (magnitude).

8.5.10 The sensitivity of the receptors will be derived from the detailed assessment of their susceptibility and value. The magnitude of change will consider the size/scale of change, the geographical extent over which the change will be likely to be experienced, and the duration of the change.

8.5.11 The overall assessment of the significance of effect will be the result of professional judgement drawing on guidance provided in GLVIA3. A numerical or formal weighing system will not be applied. Instead, consideration of the relative importance of each aspect will be made to feed into the overall decision which will be described fully.

8.5.12 Levels of significance will be identified as negligible, minor, moderate or major. Moderate and major effects will be considered ‘significant’ in EIA terms.

8.5.13 The nature of effect (beneficial, adverse or neutral) will be determined in relation to the degree to which the proposed development fits with the landscape character and the contribution to the landscape that the proposed development makes as well as how well the proposed development fits with the view and the contribution to visual amenity that the proposed development makes.

8.5.14 The LVIA process will also identify measures for avoiding and mitigating potential adverse effects, feed these into the project design and assess the residual effects and their significance. Inputs to the design will aim to minimise adverse effects and maximise beneficial effects on the landscape and on people’s views. In recognition that the proposed development is located within the open extents of an existing airfield, the potential for landscape and visual mitigation will typically be focused on informing the siting of infrastructure as part of the design layout.

8.5.15 The assessment of landscape and visual effects will include consideration of the following:

- Seasonal differences with or without the proposed development including summer with the screening effects of foliage and winter without foliage (visual assessment only);
- The effect of change or loss of existing landscape features (e.g. loss of existing vegetation);
- The effect of temporary construction activity (e.g. presence of plant, temporary buildings, materials storage, and construction traffic parking and movements);
- The effect of the introduction of new associated infrastructure (e.g. antennae, buildings, fencing and lighting); and
- Both day and night-time situations with or without the proposed development.

8.5.16 The assessment will likely consider the effects of the proposed development at the following specific points in time:

- Construction; short term (temporary) effects;
- Opening year (or Year 1); short term effects. The visual assessment will consider both winter and summer effects and the description of each effect includes reference to key differences in seasonal effects where applicable. However, the judgement with regards the level and significance of effect on each visual receptor will refer to winter. Visual effects experienced during winter months are considered to be the 'worst-case' in assessment terms as trees are without leaf and visibility tends to be more open; and
- Fifteen years following opening year (or Year 15); long term (residual) effects. This is also referred to as the 'design year' as mitigation proposed would have gained a relative stage of maturity such that it would effectively mitigate effects. Similar to the Year 1 assessment, reference will be made to visual effects at Year 15 during both summer and winter and the focus of this assessment is the extent to which proposed mitigation planting would have established and the subsequent change in effects during both seasons, albeit with the level and significance of effect on each visual assessed as a worst-case during winter.

8.5.17 However, once LVIA studies are underway and if planting to mitigate landscape and visual effects around the Cawdor Barracks site is not proposed, for example if the landscape character of the study area doesn't suggest planting is an appropriate response, the above staged assessment approach may be simplified to two stages of assessment: temporary construction effects; and permanent operational effects. Year 15 assessment is only beneficial to an assessment where the establishment of planting is required to be taken into account with regards residual effects.

8.5.18 Any required landscape and visual mitigation will be designed to mitigate effects during both summer and winter, albeit it is acknowledged that this tends to be more effective during summer when trees are in leaf. The depth of planting proposed in key locations where visual effects are identified will be designed to be sufficient to mitigate visual effects during both seasons.

8.5.19 The landscape assessment will not take into account seasonality; however, reference may be made to the seasons where seasonal changes over a calendar year form a distinct part of the landscape character.

8.5.20 With regards the proximity of the Cawdor Barracks site to the coastline, the landscape assessment will consider the effects of the proposed development on landscape character as described in the earlier 'Landscape Character' section of this report (8.2.7). The landscape character assessment will therefore inherently consider the effects of the development on the coastal landscape. However, a Seascape Character Assessment has been scoped out of the assessment as the development is set sufficiently inland and is of a small enough scale that it would not give rise to significant seascape effects.

8.5.21 The potential for phased construction has yet to be confirmed. The LVIA will assess the operational landscape and visual effects of the proposed development as a single development. However, clear reference will made to the components of the proposed development which give rise to key effects and, following the assessment of residual effects, a section will be included which presents a narrative discussion on the link between the landscape and visual effects and any phasing of development.

8.6 Climate Change Adaptation and Resilience

8.6.1 Climate change is not considered to result in a material impact on the significance of landscape or visual effects.

8.7 Referencing

National Landscape Character Areas 44: Taf and Cleddau Vales (Natural Resources Wales, 2014)

National Landscape Character Areas 43: West & North Pembrokeshire Coast (Natural Resources Wales, 2014)

Pembrokeshire County Council Landscape Character Assessment (Consultation Draft) (Pembrokeshire County Council, 2019)

Pembrokeshire Coast National Park Landscape Character Supplementary Planning Guidance (Pembrokeshire Coast National Park Authority, adopted 2011)

Guidelines for Landscape and Visual Impact Assessment (GLVIA3) (Landscape Institute and Institute of Environmental Management and Assessment, 2013)

Natural Resources Wales (2022) *Using LANDMAP in Landscape and Visual Impact Assessment GN46*

Visual Representation of Development Proposals Technical Guidance Note 06/19 (Landscape Institute, 2019)

9 Archaeology and Built Heritage

9.1 Introduction

9.1.1 This chapter sets out cultural heritage receptors of relevance to the proposed development an provides details of the proposed approach to the assessment of potential impacts on archaeology and built heritage during construction and operation.

9.1.2 The archaeology and built heritage assessments are currently being undertaken and information is presented in this chapter where available.

9.1.3 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

9.2 Baseline

9.2.1 Baseline conditions are currently being gathered and have been informed by an initial interrogation of the Historic Environment Record (HER), data held on the National Historic Assets of Wales (Cof Cymru) database, site walkovers and other sources available online. An archaeological desk-based assessment (DBA) and historic environment settings assessment will be produced and included as technical appendices with the ES chapter.

9.2.2 The earliest evidence of activity within the Study Area dates to the Bronze Age and is effectively limited to isolated stone tool finds and standing stones. By the Iron Age, however, there is definitive evidence of activity and occupation in the form of two now scheduled monuments both of which relate to defended enclosures. These enclosures are formed of above ground earthworks of banks and ditches and have significant potential for important archaeological remains which would serve to enhance the knowledge of settlement and organisation during the Iron Age and throughout the Roman invasion.

9.2.3 Evidence from cropmarks visible on aerial photographs also indicates the presence of a number of other smaller areas of activity dating to the Iron Age which suggests the use of the wider landscape, and a broader relationship between those living within the defended enclosures and those outside. The landscape around the Cawdor Barracks site holds evidence for continued occupation throughout the Anglo-Saxon period through to the present. Excavations at bawdy castle found part of a clay bellow protector which dated to the early medieval period, and had at that point in 1989, only been found on sites in Ireland and on contemporary Irish sites in Scotland and on the Isle of Man.

9.2.4 Through the medieval and post-medieval periods, the information within the HER is indicative of a rural landscape with a number of small settlement centres serving as the focal points for the wider communities. This landscape has for the most part remained in continuous use for agriculture to the present day.

9.2.5 The Cawdor Barracks site area covers Cawdor Barracks which is currently home to the Royal Signals but was originally an RAF station opened in early 1944 as a satellite station for the nearby RAF St Davids. The station was operational until 1995, changing hands between the RAF and the Royal Navy a number of times.

9.3 Receptors

9.3.1 As the baseline collection phase is ongoing, the following summary is incomplete and will be refined and expanded throughout the assessment phase.

Within the Cawdor Barracks site

9.3.2 The following heritage assets located within the Cawdor Barracks site have been identified as susceptible to receiving a direct impact, and a potential likely significant effect, during the construction phase of the proposed development:

- Archaeological remains recorded by the Historic Environment Record (HER); and
- As yet unknown archaeological remains.

Outside the Cawdor Barracks site

9.3.3 A list of designated heritage assets located within a 5 km Study area around the Cawdor Barracks site is included as Appendix B.

9.3.4 Based on the emerging refinement process, the following heritage assets located outside the Cawdor Barracks site have been identified as susceptible to receiving an indirect impact, and a potential likely significant effect. These are scoped in for further assessment, during the operation of the proposed development:

- The St David's Peninsula and Ramsey Head Historic Landscape Area (HLW (D) 4);
- The Scheduled Brawdy Promontry Fort (2731);
- The Scheduled Bay View Farm Defended enclosure (1365);
- The Grade I listed Roch Castle (11982);
- The Grade II* listed Rickeston Hall (13077);
- The Grade II* Church of St David (14396);
- The Grade II listed Llethr (14405);
- The Grade II listed U-Plan Farmhouse Ranges at Rickeston Hall (13079);

- The Grade II listed Carriage-House at Rickeston Hall (13080);
- The Grade II listed Paran Chapel (12473); and
- The Grade II listed Church of St Teilo (14397).

9.3.5 Further refinement and expansion of this list of assets will be undertaken within the Historic Environment Settings Assessment to be included as a technical appendix to the ES. Assets may also be added to this list following consultation with the relevant stakeholders.

9.4 Scoping of Impacts

9.4.1 Table 9.1 and Table 9.2 present a summary of the scoping. They identify which likely environmental effects, with respect to Archaeology and Built Heritage will be assessed in the EIA (i.e. considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e. scoped out).

TABLE 9.1: POTENTIAL ARCHAEOLOGY AND BUILT HERITAGE IMPACTS - CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Physical impact to known and unknown archaeological remains through construction works e.g. landscaping, service excavation, new foundations etc.	Yes	Direct impacts are those caused by physical disturbance associated with the proposed development and generally occur during the construction phase through activities including, but not limited to: • Ground reduction; • Topsoil stripping; • Establishment of compounds and haul roads; • Construction of foundations; • Piling; • Hard and soft landscaping; • Establishment of ecological mitigation areas; and • General construction activities which require excavation.
Harm to the significance of a designated heritage asset through physical impacts from construction e.g. demolition, refurbishment or alteration	No	No works associated with the proposed development are planned to take place which would lead to any physical impact, up to and including complete removal, on any designated heritage asset.
Harm to the significance of a non-designated heritage asset through physical impacts from construction e.g. demolition, refurbishment or alteration	No	No works associated with the proposed development are planned to take place which would lead to any physical impact, up to and including complete removal, on any non-designated heritage asset.
Harm to the significance of a designated heritage asset through an alteration of its setting	No	Indirect impacts can occur from a change of setting brought about through the finished built form of the proposed development. Any potential impacts brought about in this way are therefore considered to be from the operational phase.

Potential Impact	To be assessed in EIA	Reason
Indirect impacts to non-designated heritage assets within the 1 km Study area	No	Indirect impacts can occur from a change of setting brought about through the finished built form of the proposed development. Any potential impacts brought about in this way are therefore considered to be from the operational phase. A 1 km Study area for such effects has been deemed proportionate for this assessment due to the nature of the proposed development and the topographical form of the Cawdor Barracks site.
Indirect impacts to designated heritage assets within the 5km Study area	No	Indirect impacts can occur from a change of setting brought about through the finished built form of the proposed development. Any potential impacts brought about in this way are therefore considered to be from the operational phase. A 5 km Study area for such effects has been deemed proportionate for this assessment due to the nature of the proposed development and the likely potential for these assets to share any relationship with the Cawdor Barracks site.

TABLE 9.2: POTENTIAL ARCHAEOLOGY AND BUILT HERITAGE IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Physical impact to known and unknown archaeological remains during operation	No	Any potential impacts to both known and unknown archaeological remains will occur during construction.
Harm to the significance of a designated heritage asset through physical impacts from construction e.g. demolition, refurbishment or alteration	No	All physical effects will occur during the construction phase, no additional impacts will occur during operation
Harm to the significance of a non-designated heritage asset through physical impacts from construction e.g. demolition, refurbishment or alteration	No	All physical effects will occur during the construction phase, no additional impacts will occur during operation
Harm to the significance of a designated heritage asset through an alteration of its setting	Yes	Indirect impacts are caused by the introduction of development into the landscape where that development can alter the way that landscape is understood and where it can alter how heritage assets are appreciated and understood. Indirect impacts generally occur during the operation phase where the completed development form is present within the landscape. These impacts are often through a visual alteration, although can be through the alteration of a non-visual relationship which is deemed important to the heritage significance of an asset. It is important to note that the mere presence of a development within the visual range of an asset is not sufficient on its own to have an impact on the heritage significance of an asset. This must be determined in relation to the heritage significance of that asset and how that visual relationship is important to that heritage significance.

Potential Impact	To be assessed in EIA	Reason
Indirect impacts to non-designated heritage assets within the 1 km Study area	Yes	Indirect impacts can occur from a change of setting brought about through the finished built form of the proposed development. Any potential impacts brought about in this way are therefore considered to be from the operational phase. A 1 km Study area for such effects has been deemed proportionate for this assessment due to the nature of the proposed development and the topographical form of the Cawdor Barracks site.
Indirect impacts to designated heritage assets within the 5km Study area	Yes	Indirect impacts can occur from a change of setting brought about through the finished built form of the proposed development. Any potential impacts brought about in this way are therefore considered to be from the operational phase. A 5 km Study area for such effects has been deemed proportionate for this assessment due to the nature of the proposed development and the likely potential for these assets to share any relationship with the Cawdor Barracks site.

9.4.2 Archaeology and Built Heritage is to be scoped into the EIA.

9.5 Methodology for Impact Assessment

Relevant legislation, policy and guidance

9.5.1 The relevant legislation, planning policy and guidelines which underpin the assessment methodology for archaeology and built heritage are outlined below:

Legislation

9.5.2 The following legislation underpins the assessment of archaeology and built heritage within the planning process:

- Ancient Monuments and Archaeological Areas Act 1979 (amended by the National Heritage Act 1983 and 2002);
- Planning (Listed Buildings and Conservation Areas) Act, 1990; and
- Protection of Military Remains Act 1986

Policy

9.5.3 The following national and local planning policies of relevance to the proposed development and the archaeology and built heritage assessment have been considered:

National

- Planning Policy Wales 2021 (Section 6, Sub-Section 6.1: Distinctive and Natural Places, the Historic Environment); and
- Technical Advice Note (TAN) 24: The Historic Environment.

Local

- Pembrokeshire County Council Local Development Plan (adopted 2013), Policy GN.38 Protection and Enhancement of the Historic Environment.

Guidance

9.5.4 The following guidance will be used for the archaeology and built heritage assessment:

- Standards and guidance for historic desk-based assessment (CiFA 2020);
- Conservation Principles for the Sustainable Management of the Historic Environment In Wales (CADW 2011);
- Setting of Historic Assets in Wales (CADW 2017a);
- Heritage Impact Assessment in Wales (CADW 2017b); and
- Managing Historic Character in Wales (CADW 2018).

Study Area

9.5.5 The following Study areas are proposed to conduct the desk-based elements of the archaeology and built heritage assessment which have been set out in line with industry best practice and with regard to the nature of the known evidence base. The use of these Study areas will be subject to agreement from the relevant stakeholders:

- A 1 km buffer around the Cawdor Barracks site to provide adequate context to sufficiently assess the potential for impacts to archaeological remains (known and unknown) during the construction of the proposed development; and
- A 5 km buffer around the application area to capture designated heritage assets for which there is a potential for a likely significant effect (upon their Heritage Significance) through a change in their setting.

Consultation

9.5.6 The following stakeholders will be consulted regarding archaeology and built heritage:

- CADW with regard to the scope of the assessment in relation to the setting of designated heritage assets;
- The Heritage Management Team at Dyfed Archaeological Trust who provide archaeological advice to PCC; and
- The Conservation Officer at PCC regarding the assessment of the built environment including designated heritage assets, non-designated heritage assets and Conservation Areas; and
- Any additional stakeholders identified following the review of the scoping

Assessment Methodology

9.5.7 The archaeology and built heritage assessment will be undertaken in line with industry standards and guidance, in accordance with national and local planning policy and using professional judgement throughout.

9.5.8 The methodology listed below takes account of the elements noted above to provide a robust and proportionate assessment and will be supported by a range of technical appendices setting out an extensive baseline which will underpin the assessment.

Sources of information

9.5.9 The following data sources will be consulted as part of the assessment to 100haracterize the existing historic environment with respect to archaeology and built heritage:

- The Dyfed Archaeological Trust Historic Environment Record (HER);
- CADWs list of designated heritage assets, including Scheduled Monuments, Listed Buildings, Gardens and Designed Landscapes and Historic Battlefields;
- Satellite imagery available online;
- Light Detection and Ranging data accessed via the Natural Resources Wales; and
- Historic maps available online.

9.5.10 The surveys that will be undertaken to inform the assessment, in accordance with industry guidelines and in consultation with historic environment stakeholders, include:

- site walkovers;
- dedicated settings assessment visits; and
- a geophysical survey.

9.5.11 All surveys will be carried out by qualified archaeologists as per the requirements of the CiFA which is noted within the guidance in 9.5.4.

Supporting technical documents

9.5.12 The archaeology and built heritage assessment will be supported by the following technical appendices:

- An Archaeological Desk- based assessment (DBA);
- A Historic Environment Settings Assessment; and

- The results of a geophysical survey.

9.5.13 The data gathered during the DBA and the assessment made of the potential for impacts to any known or unknown archaeological remains will be used during the design process to inform the location of infrastructure, including associated cable routes.

9.5.14 The geophysical survey will be undertaken across as much of the Cawdor Barracks site as possible in order to identify any anomalies which could potentially represent buried archaeological remains.

9.5.15 A Written Scheme of Investigation (WSI) setting out the proposed methodology for the geophysical survey will be submitted to and agreed by the archaeological advisors for PCC prior to commencement.

Criteria for determining sensitivity of receptor

9.5.16 Significance in relation to the value of a heritage asset will be referred to throughout this Scoping Report and the archaeology and built heritage assessment as 'heritage significance'.

9.5.17 The value of a heritage asset is determined through the sum of its values based on the criteria provided by CADW's Conservation Principles. Within this document, heritage significance is weighed by consideration of the potential for the asset to demonstrate the following value criteria:

- **Evidential value** - Deriving from the potential of a place to yield evidence about past human activity;
- **Historical value** - Deriving from the ways in which past people, events and aspects of life can be connected through a place to the present.
- **Aesthetic value -** Deriving from the ways in which people draw sensory and intellectual stimulation from a place; and
- **Communal value** - Deriving from the meanings of a place for the people who relate to it, or for whom it figures in their collective experience or memory. For the purposes of the archaeology and built heritage assessment, designation status is used a as proxy for heritage significance as these hold and inherent heritage significance which justified its designation.

9.5.18 For the purposes of the archaeology and built heritage assessment, designation status is used as a proxy for heritage significance as these hold an inherent heritage significance which justified its designation.

9.5.19 This determination is further justified through the legal protection afforded to the designations and their meaning in terms of the application of planning policy.

9.5.20 Using this proxy criteria in addition to national planning policy and guidance and through professional judgment, Table 9.3 has been amended and adapted to encompass both designated heritage and non-designated heritage assets.

9.5.21 With regard to heritage significance there is an explicit distinction between that heritage significance and its 'sensitivity to change'. Some assets of the highest designation will not be sensitive to the types of changes proposed, whilst others will be more so. This will be assessed on a case-by-case basis in the assessment text for each asset, as appropriate.

TABLE 9.3: LEVELS OF HERITAGE SIGNIFICANCE

Heritage Significance	Description
High	World Heritage Sites Scheduled Monuments Grade I and II* listed buildings Grade II listed buildings which can be shown to have exceptional qualities in their fabric or historical association Registered Battlefields Grade I and II* Registered Parks and Gardens Non-designated assets of equivalent heritage significance which are potentially nationally important.
Medium	Grade II listed buildings Regionally important archaeologically features and areas (as defined in the HER) Conservation Areas, which are considered regionally important.
Low	Sites and features noted as locally important in the HER, other non-designated features of heritage significance.
Negligible	Assets compromised by poor preservation and/or poor contextual association, or very common archaeological features/buildings of little or no value at local or other scale

9.5.22 While the categorisation of listed buildings by CADW implies different levels of heritage significance, as reflected in Table 9.3, all listed buildings are afforded the same level of legal protection.

9.5.23 Table 9.3 nominally sets out heritage significance levels, professional judgement will be used in determining heritage significance. Where assets are placed in a different category to those set out above, a rationale and justification will be made explicit in the assessment text, where relevant.

Criteria for assessing magnitude of change

9.5.24 Magnitude of change will be assessed through the nature of a predicted impact, which is broken down in Table 9.4.

9.5.25 Direct impacts are permanent, as the loss of archaeological assets or historic buildings cannot be replaced or recreated while damage to archaeological assets cannot be repaired.

9.5.26 Indirect impacts can occur through changes in setting (arising from visual intrusion, alteration of townscape etc.) which may cause a reduction in the contribution that setting makes to an asset's heritage significance, so as to diminish that asset's overall heritage significance, and/or affect the ability to experience and appreciate that heritage significance.

TABLE 9.4: MAGNITUDE OF CHANGE

Level of impact	Description
High	Total loss of or major physical damage to or significant alteration to a site, building or other feature. Extensive change (e.g. loss of dominance, intrusion on key view or sightline) to the setting of a scheduled monument, listed building or other feature registered as nationally important, which may lead to a major reduction in the contribution of that setting to the heritage significance of the asset so that the asset loses heritage significance, and a major reduction in the ability to experience and/or appreciate that heritage significance.
Medium	Damage or alteration to a site, building or other feature. Encroachment on an area considered to have a high archaeological potential. Change in setting (e.g. intrusion on designed sight-lines and vistas) to monuments / buildings and other features, which may lead to a moderate reduction in the contribution of that setting to the heritage significance of the asset. Change/reduction in the ability to experience/appreciate that heritage significance.
Low	Minor damage or alteration to a site, building or other feature. Encroachment on an area where it is considered that low archaeological potential exists. Minor change in setting (e.g. above historic skylines or in designed vistas) of Monuments, Listed Buildings, sites and other features, which may lead to a small reduction in the contribution the setting makes to the heritage significance of the heritage asset, and limited loss of heritage significance. Limited change in or reduction of the ability to experience or appreciate the heritage significance of an asset.
Negligible	No physical effect. No change in setting with no change in the contribution that setting makes to the heritage significance of the asset. No change in the ability to experience or appreciate the heritage significance of the asset.

Criteria for assessing significance

9.5.27 The predicted significance of effect will be determined through a standard method of assessment based on professional judgement, considering both the heritage significance of the asset and the magnitude of change as detailed in Table 9.5 below.

9.5.28 Major and moderate effects are considered significant in the context of the EIA Regulations while minor and negligible effects are considered not significant.

9.5.29 Effects can be beneficial or adverse and permanent or temporary, where temporary makes reference to effects limited to the construction phase of the proposed development.

9.5.30 All effects derived from direct impacts are permanent while those derived from indirect impacts are long term, but fully reversible upon.

TABLE 9.5: SIGNIFICANCE OF EFFECT

Heritage Significance	Magnitude of change			
	High	**Medium**	**Low**	**Negligible**
High	Major	Major	Moderate	Negligible
Medium	Major	Moderate	Minor	Negligible
Low	Moderate	Minor	Minor	Negligible
Negligible	Negligible	Negligible	Negligible	Negligible

Mitigation

9.5.31 Where the proposed development is predicted to have an effect on the heritage significance of a heritage asset, mitigation can be applied to lessen or remove that effect entirely.

9.5.32 For effects derived from direct impacts, the primary mitigation measure is avoidance of physical disturbance through design.

9.5.33 Where avoidance is not possible, mitigation measures may include set piece archaeological excavations where remains of sufficient heritage significance are present.

9.5.34 Mitigation measures for indirect impacts during operation are exclusively set out in the design for the proposed development by way of the placement of the constituent elements and through the provision of screening either through mature vegetation or other means. No additional mitigation measures can be applied to limit indirect impacts once construction is complete.

Limitations and assumptions

9.5.35 Data used to compile the assessment consists of information derived from a variety of sources, only some of which can be directly examined for the purposes of the assessment. The assumption is made that this data, as well as that derived from other secondary sources, is reasonably accurate.

9.5.36 The Historic Environment Record is not a record of all surviving heritage assets, but a record of the discovery of a wide range of archaeological and historic components of the historic environment. The information held within it is not complete and does not preclude the subsequent discovery of further elements of the historic environment that are, at present, unknown.

9.6 Climate Change Adaptation and Resilience

9.6.1 Climate change is not considered to result in a material impact on the significance of archaeology and built heritage effects.

9.7 References

Cadw 2011. Conservation Principles for the Sustainable Management of the Historic Environment in Wales. Available at: https://cadw.gov.wales/sites/default/files/2019-05/Conservation_Principles%20for%20the%20sustainable%20managment%20fo%20the%20historic%20environment%20of%20Wales.pdf

Cadw 2017a. Technical Advice Note 24: The Historic Environment. Available at: https://gov.wales/sites/default/files/publications/2018-09/tan24-historic-environment.pdf

Cadw 2017b. Setting of Historic Assets in Wales. Available at: https://cadw.gov.wales/sites/default/files/2019-05/Setting%20of%20Historic%20Assets%20in%20Wales%20EN.pdf

Cadw 2017c. Heritage Impact Assessment in Wales. Available At: https://cadw.gov.wales/advice-support/placemaking/heritage-impact-assessment/heritage-impact-assessment

Cadw 2018. Managing Historic Character in Wales. Available at: https://cadw.gov.wales/advice-support/placemaking/historic-character/managing-historic-character

Chartered Institute for Archaeologists (CIfA; 2020). Standards and guidance for historic environment desk-based assessment. Available at: https://www.archaeologists.net/sites/default/files/CIfAS%26GDBA_3.pdf

10 Ground Conditions and Contaminated Land

10.1 Introduction

10.1.1 This chapter of the Scoping Report identifies potential impacts with regard to ground conditions that may occur during the demolition of existing structures and buildings, construction and operation of the proposed development and outlines how these will be addressed in the ES.

10.1.2 It assesses both human health and environmentally sensitive receptors from the presence of contaminated land (soil and groundwater) including ground gases / vapours. This chapter also identifies the potential impacts and related effects associated with the proposed development on materials and waste. Wastewater has been assessed within Chapter 11 - Water Environment, Flood Risk and Drainage.

10.1.3 The Cawdor Barracks site location is shown on Figure 1.1 and includes the airfield and technical area. The airfield and Airfield Operating Surfaces (AOS) are now redundant and no longer maintained. The technical area includes buildings and infrastructure associated with technical, domestic and administrative site use.

10.1.4 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

10.2 Baseline

Background

10.2.1 A Stage 1: Phase 1 Land Quality Assessment (LQA) was prepared in 2023 (Sweco, 2023, Appendix C). This report included a review of third-party regulatory data (Landmark Envirocheck Report dated December 2022), a previous Phase 1 LQA report by Entec UK Ltd (Entec, 2011) and two phases of intrusive investigation which were reported by Amec Environment & Infrastructure UK Ltd in 2012 and by Amec Foster Wheeler in 2015.

10.2.2 The 2023 Phase 1 LQA for the Cawdor Barracks site (Appendix C) included an assessment of the airfield and technical area (including barracks accommodation). These areas are referenced in this Scoping Report and will be referenced in the subsequent ES.

10.2.3 The study area for the purpose of assessing materials and waste is the Cawdor Barracks site. The expansive study area for non-hazardous waste (including inert waste) is defined as waste infrastructure capacity in the southwest region of Wales. The study area for hazardous waste is defined as the hazardous waste landfill void in the southwest region of Wales.

Environmental Setting

Geology

10.2.4 The following geological conditions have been determined based on available data taken from the British Geological Survey (BGS) website and provided within previous intrusive investigation reports referenced above.

Although not indicated to be present on the available BGS mapping (Sheet 209-St David's), made ground has been encountered across the Cawdor Barracks site. Within the airfield, a surface covering of topsoil, underlain by made ground was typically recorded to depths of between 0.2 mbgl (metres below ground level) and 1.2 mbgl, with a maximum depth of 2.6 mbgl recorded. Made ground typically comprised clays, sands and silts with gravels of brick, concrete, mudstone, sandstone, and igneous rock. More occasional anthropogenic constituents included metal, clinker, bitumen, tile, and ceramics. Thicker areas of made ground were typically recorded at the site of former infrastructure including former Bulk Fuel Installations (BFI).

10.2.5 Made ground (including a surface covering of pulverized rubble) was recorded to depths of between 0.5 mbgl and 3.6 mbgl at the former tip and burning area. Made ground at this location included the following anthropogenic constituents: brick, macadam, concrete, re-bar, plastic, fibre glass, cabling, metals, ceramics, glass, and wood.

10.2.6 Within the technical area, made ground was encountered within the majority of the previous exploratory locations. Where encountered, made ground was recorded to depths of between 0.1 mbgl and 2.8 mbgl. Made ground largely comprised gravelly clays, silty gravelly sands and gravelly silts. The gravel component (including a variable cobble content) consisted of mudstone, sandstone, rare ceramics, glass, clinker, metal fragments, bitumen, tile, and concrete. Fill materials (brick, tile, concrete, clinker, plastic, glass, and wood) were recorded at discrete locations.

10.2.7 BGS mapping indicates that superficial deposits are largely absent across the Cawdor Barracks site, although there are localised Glaciofluvial Deposits and Glacial Till is mapped at discrete locations within the airfield and technical area. Within the airfield, these superficial deposits were recorded as sand and gravel drift, firm gravelly clay with cobbles of mudstone identified as Glacial Till and weathered mudstone. These superficial deposits were encountered from between the existing ground level and 3.3 mbgl and had a thickness ranging between 0.15 m and 3.2 m.

10.2.8 Natural strata within the technical area comprised sand and gravel drift, Glacial Till consisting of firm gravelly clays with cobble of mudstone, and silty gravel or gravelly clay identified as weathered mudstone. The superficial deposits were encountered generally between the existing ground level and 6 mbgl and ranged in thickness between 0.2 m and 5 m. Drift deposits in the Motor Transport (MT) area comprised Glacial Till at 0.7 mbgl underlain by sandy gravel to a depth of 8.2 mbgl. Reworked natural strata was identified along the route of a Naval Facilities Engineering Systems Command (NAVFAC) fuel pipeline in the airfield.

10.2.9 Solid geology beneath the Cawdor Barracks site is indicated to comprise Lingula Flags sandstone and mudstone (central area), Triffleton Group sandstone (northern

area) and Ramsey Sound Group (Tuff) (southern area). Two unnamed igneous intrusions are mapped in the central area of the the Cawdor Barracks site. Mudstone bedrock was encountered from depths of between 0.4 mbgl and 4.3 mbgl (the latter depth recorded at the former tip and burning area) to a maximum unproven depth of 15 mbgl within the airfield. Mudstone and sandstone bedrock was encountered from 0.4 mbgl to 8.2 mbgl within the technical area.

Hydrogeology

10.2.10 The superficial Glaciofluvial Deposits are classed as a Secondary A Aquifer and are considered to be of low-moderate sensitivity. Glacial Till is classed as a Secondary Undifferentiated Aquifer and is assessed as being of low sensitivity.

10.2.11 The solid geology beneath the Cawdor Barracks site is classified as a Secondary B aquifer of low sensitivity.

10.2.12 The previous Phase 2 LQA encountered groundwater within the drift deposits in the technical area and north of the technical area. Drift deposits were recorded to be dry within the airfield. Based on groundwater monitoring undertaken, perched groundwater was confirmed within the superficial deposits the indicative flow direction is considered to be in a southerly direction.

Groundwater was present in all monitoring wells installed in the mudstone bedrock. Groundwater levels in the mudstone bedrock were consistent over the monitoring rounds with an indicative general groundwater flow direction to the east. Groundwater flow across the technical area trends in a southeasterly direction.

10.2.13 Further detail on groundwater baseline is provided in Section 11.2 of Chapter 11 (Water Environment, Flood Risk and Drainage).

Summary of Previous Ground Investigations

10.2.14 The Cawdor Barracks site has been subject to a number of previous intrusive investigations.

10.2.15 The Entec Phase 1 LQA states that prior to 2011, the Cawdor Barracks site had been subject to previous intrusive investigations including one undertaken by the Internal Military Works Force (reported in March 1987) to identify the potential locations of historical hardened aircraft shelters. Between 1995 and 1998 Entec UK produced two combined Phase 1 and Phase 2 reports relating to investigations undertaken at the fire training area and BFI 1. Entec UK subsequently completed a programme of groundwater monitoring at the Cawdor Barracks site which was reported in 2001, 2009 and 2010.

10.2.16 Amec Environment & Infrastructure Ltd completed a ground investigation (Phase 2 LQA) in 2011 (reported in 2012). The investigation targeted potential sources of contamination across the airfield and technical area (including barracks accommodation). These potential sources included former BFIs, former fuel storage facilities, workshops, a former site tip and burning area, former explosives storage area and historical firing range, known asbestos contaminated land area, former fire training areas and the site of demolished buildings.

10.2.17 As part of this Phase 2 LQA, a radiological survey of the former tip and burning area, and former fire training area, and route tracing of the former NAVFAC BFI fuel pipeline was undertaken.

10.2.18 In July 2015 Amec Foster Wheeler reported on a targeted groundwater and vapour assessment undertaken at the Cawdor Barracks site. This investigation focused on three areas within the airfield; the former fire training area, the Old BFI, and former BFI 1.

Contamination

10.2.19 Based on information reviewed, the following potential contaminant sources have been identified associated with the Cawdor Barracks site, and are detailed on Figure 10.1:

- Made ground (site wide);
- Former bulk fuel installations (Old BFI, BFI 1, BFI 2, and NAVFAC BFI) (airfield);
- Former fire training area (airfield);
- Former fuel bowser parking (airfield);
- Former tip and burning area (airfield);
- NAVFAC BFI fuel pipeline (airfield);
- Explosives storage area (ESA) (airfield);
- Current BFI/ POL point (technical area);
- Historical POL points and former above and below ground fuel storage tanks, and small former fire training area (technical area);
- Known asbestos contaminated area (technical area);
- Infilled quarries and gravel pits, and linear mound (airfield); and
- Offsite former Brawdy Farm Sand pit (adjacent to the airfield).

10.2.20 In consideration of the documented military use of the Cawdor Barracks site a broad range of contaminants may be present including asbestos containing materials (ACMs), metals, hydrocarbons, organic and inorganic compounds, chlorinated solvents, explosive residues, fire-fighting substances (polyfluoralkyl substances (PFAS)), including perfluorooctanesulfonate (PFOS)), radiological materials, polychlorinated biphenyls (PCBs) and ground gas/ vapours. These are potential contaminants associated with legacy military site use and in some instances have not been confirmed present on the Cawdor Barracks site at this time.

10.2.21 Figure 10.1 indicates the potential contamination listed above.

10.3 Receptors

10.3.1 The key potential receptors have been identified as follows:

- Onsite workers (including site visitors) and residents;
- Future site workers;
- Off-site residents (residents living at the adjacent Rickeston Hall);
- Offsite amenity users (offsite users of the adjacent Newgale Lodge Holiday lets and Park Hall Village camp site);
- Offsite commercial works (Brawdy Business Park);
- Secondary A Aquifer (Glaciofluvial Deposits);
- Secondary B Aquifer (Lingula Flags, Triffleton Group Sandstone, and Ramsey Sound Group);
- Unnamed surface water courses adjacent to the Cawdor Barracks site;
- On site flora and fauna (including protected species identified on the Cawdor Barracks site); and
- Buildings and buried services.

10.4 Scoping of Impacts

10.4.1 Table 10.1 and 10.2 present a summary of the scoping. They identify which likely environmental effects, with respect to ground conditions and contaminated land, will be assessed in the EIA (for example those considered to have likely significant effects and therefore scoped in) and those which will not be assessed further (scoped out).

TABLE 10.1: POTENTIAL GROUND CONDITIONS AND CONTAMINATED LAND IMPACTS – DURING DEMOLITION AND CONSTRUCTION

Potential Impact	To be assessed in the EIA	Reason
Is the project likely to affect designated geological sites (statutory or non-statutory)?	No	No statutory or non-statutory or nationally designated geological sites (includes SSSIs, UNESCO sites, rare, national or locally important geology) recorded within 2 km of the Cawdor Barracks site.
Is the project likely to introduce significant sources of contamination?	No	No significant sources of contamination are likely to be introduced as part of the proposed development's demolition and construction activities.
Presence and disturbance of contaminated ground and groundwater and associated effects as a result of demolition and construction to identified receptors (this includes potential effect of contaminated land runoff to surface water (unnamed surface water courses) leaching to underlying sensitive groundwater bodies or impacts on nearby residents).	Yes	Localised sources of soil and groundwater contamination have been identified during previous intrusive investigation at the Cawdor Barracks site. Potential for further previously unidentified sources of contamination at the Cawdor Barracks site. Demolition and Construction activities may mobilise contaminants and result in impacts on identified receptors. Although not previously identified, there may be PFAS contamination within soil and groundwater associated with historical fire training activities.

Potential Impact	To be assessed in the EIA	Reason
Potential for ground gas and vapour migration and accumulation	Yes	Previous investigations at the Cawdor Barracks site have identified hydrocarbon contaminated groundwater associated with the former BFIs and former fire training area within the airfield. A targeted groundwater and vapour assessment suggested risks to adjacent offsite residents from vapours in groundwater was low, however assessment of risks posed to the proposed development and future site users will be required. Additionally, there may be ground gas and vapour risks associated with infilled quarries and pits on site, and any previously unidentified areas of contamination. Given the potential for below ground structures (including piled foundations) assessment of the potential impacts from ground gas and vapours will be assessed.
Potential for mineral extraction / mineral safeguarding	Yes	Although there are no safeguarded mineral deposits within the boundary of the Cawdor Barracks site, an area in the south of the airfield falls with a Mineral and Quarry Sites Buffer (Policy GN.25) and will therefore be assessed.
Aggressive ground conditions	Yes	Concerns related to aggressive conditions or piling are more relevant to the design and construction (build environment) of the proposed development, however, at this stage some further consideration will be required. The potential for chemically aggressive ground has not been investigated or assessed, therefore the potential impact of the ground on structural materials used during construction will be established though assessment of ground investigation data.
Ground conditions requiring piled foundations	Yes	If identified during the phased approach to assessment the chapter will make note of recommendations in relation to aquifer protection.
Radon	Yes	The Cawdor Barracks site is in an area of elevated radon potential with 10-30% of properties above the action level for which installation of basic radon protection measures is recommended in dwellings. Radon has the potential to migrate beneath the Cawdor Barracks site and into buildings where it can present risks to human health. These risks could affect identified receptors including proposed commercial site users and construction workers during development. Potential radon risks will need to be considered and addressed in the proposed development design and during construction
Earthworks and waste disposal	Yes	It is necessary to understand earthworks requirements alongside contaminated land risks including the effects of any cut and fill operations on material balances. There could be potential to generate significant volumes of material which may have to be disposed of off-site. If material does need to be disposed off-site, particularly if designated as hazardous waste, this would generate significant non-forecast costs, could lead to significant programme delay and would be an unsustainable solution for materials management. MOD / DIO have internal policies that promote diversion from landfill with a minimum target of 80%.
Reduction in available landfill capacity	Yes	The generation of waste materials requiring off-site disposal during demolition and construction may lead to a reduction in available landfill void capacity. Waste generation can have indirect impacts of greenhouse gas emissions through transportation and visual/human health impacts such as noise, vibration, traffic disruption and environmental pollution. Indirect impacts are not considered in this chapter but are discussed further in the relevant chapters of this report. Use of a Site Waste Management Plan, incorporating source segregation, management of demolition materials and use of site-won excavated arisings which can be used without the need for treatment (either via waste exemption or use of the CL:AIRE DoW CoP criteria) will help minimise the requirement for off-site waste disposal during demolition and construction activities. MOD / DIO have internal policies that promote diversion from landfill with a minimum target of 80%.

**The extent of demolition will be determined throughout the ongoing design process. For the purposes of EIA scoping, it is assumed that demolition of existing structures may be required prior to construction.*

TABLE 10.2: POTENTIAL GROUND CONDITIONS AND CONTAMINATED LAND IMPACTS – DURING OPERATION

Potential Impact	To be assessed in EIA	Reason
Is the project likely to affect designated geological sites (statutory or non-statutory)?	No	No statutory or non-statutory or nationally designated geological sites (includes SSSIs, UNESCO sites, rare, national, or locally important geology) recorded within the Cawdor Barracks site.
Use of scheme by workers	Yes	Potential impacts with regard to ground conditions and contaminated land that may occur during the operation of the proposed development will be assessed.
Is the project likely to introduce significant sources of contamination?	Yes	Maintaining uninterrupted power supply for the proposed development will be critical for the design and operation of the proposed development. Back up power generation is considered likely. The standard technology for this application would be diesel generators. Although there is currently limited information on the proposed development scheme design, it is anticipated that there may be a requirement for bulk storage of fuel in this event. Operation of the proposed development, maintenance and inspection and systems control would introduce some handling, storage and use of chemicals, whilst solid and liquid waste streams would be expected. Depending on the exact nature of the operations to be undertaken, scale and volume it is possible that these may be captured under relevant environmental regulations, requiring permits, authorisations, consents and licences to be secured as appropriate. Potential impacts with regard to ground conditions and contaminated land that may occur during the operation of the scheme will be assessed.
Presence and disturbance of shallow contamination which could affect human health	No	Contamination within shallow soils will be assessed during construction and appropriate remediation/mitigation undertaken such that there should be no further impacts to assess during operation of the proposed development.
Presence of ground gas or vapours which could accumulate in confined spaces within new buildings	No	The design of buildings to mitigate risks associated with ground gas or vapours (including radon) will be addressed during construction.
Potential effect of contaminated land leaching to sensitive groundwater bodies	No	Assessment of risks to groundwater associated with any existing contaminated land will be assessed during construction phase, with appropriate mitigation measures implemented (if required) and therefore will not remain during operational phase.
Impact on service pipeline materials	No	It is possible that hydrocarbon contamination could react with certain organic compounds used in building materials and services during construction for the proposed development. However, assessment of the potential hazard to any new materials used on site will be undertaken during construction with appropriate mitigation measures undertaken.
Impact of contamination on plant growth - soils potentially used as a growing medium	No	The requirement of mitigation in areas of proposed landscaping will be assessed during construction.
Reduction in available landfill capacity	No	It is anticipated that significant volumes of waste will not be generated during the routine operation of the proposed development.

10.4.2 Ground conditions including contaminated land and waste is to be scoped into the EIA.

10.5 Methodology for Impact Assessment

Legislation and Guidance

Whilst not an exhaustive list of legislation relating to contaminated land and waste for the UK, the following provides a summary of relevant, principal pieces of the legislative framework:

- Contaminated Land (Wales (Amendment) Regulations 2012;
- Development of Land Affected by Contamination: A Guide For Developers (Welsh Land Contamination Working Group, 2017);
- Environmental Protection Act 1990 (as amended by the Environment Act 1995);
- Environmental Protection (Duty of Care) Regulations 1991 (as amended 2003);
- Contaminated Land Risk Assessment – A Guide to Good Practice C552 (CIRIA, 2001);
- Land contamination: risk management (Environment Agency, October 2020);
- BS 10175 Investigation of potentially contaminated sites. Code of practice;
- Construction Code of Practice for the Sustainable Use of Soils on Construction Sites, (Department for Environment, Food and Rural Affairs (Defra), 2009);
- Water Resources Act 1991;
- Waste Framework Directive 2000, 2008 and 2018;
- Water Framework Directive and the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017;
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration;
- Environmental Permitting (England and Wales) Regulations 2016 (as amended);
- EU Waste Framework Directive (WFD) 2008/98/EC;
- The Waste (England and Wales) Regulations 2011 (as amended);
- The Hazardous Waste (England and Wales) Regulations 2005 (published March 2005) (as amended) - implements the Hazardous Waste Directive (91/689/EC); and
- The Hazardous Waste (Miscellaneous Amendments) (Wales) Regulations 2015.

10.5.1 Current guidance on contaminated land assessment uses the principal of a Conceptual Site Model (CSM) to establish pollutant linkages using the source-pathway-receptor methodology. For a source of contamination (or hazard) to present a risk to a receptor (such as construction workers or groundwater), there must be a viable exposure pathway. Assessment of contaminated land will be undertaken with reference to Land Contamination Risk Management (LCRM) (LCRM, 2020).

10.5.2 Guidance on the assessment of materials and waste is provided in the IEMA guide to Materials and Waste in Environmental Impact Assessment (IEMA, 2020). The Environment Agency Groundwater Protection Position Statements, 2018, are adopted by Natural Resources Wales and provide guidance on the management and protection of groundwater. Piling and Penetrative Ground Improvement Methods on Land Affected by Contamination: Guidance on Pollution Prevention, 2001 (and any subsequent amendments) provides guidance on assessing risks associated with, and preventing pollution from, piling and penetrative ground improvement methods on land affected by contamination.

Methodology

10.5.3 The methodology for EIA comprises:

- Gather site specific information and inform baseline. This will include intrusive investigation to confirm site conditions and relationships, gather geotechnical / ground engineering data, establish land quality and materials data;
- Review and update the CSM;
- Complete a risk assessment to determine contaminated land risks to sensitive receptors associated with identified pollutant linkages (LCRM, 2020);
- Identify the availability and void capacity of regional, and where appropriate, national landfill facilities in the context of expected waste generation estimates during demolition and construction;
- Assess the risks associated with piling and penetrative ground improvement methods on land affected by contamination;
- Identification of significant effects, which will be a function of magnitude of impact and sensitivity of receptor. The significance of an effect will be determined by assessing the value/sensitivity of the resource and the magnitude of an impact. The impact on human receptors will be assessed using the criteria developed from the model provided in CIRIA C552 Contaminated Land Risk Assessment – a guide to good practice (ref. 8.13.11);
- Identification of design and mitigation measures to minimise significant effects; and
- Identification of potential cumulative effects.

Uncertainties

Uncertainties are present for landfill and waste recycling/processing centre capacity information, both locally and regionally and this has the potential to change throughout the proposed development construction phase.

10.6 Climate Change Adaptation and Resilience

10.6.1 It is not anticipated that there will be any direct measurable changes or impacts in terms of ground conditions including contaminated land, materials and waste as a result of the changing climate. Hence reference to climate change has been scoped out of this assessment.

10.7 References

Entec (2011). Cawdor Barracks, Pembrokeshire. Land Quality Assessment. Phase 1: Desk Study Report

Amec Environment & Infrastructure UK Ltd (2012). Cawdor Barracks, Pembrokeshire. Phase 2: Intrusive Survey Report

Amec Foster Wheeler (2015) Cawdor Barracks- Targeted Groundwater and Vapour Assessment LQA Report

Environment Agency. Land Contamination Risk Management (LCRM). How to assess and manage the risks from land contamination, October 2020.

BGS Map 209 St David's

MAGIC mapping (https://magic.defra.gov.uk/magicmap.aspx) accessed January 2023

Envirocheck Report (refer 305022956_1_1)

PCC, 2013. Pembrokeshire County Council Local Development Plan, s.l.:s.n

LLe A Geo-Portal for Wales (https://lle.gov.wales/home) Accessed January 2023

IEMA (2020). Materials and Waste in Environmental Impact Assessment - March 2020

11 Water Environment, Flood Risk and Drainage

11.1 Introduction

11.1.1 This section of the Scoping Report identifies potential impacts on the water environment that may occur during the construction and operation of the proposed development and outlines whether these impacts will be addressed in the Environmental Assessment (ES).

11.1.2 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

11.2 Baseline

11.2.1 This section summarises the water environment baseline of the Cawdor Barracks site and surrounding study area with respect to surface water, groundwater, and flood risk. The study area is defined as a 1 km buffer around the Cawdor Barracks site.

11.2.2 The site known as ‘Cawdor Barracks’ is currently used as a working military base on the St David’s peninsula in Pembrokeshire, South Wales. A detailed description of Cawdor Barracks, its surrounding area, and the proposed development are provided in Chapter 2 – Cawdor Barracks site and Proposed Development.

Surface Water

11.2.3 There is one ordinary watercourse known as Ffynnon Dogvael (also referred to as Brawdy Brook), located within the Cawdor Barracks site (see Figure 2.1). It originates in a wooded area in the west behind the existing barracks and flows for 250 m west then north-westwards where it joins a separate field drain in the western study area (defined as a 1 km buffer around the Cawdor Barracks site line boundary). In the western study area, there are five ordinary watercourses which are assumed to be field drains (see Figure 2.1). They flow in a westerly direction and discharge to St. Brides Bay at the mouth of the River Solva approximately 4.5 km downstream of the Cawdor Barracks site and outside of the study area.

11.2.4 In the southern section of the study area, Cwm Mawr stream rises in the village of Penycwm and flows to the south-west. It flows through the Pembrokeshire Coast National Park discharging to St. Brides Bay at the southern boundary of the study area. In the eastern study area, there are five ordinary watercourses, all of which flow eastwards where they eventually join the Brandy Brook approximately 1.6 km from the study area boundary. In the north and north-eastern areas of the study area, there are six ordinary watercourses, two of which flow along the boundary of the Cawdor Barracks site. Both watercourse's flow in a northerly direction to join the Llandeloy water body, which itself joins the River Solva at the northern most extent of the study area.

11.2.5 According to the Cawdor Barracks services drawing (Carillion Enterprise, 2010), there are existing foul and storm water drainage networks across the barracks building within the Cawdor Barracks site. The networks appear to extend westwards through the study area. There are surface water connections to ordinary watercourse to the north of the Cawdor Barracks site, outside of the site boundary, and to the west of the Cawdor Barracks site, inside of the site boundary. Surface water passes by gravity through a surface water drainage system which incorporates oil water interceptors situated around the barracks. Foul sewerage drains to a sewage treatment works (STW) located in the southwestern study area approximately 800 m from the Cawdor Barracks site at its nearest point (Ordnance Survey, 2023). There is a single sewage pumping station which pumps sewage to the foul sewerage system from areas which would not drain freely. The STW also treats the sewage from the adjacent Brawdy Business Park. The STW is situated 'outside the wire' but there is full right of way to it. The STW is a Condor Clereflow and ammonia removal plant. However, the works is under designed and fails to meet its consent, so effluent is pumped to the head of the old biological filter bed to be treated again through this works.

11.2.6 There are six small pond water bodies located within the study area (see Figure 2.1), none of which are located within the Cawdor Barracks site itself. A group of three ponds lie within the southwest of the study area, 350 m from the Cawdor Barracks site. Google Satellite imagery (Google, 2023) indicates that they are experiencing significant algal growth. A further two ponds are located to the west of the Cawdor Barracks site at respective distances of 100 m and 700 m, and one to the north at 650 m (see Figure 2.1).

11.2.7 The Cawdor Barracks site and the study area lie within three Water Framework Directive (WFD) water body catchments (Natural Resources Wales, 2023a), which can be seen in Figure 2.1 and are detailed below:

- The Solva – headwaters to tidal limit (ID: GB110061038340) WFD water body catchment covers the central and northern areas of the Cawdor Barracks site and the study area. It lies within the Cleddau and Pembrokeshire Coastal Rivers Management catchment and the Coastal Streams – Druidston to Fishguard Bay Operational Catchment. During WFD Cycle 3 (2021) it was classified as of good overall status and good ecological status. It is known to contain small stocks of salmon and sea trout (Natural Resources Wales, 2016).

- The Brandy Brook – headwaters to tidal limit (ID: GB110061021160) WFD water body catchment covers the eastern area of the Cawdor Barracks site and the study area. It lies within the Cleddau and Pembrokeshire Coastal Rivers Management catchment and the Coastal Streams – Druidston to Fishguard Bay Operational Catchment. It was considered to be of moderate overall status and moderate ecological status during Cycle 3.

- The Pembrokeshire South (ID: GB611008590003) WFD coastal catchment covers the area of coastline in the southwestern study area. It lies within the Cleddau and Pembrokeshire Coastal Rivers TraC Management catchment and the Pembrokeshire South Operational Catchment. Its overall status and ecological status were considered good during Cycle 3.

11.2.8 The Ffynnon Dogvael and Cwm Mawr watercourses are not designated under the WFD.

11.2.9 Within the Cawdor Barracks site and the study area there are five surface water discharge consents currently in effect (Envirocheck, 2022):

- One relating to sewage discharge from a STW storm overflow / storm tank discharging to an unnamed tributary of the River Solva.

- One relating to sewage discharge from a STW pumping station storm overflow / storm tank discharging to an unnamed tributary of the Cwm Mawr stream.

- One relating to sewage discharge from Cawdor Barracks STW storm overflow / storm tank discharging to Brawdy stream.

- One relating to sewage discharge from Cawdor Barracks STW final / treated effluent discharging to Brawdy stream.

- One unspecified discharge to Brawdy stream from Cawdor Barracks.

11.2.10 Within the Cawdor Barracks site and the study area there are two consented surface water abstractions currently in effect (Envirocheck, 2022):

- One relating to general agriculture - spray irrigation from the River Solva and Llandeloy Brook located approximately 0.43 km from the Cawdor Barracks site.

- One relating to impounding located approximately 0.57 km from the Cawdor Barracks site.

11.2.11 Water and wastewater services on the Cawdor Barracks are provided by the Aquatrine Water & Wastewater Public Finance Initiative (PFI) arrangements through Ancala Water Services as the Aquatrine Service Provider (ASP). The ASP is responsible for the following within the Cawdor Barracks site boundary:

- Supply of potable water for drinking and sanitation.
- Supply of water for firefighting.
- Removal of sewage and surface water drainage.
- Mitigation of the risk of flooding on site.

11.2.12 The ASP will be consulted during the EIA to obtain this information.

11.2.13 No information on private water supplies within the study area has of yet been requested from the local authority.

11.2.14 There are several designated sites with known or potential surface water dependency. Located in the southwestern region of the study area is the St. David's Peninsula Coast Site of Special Scientific Interest (SSSI) (Natural Resources Wales, 2023b) and the Ramsey and St David's Peninsula Coast Special Protected Area (SPA) (Natural Resources Wales, 2023c), as well as the St. David's Special Area of Conservation (SAC) (Natural Resources Wales, 2023d). These designated sites cover areas of cliff-land that host a range of maritime vegetation, from rock-crevice communities on exposed cliff faces to maritime grassland, heath and scrubland. They are noted for their communities of rare plants and invertebrates, as well as high densities of nesting chough and peregrine falcons (Countryside Council for Wales, 2008).

11.2.15 In addition, the Pembrokeshire Marine SAC (Natural Resources Wales, 2023d) covers the area of sea in the southwestern section of the study area. The area is recognised for being particularly diverse, with eight Habitats Directive Annex I habitat types and seven Annex II species (Pembrokeshire Marine SAC, 2022). North-West Pembrokeshire Commons SAC (Natural Resources Wales, 2023a) lies within the study area, however it is not hydrologically connected to the proposed development. The designated sites can be seen on Figure 2.1 and more information can be found in Chapter 7 Biodiversity.

11.2.16 There is a drinking water protected area within the study area associated with the Solva - headwaters to tidal limit WFD waterbody catchment (GB110061038340).

Groundwater

11.2.17 The geology underlying the Cawdor Barracks site is described in Chapter 10 (Ground Conditions and Contaminated Land). A summary is provided below.

11.2.18 Made ground across the Cawdor Barracks site, at the airfield, the former tip site in the north-east, and the technical area in the south-west, was encountered at depths from 0.1 to 3.6 m bgl (metres below ground level). This made ground is generally comprised of clays, sands and silts with varying gravel compositions, as well as anthropogenic material such as brick, tile, metal, concrete, clinker, ceramics, glass and wood (Amec, 2012).

11.2.19 Notable examples of potential contaminants from identified on-site contamination sources include hydrocarbons (fuels and oils), polychlorinated biphenyls (PCBs), polycyclic aromatic compounds (PAHs), ground gas, metals and solvents. In addition, potential radiological contaminants (radium-226) at the former tip site and perfluorinated firefighting foams (PFOS/PFOA) at the historic fire training area in the north-west of the Cawdor Barracks site may be present (Amec, 2012).

11.2.20 Superficial deposits are largely absent across, and in the vicinity of, the Cawdor Barracks site except for Devensian glaciofluvial deposits of sand and gravel in the south and Mid Pleistocene glacial till at the north-eastern boundary (British Geological Survey, 2023). Across the Cawdor Barracks site, superficial deposits were encountered at depths from 0 (the existing ground level) to 6 m bgl and at thicknesses between 0.15 and 8.2 m (Amec, 2012).

11.2.21 The bedrock that underlies most of the superficial deposits beneath the Cawdor Barracks site comprises sandstone and mudstone of the Cambrian Lingula Flags Formation. The northern extent of the Cawdor Barracks site is underlain by sandstone of the Ordovician Triffleton Group and the southern extent by tuff of the Neoproterozoic (Ediacaran) Ramsey Sound Group. In addition, two unnamed igneous intrusions are present in the centre of the Cawdor Barracks site (British Geological Survey, 2023). Mudstone bedrock beneath the airfield, including the former tip area in the north-eastern corner of the airfield, was encountered from 0.2 to 3.3 m bgl with a maximum unproven depth of 15 m bgl. Sandstone and mudstone bedrock beneath the technical area was encountered from 0.4 to 8.2 m bgl (Amec, 2012).

11.2.22 The bedrock geology beneath the Cawdor Barracks site (comprising the Lingula Flags Formation, the Triffleton Group, and the Ramsey Sound Group) is classed as a Secondary B Aquifer (Envirocheck, 2022).

11.2.23 The glaciofluvial deposits beneath the southern part of the Cawdor Barracks site are classed as a Secondary A Aquifer and the glacial till on the northern boundary of the Cawdor Barracks site is classed as a Secondary Undifferentiated Aquifer (Envirocheck, 2022).

11.2.24 Previous GIs have encountered groundwater in superficial deposits in and around the technical area to the south and west of the Cawdor Barracks site. Perched groundwater within these superficial deposits ranged between elevations of 92.20 and 109.43 m AOD (metres above ordnance datum) and suggested a southwards groundwater flow direction influenced by local topography. Superficial deposits beneath the airfield to the north and east of the Cawdor Barracks sitewere found to be dry with no groundwater present (Amec, 2012).

11.2.25 Groundwater encountered during previous GIs in the mudstone bedrock beneath Cawdor Barracks ranged between elevations of 92.65 and 106.44 m AOD (3.80 and 2.66 m bgl respectively) and indicated an easterly to south-easterly groundwater flow direction (Amec, 2012). More recent GI work at the Cawdor Barracks site encountered groundwater at shallow depths typically within 0.5 and 4.0 m within the sandstone and mudstone bedrock and groundwater flow was inferred to be likely driven by fracture flow. Shallow groundwater from the raised plateau of the airfield was inferred to flow radially outwards towards the site boundaries (Amec Foster Wheeler, 2015).

11.2.26 Several groundwater-fed springs that feed unnamed surface water streams are present on the western and eastern boundary of the Cawdor Barracks site (Amec Foster Wheeler, 2015)

11.2.27 Groundwater vulnerability mapping (Envirocheck, 2022) indicates that groundwater contained within the bedrock and superficial aquifers underlying the Cawdor Barracks site is classed as high vulnerability, with a small section at the north-eastern boundary classed as medium vulnerability.

11.2.28 The bedrock and superficial aquifers underlying the Cawdor Barracks site are included in the Cleddau and Pembrokeshire groundwater body (GB41002G200400), within the Cleddau and Pembrokeshire operational catchment and the Western Wales groundwater management catchment. The groundwater body has good quantitative status, poor chemical status, and poor overall status (Cycle 2, 2017 to 2021) (Natural Resources Wales, 2023f).

11.2.29 Data produced by Natural Resources Wales (NRW) in July 2022 indicates that the Cawdor Barracks site do not lie within a Groundwater Source Protection Zone (SPZ) and that there are no licensed groundwater abstractions within the Cawdor Barracks site and within 1 km of the Cawdor Barracks site (Envirocheck, 2022). Furthermore, information on unlicensed abstractions has not been requested from the local authority. There are records of historic spring sources presumably discharging from the Lingula Flags Formation approximately 6 km to the west at Solva, however, confirming that the bedrock can potentially support local supplies (British Geological Survey, 2023).

11.2.30 As mentioned above, designated sites have been identified within and down hydraulic gradient of the proposed development. These will be reviewed at the Environmental Impact Assessment (EIA) stage to determine whether they are groundwater dependent terrestrial ecosystems (GWDTEs).

Flood Risk

11.2.31 A qualitative assessment of flood risk has been undertaken as part of this scoping report. It considered all sources of flood risk and utilised the NRW Flood Map for Planning (Natural Resources Wales, 2023g) and the NRW Flood Risk Assessment Wales Map (Natural Resources Wales, 2023h).

Fluvial and Tidal

11.2.32 The NRW Flood Map for Planning (Natural Resources Wales, 2023g) indicates that the Cawdor Barracks site lies within Flood Zone 1, indicating a very low risk of flooding from rivers of <0.1% annual probability (1 in 1000-year event). There are two areas within the northern and western study area that lie within Flood Zone 2 (0.1% to 1% annual probability, or 1 in 100 to 1 in 100-year event) and Flood Zone 3 (>1% annual probability, or 1 in 100-year event). The area located to the north is associated with the Llandeloy watercourse, whilst the area to the west is associated with the field drains that flow in a westerly direction towards the River Solva and away from the Cawdor Barracks site. There are no areas of Flood Zone 2 or 3 within Cawdor Barracks (see Figure 2.1).

11.2.33 Bordering the coast, along the south-west of the study area, there are areas lying within Flood Zone 2 (0.1% to 0.5% annual probability, or 1 in 1000 to 1 in 200-year event) and Flood Zone 3 (>0.5% annual probability, or 1 in 200-year event).

11.2.34 Fluvial and tidal flood risk zones can be seen in see Figure 2.1.

Surface Water and Small Watercourses

11.2.35 The NRW Flood Map for Planning (Natural Resources Wales, 2023g) also presents the risk of flooding from surface water and small watercourses, which can be seen in Figure 2.1. It indicates that the majority of the Cawdor Barracks site is at very low risk (less than 1 in 1,000 (0.1%) annual probability). However, across the study area there are areas classified as Flood Zone 2 (between 1 in 100 and 1 in 1000 (0.1% to 1%) annual probability of flooding from surface water and small watercourses) and Flood Zones 3 (greater than 1 in 100 (>1%) annual probability). This is attributed to the prevalence of small watercourses, such as field drains and ordinary watercourses, across the study area. Across the Cawdor Barracks site itself, there are pockets of areas defined as Flood Zones 2 and 3. This is assumed to be due to minor topographic depressions which facilitate the pooling of surface waters. There is no known historic flooding at Cawdor Barracks. However, this will be reviewed during the ES.

Reservoirs and Canals

11.2.36 According to the NRW Flood Risk Assessment Wales Map (Natural Resources Wales, 2023h), the locations of the Cawdor Barracks site and the study area are not within an area at risk of flooding from reservoir failure or canal flooding.

Groundwater

11.2.37 British Geological Survey (BGS) Groundwater Flooding Susceptibility data from 2013 indicates that there is no risk of groundwater flooding across most of the Cawdor Barracks site (see Figure 2.1). However, there is potential for groundwater flooding to occur below ground level and at surface at the south of the airfield and at the north-eastern boundary of the Cawdor Barracks site and limited potential for groundwater flooding to occur at the technical area and other sections at the south of the airfield (Envirocheck, 2022).

11.3 Receptors

11.3.1 The key potential water environment receptors identified are as follows:

- River Solva – headwaters to tidal limit WFD waterbody catchment (ID: GB110061038340).
- Brandy Brook – headwaters to tidal limit WFD waterbody catchment (ID: GB110061031160).
- Pembrokeshire South WFD coastal catchment (ID: GB611008590003).

- Ordinary watercourses within the study area.
- Six ponds within the study area.
- St. David's Peninsula Coast SSSI.
- Ramsey and St David's Peninsula Coast SPA.
- St. David's SAC.
- Pembrokeshire Marine SAC.
- The Cleddau and Pembrokeshire groundwater body which includes the bedrock geology of the Lingula Flags, Triffleton Group and Ramsey Sound Group (Secondary B Aquifer), the superficial glaciofluvial deposits (Secondary A Aquifer) and glacial till (Secondary Undifferentiated Aquifer) and any associated springs.
- Unconfirmed groundwater or spring source abstractions within the Cawdor Barracks site.

11.4 Scoping of Impacts

11.4.1 Table 11.1 and Table 11.2 present a summary of the scoping. They identify which likely environmental effects, with respect to the water environment, flood risk and drainage will be assessed in the EIA (that is, effects considered to be significant and therefore scoped in) and those which will not be assessed further (that is, effects that will be scoped out).

TABLE 11.1 POTENTIAL WATER ENVIRONMENT IMPACTS – CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Alteration of surface water flood flow routes due to changes in ground elevations and construction of structures	Yes	Instances of high-risk flooding from surface water and small watercourses are prevalent across the study area, and isolated areas are located across the Cawdor Barracks site within topographic depressions. Altering ground elevations during construction could result in increased or redirected flood risk due to changes in topography.
Indirect impact on fluvial flood risk due to alteration of surface water flood flow paths	Yes	The redirection of surface water flow paths across the Cawdor Barracks site and the wider study area could increase the risk of fluvial flooding downstream as ordinary watercourses within the study area could be overloaded by redirected flood waters.
Increased surface water runoff rate and volume due to drainage of additional impermeable areas	Yes	Due to the proposed development, there could be an increase in the impermeable area. This would increase both the rate and volume of surface water runoff which would discharge to the surrounding water features or groundwater. In turn this could lead to an increased risk of localised flooding within the Cawdor Barracks site, or to others outside of the development such as flood sensitive receptors.

Potential Impact	To be assessed in EIA	Reason
Contamination of surface water runoff due to drainage of construction areas and construction activities	Yes	There is the potential that surface water runoff generated from the construction areas would discharge to either local surface water features and/or groundwater. Construction activities could result in the contamination of this runoff, ultimately adversely impacting the water environment and designated sites due to water quality deterioration and aquatic habitat degradation. This could impact WFD status. Sources of possible contamination include the stockpiling of construction materials, the washing of plants, cleaning areas of hardstanding, and accidental spillages and leakages.
Contamination of surface water runoff due to accidental spillages and impact on water quality of receiving watercourses	Yes	During construction, there is a risk that accidental spillages could pollute surface water entering the drainage system, such as from diesel fuel and lube oil tanks. This, as well as routine runoff, could lead to deterioration of water quality and habitats in receiving watercourses and designated sites without appropriate mitigation.
Pollution of groundwater due to contact with construction materials	Yes	Placement of below ground structures / foundations may cause groundwater contamination due to direct contact with construction materials, particularly if these are below the water table.
Below ground structures diverting groundwater flow	Yes	Structures placed below the water table such as foundations or pipe trenches may divert groundwater flow, reducing flow to receptors such as watercourses or abstractions. Placement of structures may also increase groundwater flooding risk through the creation of groundwater dams, particularly if groundwater levels are close to the surface.
Mobilisation of existing ground contamination due to excavations or placement of below ground structures, including temporary works	Yes	Excavations or placement of below ground temporary or permanent structures may result in the disturbance and mobilisation of existing ground contamination within areas of made ground, even if above the water table. This may result in leaching and vertical migration of contaminants from the unsaturated made ground to the underlying superficial and bedrock aquifers. One example of notable potential contaminants that may be mobilised are perfluorinated firefighting foams (PFOS/PFOA) at the historic fire training area in the north-west of the Cawdor Barracks site. Excavations for foundations or pipe/cable trenches may result in groundwater pollution, including turbidity generation, which may adversely impact groundwater receptors such as abstractions. Excavations may also create a pollution pathway to the underlying aquifer(s). For excavations below the water table or within perched aquifers, dewatering may be required, which could impact on surface water or groundwater features. Depending on the degree of dewatering required, an abstraction (transfer) licence and / or discharge environmental permit may be needed.

TABLE 11.2: POTENTIAL WATER ENVIRONMENT IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Alteration of flood flow routes due to permanent changes in ground elevations and construction of structures	Yes	Instances of low to high risk of flooding from surface water and small watercourses are prevalent across the study area, and isolated areas are located across the Cawdor Barracks site within topographic depressions. The permanent alteration of ground elevations due to the proposed scheme could result in increased or redirected flood risk due to permanent changes in topography.
Indirect impact on fluvial flood risk due to permanent alteration of surface water flood flow paths	Yes	The permanent alteration of surface water flow pathways could increase the risk of flooding downstream as ordinary watercourses within the study area are overloaded by redirected flood waters.
Increased surface water runoff rate and volume due to drainage of additional impermeable areas	Yes	Due to the proposed development, there could be an increase in impermeable areas associated with antenna foundations, their surrounding maintenance pavement, and internal maintenance roads. Alongside the increase in peak rainfall due to climate change, this would increase both the rate and volume of surface water runoff which would discharge to the surrounding water features. In turn this could lead to an increased risk of localised surface water flooding within the Cawdor Barracks site, or to others.
Contamination of surface water runoff due to accidental spillages and impact on water quality of receiving watercourses / groundwater	Yes	During operation, there is a risk that accidental spillages could pollute surface water entering the drainage system, such as from diesel fuel and lube oil tanks. This, as well as routine runoff and wastewater discharges, could lead to deterioration of water quality and habitats in receiving watercourses / groundwater without appropriate mitigation. A water treatment facility and SuDS features are anticipated to be part of the design, although will be confirmed as the design progresses.
Mobilisation of existing contamination due to infiltration	Yes	Infiltration via groundwater SUDS features (e.g. retention ponds and infiltration trenches or fields), should they be included, and adjacent to areas of hardstanding may result in the mobilisation of existing contamination within the unsaturated made ground to the underlying superficial and bedrock aquifers.
Below ground structures diverting groundwater flow	Yes	Structures placed below the water table such as foundations or pipe trenches may permanently divert shallow groundwater flow, reducing flow to receptors such as watercourses or abstractions. Placement of structures may also increase groundwater flooding risk through the creation of groundwater dams, particularly if groundwater levels are close to the surface.
Water stress	Yes	Potable water supply is currently met by the water company Dŵr Cymru / Welsh Water. Water supply provision within the Cawdor Barracks site is the responsibility of Ancala Water Services, the ASP under the Aquatrine Water & Wastewater PFI Arrangements. An increase in potable water usage may put stress on the water supply depending on the local water resource availability and the capacity of the existing water and wastewater of the Cawdor Barracks site infrastructure. The proposed water usage requirements have not been confirmed yet, however.

11.4.2 In view of the potential effects of the proposed development on the water environment and flood risk, it is considered that water environment, flood risk and drainage should be scoped into the EIA.

11.4.3 No confirmed licensed groundwater and surface water abstractions have been identified within the Cawdor Barracks site, therefore at this stage it is assumed that water supply is ultimately provided by the local water company, Dŵr Cymru Welsh Water. Provision of water and wastewater management services within the Cawdor Barracks site is the responsibility of Ancala Water Services, the ASP under the Aquatrine Water & Wastewater PFI Arrangements.

11.4.4 Water stress has been scoped into the assessment. This will be reviewed as part of the EIA assessment when the water usage requirement for the proposed development has been confirmed. If there is a likely to be significant increase in water usage beyond existing at the Cawdor Barracks site and / or the proposed development requires a form of self-supply then this will be included in the EIA assessment.

11.4.5 Methodology for Impact Assessment

Overall Approach

11.4.6 An assessment of the likely effects due to construction and operation of the proposed development will be undertaken in accordance with the general assessment methodology outlined in Chapter 3. The assessment also takes into consideration the guidance outlined in the Water Resources (Environmental Impact Assessment) (England and Wales) (Amendment) Regulations 2017 (UK Government, 2017).

11.4.7 A Drainage Strategy, Flood Consequences Assessment, Water Features Survey and WFD assessment will be undertaken, and the findings will be considered when assessing the likely effects of the proposed development.

11.4.8 The points below provide a summary of the overall approach to assessing the likely effects in relation to the water environment, flood risk and drainage in line with standard EIA procedures following the scoping stage:

- Undertake a detailed desk study and site visits to identify water receptors within the study area (and any downstream water bodies) that could potentially be impacted by the proposed development to establish baseline conditions. A 1 km corridor surrounding the Cawdor Barracks site is considered appropriate, considering local hydrology and rather limited hydrogeological conditions of the aquifers present below site.

- Determine the sensitivity of the identified receptors with consideration for water supply / quality, dilution, vulnerability, economic value, recreation, conveyance of flow and biodiversity. Definitions and examples are outlined in Table 11.3.

- Identify any potential source-pathway-receptor linkages.

- Determine the magnitude of impact on the identified surface water receptors based on examples provided in Table 11.4. The key potential impacts are

summarised above, however the EIA should also consider any additional impacts identified from the Drainage Strategy, Flood Consequences Assessment and the Water Features Survey.

- Consider mitigation measures to be integrated within the design and during construction of the proposed development.
- Determine the significance of effects based on the sensitivity of the receptor and the magnitude of the impacts in line with EIA guidance.
- Identify and outline any additional mitigation measures that may be necessary to eliminate or reduce any residual effects.

11.4.9 In the absence of published criteria for assessing water receptor sensitivity and impact magnitude, Table 11.3 and Table 11.4 are based on guidance provided in the Design Manual for Roads and Bridges (DMRB) - LA 113 Road drainage and the water environment (Highways England, 2020a), DMRB - LA 104 Environmental assessment and monitoring (Highways England, 2020b), and professional judgement. Reference is also made to DEFRA's general guidance relating to water and flood risk (DEFRA, 2011).

11.4.10 The sensitivity level assigned to a receptor is based on its baseline quality as outlined in Table 11.3.

TABLE 11.3: VALUE (SENSITIVITY) OF WATER RECEPTORS

Sensitivity	Defined as	Typical description
Very high	Nationally significant attribute of high importance	**Surface water:** Watercourse having a WFD classification shown in a RBMP and Q_{95} > 1.0 m^3/s. Site protected/designated under EC or UK legislation (SAC, SPA, SSSI, Ramsar site, salmonid water). Species protected by EC legislation LA 108. **Groundwater:** Principal aquifer providing a strategically or nationally important resource or supporting site protected under EU habitat legislation; SPZ1. **Flood risk:** Essential infrastructure or highly vulnerable development
High	Locally significant attribute of high importance	**Surface Water:** Watercourse having a WFD classification shown in a RBMP and Q_{95} > 1.0 m^3/s. Species protected under EC or UK legislation LA 108. **Groundwater:** Principal or Secondary A aquifer providing a regionally or locally important resource or supporting site protected under EU habitat legislation; SPZ1. **Flood Risk:** More vulnerable development.
Medium	Of moderate quality and rarity	**Surface Water:** Watercourses not having a WFD classification shown in a RBMP and Q_{95} >0.001 m^3/s **Groundwater:** Secondary B or undifferentiated aquifer which is of limited value because the water quality does not allow potable or other quality sensitive uses, exploitation may be for agricultural or industrial use but is not extensive; limited connection to surface water and may provide some support to local site of nature conservation interest; SPZ 2 or 3. **Flood Risk:** Less vulnerable development.
Low	Lower quality	**Surface Water:** Watercourses not having a WFD classification shown in a RBMP and Q_{95} <0.001 m^3/s. **Groundwater:** Unproductive strata, with no known past or existing exploitation and not

Sensitivity	Defined as	Typical description
		providing baseflow to rivers or supporting a site of nature conservation interest. **Flood Risk:** Water compatible development.

11.4.11 Assessing the magnitude of an impact requires consideration of timing, scale, size, and duration of the likely effects. The assessment criteria are outlined in Table 11.4.

TABLE 11.4: ASSESSING THE MAGNITUDE OF IMPACTS OF WATER ENVIRONMENT ATTRIBUTES

Magnitude	Criteria	Typical example
Major adverse	Results in loss of attribute and / or quality and integrity of the attribute	**Surface Water:** Loss or extensive change t to a regionally important public water supply or a designated nature conservation site. Reduction in WFD classification. **Groundwater:** Loss of, or extensive change to, an aquifer. Loss of regionally important water supply. Loss of, or extensive change to GWDTE or baseflow contribution to protected surface water bodies. Reduction in water body WFD classification. Loss or significant damage to major structures through subsidence or similar effects. **Flood Risk:** Increase in peak flood level (>100 mm).
Moderate adverse	Results in effect on integrity of attribute, or loss of part of attribute	**Surface Water:** Degradation of regionally important public water supply, contribution to reduction in WFD classification. **Groundwater:** Partial loss or change to an aquifer. Degradation of regionally important public water supply or loss of significant commercial/ industrial/ agricultural supplies. Partial loss of the integrity of GWDTE. Contribution to reduction in water body WFD classification. Damage to major structures through subsidence or similar effects or loss of minor structures. **Flood Risk:** Increase in peak flood level (>50 mm).
Minor adverse	Results in some measurable change in attributes, quality or vulnerability	**Surface Water:** Minor effects on water supplies, a measurable change to water quality or levels but no loss of habitat. **Groundwater:** Potential low risk of pollution to groundwater. Minor effects on an aquifer, GWDTEs, abstractions and structures. **Flood Risk:** Increase in peak flood level (>10 mm).
Negligible	Results in effect on attribute, but of insufficient magnitude to affect the use or integrity	The proposed development is unlikely to affect the integrity of the water environment for both surface water and groundwater. Negligible change to peak flood level (⩽ +/- 10 mm).
Minor beneficial	Results in some beneficial effect on attribute or a reduced risk of negative effect occurring	**Surface Water:** A measurable positive change to water quality. **Groundwater:** Reduction of groundwater hazards to existing structures. Reductions in waterlogging and groundwater flooding. **Flood Risk:** Creation of flood storage and decrease in peak flood level (>10 mm).
Moderate beneficial	Results in moderate improvement of attribute quality	**Surface Water:** Contribution to improvement in water body WFD classification. **Groundwater:** Contribution to improvement in water body WFD classification. Improvement in water body catchment abstraction management Strategy (CAMS) (or equivalent) classification. Support to significant improvements in damaged GWDTE. **Flood Risk:** Creation of flood storage and decrease in peak flood level (>50 mm).

Magnitude	Criteria	Typical example
Major beneficial	Results in major improvement of attribute quality	**Surface Water:** Removal of existing polluting discharge or removing the likelihood of polluting discharges occurring to a watercourse. Improvement in water body WFD classification. **Groundwater:** Removal of existing polluting discharge to an aquifer or removing the likelihood of polluting discharges occurring. Recharge of an aquifer. Improvement in water body WFD classification. **Flood Risk:** Creation of flood storage and decrease in peak flood level (>100 mm).
No change		No loss or alteration of characteristics features or elements. No observable impact in either direction.

Drainage Strategy

11.4.12 A Drainage Strategy will be produced as part of the application and will be referenced during the assessment of effects. It will outline opportunities for SuDS, infiltration and water re-use to provide attenuation, reduce flooding, and provide pollution treatment.

11.4.13 A groundwater risk assessment will be undertaken should infiltration to groundwater be proposed based on the high-level approach outlined in DMRB LA 113 (Highways England, 2020a). This will identify any risk to groundwater quality and will outline whether mitigation measures are required. The Drainage Strategy will similarly assess the risk of groundwater flooding such as the high-level approach outlined in DMRB LA 113 (Highways England, 2020a).

11.4.14 The Drainage Strategy will be appended to the ES in a technical appendix.

Flood Consequences Assessment

11.4.15 In accordance with the requirements of the Planning Policy Wales (PPW) (Welsh Government, 2021a) document and the associated Technical Advice Note 15: Development, flooding and coastal erosion (TAN 15) (Welsh Government, 2021b), a Flood Consequences Assessment (FCA) will be undertaken.

11.4.16 Section 12 of the PPW TAN 15 document (Welsh Government, 2021b) states that an FCA is required for any new development proposal located fully or partly in Flood Zones 2 and 3 for surface water and small watercourses, as well as for developments with the potential to affect surface water flow pathways despite lying outside of these zones.

11.4.17 The FCA will consider both the risk of flooding to and from the proposed development, as well as the impact of climate change over the lifetime of the development. The climate change allowances and flood consequence assessments (Welsh Government, 2021c) document supplements the advice provided in the TAN 15 document and provides detailed guidance on climate change allowances for planning purposes. The assessment will be a desk-based study using existing data sources from Natural Resources Wales (NRW).

11.4.18 The FCA will be appended to the ES in a technical appendix.

Water Features Survey

11.4.19 A desk-based water features survey (WFS) will be undertaken to identify surface water and groundwater features that could be impacted by the proposed development. This will be supplemented by a walkover survey, subject to land access constraints. The WFS will also identify licensed and unlicensed abstractions.

11.4.20 The WFS will be appended to the ES in a technical appendix.

Water Framework Assessment

11.4.21 A preliminary WFD assessment will be undertaken alongside the above assessments to establish the potential for effects on WFD waterbody status and to establish the need for a detailed WFD compliance assessment.

11.5 Climate Change Adaptation and Resilience

11.5.1 The Flood Consequences Assessment: Climate change allowances (Welsh Government, 2021c) document highlights the expected increase in serious flood risk from all sources to people, the economy, and the environment in Wales due to climate change.

11.5.2 The PPW (Welsh Government, 2021a) outlines measures that should be undertaken from the early planning stage to incorporate consideration for climate change in Section 3.3 Strategic and Spatial Choices – Climate Change, Decarbonisation, and the Sustainable Management of Natural Resources. It summarises the Environment (Wales) Act (Welsh Government, 2016a) and its establishment of the Flood and Coastal Erosion Committee (Welsh Government, 2016b) which provides advice on the wider risks and benefits of flood and coastal erosion risk management in Wales, with a focus on all sources of flooding.

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12 Health

12.1 Introduction

12.1.1 This section of the Scoping Report identifies potential impacts with regard to human health that may occur during the construction and operation of the proposed development and outlines whether these will be addressed further in the Environmental Statement (ES).

12.1.2 The World Health Organisation (WHO) defines health as “a state of complete physical, mental and social wellbeing and not merely the absence of disease or infirmity” (WHO, 2020). Health determinants are factors that influence the health of the population. This definition reflects the understanding that an individual’s traits interact with lifestyle, community, environmental, social and economic factors as well as a wider range of issues to determine their health outcomes.

12.1.3 The conclusions of the following other ES topics inform the changes in determinants of health, and therefore are referred to within this chapter:

- Air quality.
- Noise and vibration.
- Socio-economics.
- Ground conditions and contaminated land.
- Heat and Radiation.

12.1.4 The health assessment in EIA considers the potential outcome of how changes in the determinants could impact the local and future population. The analysis within the health chapter will therefore describe, where possible, the predicted health and well-being outcomes as a result of changes in the determinants of health.

12.1.5 The health assessment study area varies across each of the ES topics as listed above and are therefore stated in the respective chapters.

12.1.6 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

12.2 Baseline

12.2.1 As outlined in Chapter 2, the Cawdor Barracks site is located on St David’s Peninsula in Pembrokeshire, South Wales, and is currently a working military base. The Cawdor

Barracks site is approximately 1.2 km northeast of the coast. There are small settlements surrounding the Cawdor Barracks site such as Penycwm located approximately 130 m south of the Cawdor Barracks site, Llethr located adjacent to the Cawdor Barracks site, Trefgarn Owen located approximately 1 km east of the Cawdor Barracks site and Llandeloy located approximately 1 km north of the Cawdor Barracks site. The villages of Solva and Newgale are located approximately 4.5 km southwest 2 km to the south of the Cawdor Barracks site.

12.2.2 The Cawdor Barracks site is located within the jurisdiction of PCC. The approximate population of Pembrokeshire is approximately 124,000 (Pembrokeshire County Council, 2023).

12.2.3 The Solva Surgery in Maes Yr Eglwys is the nearest GP surgery to the Cawdor Barracks site, located approximately 4.5 km west. There is one other GP surgery within 10 km of the Cawdor Barracks site, St David's Surgery in Haverfordwest. The nearest hospital is Withybush Hospital approximately 12 km southeast of the Cawdor Barracks site.

12.2.4 There are approximately 400 employees currently on-site. There are some existing facilities on-site including:

- rugby and football pitches;
- community centre;
- cricket pitch;
- assault course;
- cross country running course;
- gym;
- outdoor exercise training facilities;
- large outdoor open spaces; and
- a canteen.

12.2.5 These will remain in place once the proposed development is operational.

12.3 Receptors

12.3.1 The key potential receptors during construction and operation have been identified as follows:

- Local community within approximately 5 km (as described in Baseline section) of the Cawdor Barracks site;
- Those working within the operational proposed development (site operatives); and

- Construction workers.

12.4 Scoping of Impacts

12.4.1 Table 12.1 and Table 12.2 present a summary of the scoping. They identify which likely environmental effects, with respect to Health will be assessed in the EIA (i.e. considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e. scoped out).

TABLE 12.1: POTENTIAL HEALTH IMPACTS - CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Construction related health impacts e.g. from noise, vibration, dust and pollutants	Yes	Potential health effects may arise as a result of construction related activities, such as noise and dust creation, pollutants and access impacts from construction vehicles using local roads. These potential impacts will be assessed in the following ES topic chapters: air quality, noise and vibration, transport and ground conditions and contaminated land.
Access to healthcare services, other social infrastructure and open space	No	The proposed development is not anticipated to impact access to healthcare services and other social infrastructure outside of the site during construction. Construction traffic will be managed through a construction traffic management plan (this is a requirement for MOD projects).

TABLE 12.2: POTENTIAL HEALTH IMPACTS – OPERATION

Potential Impact	To be assessed in EIA	Reason
Access to health and social care services and other social infrastructure	No	Access to health care services by residents in the surrounding area will not be impacted during operation of the proposed development.
Impact on local health inequalities and vulnerable groups	No	It is not anticipated there will be any significant effects on health inequalities and vulnerable groups given the site is not publicly accessible and relatively low number of additional site staff predicted in relation to the current baseline.
Access to outdoor green space and recreational/break-out areas (employees)	No	Access to outdoor green space and recreational areas are important for the health and well-being of employees, particularly if they work and live full-time on-site. It is assumed facilities for future employees will be similar to that which is currently provided. These facilities will remain in use once the proposed development is operational.
Operational related health impacts on site operatives and nearby settlements e.g. from noise, vibration, heat and radiation, major accidents and disasters, dust and pollutants	Yes	Potential health effects may arise as a result of operational related activities. These will be assessed in the following ES topic chapters: air quality, noise and vibration, heat and radiation, and geology and soils.

Potential Impact	To be assessed in EIA	Reason
Access to healthy food options	No	Access to healthy food options is important for the health and well-being of employees. Particularly if an employment site is remote and has no nearby cafes or supermarkets, and if employees are residential on-site, employers have a responsibility to provide this facility. It is assumed facilities for future employees will be similar to that which is currently provided. These facilities will remain in use once the proposed development is operational.

12.4.2 The other ES chapters will address the potential for health effects in relation to air quality, noise, heat and radiation, socio-economics, ground conditions and contaminated land and transport. The other health determinants as set out in in Tables 12.1 and 12.2 are not considered to result in any significant effects and are therefore scoped out.

12.4.3 The MOD People Health and Wellbeing Strategy 2022-2027 (Ministry of Defence, 2022) will be taken into account in the design of the proposed development. The Strategy states the following:

"All Defence People will be in a state of positive physical, mental and social health and wellbeing, to enable sustained delivery of defence outputs and optimise whole force operational effectiveness through improved productivity."

12.4.4 The Strategy outlines the following priorities relevant to the proposed development:

- Mental wellbeing and resilience.
- Addressing health inequalities.
- Nutrition.
- Addictions and lifestyle choices.
- Workplace exposures and climatic injuries.

12.4.5 A separate health assessment has been scoped out of the ES as any potential significant effects in terms of health will be considered in the other EIA chapters as noted above.

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13 Socio-economics

13.1 Introduction

13.1.1 This chapter of the Scoping Report identifies potential socio-economic impacts that may occur during the short term (construction) and long term (operation) of the proposed development at Cawdor Barracks and outlines how these will be addressed in the ES.

13.1.2 It is recognised that there are key linkages between the topics of Socio-economics and Health (Chapter 12), therefore these chapters should be considered in conjunction with one another.

13.1.3 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

13.2 Baseline

13.2.1 The Cawdor Barracks site is located within the Middle Layer Super Output Area (MSOA) of 'Pembrokeshire 003', and the Haverfordwest and Milford Haven Travel to Work Area (TTWA), both of which are contained within the boundary of Pembrokeshire County Council (PCC). The MSOA has a population of 7,656, whilst The TTWA has a population of 78,750 (Office for National Statistics, 2020).

13.2.2 The closure of Cawdor barracks was originally scheduled for 2024, but has since been delayed until 2028, along with plans to move operations to Caerwent Barracks in Monmouthshire. The largest settlement in the vicinity of the site is Haverfordwest, which is approximately 20 minutes' drive to the south-east of the site and has a population of 15,388 (Office for National Statistics, 2020). Haverfordwest offers a range of education, community, employment, shopping, health and leisure facilities as well as railway and bus services. The nearest settlement to site is St. David's, which is approximately a 12-minute drive to the west of the site, and has a population of 1,390 (ONS, 2020) and offers limited services.

13.2.3 There are an estimated 2,250 jobs based within Pembrokeshire 003 MSOA, and 30,000 within the wider TTWA (Office for National Statistics, 2021). There are 1,750 people working in construction within the TTWA (Office for National Statistics, 2021).

13.2.4 Pembrokeshire is also a popular tourist destination, renowned for its coastline and beaches, receiving 7 million+ visitors a year (Visit Pembrokeshire, 2019). The Accommodation and food services industry is responsible for 4,000 jobs in the Haverfordwest and Milford Haven Travel to Work Area, or 13.3% of total employment in the area.

13.3 Receptors

13.3.1 The key potential receptors have been identified are as follows:

- The existing Barracks community, including military (14th Regiment) and civilian staff living on base and within the local area;
- The existing resident community (living within Pembrokeshire 003 MSOA), including the resident workforce;
- The existing resident community (living with the Haverfordwest and Milford Haven TTWA), including the resident workforce;
- The construction industry in Wales and its employees;
- Local businesses across all industry sectors;
- Local healthcare facilities;
- Other local community assets; and
- The local tourism industry / visitor economy.

13.4 Scoping of Impacts

13.4.1 Table 13.1 and Table 13.2 present a summary of the scoping. They identify which likely socio-economic impacts will be assessed in the EIA (i.e. considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e. scoped out).

TABLE 13.1: POTENTIAL SOCIO-ECONOMIC IMPACTS - CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Generation of temporary employment opportunities and supply chain benefits during construction	Yes	The proposed development will create temporary construction employment, which may include employment opportunities for the local population (MSOA and wider TTWA). These include both direct employment (i.e. construction workers) and indirect and induced employment (within the construction supply chain and through construction workers spending their wages in the local economy). Given the relatively small scale of the local workforce, this has potential to be a significant effect.
Effects on availability of short term accommodation within the local area	Yes	As noted in the Baseline section above, the local (TTWA) construction sector in relatively small, meaning that a significant number of construction workers are likely to be brought in from outside the local area. These non-local workers are likely to require temporary accommodation. The ES will assess the proposed accommodation strategy for non-local construction workers to establish whether any significant effects on local housing and/or tourist accommodation markets are likely to occur.

Potential Impact	To be assessed in EIA	Reason
Effects on healthcare (GP Surgeries and A&E facilities) during construction	Yes	Linked to the above, non-local construction workers may need to access local healthcare facilities if they are to be based in the local area for an extended period of time. The ES will determine whether the increase in demand for healthcare from temporary workers will represent a significant effect. The potential for emergency incidents arising during construction requiring urgent healthcare (such as A&E visits) will be minimised by the appointed contractor through appropriate health and safety protocols, and as a result is not expected to result in a significant effect on local healthcare.
Disruption to local life from short-term construction activities, including impacts on local traffic and site access	No	Construction traffic will be managed through a Construction Traffic Management Plan. Given the short term nature of the project, any disruption to the local road network is not anticipated to result in significant socio-economic effects during construction.

TABLE 13.2: POTENTIAL SOCIO-ECONOMIC IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Creation of permanent, long term jobs	Yes	The proposed development will increase the number of jobs based on the site in the short term, and ensure that the Cawdor Barracks site retains at least some military operational activity for the long term (following anticipated relocation of current operations to Caerwent Barracks in 2028). This could represent a significant effect on the local workforce compared against the counterfactual (i.e. no development occurring, and the Barracks closing in 2028 as currently scheduled).
Safeguarding long term indirect and induced contribution to the local economy	Yes	Securing a permanent operational use for the site will also benefit local businesses – both those within the proposed development's operational supply chain and in the broader local economy (such as retail, hospitality and leisure businesses). The ES will consider whether this constitutes a significant permanent effect on the local economy.
Temporary increase in population living on the site, and associated demand for social infrastructure	Yes	It is possible that a proportion of the permanent workforce based at the completed facility could live on-site within existing MOD accommodation – operational arrangements such as these are not yet known and will be determined as the design progresses. This could temporarily result in a slightly larger resident population of the site compared with baseline levels, which would in turn result in increased demand for local social infrastructure (schools, GP surgeries etc.). Any increase in population associated with the proposed development is, however, likely to be temporary – with the majority of members of the regiment current based on site expected to depart as operations transfer to Caerwent Barracks. The significance of any potential effects on local social infrastructure will be established within the ES.

Potential Impact	To be assessed in EIA	Reason
Permanent disruption to local life, including impacts on local traffic and site access	No	The proposed development is not expected to have a significant effect on local traffic levels. Though the site population is likely to grow slightly on completion, the anticipated departure of the regiment currently based on site in 2028 means that, over the longer term, traffic movements are likely to reduce compared with baseline levels. Any short term traffic impacts are not expected to be perceptible.

13.5 Methodology for Impact Assessment

Guidance and legislation

13.5.1 The EIA regulations state that the EIA must identify, describe and assess, the direct and indirect significant effects of the proposed development on factors including population and human health. For the purposes of this EIA scoping exercise, this has been split into a socio-economics scoping chapter and a health scoping chapter.

13.5.2 There is no published specific methodological guidance and technical significance criteria to assess socio-economic effects within EIA. The assessment will be undertaken based on professional experience and judgement. Wherever possible, assessment will refer to existing best practice and socio-economic guidance from other sectors, including HM Treasury's Green Book (2022) and HCA's Additionality Guide 4th Edition (2014).

13.5.3 Reference will also be made to relevant aspects of MOD policy, including 'JSP 850: Infrastructure and Estate Policy, Standards and Guidance' Section 2 - Sustainability Appraisal - which includes guidance on appraisal of social impacts.

Assessment area boundaries for assessing employment impacts

13.5.4 Given the different characteristics of the construction and operational workforce, the areas for these two employment impacts will be different, as outlined below.

13.5.5 **Construction employment area**: construction activities are characterised by relatively short and temporary contracts and longer journeys to work compared to those made by people working on the operation and management of the Cawdor Barracks site. The study area for estimating construction employment impacts is defined as Wales. Given the rural location and specialist nature of project, it is also likely that some construction workers will be brought in from the rest of the UK and potentially from abroad.

13.5.6 **Operational employment area**: operational employment requires some specialist skills which will likely need to be brought in externally in order to fulfil required roles, whereas others will be available from the local and surrounding areas.

13.5.7 On this basis, the study area for estimating operational employment impacts is defined as the Haverfordwest and Milford Haven TTWA.

Establishing Baseline

13.5.8 The assessment of baseline socio-economic conditions will set out the existing economic and demographic conditions, and provision of relevant community facilities (healthcare) and overnight accommodation (including Hotels, B&Bs and Caravan Sites). It will include an assessment of the economic and social value of the existing site in terms of its economic and societal impacts.

13.5.9 Baseline conditions will be assessed at spatial levels including the Cawdor Barracks site, MSOA, TTWA and where relevant (i.e. where MSOA/TTWA-level data is not available) within Pembrokeshire.

13.5.10 Relevant existing social infrastructure, namely schools and healthcare facilities, will be assessed based on provision within reasonable travel times of the Cawdor Barracks site and on relevant guidance and policy such as the local plan.

13.5.11 A range of publicly available research and data will inform the baseline assessment with reference to the following sources:

- A policy review to provide an outline of relevant local and regional, social and economic policy objectives for the area.
- A desk-top review of current social and economic conditions prevalent in the local area in comparison with regional and national trends, using Geographic Information Systems (GIS) and information from the project team, the local authority, and publicly available database records. This information will be used to establish:
    - Economic baseline: A review of workforce, economic activity, earnings, industries of occupation and occupational classification; and
    - Social baseline: A review of the area demographics, indices of deprivation, visitor accommodation demand and supply, capacity of local facilities including schools, hospitals and GP surgeries.
- Liaison and dialogue with the local authority and other stakeholders for information regarding the economic aspirations for the local area, as appropriate.

13.5.12 The likely effects generated from the proposed development will be examined, accompanied by an assessment of their relative significance. In particular, the assessment will address the direct, indirect and induced employment opportunities generated during the construction and operational phases, the capacity of local social infrastructure to accommodate temporary increases in the local population on completion, and the likely impacts upon the availability of visitor accommodation during construction (and any subsequent effects on the local tourist economy).

Assessment Methodology

13.5.13 The assessment of socioeconomic effects will be undertaken using the following methodology:

Construction Phase

- Demolition and construction-related employment effects will be assessed using standard ratios of construction employment to output from the Office of National Statistics, as well as specific information supplied by the MOD due to the non-standard nature of the proposed development.
- The assessment of the construction phase will quantify the expected construction employment supported in the study area.
- No specific comprehensive, quantitative socio-economic assessment methodology exists, and as such a quantitative analysis of employment effects will be undertaken using established methodologies, including the Additionality Guide by the Homes and Communities Agency (2014).
- The Additionality Guide sets out an approach to measuring the extent to which a proposed development (and associated outputs, outcomes and impacts) is larger in scale, at a higher quality, takes place quicker, takes place at a different location, or takes place at all as a result of intervention. Additionality measures the net result, taking account of deadweight, leakage, displacement, substitution and economic multipliers.

Operational Phase

- The employment expected to be accommodated by the operational facility will be supplied by the MOD, owing to the non-standard nature of the project;
- The generation of additional gross value added (GVA) will be estimated using national statistics;
- Assessment of demography of the anticipated new resident population living within existing (currently vacant) accommodation on site and the potential effects on demand for schools and primary healthcare facilities. The assessment will also consider the accessibility of local facilities. This includes:
    - Current capacity in healthcare facilities in the Local Area against expected demand from the temporary workforce and new employees on the site, including any additional construction and timing of new facilities.
- Changes to local employment during the operational phase informed by the MOD;
- A review of the potential impacts on local commercial businesses providing products and services to the operational facility and its employees.

13.5.14 The assessment of socio-economic effects will be made with reference to the standard EIA significance criteria terminology, as set out in Chapter 3. There is no standardised methodology for the assessment of significance for socio-economic effects, and as a result the assessment will be made based on professional judgement, with reference to the magnitude of deviation from baseline conditions

expected to occur. This will take into account the rural nature of this location, with receptors in most categories (and particularly those relating to employment) likely to be more sensitive than is typically the case in urbanised areas. In all cases, receptor sensitivity will be justified with reference to baseline conditions.

13.5.15 The results of the socio-economic assessment will benchmark the overall project aims against a variety of additional socio-economic components, and how these meet established social and economic policy objectives at the national level.

13.6 Climate Change Adaptation and Resilience

13.6.1 Climate change is not considered to result in a material impact on the significance of effect for socio-economics.

13.7 References

Office for National Statistics (2020), Small Area Population Estimates

Office for National Statistics (2021), Business Register Employment Survey

Visit Pembrokeshire (2019) Economic Impact of Tourism Report, https://www.visitpembrokeshire.com/wp-content/uploads/Economic-Impact-of-Tourism-Pembrokeshire-Report-2019.pdf

HM Treasury (2022), The Green Book

Homes and Communities Agency (2014), Additionality Guide – 4th Edition

14 Climate Change and Carbon

14.1 Introduction

14.1.1 This section of the Scoping Report identifies potential impacts with regard to Climate Change that may occur during the construction and operation of the proposed development and outlines whether these will be addressed further in the Environmental Statement (ES).

14.1.2 The EIA Directive (2014/52/EU) and the 2017 updates to UK EIA regulations include the requirement to assess the potential impacts of the proposed development on climate change and its vulnerability to climate change.

14.1.3 In accordance with the EIA Regulations, the climate change chapter comprises of two assessments. The first assessment required involves the evaluation of the potential effects of the proposed development on the climate, which is referred to as a *Carbon Impact Assessment*. The second assessment, the *Climate Change Resilience Assessment*, investigates the effects of projected climate change on the development and identified environmental receptors.

14.1.4 The Scoping Report shall determine whether a full climate assessment is necessary for the proposed scheme.

14.1.5 The term ‘carbon’ is used throughout as shorthand to refer to all relevant greenhouse gas (GHG) emissions.

14.1.6 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

Carbon Impact Assessment

14.1.7 The Environmental Impact Assessments (EIA) Directive 2014/52/EU requires a whole life carbon assessment, i.e., operational plus embodied carbon emissions. In accordance with the modules contained within *PAS 2080:2016 (Carbon Management in Infrastructure)* (CLC, 2016) and standard industry best practice, this assessment will measure embodied carbon associated with the materials used to construct the proposed development, the emissions involved transporting the materials to site and construction emissions from use of plant and machinery. Operational carbon emissions from the use of the scheme once completed will also be quantified to give the whole life assessment.

14.1.8 As required by IEMA's latest guidance on *Assessing Greenhouse Gas Emissions and Evaluating their Significance* (IEMA, 2022), the carbon impact assessment quantifies the carbon emissions associated with the proposed development. Emissions from both the construction and operational phase of the development are measured.

Climate Change Resilience Assessment

14.1.9 The second assessment will comply with the requirements of the IEMA guide to *Climate Change Resilience and Adaptation* (IEMA, 2020). This qualitative risk assessment involves assessing the resilience of the proposed development and surrounding environment to climate change.

14.1.10 This assessment will consider the embedded and proposed measures of mitigation of all environmental technical disciplines, that are proposed to exist within design, for the determination of resilience to climate change.

Policy Requirements

14.1.11 Policy outlined in the MoD *Infrastructure Function - Policy Instruction Extant Policy to Support the transition to Net Zero* must be applied to all defence-funded infrastructure across the defence enterprise. It is the responsibility of all staff engaged in defence funded infrastructure and estate activities to apply and meet these MOD Policy requirements.

14.1.12 The relevant policy, listed in the *Infrastructure Function,* to the development, which needs to be adhered to, is listed below:

GHG Emissions

"1.a. Opportunities to reduce GHG emission must be considered in all sustainability and environmental appraisals and assessments.*

1.b. Strategies and Policies must set out the criteria against which plans, programmes and projects must address GHG emission.

1.c. Whole/Design life GHG emission must be assess for all infrastructure projects.

1.d. Business Cases must not be approved without a clear audit trail that GHG emission have been addressed in line with criteria set for the project through MOD policy and chain of sustainability appraisals and assessments.

EV Charging

Government proposed policy on EVCP to be adopted with immediate affect where it is practical to do so:

- *All new SFA to have one charge point unless there are overriding technical or operational reasons*
- *All new/major refurbished SLA and non-residential buildings to have cabling for one EV charge point per 10 parking spaces provided/allocated to the building occupants plus conduits for electric cables to 1 in every 5 parking spaces for future installation unless there are overriding technical or operational reasons*

- *Private vehicles may use spare MOD fleet charging capacity provided there is a booking and cost recovery system in place. No charging points are to be provided solely for private vehicles unless part of a development plan. A booking and cost recovery system must be in place.*
- *Contractors' vehicles can only be charged from MOD electricity supplies if there are provisions in the contact."*

14.2 Baseline

Carbon Impact Assessment

14.2.1 As per IEMA guidance (IEMA, 2022), the baseline for the carbon impact assessment is taken as a 'business as usual' scenario, prior to existence of the proposed development. It represents existing carbon emissions from the Cawdor Barracks site prior to construction and operation of the project under consideration. If the proposed development is located on a brownfield site, the current operations of the Cawdor Barracks site will be assessed as part of the baseline assessment. Where a baseline involves existing infrastructure, typical baseline carbon emission sources would include maintenance works (e.g., the embodied carbon of materials used), operational energy (e.g., lighting) and end-user emissions (i.e., emissions from vehicles using the road).

14.2.2 The study area for the assessment encompasses a wider extent than the site boundary due to the consideration of embodied carbon emissions from products and materials, the transport of materials to site and installation processes on site. The study area also includes activities that may be avoided or displaced because of the proposed development, namely construction and operational transport, heating and electricity production activities. The baseline carbon emission sources thus comprise embodied carbon and operational utility consumption (electricity, gas and water consumption).

Climate Change Resilience Assessment

14.2.3 The baseline for the Climate Change Resilience Assessment is based on the current climatic conditions, existing at the site and surrounding environment, as modelled via UKCP18 data (Met Office, 2023). The future baseline then describes the extent to which the identified receptors are vulnerable to and are affected by the projected changes to climatic impacts (e.g., temperature, precipitation and wind), as relevant to the geographical location, characteristics, and timeframe of the proposed development. Future climatic projections are depicted based on the most applicable grid resolution of the UKCP18 projections, to the site location. This data will be provided to the EIA coordinators for dissemination around the environmental disciplines to ensure climate change projections are appropriately considered.

14.3 Receptors

Carbon Impact Assessment

14.3.1 For the Carbon Impact Assessment, the receptor is the global atmosphere.

14.3.2 The sensitivity of the receptor (global climate) to increases in carbon emissions is always defined as high as any additional carbon impacts could compromise the UK's ability to reduce its carbon emissions and therefore meet its future carbon budgets.

Climate Change Resilience

14.3.3 IEMA (2020) guidance defines the key potential receptors, for consideration within the assessment, as follows:

- Buildings and infrastructure receptors (including equipment and building operations).
- Human health receptors (e.g., construction workers, occupants and site users).
- Environmental receptors (e.g., habitats and species).
- Climatic systems.

14.3.4 The in-combination impact on the UKCP18 projections of climate change on the receptors listed above, are assessed by each technical discipline that will be scoped into the ES. The receptors are qualitatively assessed against a range of climatic impacts (temperature, precipitation and wind) and their respective change, as modelled by UKCP18 climate projections. Once the future baseline is established, the receptors are assessed for their resilience against the projected climatic changes.

14.4 Scoping of Impacts

14.4.1 Table 14.1 and Table 14.2 present a summary of the scoping. They identify which likely environmental effects, with respect to climate change will be assessed in the EIA during both the construction and operation phase (i.e., considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e., scoped out).

TABLE 14.1: POTENTIAL CLIMATE CHANGE IMPACTS – CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
Part 1: Carbon Impact Emissions arising from product stage (A1 – A3 life cycle stage)	Yes	Emissions are expected to derive from the extraction of materials (A1 – A3), transportation of construction materials to the site (A4) and use of plant machinery on site for construction processes (A5). The quantification and assessment of embodied carbon (A1 – A5) is fundamental for successful implementation of carbon management throughout the design process. The embodied carbon emissions associated with a development is a major contributory factor to a development's total carbon emissions. The identification of emission hotspots across the A1 – A5 stages can often lead to further efficiencies in terms of carbon elimination and
Part 1: Carbon Impact Emissions arising from construction transport processes (A4 life cycle stage)	Yes	

Potential Impact	To be assessed in EIA	Reason
		development cost reduction with the implementation of appropriate mitigation.
Part 1: Carbon Impact Emissions arising from construction installation processes (A5 life cycle stage)	Yes	

TABLE 14.2: POTENTIAL CLIMATE CHANGE IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Part 1: Carbon Impact Emissions from operation	Yes	• Carbon emissions from energy, water consumption and treatment of wastewater during the operational phase of the proposed development • Emissions associated with transport during operation. This is dependent on the availability of traffic data.
Part 1: Carbon Impact **Emissions from End of Life**	Yes	Emissions associated with end of life and decommissioning (C1-4) will also lead to increased emissions. To ensure a whole life carbon perspective is taken these will be assessed.
Part 2: Climate Resilience Changes in temperature	Yes	Under the RCP8.5 50th percentile (Met Office, 2022), climate change projections estimate a 4 – 5 degree increase in mean temperatures. This increase temperature owing to climate change could increase the sensitivity of human receptors to pollutant / dust emissions due to lifestyle changes for example, more outside living and windows being kept open for longer. Changes to temperature may also impact onsite biodiversity. Increased air temperatures due to climate change may also require increased cooling requirements within the design of the proposed development.
Part 2: Climate Resilience Changes in precipitation	Yes	Climate change may lead to periods of decreased precipitation resulting in water scarcity and periods of heavier rainfall leading to flooding. The assessment on climate resilience of various receptors, with regard to the impacts on groundwater and surface water from changing precipitation, will be assessed in this chapter. If receptors are determined as sensitive, the magnitude of effect and hence the receptor resilience to climate change, will consider the mitigation measures proposed within the Flood Risk Assessment.
Part 2: Climate Resilience Changes in frequency of more-intense storm events	Yes	The development may be vulnerable to storm damage to structures and assets. Consideration will be given to the mitigation measures associated with the building's resilience to wind and storm related risks.

Potential Impact	To be assessed in EIA	Reason
Part 2: Climate Resilience Changes in Sea level rise	Yes	As the proposed development is planned to be located approximately 1km away from the coast of St Brides Bay, it is probable that the risk of sea level rise may impact the development's resilience to climate change. The projected sea level rise will be identified in the climate change chapter and the proposed development's resilience to the climate change risk will be assessed with consideration of mitigation measures.

Emission Sources Scoped Out

14.4.2 The impact of climate change on construction, with regard to the proposed development's resilience, is scoped out of the Climate Change Resilience Assessment due to the climate projections existing from 2030 onwards, thus past the temporal scope of the construction phase.

14.4.3 Emissions associated with maintenance, for both the baseline and future carbon estimate, have been excluded from this assessment as it is not considered likely to materially affect the baseline calculations; it is likely to be minimal in proportion to the overall carbon footprint and are therefore scoped out of the assessment.

14.5 Methodology for Impact Assessment

Carbon Impact Assessment

14.5.1 The carbon impact assessment of the construction element of the proposed development will include assessing the physical infrastructure assets associated with the proposed development. It includes the embodied carbon of proposed development materials and emissions associated with construction activities. These are defined in terms of lifecycle stages, detailed in Section 7 of *PAS 2080:2016, Carbon Management in Infrastructure*, as follows:

- **Products and materials (A1-3)** – use of materials for temporary and permanent construction activities
- **Transport to works site (A4)** – the transportation of materials to the Proposed Scheme site, e.g., by HGV
- **Construction and installation processes (A5)** - construction plant use

14.5.2 The operation assessment will be informed by the design life of key elements of the proposed development. This assessment will include the operational energy requirements of the proposed development. This element is also defined in terms of life cycle stages, as detailed in Section 7 of PAS 2080:2016 as follows:

- **Operational energy use (B6)** – operational emissions associated with buildings, infrastructure and transportation
- **Operational water use (B7)** –emissions associated with water and water processing

- **Operational transport (B9)** – emissions associated with operational traffic

14.5.3 The end of life assessment will be informed by the up front assessment. This assessment will include the deconstruction, transportation of waste and demolition activities. This element is also defined in terms of life cycle stages, as detailed in Section 7 of PAS 2080:2016 as follows:

- **Decommissioning (C1)** – emissions associated with decommissioning activities
- **Transport (C2)** – transportation of materials off site
- **Waste and Disposal (C3/4)** – emissions associated with waste and disposal of materials

14.5.4 Under the Environment (Wales) Act 2016, carbon budgets have been set that aim for the country to achieve net zero by 2050. The target budgets below set in law followed the Climate Change Committee's (CCC) recommendations:

- Carbon Budget 2 (2021 – 2025): 37% average reduction of 1990/1995 baseline. Within this budget is 0% offset limit;
- Carbon Budget 3 (2026 – 2030): 58% average reduction of 1990/1995 baseline;
- 2030: 63% reduction of the 1990/1995 baseline; and
- 2040: 89% lower than the 1990/1995 baseline.

14.5.5 The assessment of significance associated with the emissions of the proposed development is defined by the IEMA (2022) guidance and is determined with the consideration of proposed mitigation and the development's ability to meet regional and national policy requirements.

14.5.6 The Carbon Impact Assessment will include opportunities for mitigation to be considered in the design of the proposed development in line with design hierarchy of 'build less, build clever, build efficiently' as set out in IEMA 2022 guidance and PAS2080.

Climate Change Resilience

14.5.7 The climate change resilience assessment involves consultation with all other scoped-in environmental disciplines, to determine any relevant receptors and impacts that could be affected by the climate change parameters and in turn, to identify any potentially significant in-combination impacts.

14.5.8 Significance of effects will be determined in accordance with IEMA (2020) Guidance that involves using a matrix comparing the likelihood of climate hazards, leading to an in-combination impact, with the consequence of in-combination impacts. The likelihood of climate hazards leading to an in-combination impact will be defined using an assessment of the regional climatic data, derived from the UKCP18 Climate Projections, combined with professional judgement. The consequence of in-combination impacts will be based on the change to the significance of the effect of the proposed development on the resource or receptor for each relevant environmental discipline, given existing mitigation measures.

14.5.9 The proposed development's resilience to climate change will be considered qualitatively. This will be completed in liaison with project design team and the other ES technical specialists by considering the climate projections for the geographical location and timeframe of the proposed development. A statement will be provided within the ES to describe how the design of the proposed development will be designed to improve its resilience to future climate change.

14.5.10 Overall, climate change will be scoped in to the EIA. Climate change will have a material impact on the significance of impacts however, both the Carbon Impact Assessment and the Climate Change Resilience Assessment will establish the adversity of significance which will be determined by the level of mitigation considered within the design.

14.6 References

CLC. (2016). *PAS2080:2016 - Carbon Management in Infrastructure.* The British Standards Intistitution.

IEMA. (2020). *Environmental Impact Assessment Guide to: Climate Change Resilience & Adaptation.*

IEMA. (2022). *Assesing Greenhouse Gas Emissions and Evaluatign their Significance.*

Met Office. (2022). *Climate change projections over land*. Retrieved from Met Office: https://www.metoffice.gov.uk/research/approach/collaboration/ukcp/summaries/climate-change-projections-over-land

Met Office. (2023, January 1). *UK Regional Climates*. Retrieved from Met Office: https://www.metoffice.gov.uk/research/climate/maps-and-data/regional-climates/index

15 Heat and Radiation

15.1 Introduction

15.1.1 This section of the Scoping Report identifies potential impacts with regard to heat and radiation that may occur during the operation of the proposed development and outlines whether these will be addressed further in the Environmental Statement (ES). This potential impact is considered due to presence of radar antennae and the non-ionising radiation associated with their operation.

15.1.2 The difference between ionising and non-ionising radiation is defined by the Health and Safety Executive as follows:

15.1.3 'Ionising radiation includes:

- *X-rays;*
- *gamma rays; and*
- *radiation from radioactive sources and sources of naturally occurring radiation, such as radon gas.*

15.1.4 Ionising radiation has many uses in industry, such as energy production, manufacturing, medicine and research and produces many benefits to society. However, it is important that the risks of ionising radiation are managed sensibly to protect workers and the public.

15.1.5 Non-ionising radiation includes:

- *visible light*
- *ultra-violet light*
- *infra-red radiation*
- *electromagnetic fields*

15.1.6 *Sources of electromagnetic fields are used extensively in telecommunications and manufacturing with little evidence of related long-term health problems. Ultra-violet light is part of natural sunlight and also forms part of some man-made light sources. It can cause a number of health problems, including skin cancer.*'

15.1.7 Cawdor Barracks is being considered for the location of the proposed development. For the purposes of this EIA scoping exercise, the Cawdor Barracks site MOD ownership boundary has been assessed to provide a conservative spatial extent and worst-case approach. It is noted that the Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor barracks site (approximately 50 hectares). The design development will seek to avoid areas associated with environmental sensitivities and constraints within the wider Cawdor Barracks site as far as possible.

15.2 Receptors

15.2.1 The key potential receptors have been identified as follows:

- Occupational exposure
- Public exposure
- Biodiversity

15.3 Scoping of Impacts

15.3.1 Table 15.1 and Table 15.2 present a summary of the scoping. They identify which likely environmental effects, with respect to heat and radiation will be assessed in the EIA (i.e. considered to be likely significant effects and therefore scoped in) and those which will not be assessed further (i.e. scoped out).

TABLE 15.1: POTENTIAL HEAT AND RADIATION IMPACTS - CONSTRUCTION

Potential Impact	To be assessed in EIA	Reason
There are no potential heat and radiation impacts associated with construction	No	There are no potential heat and radiation impacts associated with construction

TABLE 15.2: POTENTIAL HEAT AND RADIATION IMPACTS - OPERATION

Potential Impact	To be assessed in EIA	Reason
Occupational Exposure	Yes	It is currently anticipated that staff will be required on site to operate the radar arrays and associated equipment. Although sufficient exclusion zones will be imposed while the radar arrays are operating, the potential for exposure of occupational staff on site to non-ionising radiation will be addressed in the EIA.
Public Exposure	Yes	Although public access to the Cawdor Barracks site is restricted, there are residential receptors in close proximity to the Cawdor Barracks site and potential for members of the public to be moving through the surrounding area. Potential for impact is considered negligible, but will be addressed in the EIA
Wildlife Exposure	Yes	There is potential for biodiversity in the surrounding area, such as birds and bats, to come into contact with the non-ionising radiation associated with operation of the radar array, or experience secondary effects such as interaction with natural navigation. This will be considered within the 'Biodiversity' chapter of the ES and will not be specifically reported in the 'Heat and Radiation' chapter.

15.3.2 It is proposed that 'Heat and Radiation' will be scoped into the Environmental Statement (ES) and reported in a technical ES chapter.

15.4 Methodology for Impact Assessment

15.4.1 This assessment will be carried out by the MOD Defence Electro Magnetic Authority (DEMA) in accordance with the MOD JSP 392 Management of radiation protection in defence: part 2 guidance, Chapter 35 radio frequency radiations, January 2023. This JSP is primarily designed for users of small quantities of radioactive material and x-ray equipment.

15.4.2 This is mandatory guidance for MOD projects. In addition, the MOD has a duty of care to protect the health and safety of members of the public who have potential to interact with MOD facilities. This is outlined in the JSP 392 as: *'Duties Commanding Officer / Head of Establishment (CO / HoE) 18. The CO for an activity and any HoE with EMF transmission sources within their establishment each hold a duty to the Secretary of State, and a personal responsibility, to protect the environment and secure the health, safety and welfare of their staff at work. The CO / HOE each hold general duties to protect persons not in MOD employment (e.g. members of the public) against risks to their health and safety arising from the MOD work activities. This includes radiation safety. The CO / HoE authority (but not responsibility) for EMF radiation safety management arrangements may be delegated to an appropriate, Suitably Qualified and Experienced Person (SQEP) such as an EMF Safety Officer (ESO)'*.

15.4.3 'The Control of Electromagnetic Fields at Work Regulations 2016' also places a duty of care on the employer to protect employees.

15.4.4 The findings of this assessment will be reported within a Technical Appendix and will be summarised in an EIA technical chapter as part of the ES.

15.5 Climate Change Adaptation and Resilience

It is not anticipated that climate change would have a material impact on the significance of any potential effects associated with Heat and Radiation in this context.

15.6 References

Ministry of Defence (2023). JSP 392 - Management of radiation protection in defence: part 2 guidance. Chapter 35: Radio frequency radiations.

The Control of Electromagnetic Fields at Work Regulations, 2016.

16 Major Accidents and Disasters

16.1 Introduction

16.1.1 Schedule 4 of the EIA Regulations state that the following should be provided within the ES in relation to this topic:

16.1.2 "A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned"

16.1.3 The following sources of guidance were taken into account when considering potentially significant adverse effects of the proposed development on the environment deriving from its vulnerability to risks of relevant major accidents and/or disasters:

- IEMA Primer - Major Accidents and Disasters in EIA (September 2020);
- Cabinet Office National Risk Register 2020 Edition;
- UK Government Emergency Response & Recovery Guidance (October 2013); and
- International Federation of Red Cross & Red Crescent Societies Disaster and Crisis Management Guidance (IFRC, 2022).

16.1.4 According to the International Federation of the Red Cross (IFRC, 2022), *'disasters are serious disruptions to the functioning of a community that exceed its capacity to cope using its own resources. Disasters can be caused by natural, man-made and technological hazards, as well as various factors that influence the exposure and vulnerability of a community.'*

16.1.5 The IEMA guidance defines a 'major accident' as, 'e*vents that threaten immediate or delayed serious environmental effects to human health, welfare and/or the environment and require the use of resources beyond those of the client or its appointed representatives to manage. Whilst malicious intent is not accidental, the outcome (e.g. train derailment) may be the same and therefore many mitigation measures will apply to both deliberate and accidental events.'*

16.1.6 The types of major natural disasters, major accidents and man-made disasters that have been considered in this scoping report are discussed in sections 16.2 and 16.3.

16.2 Major Natural Disasters

16.2.1 The following types of major natural disasters have been considered:

- Epidemics;
- Animal infestation;
- Earthquakes;

- Mass movements;
- Volcanic eruptions;
- Storms;
- Droughts;
- Extreme temperatures;
- Floods (including storm surges); and
- Wildfires.

16.2.2 Given the low risk of occurrence in the UK of many types of major natural disaster events, such as major volcanic eruptions, earthquakes, tsunamis or animal infestations, these disasters are not considered relevant to the proposed development and have been scoped out from further consideration. In addition, epidemics are not considered relevant to the proposed development.

16.2.3 Furthermore, given that the Cawdor Barracks site is located on an exposed plateau, with limited vegetation cover, mass movements have been scoped out from further consideration. In addition, as we are not increasing the risk of grass fires in the area, wildfires have also been scoped out.

16.2.4 Four types of natural disaster event are however considered to pose a material risk to receptors in the UK and are considered relevant in the context of the proposed development: storms; extreme temperatures; droughts; and flooding. A consideration of the risk posed by these disasters is provided in the following paragraphs.

Storms and Extreme Temperatures

16.2.5 During both construction and operation of the proposed development, new site users would be brought to the Cawdor Barracks site that could potentially be affected by any storm occurring in the area, or by heatwaves or extreme low temperatures with heavy snow occurring. The building design associated with the proposed development will be required to meet the latest building regulations and will be designed to withstand the baseline wind strengths and directions, and with consideration of potential temperature highs and lows as part of their typical operation to ensure appropriate thermal comfort. This will include an allowance for climate change. It is therefore considered that an appropriate climate can be maintained within the proposed buildings.

16.2.6 The Met Office also operates a national severe weather warning service to inform the public and emergency responders of forthcoming severe or hazardous weather which would have the potential to cause loss of life or widespread disruption. The UK Health Security Agency (UKHSA) issues cold weather alerts and a heat health watch service to provide health advice for the public in the UK, according to levels of heat forecast / measured by the Met Office.

16.2.7 The 999 emergency response procedure is also in place to allow any site users whose health may be affected by such an event (e.g. through trips and falls) to request an ambulance or other emergency assistance. On this basis, it is considered that suitable mitigation is already in place in regard to the safety of future site users, such that further assessment of potential risks would be unnecessary.

16.2.8 In addition, the MOD has prepared a 'Climate Impact Risk Assessment' for Cawdor Barracks, which will be taken into consideration by the relevant EIA topics discussed within this chapter.

Flooding and Droughts

16.2.9 It is proposed that the Water Environment, Flood Risk and Drainage topic area is scoped into the ES. An assessment of potential effects related to flooding will therefore be reported in the Water Environment ES chapter, and a Flood Risk Assessment report will be included within the ES appendices. Further information on the scope of these assessments is provided in the Water Environment, Flood Risk and Drainage Chapter (Chapter 11) of this report.

16.2.10 Given the uses proposed, it is not anticipated that the proposed development will result in a long-term demand for water over and above the current usage on the Cawdor Barracks site. It is intended that the designs will respond to these requirements with a considered strategy to reduce water consumption, which would also include a consideration of climate change. It is not considered that the potential effects of drought would be of particular detriment to the proposed development, nor that the proposed development would result in an increase in the risk of drought conditions at the Cawdor Barracks site or in the surrounding area, or in a substantial increased demand for potable water that could not be managed through the design development.

Impact of Climate Change on Major Natural Disasters

16.2.11 The latest UK Climate Projections identify the potential for extreme climate events to become more likely and frequent as a result of climate change. The design process will take account of the relevant climate change scenarios, and each technical assessment undertaken as part of the EIA will consider climate change resilience and adaptation as part of the process to ensure that the impact of climate change is accounted for within the design and assessment.

16.3 Major Accidents/Man-Made Disasters

16.3.1 The following types of major accidents/man-made disasters have been considered:

- Transport accidents;
- Industrial accidents;
- Electricity, gas, water supply or sewerage system failures;
- Urban fires;

- Famine / food insecurity;
- Displaced populations;
- Complex emergencies;
- Terrorist incidents;
- Cyber attacks; and
- Public disorder.

16.3.2 Given the nature of the proposals and the location of the Cawdor Barracks site, famine, food insecurity, displaced populations and complex emergencies are not considered relevant to the proposed development and are proposed to be scoped out of further consideration.

Transport Accidents

16.3.3 Impacts associated with construction traffic, including transport accidents, will be assessed as part of the Transport Assessment and reported in the Transport and Access ES chapter. Construction traffic impacts will be minimised through implementation of a Construction Traffic Management Plan (CTMP) which will be agreed with the LPA in advance and conditioned as part of any potential future planning consent. Given the relatively low numbers of operational staff anticipated to be brought to the Cawdor Barracks site as part of the proposed development (expected to be in the region of 60 staff, however will be confirmed as the design progresses) after the departure of the Army Regiment from 2028, risk of transport accidents relevant to the operational phase are not anticipated to be significantly above the baseline levels. Therefore, transport accidents are appropriately covered elsewhere in the ES.

Industrial Accidents, Electricity, gas, water supply or sewerage system failures

16.3.4 There is anticipated to be back-up diesel generators, fuel storage, mains electricity and water supply, and a sewerage system associated with the proposed development. The back-up diesel generators will be operated under a relevant permit and the potential for any accidental leaks or emissions will be assessed as part of the Water Environment and Ground Conditions ES Chapters. Appropriate control measures, such as standard pollution prevention measures, secured as part of the mitigation that will be outlined in the ES will minimise the potential for impacts. The design of any such facility would be in accordance with the Control of Major Accident Hazards (COMAH) regulations, 2015 and the Health and Safety Executive (HSE) guidance on implementing them (HSE, 2015), and is therefore considered to be adequately covered under existing legislation.

16.3.5 Similarly, any potential water supply or sewerage system failures will also be covered elsewhere in the ES and appropriately mitigated for. The Cawdor Barracks site has existing water supply and sewerage utility connections anticipated to cope with the demand for the proposed development. However, the respective utilities providers will be consulted, to consider existing and future capacity/demand, and appropriate

measures implemented where required to ensure that the proposed development is sufficiently serviced. In addition to this, a consideration of resilience to potential systems failure will also be incorporated as appropriate. The utilities providers already have in place procedures to allow users to report a failure in supply of a particular utility so that repairs and continuation of supply can be enabled. On this basis, it is considered that suitable mitigation is already in place, such that further assessment of potential risks within the EIA would be a reiteration and hence unnecessary. For this reason, this disaster/accident type is proposed to be scoped out of further consideration.

Urban Fires, Terrorist Incidents and Public Disorder

16.3.6 Given the nature of the proposed development being associated with military use, it is anticipated that it could be subject to a heightened risk of terrorist attack. However, as the Cawdor Barracks site is currently owned and operated by the MOD, there are substantial security measures and response procedures already in place and the Cawdor Barracks site is fully enclosed and monitored to prevent unauthorised access. As such, with reference to the types and characteristics of a potential impact highlighted in Schedule 3 of the EIA regulations, '*the probability of the impact'* is anticipated to be low.

16.3.7 Schedule 4 of the EIA Regulations state with regard to major accidents or disasters *'Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.'* MOD would prepare an emergency response plan to deal with major disasters, accidents and emergencies associated with the Cawdor Barracks site in accordance with the relevant JSP and Defence Code of Practice, including the Major Accident Control Regulations (MACR) as appropriate and as the proposed development progresses. Therefore, it is anticipated that the risk of major accidents or disasters is adequately covered outside of the ES and the appropriate response procedures will already be in place.

16.3.8 In regard to urban fires, the proposed development will be designed in accordance with the latest Building Regulations requirements, as well as the requirements of relevant fire safety guidance. Furthermore, as already highlighted, the 999 emergency response procedure is also in place to allow the general public to report urban fires, terrorist attacks, public disorder and other types of major accidents disasters to the emergency services, who would attend site and act to resolve the incident. As such, it is considered that suitable mitigation is already in place for these types of accident / disaster, such that further assessment of potential risks would be unnecessary and on this basis, they have also been scoped out of the EIA.

Cyber Attacks

16.3.9 As the proposed development would involve the storage and processing of large amounts of official data, there is potential for it to be the target of cyber attacks. In the UK, the National Cyber Security Centre (NCSC), part of the Government Communications Headquarters (GCHQ), plays a strategic role in protecting and promoting national interests in and through cyberspace. Given the strategic nature of

the proposed development, and the advanced technology involved in its implementation, there would be advanced cyber security measures in place and ongoing monitoring and support from organisations such as NCSC. In addition, applicable JSP would apply to the proposed development, including the Defence networks governance (JSP 604) which applies to all systems interacting with Ministry of Defence information and communication technology (ICT) systems.

16.3.10 Therefore, it is anticipated that sufficient control measures would be in place to prevent cyber attacks, and no significant effects would be anticipated as a result. For this reason, this disaster/accident type is proposed to be scoped out of further consideration.

16.4 Scoping of Impacts

16.4.1 Overall, the types of accidents and disasters considered are either sufficiently covered through existing legislation and procedures, other assessments work or are not relevant to the proposed development. For reasons set out in the preceding sections, it is proposed that a specific assessment of major accidents and disasters is scoped out of the EIA and will not be reported further in the ES.

16.5 References

IFRC (2022). What is a disaster?, International Federation of Red Cross and Red Crescent Societies, available at https://www.ifrc.org/our-work/disasters-climate-and-crises/what-disaster [accessed 28/02/2023]

HSE (2015). The Control of Major Accident Hazards Regulations 2015: Guidance on Regulations, L111, Third Edition, June 2015

17 Cumulative Effects Assessment

17.1 Introduction

17.1.1 Schedule 4(5) of the EIA Regulations stipulates that an EIA must consider the cumulative effects of a proposed development.

17.1.2 Cumulative effects are characterised by two different types of relationships:

- **Intra-relationship**: where multiple different effects from the proposed development create a cumulative effect on a single receptor or group of receptors
- **Inter-relationship**: where effects from several developments combine together resulting in a cumulative effect

17.1.3 The individual technical chapters within the Environmental Statement (ES) will provide detail on reasonably foreseeable potential significant cumulative effects. The ES will include a standalone Cumulative Effect Assessment (CEA) chapter to summarise technical chapter findings of inter-relationship effects, and provide an assessment of intra-relationship effects.

17.2 Baseline

Intra- relationship

17.2.1 The baseline environment for intra - relationship cumulative effects will be described in the technical chapters of the ES.

17.2.2 The assessment of intra - relationship cumulative effects will use the study areas detailed in the technical chapters to identify potential cumulative effects.

Inter- relationship

17.2.3 There is no established industry- recognised guidance for carrying out CEA. This assessment is based on the method for identifying inter- relationship cumulative effects detailed in Advice Note Seventeen: Cumulative Effects Assessment (CEA) relevant to nationally significant infrastructure projects (Planning, 2019).

17.2.4 The CEA will establish a Zone of Influence (ZoI) of the proposed development together with other developments. A ZoI for CEA is determined for each technical ES topic.

17.3 Receptors

17.3.1 Receptors will be carried over from those identified in the individual technical chapters of the ES. Those identified likely to be impacted resulting in significant cumulative effects will be reported in the CEA chapter.

17.4 Scoping of Impacts

17.4.1 A CEA is proposed to be scoped into the EIA and reported as a standalone chapter in the ES.

17.5 Methodology for Impact Assessment

17.5.1 The Institute of Environmental management and Assessment (IEMA) published a review of CEA and noted that "*at present there is no single, agreed industry standard method [for CEA]"* (Mitchell, 2020). The published advice states that the Planning inspectorate Advice Note Seventeen (Planning, 2019) is an effective guide with a clear methodology and staged process.

17.5.2 Advice Note Seventeen is written with Nationally Significant Infrastructure Projects in mind. However, the approach and principles are considered proportionate and suitable for the proposed development. The proposed approach to the CEA within the ES will follow the fundamental principles of Advice Note Seventeen guidance. However, this guidance will be adapted to ensure compatibility with a non-Nationally Significant Infrastructure Project such as the proposed development.

Intra-relationship

17.5.3 The CEA will consider the in-combination effects where receptors experience multiple potential effects, of greater than negligible significance, from a range of impacts, which might collectively become significant, or of greater significance. These will be considered through the use of a matrix-based approach and set out within a stand-alone chapter within the ES. Where further significant effects are identified mitigation will need to be considered and residual effects reported. The intra-relationship effects are not specifically discussed in Advice Note Seventeen, however will be assessed in line with best practice.

Inter-relationship

17.5.4 The assessment will follow the guidance in Advice Note Seventeen: CEA relevant to nationally significant infrastructure projects.

17.5.5 Advice Note Seventeen sets out a staged approach for assessing potential cumulative effects with other developments:

<u>Stage 1: Establish the long list</u>

17.5.6 A long list of other existing development and/or approved development' likely to result in significant cumulative effects will be compiled based on a Zone of Influence (ZOI) for each environmental aspect considered within the ES. The ZoI for each topic will be displayed on a map appended to the ES CEA Chapter.

17.5.7 Once the long list has been compiled, each development will be categorised according to their certainty. The categories are assigned in tiers which descend from Tier 1 (most certain) to Tier 3 (least certain), and these reflect a diminishing degree of certainty. Advice Note Seventeen provides definitions of Tier 1 to Tier 3 developments, however the definitions provided within the guidance relate to

Nationally Significant Infrastructure Projects. For this ES, alternative definitions are proposed associated with Town and Country Planning Act developments and are based closely on the Advice Note Seventeen definitions. The proposed Tier definitions to be used within the ES CEA Chapter are provided in Table 17.1.

TABLE 17.1: CERTAINTY CRITERIA

Certainty category	Proposed category description (to be used within the proposed development ES CEA)
Tier 1	• Under construction developments (EIA developments, or developments with environmental information submitted) (see Note); • Permitted developments, (EIA developments, or developments with environmental information submitted) but not yet implemented; • Submitted application(s) for developments not yet determined (EIA developments, or developments with environmental information submitted)
Tier 2	• Developments where an EIA scoping report has been submitted.
Tier 3	• Identified in the relevant Development Plan (and emerging Development Plans – with appropriate weight being given as they move closer to adoption) recognising that there will be limited information available on the relevant proposals; • Identified in other plans and programmes (as appropriate) which set the framework for future development consents/approvals, where such development is reasonably likely to come forward.

Note: Where other developments are expected to be completed before construction of the proposed development and the effects of those developments are fully determined, effects arising from them should be considered as part of the baseline and may be considered as part of both the construction and operational assessment. The ES will clearly distinguish between projects forming part of the dynamic baseline and those in the CEA.

17.5.8 All developments identified within the long list will be summarised within an assessment matrix (Matrix 1 - Identification of 'other development' for CEA) appended to the ES CEA Chapter. An example of the Matrix 1 is provided within the Advice Note Seventeen Guidance and is available online[2]. The structure of this example will be utilised within the CEA.

Stage 2: Establishing the short list

17.5.9 Developments within the long list will be screened out following the approach detailed in Advice Note Seventeen. The remaining developments are to be scoped into the assessment. Developments to be included in the short list will include:

- Those within the ZoI

[2] Appendix 1: Matrix 1 - Identification of 'other development' for CEA, available at https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/an17_appendix_1.pdf

- Those which meet the criteria of Tier 1 and Tier 2
- Those which meet the criteria for further assessment which has been agreed with the statutory consultation bodies
- Additional recommended developments from the LPA that are within the ZoI
- If necessary, each EIA topic lead will further refine the short list for their assessment based on any topic-specific criteria they consider pertinent.

17.5.10 All Tier 1 and Tier 2 developments will be progressed to Stages 3 and 4 for further assessment where possible, in line with Advice Note Seventeen. For Tier 3 developments, a high-level assessment will be provided within Matrix 1.

Stage 3: Information gathering

17.5.11 Includes gathering proposed design and location information, timings of construction, operation, and the potential likely impacts. Publicly available environmental assessments will also inform baseline data and residual effects arising from other developments.

Stage 4: Assessment

17.5.12 Assessment of potential impacts on receptors identified in stages 1 to 3. The level of detail will be commensurate with the information available at the time of assessment. Where information is limited, such gaps would be acknowledged within the assessment. Methodology would be more qualitative than quantitative in these instances.

17.5.13 Each technical discipline will assess the potential for likely significant effects on their technical topic as a result of a cumulative effect with 'other developments' identified in the ZoI for that discipline. In accordance with the EIA Regulations, where significant effects are identified, the CEA ES Chapter will describe proportionate measures to avoid, prevent, reduce or, if required and possible, offset adverse effects. The resulting residual effects will then be reported.

17.5.14 The CEA assessment will be summarised within an assessment matrix (Matrix 2 – Assessment Matrix) appended to the ES CEA Chapter. An example of the Stage 2 matrix is provided within the Advice Note 17 Guidance and is available online[3]. The structure of this example will be utilised within the CEA.

Zones of Influence by EIA topic

17.5.15 In accordance with Advice Note Seventeen, ZoI search areas are proposed by each EIA technical discipline, and will be agreed with the relevant statutory consultees. These are summarised in Table 17.2:

[3] Appendix 2: Matrix 1 - Assessment matrix, available at https://infrastructure.planninginspectorate.gov.uk/wp-content/uploads/2015/12/an17_appendix_2.pdf

TABLE 17.2: ZONE OF INFLUENCE BY EIA TOPIC

EIA Topic to be scoped in	Proposed Zone of Influence for CEA
Transport and Access	To be agreed with PCC during scoping discussions.
Air Quality	1 km
Noise and Vibration	600 m
Biodiversity	10 km
Landscape and Visual Impact	7.5 km
Archaeology and Built Heritage	5 km
Ground Conditions and Contaminated Land	Entire Local Authority area (only developments with EIA waste assessment scoped-in).
Water Environment, Flood Risk and Drainage	1 km
Health	Scoped out of further assessment as covered in other technical topics.
Socioeconomics	To be agreed with PCC during scoping discussions.
Climate	N/A – see section 17.7
Heat and Radiation	The Cawdor Barracks site

17.6 Information required from Pembroke County Council

17.6.1 It is requested that PCC provide details of developments within a search area of 7.5 km from the red line boundary. This search area represents the largest ZoI identified by the technical disciplines, and presented in Table 17.2 (excluding Ground Conditions and Contaminated Land which has a larger ZoI associated with regional landfill capacity). Within the scoping opinion, PCC are requested to provide details of every development within this search area which falls under the following criteria:

- Developments under construction (EIA developments, or developments with environmental information submitted) – Tier 1;
- Permitted developments, (EIA developments, or developments with environmental information submitted) but not yet implemented – Tier 1;
- Submitted application(s) for developments not yet determined (EIA developments, or developments with environmental information submitted) – Tier 1;
- Developments where an EIA scoping report has been submitted – Tier 2;
- Identification of relevant Development Plans (and emerging Development Plans, programmes, and policies) which relate to areas within the ZoI – Tier 3; and
- Any other development not under the criteria above which PCC believe should be considered within the CEA.

17.6.2 This exercise will form Stage 1 of the CEA methodology outlined within Advice Note Seventeen, and will result in a long list of developments to be refined into a short list for consideration within the ES CEA.

17.7 Climate Change Adaptation and Resilience

17.7.1 Climate change has the potential to increase the frequency and severity of impacts over time.

17.7.2 The atmospheric concentration of GHGs and resulting effect on climate change is affected by all sources and sinks globally, anthropogenic and otherwise. There is no greater local climate change effect from a localised impact of GHG emission sources (or vice versa). As such, a cumulative assessment will not be conducted but results from the GHG assessment will contextualised against local and national carbon budgets to determine significance.

17.7.3 The ES Climate Chapter will cover intra-relationship effects. Therefore, to avoid double counting, it is not necessary to include this in the standalone CEA Chapter.

17.8 References

Mitchell, A., 2020. *Review of the Current Practices in the Assessment of Cumulative Effects Volume 7: Demystifying Cumulative Effects IEMA.* [Online]
Available at: https://www.iema.net/recognition/eia-quality-mark/impact-assessment-outlook-journal
[Accessed 15 December 2022].

Planning, N. I., 2019. *Advice Note Seventeen for Cumulative effects assessment relevent to nationally significant infrastructure projects..* [Online]
Available at: https://infrastructure.planninginspectorate.gov.uk/legislation-and-advice/advice-notes/advice-note-17/
[Accessed 15 December 2022].

18 Conclusions

18.1 The Environmental Statement

18.1.1 The ES will address the requirements of Parts I and II of Schedule 4 of the EIA regulations. A preliminary structure and content of the ES is as follows:

- Non–Technical Summary
- Volume 1: Main Text:
    - Chapter 1 Introduction – introduction to the proposed development and ES structure and preparation
    - Chapter 2 Methodology – approach the EIA process and scope of the ES, scoping, details of consultation, overview of impact assessment methodology, outline of technical chapters, assumptions and limitations
    - Chapter 3 Cawdor Barracks Site & Proposed Development – description of the Cawdor Barracks site, surroundings, the proposed development and construction information
    - Chapter 4 Alternatives & Design Evolution – a review of alternatives to the proposed development (location and design) and a summary of design interventions to eliminate or minimise potentially significant effects
    - Chapter 5 Transport and Access
    - Chapter 6 Air Quality
    - Chapter 7 Noise and Vibration
    - Chapter 8 Biodiversity
    - Chapter 9 Landscape and Visual Impact
    - Chapter 10 Archaeology and Built Heritage
    - Chapter 11 Ground Conditions and Contaminated Land
    - Chapter 12 Water Environment, Flood Risk and Drainage
    - Chapter 13 Socio-economics
    - Chapter 14 Climate Change and Carbon
    - Chapter 15 Heat and Radiation
    - Chapter 16 Cumulative Effects Assessment

- Chapter 17 Mitigation Register
- Chapter 18 Conclusions
- Chapter 19 Abbreviations & Glossary

- Volume 2: Figures
- Volume 3: Technical Appendices

18.1.2 Each of the technical chapters (4 to 16 above) will include the following sections:

- Introduction
- Methodology
- Baseline Conditions
- Design Interventions and Controls
- Potential Significant Effects
- Mitigation and Enhancement Measures
- Residual Significant Effects
- Summary and Conclusion

18.2 Conclusion

18.2.1 The scope of the above disciplines in terms of impacts to be taken forward into the ES has been described in Chapters 4 to 16 of this report and will be subject to statutory consultation.

18.2.2 The topics listed below are not proposed to be covered by an individual technical assessment chapter within the ES:

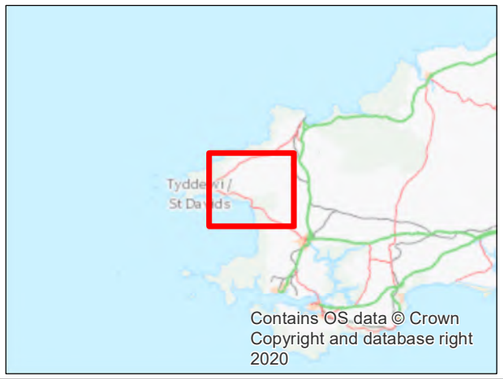
- Material assets and waste (will be covered in the Ground Conditions and Contaminated Land chapter);
- Human Health (other ES chapters will address the potential for health effects in relation to air quality, noise, heat and radiation, socio-economics, geology and soils, and transport);
- Major disasters and accidents; and
- Radar and Telecommunications.

Figures

Legend

Cawdor Barracks site*

**The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares to be determined as the design progresses). The design development will seek to avoid environmental sensitivities and constraints within the wider Cawdor Barracks site where possible*



Rev.	Date	Amendment Details	Dr'n	Chk'	App'
P0	27/01/2023	FIRST ISSUE	AC	FC	DF

SWECO

Client: Ministry of Defence

Project: PROJECT DARC – CAWDOR

Drawing Title: FIGURE 1.1 - APPLICATION SITE

Status Desc.	FOR INFORMATION	Status	S2
Project No.	65208061	Scale	1:50,000
Drawing No.		Sheet Size	A3

PEMBROKESHIRE COAST NATIONAL PARK/
PARC CENEDLAETHOL ARFORDIR PENFRO

0 0.5 1 1.5 2 2.5 Kilometres

Legend

- Cawdor Barracks site*
- The Application Site 1km Buffer

Listed Buildings - Grade:

- Grade II Listed Building
- Grade II* Listed Building
- Scheduled Monuments
- National Trail
- Byway Open to All Traffic
- Bridleway
- Footpath
- Heritage Coast
- National Park
- Special Protection Area
- Special Protection Area
- Site of Special Scientific Interest
- Landscapes Of Outstanding Intrerest
- Mineral Safeguarding Zone
- Ancient Woodland

Flood Risk from Rivers

- High
- Medium
- Low

Flood Risk from Sea

- High
- Medium
- Low

Flood Risk from Surface Water

- High
- Medium
- Low

*The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares to be determined as the design progresses). The design development will seek to avoid environmental sensitivities and constraints within the wider Cawdor Barracks site where possible

Rev.	Date	Amendment Details	Dr'n	Chk'	App'
P01	02/03/2023	FIRST ISSUE	AC	FC	DF

SWECO

Client: Ministry of Defence

Project: PROJECT DARC – CAWDOR

Drawing Title: FIGURE 2.1 - DESIGNATIONS

Status Desc.		Status	S2
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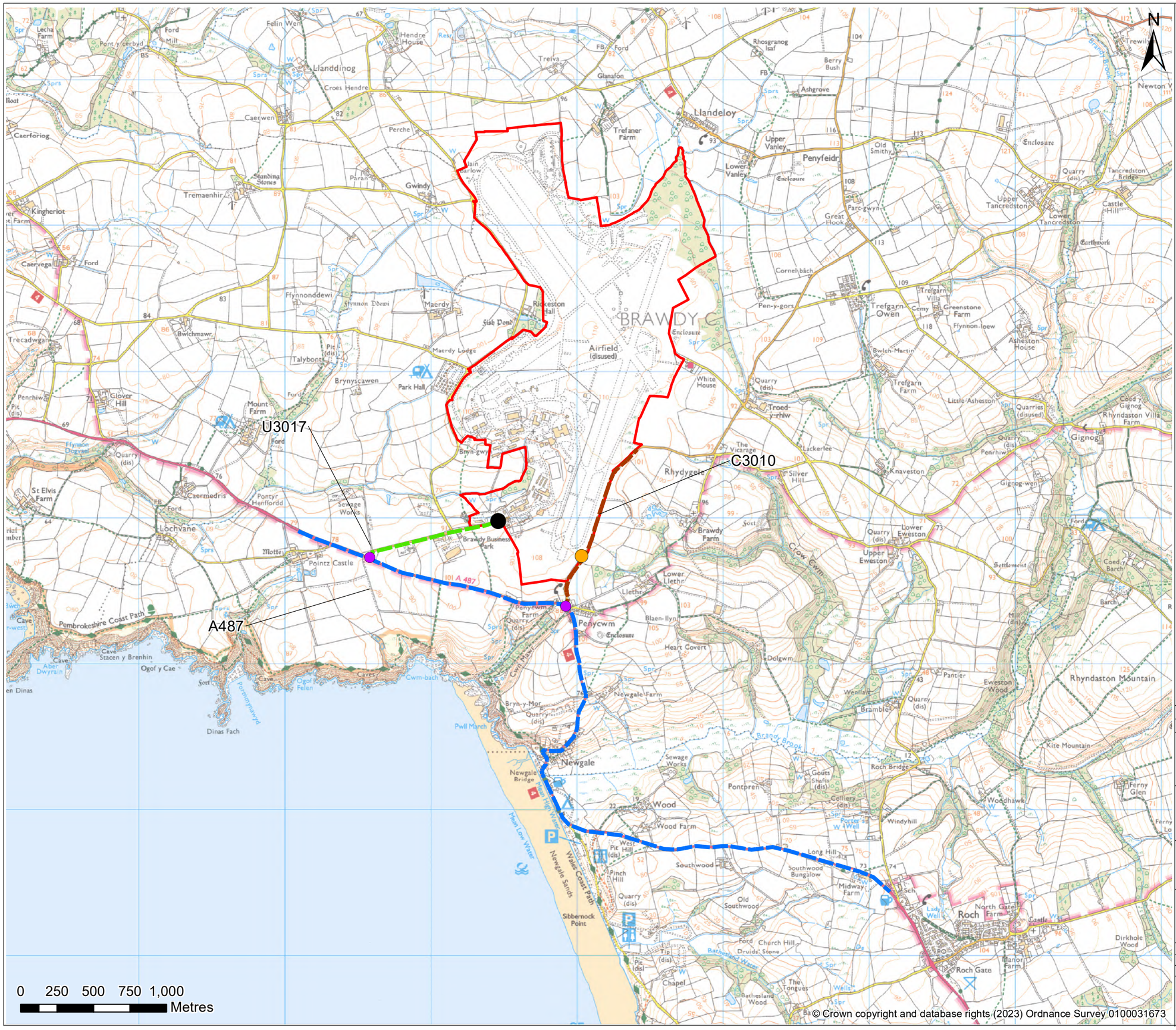
Drawing No.		Sheet Size	A3

0 250 500 750 1,000 Metres



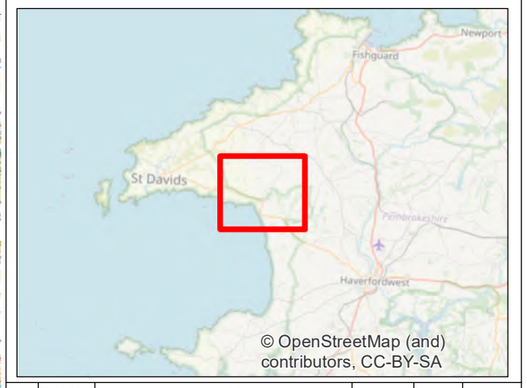
Legend

- Cawdor Barracks site*
- Primary site access
- Proposed temporary construction access
- Junctions of interest

Route of Interest

- A487
- U3017
- C3010

**The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares to be determined as the design progresses). The design development will seek to avoid environmental sensitivities and constraints within the wider Cawdor Barracks site where possible*



Rev.	Date	Amendment Details	Dr'n	Chk'	App'
P01	26/01/2023	FIRST ISSUE	AC	JS	DF

SWECO

Client: Ministry of Defence

Project: PROJECT DARC – CAWDOR

Drawing Title: FIGURE 4.1 - TRANSPORT AND ACCESS

Status Desc.		Status	S2
Project No.	65201348-217	Scale	1:25,000
Drawing No.		Sheet Size	A3

R1
R2
R3
R4
R5
R6
R7
R8
R9
BRAWDY
0 250 500 750 1,000
Metres
N
Legend
Cawdor Barracks site*
Noise Sensitive Receptors
**The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares to be determined as the design progresses). The design development will seek to avoid environmental sensitivities and constraints within the wider Cawdor Barracks site where possible*
Newport
Fishguard
St Davids
Haverfordwest
Pembrokeshire
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P01	26/01/2023	FIRST ISSUE	AC	JS	DF

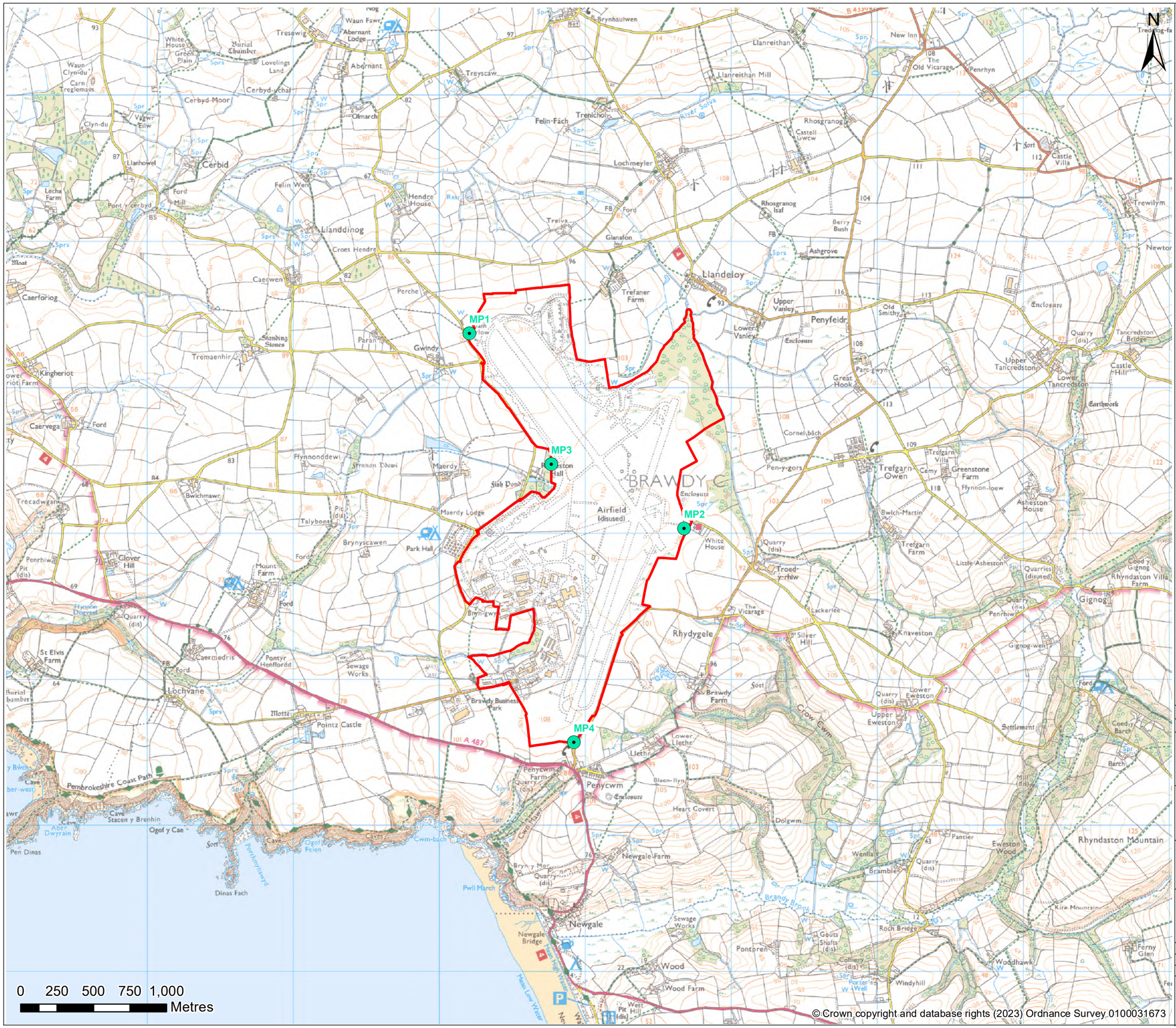
SWECO

Client
Ministry of Defence

Project
PROJECT DARC – CAWDOR

Drawing Title
FIGURE 6.1: NOISE SENSITIVE RECEPTORS

Status Desc.		Status	S2
Project No.	65201348-217	Scale	1:25,000
Drawing No.		Sheet Size	A3



Legend

- Cawdor Barracks site*
- Environmental Noise Survey Measurement Positions

**The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares to be determined as the design progresses). The design development will seek to avoid environmental sensitivities and constraints within the wider Cawdor Barracks site where possible*

Rev.	Date	Amendment Details	Dr'n	Chk'	App'
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SWECO

Client

Ministry of Defence

Project

PROJECT DARC – CAWDOR

Drawing Title

FIGURE 6.2: ENVIRONMENTAL NOISE SURVEY MEASUREMENT POSITIONS

Status Desc.		Status	S2
Project No.	65201348-217	Scale	1:25,000
Drawing No.		Sheet Size	A3

Legend

- Proposed Representative Viewpoints
- The Cawdor Barracks site*
- 5km Study Area
- National Cycle Network
- National Trail
- Dewisland Cycle Trail
- Byway Open to All
- Bridleway
- Footpath
- Heritage Coast
- National Nature Reserve
- National Park
- Landscapes of Outstanding Interest
- Centre Point of 5km Zone of Theoretical Visibility and Study Area
- 5km Zone of Theoretical Visibility (based on Digital Terrain Model data and a nominal central point in the site with a 20m height)

Viewpoint	Location
Viewpoint 1	Ty Dewi
Viewpoint 2	Pembrokeshire Coast Path National Trail
Viewpoint 3	Penycwm (within National Park)
Viewpoint 4	Local road to Brawdy
Viewpoint 5	Roch Text
Viewpoint 6	Country Lane Curlew's Rise
Viewpoint 7	Llandeloy
Viewpoint 8	Maidenhall Point Car Park
Viewpoint 9	Treffynnon
Viewpoint 10	Tregarn Owen Footpath PP5/16/1
Viewpoint 11	Coastal Path at Solva

**The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares to be determined as the design progresses). The design development will seek to avoid environmental sensitivities and constraints within the wider Cawdor Barracks site where possible*

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SWECO

Client: Ministry of Defence

Project: PROJECT DARC – CAWDOR

Drawing Title: PROPOSED REPRESENTATIVE VIEWPOINTS

Status Desc.	FOR INFORMATION	Status	S2
Project No.	65201348-217	Scale	1:50,000
Drawing No.		Sheet Size	A3

Legend

- Cawdor Barracks site*
- Technical area/barracks

SOURCE

- SOURCE 1 - OLD BFI, BFI 1, BFI 2 AND NAVFAC BFI
- SOURCE 2 - FORMER FIRE TRAINING AREA
- SOURCE 3 - FORMER FUEL BOWSER PARKING
- SOURCE 4 - FORMER TIP / BURNING AREA
- SOURCE 5 - FORMER NAVFAC BFI PIPELINE
- SOURCE 6 - CURRENT BFI/ POL POINT
- SOURCE 7 - HISTORICAL POL POINTS AND FORMER ABOVE AND BELOW GROUND FUEL STORAGE TANKS, AND SMALL FORMER FIRE TRAINING AREA LOCATED WITHIN THE TECHNICAL AREA/BARRACKS AREA
- SOURCE 8 - KNOWN ASBESTOS CONTAMINATES AREA
- SOURCE 9 - FORMER ELECTRICITY DISTRIBUTION SUBSTATIONS
- SOURCE 10 - FORMER FIRE TRAINING AREA
- SOURCE 11 - AIRCRAFT PARKING, AIRFIELD USE AND CRASHES
- SOURCE 12 - INFILLED QUARRIES / GRAVEL PITS, LINEAR MOUND AT THE END OF THE RUNWAY TRENDING SSW TO NNE

SOURCES OFF SITE

- SOURCE 13 - FORMER BRAWDY FARM SAND PIT

**The Cawdor Barracks site extends over 300 hectares, however the potential developed footprint associated with the proposed development will encompass a smaller area within the wider Cawdor Barracks site (approximately 50 hectares to be determined as the design progresses). The design development will seek to avoid environmental sensitivities and constraints within the wider Cawdor Barracks site where possible*

Reference Map

Rev.	Rev.Date		Drawn	Appr'd
01	22/02/2023	FOR INFORMATION ONLY	RM	DF
		Drawing Suitability		

SWECO

Client

Ministry of Defence

Project Title

PROJECT DARC – CAWDOR

Drawing Title

FIGURE 10.1 - POTENTIAL SOURCES OF CONTAMINATION

Scale @ A1	1:10,000	DO NOT SCALE
Project No.	65201348-217	
Drawing No.	65208061-SWE-XX-XX-I-LQ-0002	

0 0.5 1 1.5 2 Km

Appendix A – Preliminary Ecological Appraisal Report

Ministry of Defence

SWECO

OFFICIAL

Preliminary Ecological Appraisal Report
Project DARC – Cawdor Barracks

MOD Project Number: 65208061

Final Issue
January 2023

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Revision: 1
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Status / Revisions

Rev.	Date	Reason for issue	Prepared	Reviewed	Approved
1	27.01.23	Final draft	EU / LH	JS	RWS

Table of Contents

Appendices

1 Executive Summary

This preliminary ecological appraisal report has been prepared by Sweco for the Ministry of Defence, to inform the design and planning of a proposed deep-space radar site at the Cawdor Barracks (hereafter the “site”). The purpose of this report is to identify and classify the habitats present, assess ecological constraints to the project and provide recommendations for any further surveys required to inform baseline conditions and any potential mitigation or licencing that may be required.

A UK Habitat Classification (UK HABS) survey and protected species scoping survey was undertaken on site between the 22 and 24 November 2022.

Ramsey and St David's Peninsula Coast Special Protection Area (SPA), St David's / Ty Ddewi Special Area of Conservation (SAC) and St. David's Peninsula Coast Site of Special Scientific Interest (SSSI) are located close to the site boundary, and the priority habitat lowland heathland is present on site.

Primary broad habitats present on site include modified grassland other neutral grassland lowland heathland and mixed scrub, bramble scrub, blackthorn scrub, developed land; sealed surface, wet woodland standing open water, lines of trees and hedgerows.

The findings of the UK habitat classification survey confirm that the habitats on-site have the potential to support the following notable taxa:

- Fungal assemblages
- Amphibians
- Reptiles
- Wintering birds
- Breeding birds
- Bats
- Badgers

Invasive non-native plant species rhododendron and cotoneaster were observed on site.

The following further survey work is therefore recommended for the site:

- Habitat Regulations Assessment
- National Vegetation Classification assessment (one visit; May-July inclusive)
- A fungi eDNA survey (one visit, no timing constraint)
- Great crested newt eDNA survey (one visit; April-June inclusive)
- Reptile surveys (eight visits; May-September inclusive)
- Wintering bird survey (four visits; November-February inclusive)
- Breeding bird survey (six visits; March-July inclusive plus two dedicated chough surveys between April and June)
- Scoping survey for barn owl suitability assessing nesting and foraging potential (one visit, no timing constraint)

- Bat static detector surveys (ten detectors, once per month April to October inclusive)
- A pre-construction survey for badger (one visit, no more than three months prior to start of works)
- Invasive species surveys (one visit; April-July inclusive)

Given the on-site presence of potential bird nesting habitat, any clearance of vegetation should be timed to avoid the bird breeding season (March-August inclusive). If this is not possible, these habitats can only be removed following confirmation by a suitably qualified ecologist that they are not in active use by nesting birds.

2 Introduction

2.1 Background

Sweco was commissioned by the Ministry of Defence (hereafter “the Client”) to conduct a Preliminary Ecological Appraisal (PEA) to inform the design and planning of a proposed deep-space radar site at Cawdor Barracks (hereafter referred to as the ‘site’).

The purpose of this report is to identify and classify the habitats present on site, assess any ecological constraints to the project and provide recommendation for any further surveys required to inform site baseline conditions as well as any mitigation or licensing requirements. This includes an assessment of whether the proposed development and associated activities will have the potential to adversely affect any designated nature conservation sites and/or protected or notable habitats or species.

2.2 Site Description

The Site is located at Cawdor Barracks, Haverfordwest, SA62 6NN, at central National Grid Reference (NGR) SM 8502 2512. The red line boundary is shown in Figure 1. The site covers an area of approximately 310 hectares (ha).

Figure 1 – The redline boundary of the site and survey area.
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The site is near Penycwm, in Pembrokeshire, Wales and is surrounded by arable and grassland with small scattered villages. A tributary for the River Solva runs along the edge of the site to the southwest and an approximately 60m long stretch is inside the

red line boundary, with the end then going underground. The site is approximately 840m from the coast to the southwest.

2.3 Proposed Development

The Deep-space Advanced Radar Capability (DARC) is a United States Space Force (USSF) led programme that aims to set up three geographically dispersed radar sites to increase global Space Domain Awareness with the UK and Australia being offered to host one of the three sites.

The proposed development will include the construction of transmission and receiving arrays, support and operation buildings, radar platforms, security fencing and associated roads.

The receiving array would have approximately 20 - 30 receive antennas, each with a 15m dish (approx. 20m in height). Each antenna has a concrete foundation, composed of an antenna foundation and a ground foundation. Surrounding the ground foundation would be an additional 3.6m width of pavement on each side to be used by maintenance vehicles. The transmitter array has 6 transmit antennas. These would be consistent with the receiving arrays described above, however each transmit antenna has a Travelling Wave Tubes (TWT) chiller unit and an additional electronic equipment shelter. The transmit array should be located a minimum of half a kilometre away from the receiver array.

2.4 Limitations

The study has been completed taking into consideration any operational and access restrictions. The report should be read in full and no excerpts are to be taken as representative of the findings. No responsibility is accepted by Sweco for the use of any part of this report in any other context.

The findings of Sweco's study are based upon the results of a desk-based study and visual inspection of the Site and we rely upon professional judgement in its interpretation.

This report presents the information obtained during the study and our opinion is based on the information made available to us during the given time period. Sweco has exercised reasonable skill, care and diligence to assess information acquired during the preparation of this report but make no guarantee or warranties as to the accuracy or completeness of information provided by third parties.

This report is prepared and written in the context of the proposals stated in the introduction to this report and should not be used in a differing context. Furthermore, alterations to the initial proposals or changes in conditions on site over time may necessitate an alteration to the report in whole or in part after its submission. Therefore, in the event of any change in proposals or lapse of one year or more from the date of the report, the content of the report should not be relied upon unless referred to Sweco for validation and if necessary, re-appraisal.

The survey was undertaken outside the optimal time of year for grasslands surveys as such this is a limitation as the extent and condition of the grassland was assessed as

found. However, a Phase 2 National Vegetation Classification (NVC) survey should be undertaken between May and August to ensure that habitat type, area and botanical compositions are accurate, this will address the limitation.

The far north-east of the site was inaccessible due to dense vegetation, including blackthorn scrub. This is not considered a significant limitation as where possible, habitat assessment was conducted from a distance, however it could potentially result in an under recoding of species within the area.

Ponds within 500m of the site and sited on private land were inaccessible and not surveyed. This is a minor limitation, given the coverage of the site, lack of GCN records in the data search and arable land surround the base making it unlikely that newts, if present could easily travel onto the site.

2.5 Reliance

This report is prepared solely for the use of the Client and other agreed parties under a deed of warranty. No responsibility will be accepted where this report, either in its entirety or in part, is used by any other third party and no reliance shall be placed on the findings contained therein without prior written agreement from the Client and Sweco.

3 Legal and Policy Context for Nature Conservation

This document takes into consideration the requirements of and advice given in a number of legislation, policy and guidance documents as detailed below.

The following legislative instruments are relevant to this report:

- The Conservation of Habitats and Species Regulations 2017 (as amended) (England & Wales) aims to protect approximately 220 habitats and 1,000 species listed within its Annexes. This includes legislation covering European protected species (EPS) and Natura 2000 sites hereafter known as the National Site Network (NSN) which includes Special Areas of Conservation (SAC – designated under the EU Habitats Directive) and Special Protection Areas (SPA – designated under the EC Birds Directive).

- The Wildlife and Countryside Act (WCA) 1981 (as amended) makes it an offence to injure or kill a number of species listed on Schedule 5, protects wild birds and their eggs whilst nests are in use, protects wild plants listed in Schedule 8 and makes it unlawful to plant or otherwise case to grow in the wild any plant which is listed in Part II of Schedule 9. Together, the WCA and The Conservation of Habitats and Species Regulations 2017 (as amended) form the precedent for species and habitat protection in England and Wales. This includes legislation covering European protected species (EPS) and the National Site Network (previously known as Natura 2000 sites). This effectively extends the legal protection of European designated sites and species post-Brexit.

- The Environment (Wales) Act (EWA) 2016 requires public authorities to consider the maintenance and enhancement of biodiversity. Section 7 of this Act requires Welsh Ministers to publish a list of species and habitats which are of principal importance for maintaining and enhancing biodiversity in Wales: at the time of writing, these lists are identical to the those found within the superseded section 42 (Wales) of the NERC Act (2006). A new reporting duty under the Act enables public bodies to report on actions taken to improve biodiversity and to promote the resilience of ecosystems and also what actions have been taken to incorporate biodiversity measures into other areas of policy, strategies or initiatives.

- The Well-being of Future Generations (Wales) Act 2015 states the seven well-being goals which public bodies must work toward to improve the well-being of Wales. This includes “A resilient Wales - A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change).

The following policies and reports are also relevant to this appraisal:

- The UK Government is committed to the vision of the Convention on Biological Diversity’s (CBD) Strategic Plan for Biodiversity 2011 – 2020 [1] which is an overarching framework on biodiversity which signatories agree

to translate into national biodiversity strategies and action plans. The European Union's Biodiversity Strategy sets out how European policy can best contribute to achievement of the CBD's Strategic Plan. The Nature Recovery Plan for Wales sets out the Welsh position [1].

- The Nature Recovery Plan 2020-21 [2] is the National Biodiversity Strategy and Action Plan for Wales and sets out how Wales will meet the Aichi targets.

- At the local level, conservation priorities are set out in Local Biodiversity Action Plans (LBAP), in this case the Pembrokeshire LBAP [3]. There is a general duty under Section 6 for net-gain - duty on public authorities to "seek to maintain and enhance biodiversity in the exercise of functions… and in so doing promote the resilience of ecosystems".

- Pembrokeshire Nature Partnership (June 2018). Nature Recovery Action Plan for Pembrokeshire Part 1: Our Strategy for Nature Recovery [4]. This sets out action themes which will contribute in Pembrokeshire to local delivery of the objectives listed in the Nature Recovery Action Plan for Wales.

- Natural Resources Wales. 2020. The Second State of Natural Resources Report (SoNaRR2020) [5]. This report sets out the state of Wales' natural resources, assesses the extent to which natural resources in Wales are being sustainably managed, recommends a proactive approach to building resilience and links the resilience of Welsh natural resources to the well-being of the people of Wales in line with the requirements of the Well-being of Future Generations (Wales) Act 2015 (see above).

4 Methods

4.1 Technical Approach

This preliminary ecological appraisal (PEA) has been undertaken following CIEEM's guidelines [6] and British Standard 42020:2013 [7]. This approach has been employed to provide an indication of the ecological importance of the site and the potential for the site to be used by protected species. As such, the work required has been carried out in accordance with the key principles of the National Planning Policy Framework [8] and Government Circular 05/06 [9].

Common names and binomial scientific names of plant species identified are as they appear in Stace [10].

The conclusions and recommendations for further works are in accordance with current legislation and guidance.

4.2 Personnel

This report was produced by Graduate Ecologist Eleanor Unsworth and Ecologist Leonora Hunt. All surveyors used to establish baseline information are suitably qualified and experienced; surveyors' names and qualifications are stated under each survey heading below. This report was reviewed by Principal Ecologist Joshua Stafford BSc (Hons) MRSB, who has over 12 years' experience and by Richard Webber-Salmon BSC(Hons) MCIEEM who has over 9 years' experience in ecological consultancy and production of preliminary ecological appraisals and impact assessments.

4.3 Scope of the Assessment and Zone of Influence

The Zone of Influence (ZOI) is the area over which ecological features may be subject to change as a result of the proposed development and associated activities [11]. The ZOI varies depending on the ecological feature concerned and can extend beyond the site boundary. Where possible, ZOIs will be determined using the results of professionally accredited or published scientific studies. Where such studies are not available, the ZOI will be determined using the professional judgement of a suitably experienced and qualified ecologist. This is in line with professional guidelines [11].

Given the size and location of the site the zone of influence was generally taken to be the site boundary and its immediate environs only, with the site boundary being considered to be the extent of the likely development area which in this case is the existing airfield and surrounding grasslands. The following below exceptions apply to the ZOI:

- Statutory designated sites: The ZoI was considered as being 10km for internationally designated sites, 3km for nationally and locally designated sites and 2km for priority habitats and ancient woodland[1]. These distances were chosen based on best professional judgement.

[1] Areas in Wales which have been wooded for around 400 years or more.

- Non-statutory locally designated sites: A West Wales Biological Information Centre (WWBIC) [12] 5km ZoI from the Site's centre grid point was considered sufficient. This distance was chosen based on best professional judgement.

- Bats: A WWBIC records centre 5km ZoI from the Site's centre grid point was considered sufficient. This distance was chosen based on best professional judgement.

- Great crested newt: A 500m ZoI from the site boundary was considered sufficient, based on professional guidelines [13].

- Badgers: A 30m ZoI was considered sufficient, based on Natural England guidelines [14].

- Water vole: A 10m buffer zone around any watercourse / wetland habitat hydrologically linked to the site was considered a sufficient ZoI, based on professional guidelines [15].

- Otter: A 10m ZoI around any watercourse/wetland habitat hydrologically linked to the site was considered a sufficient ZoI, based on professional guidelines [16].

4.4 Desk Study

The Multi-Agency Geographic Information for the Countryside (MAGIC) [17] online database was consulted to obtain geographic information on nationally and/or internationally important site designations, in the local area of relevance to the site.

WWBIC was contacted for details of any non-statutory designations and records of protected/notable habitats and species within 5km of the site's central national grid reference.

Data Map Wales [18] was contacted for details of any priority habitats and ancient woodland within 2km of the site's boundary.

The Wetland Bird Survey (WeBS) [19] was contacted for details of bird assemblages in designated sites within 10km of the site's boundary.

The site has been subject to an Ecological Appraisal completed by Sweco in 2021 [20] and reviewed as part of this assessment.

4.5 UK Habitat Classification Survey

The UK Habs survey of the Site (see Figure 1) was undertaken from the 22nd to 24th of November 2022 by Leonora Hunt MSc (Sweco Ecologist) and Eleanor Unsworth MSc, BSc (Hons) (Sweco Graduate Ecologist). Weather conditions at the time of the survey were mostly rainy with strong wind, with an ambient temperature of approximately 11°C which were considered acceptable for surveying.

A list of plant species was compiled in accordance with methodology [21] required to establish UK habitat classification types up to level 4. Level 5 was recorded wherever possible, with care to accurately record all habitats of priority importance (if present). Secondary codes were added to polygons where deemed appropriate, taking special care to map mandatory codes for habitat mosaic, complex and origin. Survey was undertaken at the fine scale minimum mapping unit (MMU) of 25m^2 (polygons) and 1m width/5m long (lines). Key ecological features below the MMU in either area or length were mapped as points.

Habitats were classified and assessed in terms of both their conservation importance and potential to support notable and/or protected species (based on habitat suitability and/or field signs).

4.6 Species and Species Groups

The following was searched for and recorded if present during the survey:

- All field signs of protected species or those of conservation interest, including burrows, droppings, footprints and hairs
- Refuges and particular habitat types to be used by certain classes of fauna
- Any mammal paths if found were noted and followed where possible
- Entry points for fauna along fence and/or hedgerow boundaries if present
- Incidental sightings of invasive species listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended).

4.6.1 Great crested newt

A study area comprising the site and a buffer of 500m was assigned and a search was carried out using MAGIC [17] and Ordnance Survey maps for waterbodies within this area.

Waterbodies were subject to a field-based Habitat Suitability Index (HSI) assessment by Eleanor Unsworth and Leonora Hunt, to assess their suitability for great crested newt, where access was possible, in line with relevant guidelines [22]. The HSI Assessment rated the suitability of the pond to support great crested newt against ten Suitability Indices:

- Geographic location;
- Pond area;
- Pond permanence;
- Water quality;
- Shade;
- Waterfowl effect;
- Fish presence;
- Pond Density;
- Terrestrial habitat; and
- Macrophyte cover.

Each suitability index was given a score between 0 and 1, with the results calculated to give the overall HSI Score.

The HSI score was then compared with the following chart to assess suitability for great crested newt.

- < 0.50 = Poor
- 0.50 - 0.59 = Below average
- 0.60 - 0.69 = Average
- 0.70 - 0.79 = Good
- > 0.80 = Excellent

5 Results

The results of the desk study, UK Habs, protected and notable species scoping survey and great crested newt HSI surveys are given within this section.

5.1 Designated Sites

All relevant desk study data relating to designated sites is attached in Appendix A.

Consultation of the MAGIC online interactive mapping tool confirms the presence of six internationally designated sites within 10km of the site boundary and three nationally designated sites within 3km of the site boundary:

Table 5.1: Summary of Relevant Designated Sites

Site name	Designated features	Distance from site
Ramsey and St David's Peninsula Coast Special Protection Area (SPA)	Species: red-billed chough (*Pyrrhocorax pyrrhocorax*)	0.65km south-west
St David's / Ty Ddewi Special Area of Conservation (SAC)	Habitats: vegetated sea cliffs of the Atlantic and Baltic coasts; European dry heaths. Species: Floating water-plantain (*Luronium natans*)	0.65km south-west
Pembrokeshire Marine / Sir Benfro Forol SAC	Habitats: estuaries, large shallow inlets and bays, reefs, sandbanks, mudflats and sandflats, coastal lagoons, Atlantic salt meadows and sea caves. Species: grey seal (*Halichoerus grypus*), shore dock (*Rumex rupestris*), sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*), allis shad (*Alosa alosa*), twaite shad (*Alosa fallax*) and otter (*Lutra lutra*)	0.75km south-west
West Wales Marine / Gorllewin Cymru Forol SAC	Species: harbour porpoise (*Phocoena phocoena*)	0.75km south-west
North West Pembrokeshire Commons / Comin Gogledd Orllewin Sir Benfro SAC	Habitats: European dry heaths, transition mires and quaking bogs, northern Atlantic wet heaths with *Erica tetralix,* Molinia meadows on calcareous, peaty or clayey-silt-laden soils Species: floating water-plantain	4.35km east

Site name	Designated features	Distance from site
Afonydd Cleddau / Cleddau Rivers SAC	Habitats: water courses of plain to montane levels, active raised bogs, alluvial forests with alder (*Alnus glutinosa*) and ash (*Fraxinus excelsior*) Species: brook lamprey (*Lampetra planeri*), river lamprey (*Lampetra fluviatilis*), bullhead (*Cottus gobio*), otter, sea lamprey (*Petromyzon marinus*)	4.52km north
St. David's Peninsula Coast Site of Special Scientific Interest (SSSI)	St David's Peninsula Coast SSSI (part of the St David's Peninsula Coast SPA) comprises of important geological and biological features, namely lichens, invertebrates, choughs and peregrines and is nationally important for grey seals.	0.65km south-west
Arfordir Niwgwl - Aber Bach / Newgale - Little Haven Coast SSSI	Newgale - Little Haven Coast SSSI is notified for its geology and marine biology including specialised rockpool, cave, overhanging and under-boulder communities, which enhance the interest of the rocky habitats.	2.7km south
Ysgeifiog Moor SSSI	Ysgeifiog Moor SSSI is of special interest for its marshy grasslands, heaths and fen vegetation. The extensive species-rich marshy grassland communities, irrigated by slightly alkaline groundwater are of particular interest.	3.0km to the north-west

WWBIC identified no non-statutory sites such as local nature reserves or Areas of Importance for Nature Conservation within 5km of the site's central grid point.

Ramsey and St David's Peninsula Coast SPA and St. David's Peninsula Coast SSSI are designated for features of potential relevance to the site. The close proximity of the development to all these designated sites has the potential to cause indirect impacts through air and water pollution during construction and operation and will therefore need further assessment.

5.2 Priority Habitats and Ancient Woodland

Data Map Wales provided details of several priority habitats and areas of ancient woodland within 2km of the site's boundary. These are listed in Table 5.2.

Table 5.2: Summary of the priority habitats within 2km of the site's boundary

Habitat	Source	Distance of Closest Parcel (km)	Number of Parcels
Lowland Heathland	Environment (Wales) Act 2016 – section 7	On site	15 (3 on site)
Purple Moor Grass and Rush Pastures	Environment (Wales) Act 2016 – section 7	0km (adjacent to site) to the north-east	228
Lowland Meadows	Environment (Wales) Act 2016 – section 7	0.53km to the north-west	20
Lowland Fens and Reedbeds	Environment (Wales) Act 2016 – section 7	0.85km to the north-west	14
Raised Bog	Environment (Wales) Act 2016 – section 7	1.0km to the west	1
Lowland dry acid grassland	Environment (Wales) Act 2016 – section 7	1.7km to the south-east	1
Ancient & Semi-Natural Woodland	Ancient Woodland Inventory	0km (adjacent to site) to the west	4

5.3 UK Habitat Classification Survey Results

The results of the UK Habs survey are presented below and on Sweco drawing 65208061-SWE-ZZ-XX-I-EA-0001.

The following primary habitat types are present on site:

- Modified grassland (g4)
- Other neutral grassland (g3c)
- Holcus-Juncus neutral grassland (g3c8)
- Lowland heathland (h1a)
- Dense scrub (h3)
- Blackthorn scrub (h3a)
- West coast blackthorn scrub (h3a5)
- Bramble scrub (h3d)
- Mixed scrub (h3h)
- Standing open water (r1)
- Other rivers and streams (r2b)
- Developed l and sealed surface (u1b)
- Other developed land (u1b6)
- Suburban mosaic of developed/natural surface (u1d)

- Wet woodland (w1d)
- Other woodland – broadleaved (w1g)
- Other woodland – mixed (w1h)
- Other coniferous woodland (w2c)
- Line of trees (w1gb)
- Hedgerow (h2)
- Other hedgerows (h2b)
- Buildings (u1b5)
- Arable and horticulture (c1)

The survey was undertaken outside the optimal time of year for grassland surveys. The extent and condition of the grassland was assessed as found. Due to this an NVC survey should be undertaken between May and August to ensure that habitat area and botanical composition are accurate.

5.4 Habitats

The habitat descriptions in this section should be read alongside the following Sweco drawings, which show the distribution of each parcel across the site:

- 65208061-SWE-ZZ-XX-I-EA-0001: UK Habitat Classification
- 65208061-SWE-ZZ-XX-I-EA-0002: UK Habitat Classification (grassland)
- 65208061-SWE-ZZ-XX-I-EA-0003: UK Habitat Classification (scrub)
- 65208061-SWE-ZZ-XX-I-EA-0004: UK Habitat Classification (woodland)
- 65208061-SWE-ZZ-XX-I-EA-0005: UK Habitat Classification (urban)
- 65208061-SWE-ZZ-XX-I-EA-0006: Waterbodies within 500m of site boundary

5.4.1 Modified grassland (g4)

The majority of the grassland of the site is modified grassland.

The areas across the centre of the site (Photo 1) surrounding the runways are large, open areas of grassland totalling approximately 48.6ha that are maintained at regular intervals, with vegetation such as hoary groundsel (*Packera werneriifolia*), clover (*Trifolium* spp.), greater plantain (*Plantago major*) and grasses (*Poa* spp.) cut too short to identify. The two north-east areas of modified grassland also contained haybales still in place and uncovered, with further wrapped haybales of various ages scattered at the edges of the grassland adjacent to the runways. Review of aerial photography shows that all this grassland area is currently utilised as hay meadow.

The remainder of the modified grassland is within the more urban area of the site and consists of approximately 30.4 hectares of heavily mown grassland in small sections, with sward too short to identify species in most cases.

5.4.2 Modified grassland with scattered shrubs (g4 10)

There are three areas of modified grassland with scattered shrubs, all around the main runways. The northern section (Photo 2) consists of two large areas, one 16.6ha and one 16.5ha, either side of the runway and running the full length of the runway. The sward is maintained short and both sides have a wide variety of waxcap mushrooms present including pink waxcap (*Porpolomopsis calyptriformis*), butter waxcap (*Hygrocybe ceracea*) and scarlet waxcap (*Hygrocybe coccinea*).

To the west of the centre of the site is the second area, approximately 7ha and consisting of regularly mown grassland with scattered bramble scrub at the edge. The sward at the time of the survey was too short to identify species and parts of the surface showed damage due to recent vehicle travel.

The third area to the south consists of three patches, two to the east and one to the west of the southernmost end of the runway. The patch to the west is slightly more grown than the others, allowing identification of plant species such as sorrel (*Rumex acetosa*), vetch (*Vicia* spp.), speedwell (*Veronica* spp.) and greater plantain and is approximately 2ha. The two patches to the east total 3.6ha and are both mown too short to identify species present.

Photo 1: Modified grassland in the central part of the site, adjacent to the runways.

Photo 2: Modified grassland with scattered scrub in places, to the north of the site.

5.4.3 Modified grassland with scattered trees (g4 11)

There are three small areas of modified grassland with scattered trees. All three areas have been mown very short and the scattered trees are planted non-native species. The two northern patches total 1.4ha in area and lack of species diversity.

The southern patch is 0.2ha and as well as short sward and low species diversity, also contains planted rhododendron (*Rhododendron* spp.), a WCA Schedule 9 non-native invasive species.

5.4.4 Modified grassland; sports pitch (g4 510)

There are two areas of modified grassland that are counted as sports pitches. One small area to the south-west of the site approximately 0.6ha and one at the south edge that is surrounded by a running track with various obstacle courses scattered across that measures approximately 7.8ha. Both areas are maintained with very short sward with very few species identifiable. Both areas show evidence of consistent use poaching the ground.

5.4.5 Other neutral grassland (g3c)

There are three areas of other neutral grassland.

The northernmost (Photo 3) consists of one large, species poor area approximately 6ha, with cock's foot grass (*Dactylis glomerata*), yorkshire fog (*Holcus lanatus*), greater plantain and meadow thistle (*Cirsium dissectum*) present.

The central area consists of one area approximately 2.6 hectares and is a fenced off area of longer sward than the surrounding grassland. Species present include greater plantain, hoary groundsel and clover, but overall this area is species poor.

The eastern area of other neutral grassland consists of two patches, each within adjacent fields and surrounded by bramble scrub. The eastern area is approximately 0.4 hectares and the western is approximately 0.3, both containing greater plantain, cock's foot and meadow thistle.

5.4.6 Other neutral grassland with scattered shrubs (g3c 10)

There are four areas of other neutral grassland with scattered shrub.

The northernmost area is a small piece of land near the western site boundary, just to the north of the centre. It is approximately 0.3ha and consists of an area of longer sward with frequent mixed scrub scattered throughout.

The central area (Photo 4) is a triangle of land approximately 1.3ha, including vegetation such as sorrel, greater plantain, cock's foot and lesser stitchwort (*Stellaria graminea*). The sward is of varied height and noticeably distinct from the adjacent modified grassland to the east, however there is a lack of species diversity.

The eastern area consists of several small patches of land; two small strips to the north which consist of long grasses with scattered bramble and gorse, approximately 0.9ha, a central patch of unmanaged grassland with scattered bramble and gorse approximately 0.7ha and at the east edge a patch of unmaintained grass, approximately 0.9ha, with species present including yarrow (*Achillea millefolium*), spear thistle (*Cirsium vulgare*), cocks foot grass, sorrel, wooly buttercup (*Ranunculus lanuginosus*), marsh thistle (*Cirsium palustre*) and lesser stitchwort.

The southernmost area is a small section at the south tip of the site, bordering the south edge of the runway. It is approximately 1.2ha and consists of grassland with scattered gorse, bramble and *Juncus,* with a thick edge of bracken (*Pteridium aquilinum*) at the field margins.

Photo 3: Other neutral grassland at the far north of the site.

Photo 4: Other neutral grassland with scattered scrub at the centre of the site.

5.4.7 Holcus-Juncus neutral grassland (g3c8)

There is one area of Holcus-Juncus neutral grassland on site (Photo 5). The area is approximately 0.5ha, to the west of the northern runway, surrounded by modified grassland and in a slight depression in the ground. The area is *Juncus* dominated, marshy and bryophyte rich suggesting a damper environment.

5.4.8 Holcus-Juncus neutral grassland; Rushes (Juncus) dominant (g3c8 15)

There is one area of rushes-dominant Holcus-Juncus neutral grassland on site (Photo 6). The area is approximately 0.7ha, at the northern end of the east runway, directly next to the sealed surface and surrounded by bramble scrub. The area is very marshy, with heather seen at the edge.

Photo 5: A patch of Juncus dominated grassland near the north-west runway.

Photo 6: Juncus dominated grassland to the north-east of the site.

5.4.9 Lowland heathland (h1a)

Lowland heathland (a priority habitat) is present on site. The area is to the north-east, near the site boundary and to the north of the east runway and is approximately 0.4ha. The area is surrounded by blackthorn scrub and has a boundary between the scrub-

dominated and heather-dominated l and, identifiable from a distance. Due to the dense scrub, access was not possible and a full survey of species present was not undertaken.

5.4.10 Dense scrub (h3)
There is one area of dense scrub at the north end of the site. The area is approximately 4.8ha and borders the northernmost runway and an area of other neutral grassland to the north. The area of dense scrub is bordered by tall gorse, with other scrub plants such as bramble visible, however due to the height and density of the edges the prevalence of individual species could not be determined.

5.4.11 Blackthorn scrub (h3a)
There is one area of blackthorn scrub on site. The area is at the western edge of the site, along the red line boundary, bordered on both sides by paved roads and is approximately 0.05ha in area. The vegetation present is majority blackthorn, with bramble and gorse present in smaller quantities.

5.4.12 Blackthorn scrub with scattered trees (h3a 11)
There is one area of blackthorn scrub with scattered trees (Photo 7). The area is to the south-west of the site, bordering the red line boundary and is approximately 0.03ha. The blackthorn scrub with scattered trees surrounds a short ditch within an area of modified grassland fenced at both ends and with a bridge cutting through the middle. Species present include hawthorn (*Crataegus monogyna*), willow (*Salix* spp.) and the dominant blackthorn.

5.4.13 West coast blackthorn scrub (h3a5)
There is one area of west coast blackthorn scrub present (Photo 8). The area is to the north-east, covering approximately 15.3ha and is adjacent to the site boundary to the north-east of the eastern runway. The area could not be directly surveyed due to the density of scrub; however the dominance of blackthorn was evident.

Photo 7: Small patch of blackthorn scrub with scattered trees, in centre of the site.

Photo 8: Transition from bramble scrub in foreground to west coast blackthorn scrub in distance.

5.4.14 West coast blackthorn scrub with scattered trees (h3a5 11)
There is one area of west coast blackthorn scrub with scattered trees. The area is approximately 1.3ha and is located to the west of the site, along the western site boundary.

5.4.15 Bramble scrub (h3d)
There are four areas of bramble scrub.

The northern central area is located to the north of the site, following the north boundary. It is approximately 17.4ha and consists of dense bramble, with scattered blackthorn, willow and gorse throughout.

The north-west area consists of a large strip of scrub along the west edge of the site, along with several smaller areas of dense bramble scattered across the paved area a little further south-west, totalling approximately 8.2ha. The northern section of the strip consists of bramble with bracken, while the rest consist of primarily dense bramble.

The south-west section is an area of dense bramble with scattered oak (*Quercus* spp.), willow and blackthorn, approximately 2.9ha, consisting of two enclosed fields with small areas of grassland in the centre of each.

The southern area is a dense bramble scrub that covers a teardrop shape in the paved area adjacent to the southern runway and continues to cover the side of a steep mound adjacent to the sports pitch and joins the red line boundary at the south edge. The vegetation is bramble with occasional gorse and the area is approximately 0.8ha.

5.4.16 Bramble scrub with scattered trees (h3d 11)
There are two areas of bramble scrub with scattered trees.

The western area is adjacent to the red line boundary to the west of the site and consists of three small patches totalling approximately 1ha area. The westernmost patch consists of majority bramble with several non-native pine trees (*Pina* spp.), while the other two patches contain hawthorn, ash (*Fraxinus excelsior*) and sycamore (*Acer pseudoplatanus)* trees.

The southern area consists of one patch adjacent to the west edge of the southern runway, approximately 0.2ha in area and consisting of bramble with occasional willow trees.

5.4.17 Bramble scrub with scattered bracken (h3d 12)
There is one area of bramble scrub with scattered bracken (Photo 9). The area is at the southern edge of the site and consists of a wide border along the red line boundary surrounding the southern end of the runway and sports pitch, approximately 1.5ha. The vegetation present consists of bramble and scattered bracken, with no other identifiable plants present.

5.4.18 Bramble scrub with scattered grass (h3d 189)
There are two areas of bramble scrub with scattered grass.

The western area is a steep slope at the western edge of the site (Photo 10), just outside the barracks boundary fence and bordered on the western edge by a paved road. It is approximately 3.1ha and consists of bramble with blackthorn and scattered grass patches.

The second area is also in the west of the site, to the north-east of the western area and consists of a dense bramble mound approximately 0.4ha surrounded by sealed surface.

Photo 9: Bramble scrub with scattered bracken along the south boundary of the site.

Photo 10: Dense bramble scrub with scattered grass in places.

5.4.19 Mixed scrub (h3h)
There are three areas of mixed scrub on site.

The northern area is north of the centre of the site and consists of approximately 3.7ha mixed bramble and blackthorn scrub with some willow present. The scrub is dense and bordered by blackthorn scrub to the north and grassland to the west, with a paved road running through the centre and several artificial paved clearings present.

The second area is a small patch (Photo 11), approximately 0.2ha just to the south of the centre of the site. The area consists of dense bramble and gorse, bordered by sealed surface to the east and grassland to the west.

5.4.20 Mixed scrub with scattered trees (h3h 11)
There is one area of mixed scrub with scattered trees. The area is approximately 0.2ha and is located at the red line boundary to the south-west of the main complex. The scrub consists of mainly bramble, with willow and sycamore trees present.

5.4.21 Mixed scrub with scattered grass (h3h 189)
There are two areas of mixed scrub with scattered grass.

The northern area is north of the runways, toward the centre of the north edge of the site and bordered along its south edge by a paved road, with artificial paved clearings leading into the scrub. The scrub consists mainly of gorse and bramble with scattered willow and blackthorn and is approximately 6.9ha.

The eastern area is approximately 3.1ha situated at the eastern site boundary, approximately central and bordered to the west by grassland. The vegetation consists of bramble with gorse, blackthorn and bracken present, as well as willow to the south edge.

5.4.22 Mixed scrub with introduced shrub (h3h 1160)

There is one small area of mixed scrub with introduced shrub on the site (Photo 12), situated to the west of the centre of the site adjacent to the site boundary. The area is approximately 0.03ha and consists of bramble, blackthorn and bamboo (*Bambusoideae* spp.).

Photo 11: Small patch of mixed scrub.

Photo 12: Mixed scrub with bamboo alongside native species.

5.4.23 Mixed scrub with non-permeable paving (h3h 1232)

There is one 1.7ha area of mixed scrub with non-permeable paving. The area is situated to the western edge of the site, north of the centre and adjacent to the red line boundary. The area consists of a paved structure that has been overgrown by the surrounding shrub, including bramble, blackthorn and WCA Sch 9 invasive non-native cotoneaster (*Cotoneaster horizontalis*).

5.4.24 Standing open water (r1)

There are two areas of standing open water on the site.

The northern pool, P1 (Photo 13) is approximately 130m^2 and consists of a depression in the ground, surrounded by grassland with an island in the middle and shallowly filled to a depth of approximately 60cm at its deepest point. The water was turbid, but clear enough that the bottom was visible, and no pond vegetation was present.

The southern pool, P2 (Photo 14) is approximately 50m^2 and consists of a sloping bank on one edge, with the other edge a vertical wall lined in corrugated metal and with a large piece of machinery partly submerged in the middle. There is no vegetation present and the water is muddy and turbid.

Photo 13: P1, showing island in top right of photo.

Photo 14: P2, a shallow, artificial waterbody.

5.4.25 Standing open water; freshwater - manmade (r1 39)
There are two areas of standing open water; freshwater – manmade.

To the west edge of the site, on the site boundary and bordered by an area of other woodland – broadleaved, is a concrete sided structure, previously used as an Oily Water Interceptor, OWI 1 (Photo 15), approximately 660m^2. The tank is outside the fenced area of the site and was inaccessible from either direction. From a distance, the water appeared deep, with some vegetation present, however the turbidity, artificial nature of the tank and nearby non-natural habitats indicate a poor habitat quality.

To the north of the site, surrounded by dense scrub, is a second retired Oily Water Interceptor, OWI 2 (Photo 16), approximately 300m^2.

Photo 15: OWI 1 on the west border of the site.

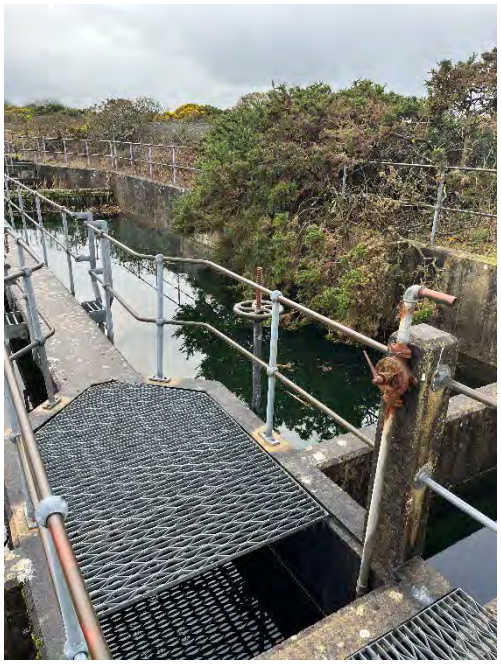

Photo 16: OWI 2 located within dense scrub.

5.4.26 Other rivers and streams; ditch (r2b 191)

There is one ditch on site (Photo 17). The habitat consists of a ditch and drain, which emerges in the south-east of the site and runs south-east and south along the red line boundary for approximately 0.17km before entering a pipe and going underground again. The water is low turbidity, however there are no floating plants present and the water level is shallow.

Photo 17: A ditch running south along the western part of the site.

5.4.27 Developed and sealed surface (u1b)
A large proportion of the site is developed and sealed surface, including the runways crossing through the centre of the site and the majority of the western side of the site which also contains the buildings. These areas have no vegetation and at the time of survey had no standing water present.

5.4.28 Other developed land; ruderal/ephemeral with scattered scrub (u1b6 17 10)
One area to the east of the centre of the site (Photo 18) is overgrown, previously sealed surface, now broken with a layer of bramble, bryophytes and grasses covering the majority and with areas of scrub growing throughout, particularly toward the edges. The area is approximately 1ha.

Photo 18: Sealed surface, now overgrown.

5.4.29 Suburban mosaic of developed/natural surface (u1d)
There are four small areas of suburban mosaic of developed and natural surface on the site, all within the more developed area to the south-west of the site. All four consist of garden areas within built up sections of the site, with the western two being gardens to small houses and the eastern being maintained garden areas next to a larger building. The areas total approximately 1.1ha.

5.4.30 Suburban mosaic of developed/natural surface with introduced shrub (u1d 1160)
There is one area of suburban mosaic of developed and natural surface with introduced shrub, to the southwest of the site. The area is approximately 28m^2 and consists of a small patch of introduced shrub next to one of the site buildings.

5.4.31 Wet woodland with scattered scrub (w1d 10)
There is one area of wet woodland with scattered scrub (Photo 19). The area is to the south-west of the site, along the site boundary at the western edge. The area is approximately 1.9ha in area and consists of majority willow woodland with bramble and bracken throughout.

5.4.32 Other woodland – mixed (w1h)
There is one area of mixed woodland present to the west edge of the site. The area is approximately 0.5ha and consists of oak (*Quercus* spp.), blackthorn and sycamore, with a density of blackthorn that prevented the area from being fully surveyed.

5.4.33 Other woodland – mixed with scattered scrub (w1h 10)
To the west edge of the site is an area of mixed woodland with scattered scrub, approximately 0.3ha with sycamore, willow hawthorn and a bramble scrub understorey. The woodland is sparse with scattered scrub and was inaccessible due to a fence at the northern and western edge so had to be assessed from the outside.

5.4.34 Other coniferous woodland; non-native (w2c 48)
There is one 0.1ha area of non-native coniferous woodland (Photo 20), to the south-west of the site bordered by grassland to the east and hardstanding to the west. The trees are mature non-native conifers.

Photo 19: Wet woodland with dense understorey of bramble scrub.

Photo 20: Non-native conifers.

5.4.35 Line of trees (w1g6)
There are three lines of trees present on site. All are to the south-west of the site, within the more developed area of the site.

The two southernmost lines are both non-native pine (Photo 21) and are structured as planted windbreaks.

The western line (Photo 22) is associated with a bank and consist of mainly sycamore and hawthorn.

Photo 21: Line on non-native pines along the southern boundary of the site.

Photo 22: Line of trees associated with a bank.

5.4.36 Other hedgerows (h2b)

There are six short hedgerows present on the site, five of which are within the western developed area, and one along the northernmost boundary.

The westernmost hedgerows are blackthorn and box (*Buxus sempervirens*) respectively and are oriented north-south at the edge of a road that slopes downhill toward the site boundary.

The southernmost hedgerow is entirely privet (*Ligustrum* spp.), approx. 2m tall.

The two eastern hedgerows are introduced shrub, however species was not discernible due to the time of year and the severe pruning of the shrubs present.

All five hedges appeared to show signs of management.

The northernmost hedgerow was inaccessible due to the presence of dense bracken and bramble within the other neutral grassland bordering it, however it appeared to be mainly composed of blackthorn, with bramble and bracken present throughout.

Photo 23: Box hedge

Photo 24: Privet hedge adjacent to the tennis courts in the south of the site.

5.4.37 Buildings (u1b5)

The majority of the west side of the site is developed and consists of office areas, commercial and residential buildings. The buildings were mainly of a flat roof structure and conditions in the area (prevailing wind, potential foraging and commuting habitats and natural roosts) are poor for bats. In addition, it is not currently anticipated that any of these buildings will be impacted by the proposed development. As such the buildings were not surveyed for potential roost features.

5.4.38 Arable and horticulture (c1)

There is one arable field present to the north of the wet woodland bordering the site boundary at the south-western edge with an area of 3.7ha. The field appeared to have been harvested recently, with light cover of grasses and remnant crops but no significant growth present.

5.5 Species Scoping Survey Results

5.5.1 Flora

The WWBIC biological record data included 61 records of 20 notable plant species within 5km of the site's central grid point including the EWA Sch.7 species cornflower (*Centaurea cyanus*), English sticky eyebright (*Euphrasia officinalis* subsp*. anglica*), pale dog-violet (*Viola lactea*), purple ramping-fumitory (*Fumaria purpurea*) and small-flowered catchfly (*Silene gallica*).

No protected or notable species of flora were identified during the survey, however, it is recommended an NVC survey is undertaken during the appropriate growing season to establish whether any particular plant species may pose a constraint to certain areas of potential development.

5.5.2 Fungi

The WWBIC biological record data included two records of Hazel gloves (*Hypocreopsis Rhododendri)*, an EWA Sch.7 species, associated with hazel and blackthorn, within 5km of the site's central grid point. Blackthorn is common on site offering potential habitat for this species.

Numerous fungi species were identified within the grassland habitats, including waxcaps (*Hygrocybe* spp.). The grassland habitats have the potential to support a diverse fungal assemblage.

5.5.3 Invertebrates

The WWBIC biological record data included 386 records of 94 notable invertebrate species within 5km of the site's central grid point. These include two records of the white clawed crayfish (*Austropotamobius pallipes*), from the River Solva.

Invertebrates of potential relevance to the site include a number of EWA Sch.7 species such as the hornet robberfly (*Asilus crabroniformis*) found in well drained areas of heath and downs, the black oil beetle (*Meloe proscarabaeus*) in meadows and field margins and the bee species *Bombus humilis* and *Bombus muscorum*, which favour grassland meadows. A range of lepidopteran species may benefit from herbaceous plants across the site, in particular, common nettle and dandelion for the mottled rustic, shaded broad-bar, white ermine and buff ermine; and *Senecio* spp. for the cinnabar moth.

5.5.4 Amphibians (including great crested newt)

The WWBIC biological records included 45 records of amphibians within 5km of the site's central grid point. This included 16 records of common toad (*Bufo bufo*), thirteen of palmate newt (*Lissotriton helveticus*), two of smooth newt (*Lissotriton vulgaris*) and 14 of common frog (*Rana temporaria*).

Woodland and scrub habitats on site provide suitable refuge, foraging and overwintering habitats while grassland habitats provide foraging potential. Ponds on site may be suitable for breeding amphibians. Nine waterbodies on site or within 500m of the site boundary were identified using online mapping sources. Ponds are described in Table 5.3 and shown on Sweco drawing 65208061-SWE-ZZ-XX-I-EA-0006.

Table 5.3: Pond numbers and descriptions

Pond Ref.	Description	Location and Grid reference
Oily water interceptor (OWI) 1	A concrete sided water tank approximately 660m^2, outside the fenced area of the site and inaccessible from either direction. Despite the turbid water, the tank appeared deep, with some vegetation present.	On site SM 84617 25265
OWI 2	Similar to OWI 1, OWI 2 is a concrete sided water tank, however OWI 2 is located within an area of dense scrub.	On site SM 85085 26007
P1	The northern pool is approximately 130m^2 with an island in the middle, surrounded by grassland and shallowly filled to a depth of approximately 60cm at its deepest point. The water was turbid, but clear enough that the bottom was visible and no pond vegetation was present.	On site SM 84858 25158

Pond Ref.	Description	Location and Grid reference
P2	The southern pool is artificial, approximately 52m^2 and consists of a of a sloping bank on one edge, with the other edge a vertical wall lined in corrugated metal and with a large piece of machinery partly submerged in the middle. There is no vegetation present and the water is muddy and turbid.	On site SM 84848 25043
P3	Inaccessible - not surveyed.	100m west SM 84627 25364
P4	Inaccessible - not surveyed.	500m west SM 83986 25616
P5	Inaccessible - not surveyed.	250m north SM 85560 26757
P6	Inaccessible - not surveyed.	200m east SM 85961 25576
P7	Inaccessible - not surveyed.	475m south-west SM 83706 24153

5.5.4.1 Habitat Suitability Index Assessment Results

Table 5.4 below shows the results of the HSI assessments undertaken on all accessible, scoped-in waterbodies on and within 500m of the site (OWI 1, OWI 2, P1 and P2). Habitat Suitability Index scores are given along with the category of suitability.

Table 5.4: HSI assessment results of waterbodies in and within 500m of the Site.

Suitability Indices	Waterbody reference			
	OWI 1	OWI 2	P1	P2
Location	0.01	0.01	0.01	0.01
Area (m²)	0.6	0.6	0.2	0.2
Pond permanence	0.9	0.9	1	0.5
Water quality	0.33	0.33	0.67	0.01
Shade (%)	1	1	1	1
Waterfowl	1	1	0.67	1
Fish	1	1	1	1
Pond density	0.9	0.9	0.9	0.9
Terrestrial habitat	0.33	1	0.33	0.33
Macrophyte cover (%)	0.3	0.3	0.3	0.3
HSI Score	**0.42 (Poor)**	**0.47 (Poor)**	**0.39 (Poor)**	**0.25 (Poor)**

5.5.5 Reptiles

The WWBIC biological record data included returned 97 records of reptiles within 5km of the site's central grid point, including 15 records of slow worm (*Anguis fragilis*), 43 records of adder (*Vipera berus*), 12 records of grass snake (*Natrix helvetica*) and 27 records of viviparous lizard (*Zootoca vivipara*).

Much of the site provides suitable habitat for reptiles and records for all four species are on, or immediately adjacent to, the site. Grass snake are most likely to use the ditch and wet woodland areas while adder and viviparous lizard are more likely to use the grassland and scrub areas. Slow worm are equally likely to occur in woodland / grassland / scrub marginal habitats and in grassland areas.

5.5.6 Birds

The WWBIC biological record data included 1,054 individual records of 66 priority bird species within 5km of the site's central grid point.

The WeBS data provided core counts of wetland bird species across seven sites within 10km of the site boundary. At Newgale Marsh, 1.2km south-east, high peak counts of teal (*Anas crecca*), snipe (*Gallinago gallinago*) and to a lesser extent, curlew (*Numenius arquata*) and oystercatcher (*Haematopus ostralegus*) were present. At Newgale beach, 1.2km south-east, common scoter (*Melanitta nigra*) were present,

with hundreds being recorded during the October, November and December months across the five years of study. High peak counts of wigeon (*Mareca penelope*), teal and lapwing (*Vanellus vanellus*) were present at St David`s Airfield Heath SSSI-5.2km to the west, while teal were also present in relatively high numbers at Lecha Farm (3.1km west) and Dwr Cleifion (7.1km west) all of these species are considered to potentially use the habitats present on site to forage or roost.

The proximity of the site to Ramsey and St David's Peninsula Coast SPA and the presence of suitable grassland habitat near to their breeding cliffs, mean the red-billed chough could use the site for foraging, however further information to determine the site's importance for this WCA Sch.1 species is required.

The dominance of grassland habitats across the site mean a range of ground nesting species may be present on site, including a population of skylarks (*Alauda arvensis*) considered to be the largest in Pembrokeshire and one of the largest in Wales [20].

Birds of prey, barn owl (*Tyto alba*), red kite (*Milvus milvus*), peregrine (*Falco peregrinus*), kestrel (*Falco tinnunculus*) have also been recorded locally.

5.5.7 Bats

The WWBIC biological data included 223 records of bats within 5km of the site's central grid point. Species recorded included barbastelle (*Barbastella barbastellus*) serotine (*Eptesicus serotinus*), Daubenton's (*Myotis daubentonii*), whiskered (*Myotis mystacinus*), Natterer's (*Myotis nattereri*), noctule (*Nyctalus noctula*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), long-eared brown bat (*Plecotus auritus*), greater horseshoe bat (*Rhinolophus ferrumequinum*) and lesser horseshoe bat (*Rhinolophus hipposideros*).

The woodland habitat and/or buildings on site have potential to support roosting bats. The site was considered to support habitats of moderate to high suitability for foraging bats and considered likely to support habitats or features that bats could roost within.

5.5.8 Badger

The WWBIC biological data included 94 records for badger (*Meles meles*) were identified within 5km of the site's central grid point.

Whilst no field signs were observed during the survey, records held by the barracks suggest the presence of badgers in the north of the site outside the grassland surrounding the airfield.

Habitats on site are likely to support badger, with sloping and undulating woodland areas being suitable for sett creation, while woodlands and grasslands are suitable for foraging.

5.5.9 Otter

The WWBIC biological data included 21 records of otter (*Lutra lutra*) within 5km of the site's central grid point, while nearby statutory sites are designated for otter 6.2.

The tributary of the River Solva, present within the southwest of the site, provides potential habitat for otter, whilst the wet woodland may provide holt or natal den

opportunities. Barrack records confirm otter presence within the woodland on the western boundary of the site.

5.5.10 Water Vole

The WWBIC biological data provided no records of water vole (*Arvicola amphibius*) within 5km of the site's central grid point within the last ten years.

The tributary of the River Solva, present within the southwest of the site, provides sub-optimal habitat for water vole, though other lengths of the stream upstream or downstream may be more suitable.

5.5.11 Other mammals

The WWBIC biological data included records of brown hare (*Lepus europaeus*), European hedgehog (*Erinaceus europaeus*), Eurasian harvest mouse (*Micromys minutus*), stoat (*Mustela erminea*), weasel (*Mustela nivalis*) and polecat (*Mustela putorius*) within 5km of the site's central grid point.

Habitats on site are suitable to support all these species.

5.5.12 Invasive Non-Native Species

The WWBIC biological data included 29 records of three invasive non-native plant species listed in Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) within 5km of the site's central grid point, including four of rhododendron (*Rhododendron ponticum*), one of Himalayan balsalm (*Impatiens glandulifera*) and 24 of Japanese knotweed (*Fallopia japonica*).

During the survey, cotoneaster and rhododendron were found on site, in locations shown on Sweco drawing 65208061-SWE-ZZ-XX-I-EA-0007. The rhododendron is maintained within a horticultural environment near the residential buildings to the south of the site, while the cotoneaster appears to be spreading near an area identified as ancient woodland (section 6.2), close to the western site boundary at Rickeston Hall.

6 Ecological Constraints and Recommendations

6.1 Background

The evaluation in this section is based on the site survey undertaken 22 to 24 November 2022. For purposes of the assessment it is assumed there has been no change in the condition of the site since the site survey (unless otherwise stated).

Recommendations comply with appropriate legislation and policy and include further targeted ecological survey which may result in the need for licence applications, seasonal restrictions and mitigation.

Recommendations for specific, high level and general mitigation measures have been made where appropriate and the mitigation hierarchy (avoidance, mitigation, compensation) has been applied where appropriate in accordance with CIEEM [11]. Recommendations for enhancement are also made and future development will need to comply with the National Planning Policy Framework (NPPF) 2021 [8].

6.2 Ecological Constraints and Recommendations

Table 6.1 below provides a breakdown of the potential ecological constraints and opportunities that have been identified based on the results of the UKHab and protected species scoping survey as well as desk study, including consideration of the extent and / or quality of the habitats present and the connectivity of the site to the wider landscape.

Table 6.1: Identified Ecological Constraints and Recommended Action(s)

Ecological Constraint	Legislation	Recommended action(s)
Designated Sites		
Ramsey and St David's Peninsula Coast SPA / St David's / Ty Ddewi SAC	CHSR WCA	There is potential for pollution, run-off and dust from construction and operational activities / impacts on species assemblages (chough) for which the site is designated. Consultation with competent authority including Pembrokeshire County Council and Natural Resources Wales is therefore recommended. A Habitat Regulations Assessment (HRA) report will be required to assess the impacts of the proposed development on the qualifying features of the designated sites. The impacts of air quality, drainage and radiation from the radar transmitters will also be assessed with the HRA. Pollution control measures should be secured through the provision of a Construction Environmental Plan (CEMP), or similar.

Ecological Constraint	Legislation	Recommended action(s)
St. David's Peninsula Coast Site of Special Scientific Interest (SSSI)		There is potential for pollution, run-off and dust from construction and operational activities / impacts on species assemblages for which the site is designated. Pollution control measures should be secured through the provision of a CEMP, or similar. Consultation with competent authority including Pembrokeshire County Council and Natural Resources Wales should be undertaken.
Habitats on Site		
Priority habitat – Lowland Heathland	EWA Sch.7	It is understood that current proposals will not directly impact this habitat. Lowland heathland is a priority habitat found on site. Public bodies, including local authorities have a legal duty to have regard to conserving biodiversity in regard to priority habitats. Any proposed development should avoid impacting this priority habitat.
Mature trees		It is understood that current proposals will not directly impact any mature trees. Mature trees have intrinsic ecological value. Mature trees within any proposed development should be retained where possible. In accordance with British Standard 5837 Trees in Relation to Design, Demolition and Construction [23], care should be taken to avoid impacts on any mature trees. Where the trees are not directly impacted by the works, care will need to be taken to avoid adverse impacts to the root systems of these trees during the works and to avoid damaging branches with machinery. If removal of mature trees is proposed, further survey / a precautionary method statement is required to ensure legally protected species such as nesting birds and bats are not present prior to their removal. Any mature trees that need to be cleared to facilitate the proposed works should be replanted on a 3:1 ratio with like-for-like, or similar native species, as soon as the works are completed.
Flora and Fauna		
Radar	-	The impact of electromagnetic radiation on species assemblages is currently unknown. This will be addressed as far as possible with available data within the HRA/ ES Chapter for biodiversity for the Cawdor Barracks site.

Ecological Constraint	Legislation	Recommended action(s)
Flora	WCA Sch. 8 EWA Sch.7	The grassland has the potential to support rare or notable plants. An NVC survey is recommended between May and August to establish an accurate ecological baseline for the site.
Fungi	WCA Sch. 8 EWA Sch.7	The grassland habitats on site support numerous fungi species including waxcaps. Whilst waxcaps are relatively common in Wales, significant assemblages can be significant at the national level (as highlighted within the JNCC designation criteria for biological SSSI's, chapter 14: non-lichenised fungi). Therefore it is recommended that eDNA surveys are undertaken to establish the significance of the assemblage on site. Alternatively, further field surveys can be undertaken during the optimal season for fungi, August to November, rainfall dependent.
Invertebrates	EWA Sch.7	The habitats on site, in particular the grassland areas, have the potential to support rare or notable invertebrates. Given the areas proposed for the radar arrays will impact only a small part of the overall site and are expected to be limited to areas currently regularly cut for hay meadow, invertebrate surveys are not currently recommended, however enhancing the remaining habitats on site for the benefit of invertebrates should be considered.
Amphibians (including great crested newt)	CHSR WCA Sch. 5 EWA Sch.7	The ponds, grassland woodland and scrub habitats have potential to support great crested newt. While the waterbodies have been assessed as providing poor habitat suitability, eDNA surveys are recommended as an inexpensive means of scoping out this protected species. One visit to each accessible waterbody located on/within 500m of the site between mid-April to end of June will be required.
Reptiles	WCA Sch. 5 EWA Sch.7	Habitats on site have the potential to support all four of the common reptile species, in particular the scrub mosaics and grassland margins. Presence of all four common species of reptile has been confirmed within the biological records received. Reptile surveys should be undertaken along grassland edges within any proposed development footprint. Reptile presence / likely-absence surveys should consist of seven survey visits between March and October, with April, May and September being optimal months.
Wintering birds	WCA WCA Sch. 1 BoCC Red / Amber BD Annex 1	Hedgerow, trees, grassland and dense scrub on site offer potential important wintering bird foraging opportunities. Wintering bird surveys are required to establish the importance of this site for rare or notable species. This should include a minimum of four visits between

Ecological Constraint	Legislation	Recommended action(s)
		November and February inclusive, which, at the time of writing, have already commenced.
Breeding birds	WCA WCA Sch. 1 BoCC Red / Amber BD Annex 1	Woodland scrub, ditches and grassland on site offer potential nesting opportunities / could support notable or rare breeding bird species, in particular, skylark and chough. Breeding bird surveys are recommended with species-specific mitigation and / or compensation potentially required, dependent on results. Breeding bird surveys are undertaken as a series of six site visits between late March and early July including one dusk survey. The site comprises habitats that could support chough, the qualifying feature of the Ramsey and St David's Peninsula Coast SPA. An additional two, dedicated chough surveys between April and June are therefore recommended to establish how the chough use the site, in accordance with Bird Monitoring Methods [24]. The potential presence of barn owls on site will require a scoping survey to assess the value of the site for nesting and foraging barn owls. The habitat will be classified into low, moderate and high foraging values. This is required due to barn owl dependence upon open grassland habitats. The survey will consist of a single visit, (June-January, a period when Barn Owls are least likely to be breeding or if breeding least likely to be disturbed by inspections). The assessment will look at the suitability of the site for foraging potential and the effect of any loss of foraging habitat as part of the development. Any clearance of nesting habitat of any bird species should be timed to avoid the bird breeding season (March-August inclusive). If this is not possible, these habitats can only be removed following confirmation by a suitably qualified ecologist that they are not in active use by nesting birds. red kite (*Milvus milvus*), peregrine (*Falco peregrinus*), kestrel (*Falco tinnunculus*) are not considered likely to be significantly impacted by the proposed development plans as they are unlikely to be breeding within the proposed locations outlined for the arrays; baseline usage of the site by these species will be obtained during the breeding bird survey.
Bats (Roosting)	WCA Sch. 5 EWA Sch.7	The woodland and buildings on site may offer potential roosting for bats, however the proposed radar array sites

Ecological Constraint	Legislation	Recommended action(s)
	CHSR	are not located close to potential roosts. Therefore, no further surveys are recommended at this time. However, if woodland habitats or buildings will be impacted by proposed development, a preliminary tree roost assessment (PTRA) should be undertaken within the proposed development footprint. Should any trees or buildings with bat roosting potential be recorded, further emergence surveys may be recommended.
Bats (Foraging and Commuting)	WCA Sch. 5 EWA Sch.7 CHSR	The habitats on site offer high quality foraging and commuting habitat for bats. While the grassland areas identified for the potential radar arrays do not provide such high quality habitat, the meadows are still considered to be of moderate suitability for foraging bats. Therefore it is recommended that ten bat static detectors are deployed across the proposed radar array sites once per month between April and October to establish an ecological baseline for this taxon. In addition, any development should avoid disrupting habitat connectivity, implement a sensitive lighting plan, or similar and enhance the remaining site for bats.
Badger	PBA	Woodland and grassland habitats found on site are suitable to support badger sett creation and foraging. A pre-commencement site walkover of the proposed development footprint plus a buffer of 30m should be undertaken by an ecologist no more than three months prior to works. Should the ecologist find evidence of badger sett creation, further advice will be given.
Hedgehog	EWA Sch.7	The woodland scrub and grassland habitats on site are considered suitable for hedgehog. Suitable habitats on site should be retained where possible. Any clearance of suitable habitat should be conducted under a precautionary method statement and with the oversight of an ecological clerk of works.
Otter	CHSR WCA Sch. 5 EWA Sch.7	The tributary of the River Solva and the wet woodland on site provide suitable habitat for otter. No positive signs of otter were identified during the survey; however the presence of dense vegetation means that signs could have been missed. Surveys may be required if suitable habitats are impacted by any proposed development, however, as the proposed radar array sites lack connectivity to suitable habitat, surveys are not currently recommended.
Water Vole	WCA Sch. 5 EWA Sch.7	The tributary of the River Solva provides potential habitat for water vole. No positive signs of water vole were identified during the survey; however the presence of

Ecological Constraint	Legislation	Recommended action(s)
		dense vegetation means that signs could have been missed. Surveys may be required if potential habitats are impacted by any proposed development, however, as the proposed radar array sites lack connectivity to suitable habitat, surveys are not currently recommended.
Eurasian harvest mouse	EWA Sch. 7	Proposals are limited to non-tussocky grassland currently regularly cut for hay meadow. Should this change to impact tall tussocky grasslands, further survey may be required.
Polecat	EWA Sch. 7	Proposals are limited to non-tussocky grassland currently regularly cut for hay meadow. Should this change and more suitable habitat (such as scrub, woodland, or tussocky grassland) be impacted, further survey may be required.
Other mammals		The proposed radar array sites should ensure connectivity with the wider landscape is retained for all these species, where current proposals retain large areas of the existing grassland that these species may be reliant upon.
Invasive Non-Native Species	WCA Sch. 9	Rhododendron and cotoneaster was recorded on site. A targeted INNS survey should be conducted in order to identify the full extent of INNS within the site. An INNS management and biosecurity plan should be prepared which identifies the measures needed to remove/control INNS and any biosecurity measures which should be implemented during on-site works to prevent their spread.

WCA - Wildlife and Countryside Act 1981 (as amended). **WCA Sch. 1** - Wildlife and Countryside Act 1981 (as amended) Schedule 1. **WCA Sch. 5** - Wildlife and Countryside Act 1981 (as amended) Schedule 5 (killing, injuring and sale of animals). **WCA Sch. 8** - Wildlife and Countryside Act 1981 (as amended) Schedule 8. **WCA Sch. 9** - Wildlife and Countryside Act 1981 (as amended) Schedule 9. **EWA** - Environment (Wales) Act 2016. **BD Annex 1**- European Birds Directive, Annex 1. **CHSR** - Conservation of Habitats and Species Regulations 2017 (as amended), Annex I, Annex II, Annex IV of the Habitats Directive. **PBA** - Protection of Badgers Act (1992). **BoCC Red/Amber** - Birds of Conservation Concern - Red or Amber listed.

Following completion of the surveys and assessments required, as detailed in Table 6.1 above, an EcIA report should be produced in line with CIEEM guidance [11]. This report should detail the methods and results of all the surveys and assessments undertaken, discuss the ecological baseline and the effect of the development on ecological features considering appropriate mitigation. This report will be suitable for submission with a planning application for the scheme.

7 Conclusion

The construction of transmission and receiving radar arrays and associated infrastructure, at Cawdor Barracks, Haverfordwest, is proposed.

Ramsey and St David's Peninsula Coast SPA, St David's / Ty Ddewi Special Area of Conservation and St. David's Peninsula Coast SSSI are located close to the site boundary and the priority habitat lowland heathland is found on site.

Primary broad habitats present on site include modified grassland other neutral grassland lowland heathland and mixed scrub, bramble scrub, blackthorn scrub, developed land; sealed surface, wet woodland standing open water, lines of trees and hedgerows.

The findings of the UK habitat classification survey confirm that the habitats on-site have the potential to support the following notable taxa:

- Fungal assemblages
- Amphibians
- Reptiles
- Wintering birds
- Nesting birds
- Bats
- Badgers

Invasive non-native plant species rhododendron and cotoneaster were observed on site.

The following further survey work is therefore recommended for the site:

- Habitat Regulations Assessment
- National Vegetation Classification assessment (one visit; May-July inclusive)
- A fungi eDNA survey (one visit, no timing constraint)
- Great crested newt eDNA survey (one visit; April-June inclusive)
- Reptile surveys (eight visits; May-September inclusive)
- Wintering bird survey (four visits; November-February inclusive)
- Breeding bird survey (six visits; March-July inclusive plus two dedicated chough surveys between April and June)
- Scoping survey for nesting barn owl (one visit, no timing constraint)
- Bat static detector surveys (ten detectors, once per month April to October inclusive)
- A pre-construction survey for badger (one visit, no more than three months prior to start of works)
- Invasive species surveys (one visit; April-July inclusive)

The potential effects on ecological features could be reduced by including the following within the design for the scheme:

- Bat sensitive lighting
- Retention of hedgerows and areas of long grassland to ensure connectivity of on site habitats with the wider landscape

Table 7.1 summarises the ecological recommendations identified within this report and constraints associated with the Site.

Table 7.1: Summary of ecological assessment

Target receptor	Initial receptor value (based upon survey)	Further ecological survey and/or mitigation	Seasonal constraints	Licence application implications
Ramsey and St David's Peninsula Coast SPA / St David's / Ty Ddewi SAC	High	Habitat Regulations Assessment addressing impacts of air quality, drainage and radiation from the radar transmitters. Consultation with competent authority including Pembrokeshire County Council and Natural Resources Wales should be undertaken. Pollution prevention measures in place during and post-construction.	Dependant on conclusions of the HRA	None
St. David's Peninsula Coast Site of Special Scientific Interest (SSSI)	High	Consultation with competent authority including Pembrokeshire County Council and Natural Resources Wales should be undertaken. Pollution prevention measures in place during and post-construction.	None	None
Priority habitat – Lowland Heathland	Moderate	Any development should avoid impacting the priority habitat. Pollution prevention measures in place during and post-construction.	None	None
Mature trees	Low	Efforts should be made to avoid direct impacts upon all trees on or adjacent to the site. Retained trees should be protected in accordance with British Standard	See protected species section	See protected

Target receptor	Initial receptor value (based upon survey)	Further ecological survey and/or mitigation	Seasonal constraints	Licence application implications
		BS5827:2012 “Trees in relation to construction – recommendations” with protective measures enacted prior to the commencement of any works.		species section
Radar	Unknown	Assessment of impacts of radiation on species assemblages.	None	None
Flora	Low	An NVC survey is recommended to establish an accurate ecological baseline for the site.	Between May and August	None
Fungi	Low	An eDNA survey is recommended to establish the significance of the assemblage on site. Alternatively, further field surveys could be considered.	None (for eDNA) / August to November rainfall dependent for field surveys.	None
Invertebrates	Low	Surveys may be required if large areas of suitable habitats are impacted by any proposed development, however, as the proposals are limited to non-tussocky grassland currently regularly cut for hay meadow, surveys are not currently recommended.	None	None
Amphibians (including great crested newt)	Low	One eDNA survey to each accessible waterbody located on/within 500m of the site is recommended to scope out this protected species.	Mid-April – June.	Dependent on results of eDNA survey.
Reptiles	Moderate	Reptile surveys consisting of one visit to deploy refugia, followed by seven visits to survey for reptiles.	Between March and October, with April,	None

Target receptor	Initial receptor value (based upon survey)	Further ecological survey and/or mitigation	Seasonal constraints	Licence application implications
			May and September being optimal months	
Wintering birds	Moderate	Survey for wintering birds comprising four visits. .	Between November and February inclusive.	None
Breeding birds	Moderate	Breeding bird surveys to inform necessary mitigation. Pre-clearance nesting bird check by ECoW if works take place within the breeding bird season (March to August, inclusive).	Breeding bird surveys should consist of five post-dawn and one pre-dusk survey visits between March and July inclusive.	None
Bats (Roosting)	Low	Potential roost feature survey of any trees or buildings that may be affected by works.	None	Possible licence requirements dependant on survey results.
Bats (Foraging and Commuting)	Moderate	Ten bat static detectors are deployed across the proposed radar array sites to establish an ecological baseline for this taxon. In addition, any development should avoid disrupting habitat connectivity, implement a sensitive lighting plan, or similar and enhance the remaining site for bats.	Deployed once per month between April and October. At least five consecutive nights data will be required per deployment, in	None

Target receptor	Initial receptor value (based upon survey)	Further ecological survey and/or mitigation	Seasonal constraints	Licence application implications
			suitable weather conditions.	
Badgers	Low	Approximately 3 months prior to the commencement of works, a badger check of development area. Trenches and excavations should be covered overnight, or else a ramp placed in them.	None	Dependent on results of badger check and proposed works
Hedgehog	Low	Suitable habitats on site should be retained where possible. Any clearance of suitable habitat should be conducted under a precautionary method statement and with the oversight of an ecological clerk of works.	None	None
Otter	Low	Surveys may be required if suitable habitats are impacted by any proposed development, however, as the proposed radar array sites lack connectivity to suitable habitat, surveys are not currently recommended.	N/A	None (unless suitable habitat is affected by works)
Water Vole	Low	Surveys may be required if suitable habitats are impacted by any proposed development, however, as the proposed radar array sites lack connectivity to suitable habitat, surveys are not currently recommended.	N/A	None (unless suitable habitat is affected by works)

Target receptor	Initial receptor value (based upon survey)	Further ecological survey and/or mitigation	Seasonal constraints	Licence application implications
Eurasian harvest mouse	Low	Proposals are limited to non-tussocky grassland currently regularly cut for hay meadow. Should this change to impact tall tussocky grasslands, further survey may be required.	N/A	None
Polecat	Low	Proposals are limited to non-tussocky grassland currently regularly cut for hay meadow. Should this change and more suitable habitat (such as scrub, woodland, or tussocky grassland) be impacted, further survey may be required.	N/A	None
Other mammals	Low	The proposed radar array sites should ensure connectivity with the wider landscape is retained for all these species, where current proposals retain large areas of the existing grassland that these species may be reliant upon.	N/A	None
Invasive Non-Native Species	Low	A targeted INNS survey should be conducted in order to identify the full extent of INNS within the site. An INNS management and biosecurity plan should be prepared which identifies the measures needed to remove/control INNS and any biosecurity measures which should be implemented during on-site works to prevent their spread.	N/A	None

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Drawings

65208061-SWE-ZZ-XX-I-EA-0001: UK Habitat Classification map

65208061-SWE-ZZ-XX-I-EA-0002: UK Habitat Classification (grassland)

65208061-SWE-ZZ-XX-I-EA-0003: UK Habitat Classification (scrub)

65208061-SWE-ZZ-XX-I-EA-0004: UK Habitat Classification (woodland)

65208061-SWE-ZZ-XX-I-EA-0005: UK Habitat Classification (urban)

65208061-SWE-ZZ-XX-I-EA-0006: Waterbodies within 500m of site boundary

65208061-SWE-ZZ-XX-I-EA-0007: Invasive non-native plant species

Legend

- Cawdor Barracks site
- h2b - other hedgerows
- w1g6 - line of trees
- r2b - other rivers and stream
- g3c - other neutral grassland
- g3c8 - Holcus-Juncus neutral grassland
- g4 - modified grassland
- w1d - wet woodland
- w1h - other woodland mixed
- w2c - other coniferous woodland
- h1a - lowland heathland
- h3 - dense scrub
- c1 - arable and horticulture
- u1b - developed land. sealed surface
- u1b5 - buildings
- u1b6 - other developed land
- u1d - suburban mosaic of developed/natural surface
- r1 - standing open water and canals

0 250 500 750 1000 m

Rev.	Rev. Date	Drawing Suitability	Drawn	Checked	Appr'd
C01	20/01/23	For Information	EU	LH	JS

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PROJECT DARC - CAWDOR BARRACKS

Drawing Title

UK HABITAT CLASSIFICATION

Status Desc.	FINAL	Status	S2
Project No.	65208061	Scale	1:12000
Drawing No.	65208061-SWE-ZZ-XX-I-EA-0001	Sheet Size	A3

Legend

- Cawdor Barracks site
- h2b - other hedgerows
- c1 - arable and horticulture
- g3c - other neutral grassland
- g3c 10 - other neutral grassland with scattered scrub
- g3c8 - Holcus-Juncus neutral grassland
- g3c8 15 - Holcus-Juncus neutral grassland, rushes (J
- g4 - modified grassland
- g4 10 - modified grassland with scattered scrub
- g4 11 - modified grassland with scattered trees
- g4 510 - modified grassland; sports pitch

0 0.25 0.5 km

Basemap Source: © 2022 Bluesky, Infoterra Ltd. & COWI A/S, CNES / Airbus, Getmapping plc, Landsat/Copernicus, Maxar Technologies, Map data © 2022

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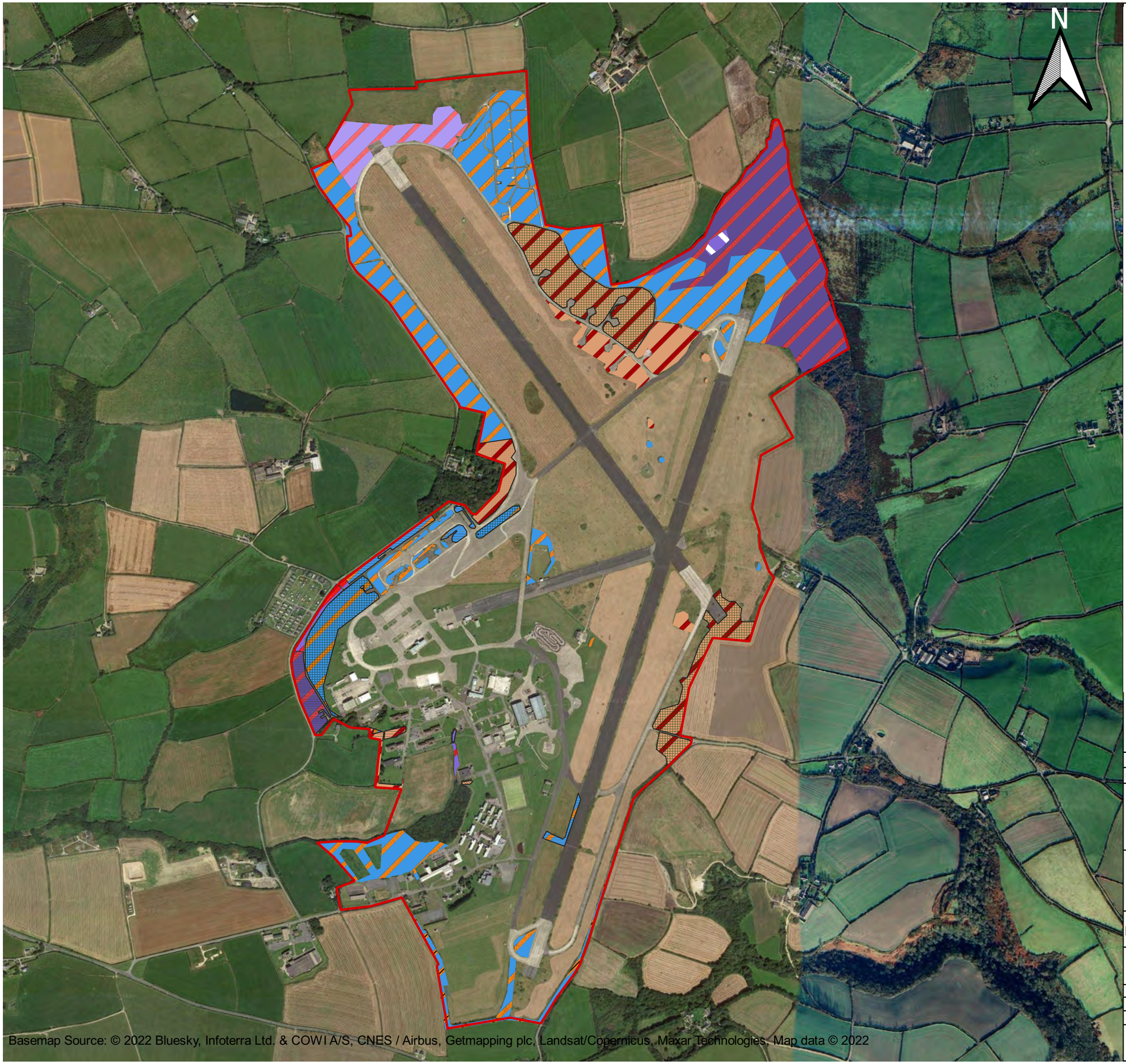
Status Desc.	FINAL	Status	S2
Project No.	65208061	Scale	1:12000
Drawing No.	65208061-SWE-ZZ-XX-I-EA-0002	Sheet Size	A3



Legend

- Cawdor Barracks site
- h1a - lowland heathland
- h3 - dense scrub
- h3a- blackthorn scrub
- h3a 11 - blackthorn scrub with scattered trees
- h3a5 - west coast blackthorn scrub
- h3a5 11 - west coast blackthorn scrub with scattered trees
- h3d- bramble scrub
- h3d 11 - bramble scrub with scattered trees
- h3d 12 - bramble scrub with scattered bracken
- h3d 189 - bramble scrub with scattered grass
- h3h- mixed scrub
- h3h 11 - mixed scrub with scattered trees
- h3h 1160 - mixed scrub with introduced shrub
- h3h 1232 - mixed scrub with non-permeable paving
- h3h 189 - mixed scrub with scattered grass

0 0.25 0.5 km

C01	18/01/23	For Information	EU	LH	JS
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Drawing Title

UK HABITAT CLASSIFICATION (SCRUB)

Status Desc.	FINAL	Status	S2
Project No.	65208061	Scale	1:12000
Drawing No.	65208061-SWE-ZZ-XX-I-EA-0003	Sheet Size	A3

N

Legend

- Cawdor Barracks site
- w1g6 - line of trees
- w1d 10 - wet woodland with scattered scrub
- w1h - other woodland mixed
- w1h 10 - other woodland mixed with scattered scrub
- w2c 48 - other coniferous woodland; non-native

0 0.25 0.5 km

Rev.	Rev. Date	Drawing Suitability	Drawn	Checked	Appr'd
C01	18/01/23	For Information	EU	LH	JS

Sweco UK Limited
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Ipswich
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Tel: +44 1473 231100
Web: www.sweco.co.uk

SWECO

Client

MINISTRY OF DEFENCE

Project

PROJECT DARC - CAWDOR BARRACKS

Drawing Title

UK HABITAT CLASSIFICATION (WOODLAND)

Status Desc.	FINAL	Status	S2
Project No.	65208061	Scale	1:12000
Drawing No.	65208061-SWE-ZZ-XX-I-EA-0004	Sheet Size	A3

N

Legend

Cawdor Barracks site

- Site Boundary
- u1b5 - buildings
- u1b - developed land, sealed surface
- u1b6 17 10 - other developed land; ruderal/ephemeral and scattered scrub
- u1d - suburban mosaic of developed/natural surface
- u1d 1160 - suburban mosaic of developed/natural surface with introduced shrub

0 0.25 0.5 km

C01	18/01/23	For Information	EU	LH	JS
Rev.	Rev. Date	Drawing Suitability	Drawn	Checked	Appr'd

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MINISTRY OF DEFENCE

Project

PROJECT DARC - CAWDOR BARRACKS

Drawing Title

UK HABITAT CLASSIFICATION (URBAN)

Status Desc.	FINAL	Status	S2
Project No.	65208061	Scale	1:12000
Drawing No.	65208061-SWE-ZZ-XX-I-EA-0005	Sheet Size	A3

Legend

- Cawdor Barracks site
- 500m buffer
- Waterbodies

0 250 500 750 1000 m

Rev.	Rev. Date	Drawing Suitability	Drawn	Checked	Appr'd
C01	20.01.2023	For Information	LH	JS	RWS

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MINISTRY OF DEFENCE

Project

PROJECT DARC - CAWDOR BARRACKS

Drawing Title

WATERBODIES WITHIN 500M OF SITE

Status Desc.	FINAL	Status	S2
Project No.	65208061	Scale	1:16000
Drawing No.	65208061-SWE-ZZ-XX-I-EA-0006	Sheet Size	A3

Basemap Source: © Google 2023: Bluesky, Infoterra Ltd & COWI A/S, CNES / Airbus, Getmapping plc, Landsat / Copernicus, Maxar Technologies, Map data © 2023

Legend

- Cawdor Barracks site
- Cotoneaster
- Rhododendron

0 250 500 750 1000 m

Rev.	Rev. Date	Drawing Suitability	Drawn	Checked	Appr'd
C01	20/01/23	For Information	EU	LH	JS

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MINISTRY OF DEFENCE

Project

PROJECT DARC - CAWDOR BARRACKS

Drawing Title

INVASIVE NON-NATIVE PLANT SPECIES

Status Desc.	FINAL	Status	S2
Project No.	65208061	Scale	1:12000
Drawing No.	65208061-SWE-ZZ-XX-I-EA-0007	Sheet Size	A3

Appendix A – Designated Sites

Site Check Report Report generated on Mon Dec 12 2022
You selected the location: Centroid Grid Ref: SM85112515
The following features have been found in your search area:

Special Areas of Conservation (Wales)

Name	West Wales Marine / Gorllewin Cymru Forol
Reference	UK0030397
Marine	y
Date Notified	26/02/2019
Cartesian Area (Ha)	737717.387179

Name	St David's / Ty Ddewi
Reference	UK0013045
Marine	p
Date Notified	13/12/2004
Cartesian Area (Ha)	939.884184

Name	Pembrokeshire Marine / Sir Benfro Forol
Reference	UK0013116
Marine	y
Date Notified	13/12/2004
Cartesian Area (Ha)	138066.365751

Name	North West Pembrokeshire Commons / Comin Gogledd Orllewin Sir Benfro
Reference	UK0030229
Marine	n
Date Notified	13/12/2004
Cartesian Area (Ha)	248.851894

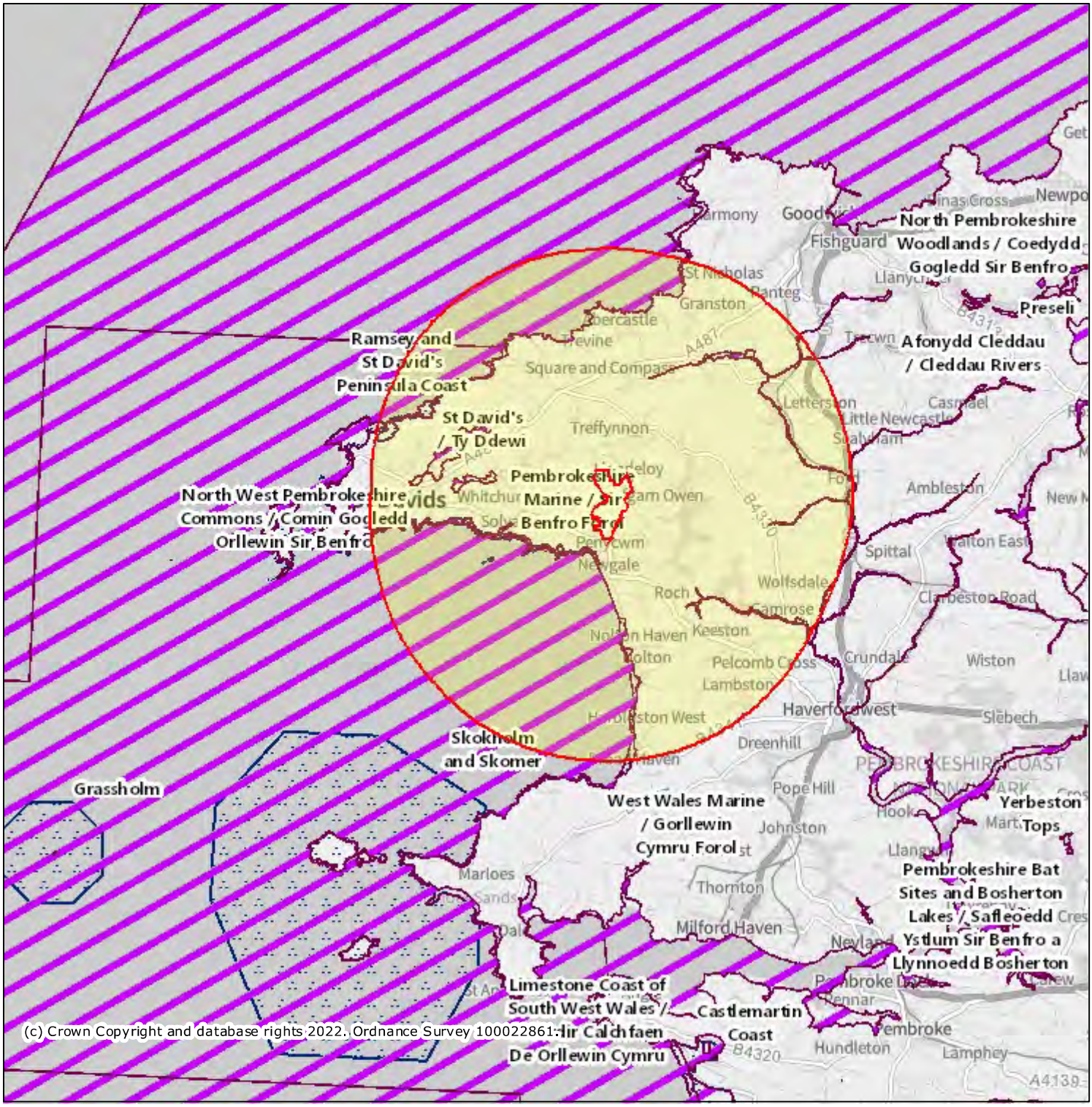
Name	Afonydd Cleddau / Cleddau Rivers
Reference	UK0030074
Marine	n
Date Notified	13/12/2004
Cartesian Area (Ha)	751.706479

Special Protection Areas (Wales)

Name	Ramsey and St David's Peninsula Coast
Reference	UK9014062

Ramsar Sites (Wales)
No Features found

Magic Map



Legend

- Ramsar Sites (Wales)
- Special Areas of Conservation (Wales)
- Special Protection Areas (Wales)

0 7.5 15
km

Projection = OSGB36
xmin = 135000
ymin = 197300
xmax = 229200
ymax = 248600

Site Check Report Report generated on Mon Nov 28 2022
You selected the location: Centroid Grid Ref: SM85022512
The following features have been found in your search area:

Sites of Special Scientific Interest (Wales)

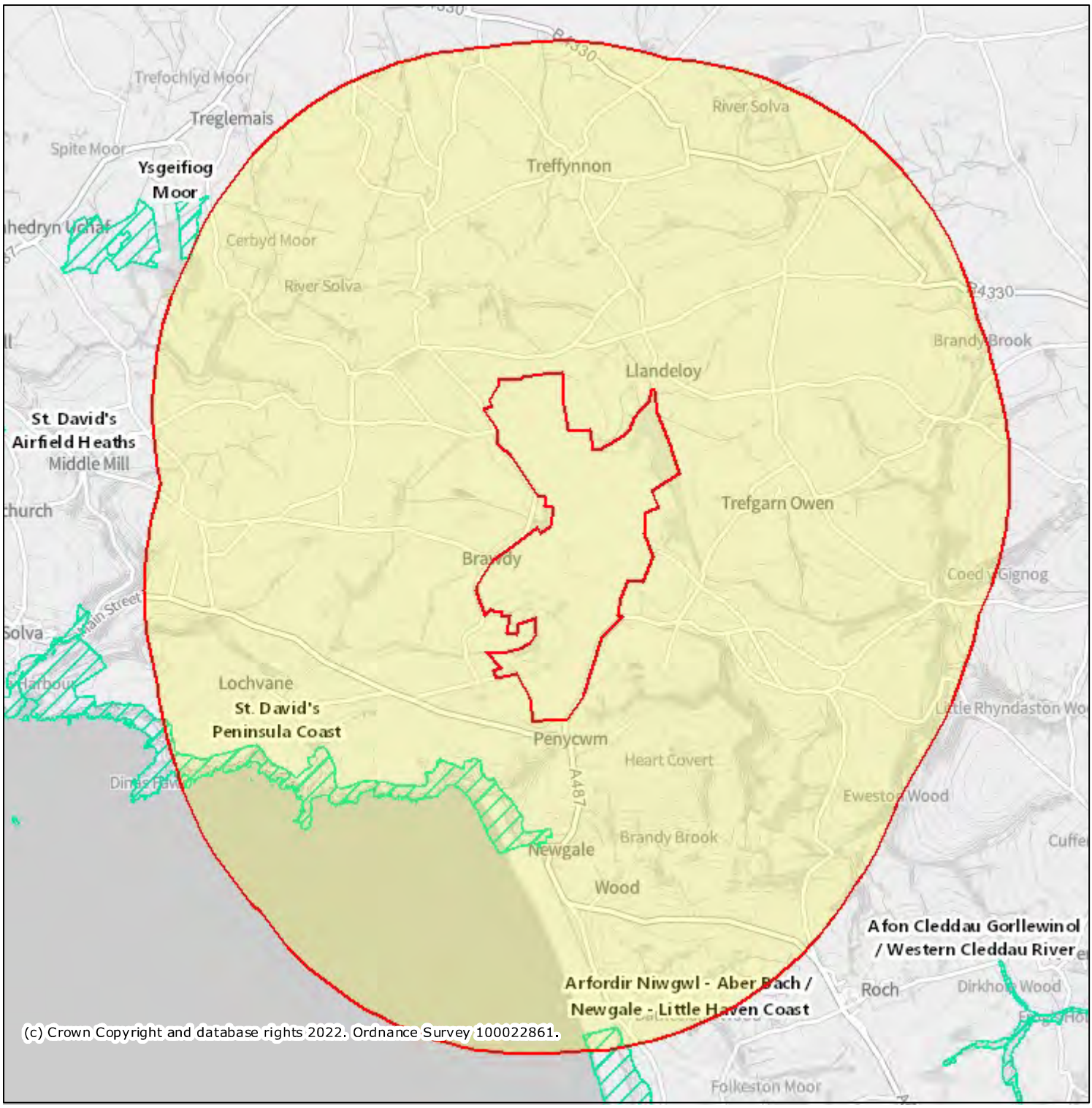
Name	Arfordir Niwgwl - Aber Bach / Newgale - Little Haven Coast
Eastings	185786.292178
Northings	216945.959191
First Notified	01/01/1954
Last Notified	08/11/2002
Confirmation Date	26/06/2003
Cartesian Area (Ha)	205.780189

Name	Ysgeifiog Moor
Eastings	180977.291301
Northings	227915.166971
First Notified	07/03/2012
Last Notified	Null
Confirmation Date	27/09/2012
Cartesian Area (Ha)	40.917039

Name	St. David's Peninsula Coast
Eastings	176077.374672
Northings	225926.908141
First Notified	01/01/1954
Last Notified	30/01/2003
Confirmation Date	26/06/2003
Cartesian Area (Ha)	685.851097

National Nature Reserves (Wales)
No Features found

Magic Map



Legend

- National Nature Reserves (Wales)
- Sites of Special Scientific Interest (Wales)

0 1.5 3
km

Projection = OSGB36
xmin = 175300
ymin = 219900
xmax = 194200
ymax = 230200

Map produced by MAGIC on 28 November, 2022.

Some information in MAGIC is a snapshot of the information that is being maintained or continually updated by the originating organisation. Please refer to the metadata for details as information may be illustrative or representative rather than definitive at this stage.

Appendix B – Designated Heritage Assets Within 5 km of Cawdor Barracks site

Reference	Asset Name	Designation	Reference	Asset Name	Designation
480	Tump Round Barrow	Scheduled Monument	12457	Mount Pleasant Baptist Chapel	Grade II Listed Building
704	Castle Mound	Scheduled Monument	12458	War Memorial	Grade II Listed Building
1150	Standing Stone 200m ENE of Trehale House	Scheduled Monument	12459	St Teilo	Grade II Listed Building
1152	Standing Stone 100m ENE of Blaen-llyn	Scheduled Monument	12460	Church of St Aidan	Grade II Listed Building
1153	Standing Stone 270m NW of Trehale House	Scheduled Monument	12461	Pen yr Aber (Bryn y Mor)	Grade II Listed Building
1155	Standing Stone 400m NE of Pen-lan-Mabws	Scheduled Monument	12462	One of Two Cottages	Grade II Listed Building
1265	Bay View Farm Defended Enclosure	Scheduled Monument	12463	One of Two Cottage	Grade II Listed Building
1269	Dinas Fach Defended Enclosure	Scheduled Monument	12464	Bank House	Grade II Listed Building
1306	Porth y Bwch Defended Enclosure	Scheduled Monument	12465	Ffynnonddewi (Brawdy)	Grade II Listed Building
2028	Tre-Maen Hir Standing Stones	Scheduled Monument	12466	Caerforiog Bridge	Grade II Listed Building
2044	Castle Villa Camp	Scheduled Monument	12467	Middle Mill Bridge	Grade II Listed Building
2658	Tre-Ffynnon Burial Chamber	Scheduled Monument	12468	The Corn Mill	Grade II Listed Building
2659	Lecha Burial Chamber	Scheduled Monument	12469	The Mill House	Grade II Listed Building
2662	Burial Chamber	Scheduled Monument	12470	Capel y Bedydddwyr/Baptist Chapel,	Grade II Listed Building
2668	Tre-Howell Burial Chamber	Scheduled Monument	12471	Kingheriot	Grade II Listed Building
2693	Slade Camp	Scheduled Monument	12472	Lofted Cartshed & Stable at Kingheriot	Grade II Listed Building
2694	Pointz Castle Mound	Scheduled Monument	12473	Paran Chapel	Grade II Listed Building

Reference	Asset Name	Designation	Reference	Asset Name	Designation
2711	Brandy Brook Camp	Scheduled Monument	12474	Church of St David	Grade II Listed Building
2726	Promontory Fort S of Solva Harbour	Scheduled Monument	12475	The Vicarage	Grade II Listed Building
2731	Brawdy Promontory Fort	Scheduled Monument	12476	Outbuilding to W. of the Vicarage	Grade II Listed Building
3075	Lime Kilns	Scheduled Monument	12478	Tremaenhir	Grade II Listed Building
3329	Bickny Round Barrow	Scheduled Monument	12479	Lofted Stable to SW of Tremaenhir	Grade II Listed Building
3344	Pen-Lan-Mebws-Uchaf Burial Chamber	Scheduled Monument	12591	Llandidgige Fach	Grade II Listed Building
3545	Rhyndaston-Fawr Standing Stone	Scheduled Monument	12662	Caer Farchell Farmhouse, including rear court with seat	Grade II Listed Building
3549	White House Burial Chamber	Scheduled Monument	12663	Outbuilding to rear of Caerfarchell Farmhouse	Grade II Listed Building
3550	Clyn-Ffwrn Burial Chamber	Scheduled Monument	12665	The Manse, including Pigsty attached at N.End	Grade II Listed Building
3704	Moated Site 100m East of Caeforiog Bridge	Scheduled Monument	12666	Outbuilding to rear of the Manse	Grade II Listed Building
12423	Church of St Hywel	Grade II* Listed Building	12667	Hamilton House	Grade II Listed Building
12664	Capel Caerfarchell & Outbuilding to NE corner of Forecourt	Grade II* Listed Building	12668	Outbuilding to E. of Hamilton House	Grade II Listed Building
13077	Rickeston Hall	Grade II* Listed Building	12669	Range of outbuildings to rear of Hamilton House	Grade II Listed Building
14396	Church of St David	Grade II* Listed Building	12670	Y Post/The Old Post Office	Grade II Listed Building

Reference	Asset Name	Designation	Reference	Asset Name	Designation
12008	Southwood	Grade II Listed Building	12671	Vaulted Chamber in Earth Bank to W. of Trewellwell	Grade II Listed Building
12411	Cerbyd Old Farmhouse	Grade II Listed Building	12672	Outbuilding with attached Horse Engine House in Farmyard to NE of Crug-Glas	Grade II Listed Building
12412	L-Plan Range of Outbuildings at Cerbyd Old Farmhouse	Grade II Listed Building	12955	Castle Cenlas	Grade II Listed Building
12413	Pont-y-Cerbyd	Grade II Listed Building	12959	Lochturffin	Grade II Listed Building
12414	Capel y Bedydddwyr/Baptist Chapel	Grade II Listed Building	12960	Outbuilding attached to W.of Lochturffin	Grade II Listed Building
12415	Y Lodge	Grade II Listed Building	13051	Former Blacksmiths Shop	Grade II Listed Building
12416	Trearched	Grade II Listed Building	13078	Three-Seater Privy to N of Rickeston Hall	Grade II Listed Building
12417	Trenewydd Fawr	Grade II Listed Building	13079	U-Plan Farmhouse Ranges at Rickeston Hall	Grade II Listed Building
12418	Cartshed to E of Trenewydd Fawr	Grade II Listed Building	13080	Carriage-House at Rickeston Hall	Grade II Listed Building
12419	Granary Range to E of Trenewydd Fawr	Grade II Listed Building	14397	Church of Saint Teilo	Grade II Listed Building
12420	Range of Outbuildings on S.Side of Farmyard at Trenewydd Fawr	Grade II Listed Building	14398	Abernant including Front Garden Railings and Gate	Grade II Listed Building

Reference	Asset Name	Designation	Reference	Asset Name	Designation
12421	Outbuilding on W.Side of Farmyard at Trenewydd Fawr	Grade II Listed Building	14399	Coach-House at Abernant	Grade II Listed Building
12422	Range of Outbuildings on E.side of Farmyard at Trenewydd Fawr	Grade II Listed Building	14400	Hendre Cross	Grade II Listed Building
12442	Treglemais Fawr	Grade II Listed Building	14401	Felin Wen	Grade II Listed Building
12443	Solva Bridge	Grade II Listed Building	14402	Linked Outbuildings NE of Tyllwyd	Grade II Listed Building
12444	The Cambrian Inn	Grade II Listed Building	14403	Linked Outbuilding NE of Tyllwyd	Grade II Listed Building
12445	Tan-Yr-Allt	Grade II Listed Building	14404	Llanreithan	Grade II Listed Building
12446	The Hungry Caterpillar Cafe & Shop	Grade II Listed Building	14405	Llethr	Grade II Listed Building
12447	The Old Printing House	Grade II Listed Building	14406	Stable Block at Llethr	Grade II Listed Building
12448	Gwyryd House	Grade II Listed Building	15875	Glan y Mor	Grade II Listed Building
12449	Glennydd	Grade II Listed Building	19079	Entrance walls and gatepiers to Roch Castle	Grade II Listed Building
12450	Limekiln adjacent to the Smithy	Grade II Listed Building	19080	Church of St Mary	Grade II Listed Building
12451	Limekiln adjacent to Brookside	Grade II Listed Building	19081	Limekiln at S end of Newgale Sands	Grade II Listed Building
12452	Limekiln on S.Side of Estuary	Grade II Listed Building	19082	Outbuilding to E of Southwood	Grade II Listed Building
12453	Limekiln on S.Side of Esturay	Grade II Listed Building	19083	Farmyard ranges at Southwood	Grade II Listed Building
12454	Limekiln on S.Side of Estuary	Grade II Listed Building	19085	Trefrane Cliff Colliery Chimney	Grade II Listed Building

Reference	Asset Name	Designation	Reference	Asset Name	Designation
12455	Limekiln on S.Side of Estuary	Grade II Listed Building	25607	Tre-howell	Grade II Listed Building
12456	NO.10 HIGH STREET,SOLFACH UCHAF/UPPER SOLVA,,,,,DYFED,	Grade II Listed Building	25613	Trehale	Grade II Listed Building
HLW (D) 4	St Davids Peninsula and Ramsey Head	Historic Landscape Area		Solva	Conservation Area
				Caerfarchell	Conservation Area

Appendix C – Stage 1: Phase 1 Land Quality Assessment (Sweco, 2023)

OFFICIAL

Stage 1: Phase 1 Land Quality Assessment

CAWDOR BARRACKS

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Final Issue

January 2023

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Document Reference: 65208061-SWE-XX-XX-T-LQ-0001-Phase_1_LQA-Cawdor
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Prepared For: Ministry of Defence