SANCTUARY

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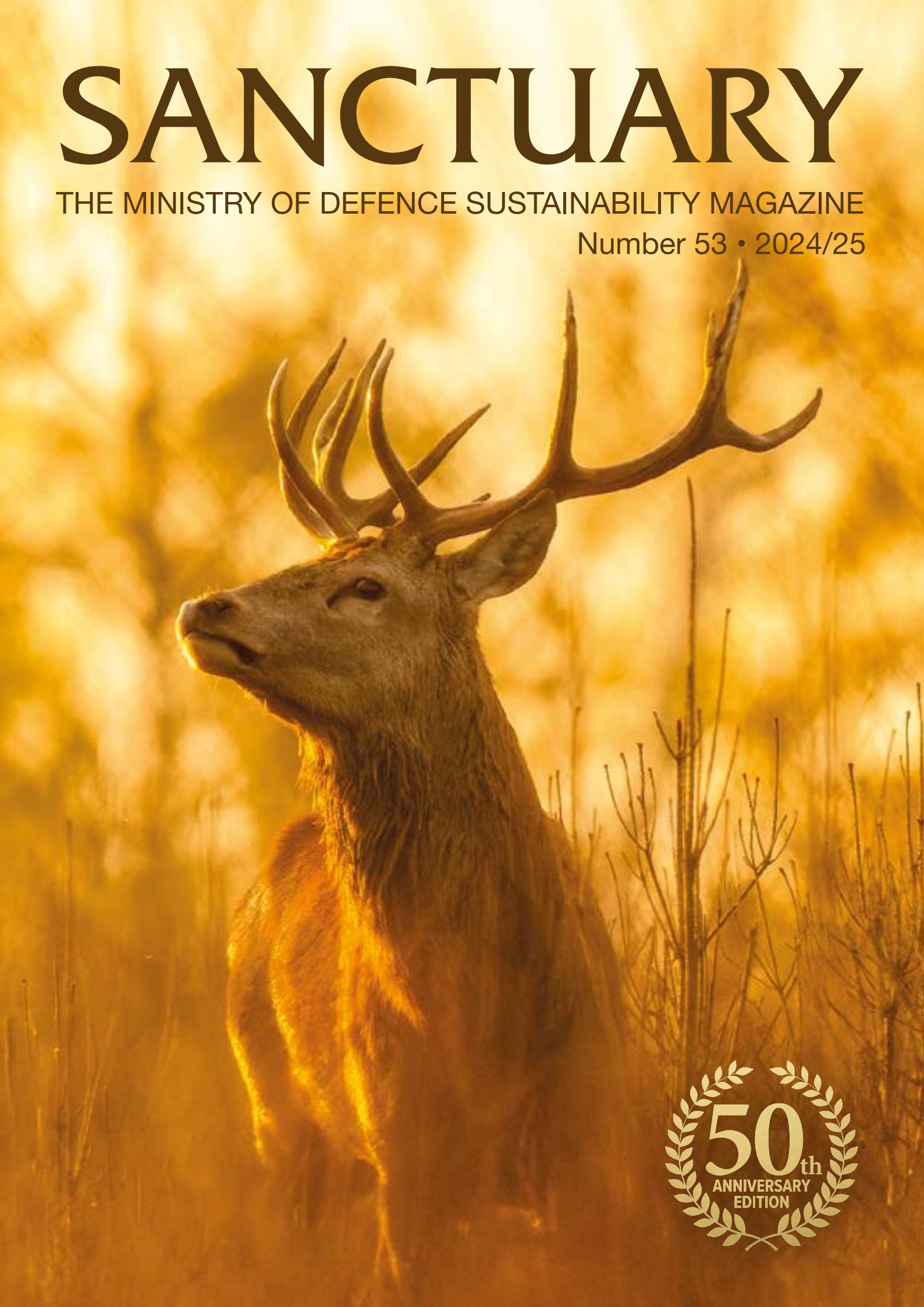

SANCTUARY

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Front and back cover image
Red deer at Pirbright Ranges © Jon Hawkins

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Editors' message

As the *Sanctuary* editors were preparing to send the 53rd edition of the magazine to the printers in May 2025, we discussed whether Lt Col (Ret'd) Christopher Norman Clayden had wondered, as his team stapled the pages of the first edition together, whether someone would still be producing the publication 50 years later. A lot has changed in the past five decades. The reach of the magazine has increased, with thousands of people now reading the publication every year. The publication began as a newsletter to share the work of the MOD's Conservation Groups, and whilst these stories are still central to the magazine, the social and economic pillars of sustainability are included alongside environmental. The publication has been available digitally for many years, and the team no longer have to staple the pages of the hard copy together!

Whilst much has changed, two factors have remained constant. Since their inception in 1974, MOD Conservation Groups have seen thousands of volunteers act as our conservation troops on the ground. They have gathered invaluable data to inform site management plans, whilst carrying out conservation activities across the MOD estate in the UK and overseas. Many of our Conservation Groups have embraced wellbeing as part of their work, especially as the importance of maintaining mental wellbeing, alongside physical health, has become better understood. It gives us great pleasure to include a bumper section of 'Around the Regions' articles in this 50th anniversary edition. Some Chairpersons write about setting up their newly formed group, others about reinvigorating their membership in recent years, and two of our oldest Conservation Groups share news of their half centenary celebrations.

The other constant is the generosity of our authors. For 50 years *Sanctuary* articles have been penned by authors who volunteer their contributions. Without them taking the time to write about their work and sharing their enthusiasm for all things conservation and sustainability, we would never have been able to publish a single edition of *Sanctuary*. Thank you to you all, past, present and future. We are excited to see where the next 50 years will take us and invite you to continue following the journey in the pages of *Sanctuary*.

The Editors

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Features Key:
- Sanctuary Awards
- Climate, Energy and Environment Directorate

Colorado Pond with the sun setting over Mount Pleasant's training grounds © Francis Merino

Around the Regions

Wind turbines on the Falkland Islands
© UKStratCom

BUCKINGHAM PALACE

I am delighted to be able to send my very warmest good wishes to all the Readers of *Sanctuary Magazine* in this remarkable fiftieth anniversary year.

I have long enjoyed receiving updates from *Sanctuary Magazine*, a publication which showcases the longstanding history of commitment by the Ministry of Defence and its partners to sustainability initiatives. The ongoing dedication to innovation and ingenuity in supporting our Armed Services to live, work and train in a way that will sustain and support our planet for future generations is truly admirable.

To all who have contributed to the wonderful work of this issue, I send my heartfelt congratulations and greatly look forward to seeing more from likeminded individuals who care so deeply about protecting our natural world.

CHARLES R

Foreword

by Luke Pollard MP
Minister of State (Minister for Defence Readiness and Industry)

I am delighted to welcome you to this year's 50th anniversary edition of *Sanctuary* magazine, which once again vividly illustrates the MOD's long-standing commitment to sustainability.

Greater sustainability and resilience is key to Britain's armed forces being war fighting ready. The environmental debate is often measured in tons of carbon, but for me, as an overt greenie, I believe we need to measure it in terms of how resilient is our war fighting base. How can we adapt to changing geographies made arid by climate change or wetter and more unpredictable to operate in. How can we use the significant Defence estate not just to train, but to generate our own power, while leading the way towards electrification of the battlefield.

This year, as *Sanctuary* marks 50 years, I am pleased to see the breadth of the activity taking place across Defence, in response to climate change and environmental degradation, which the Strategic Defence Review, recognised as the 'persistent transnational challenge'.

We know climate change will shape the operating environment and is already leading to increased strategic competition, instability and conflict, but the same is also true of environmental degradation.

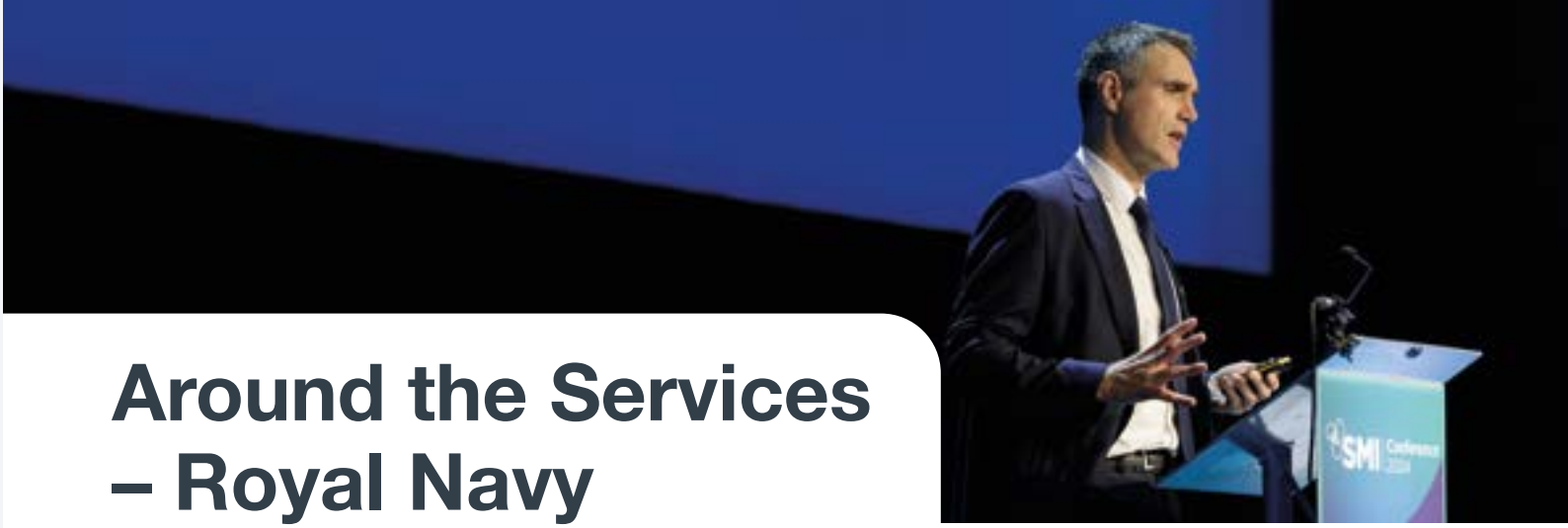
> *"As Sanctuary marks 50 years, I am pleased to see the breadth of the activity taking place across Defence, in response to climate change and environmental degradation"*

Luke Pollard MP © Crown

Reassuringly, both also drive innovation and act as a catalyst for action to meet the scale of this challenge. As such, it is heartening to see the activity already underway, from investigating new sustainable power sources (p.78), to recycling submarines (p.69), inspiring changes in culture (p.64) and using natural processes to filter pollutants from rivers (p.22). Defence is not standing still.

In this anniversary edition, we are also celebrating 50 years of MOD Conservation Groups and the dedicated volunteers who continue to conduct a wide range of tasks including species surveying, maintaining public rights of way and habitat creation. It is fascinating to read about the success of the first ever MOD Conservation Group at Longmoor, Hampshire (p.88) as well as Dale Barracks, Cheshire who are just starting on their journey (p.98).

Finally, I would like to congratulate all the award winners whose work highlights the scale of change across Defence. I'd also like to say thank you to all those volunteers who have given significant time over the years. Your commitment and dedication, exemplifies the passion we will need to adapt and secure the resilience of Defence, while continuing to be a proud custodian of our estate.



Maj Gen Totten presents the RN CC&S Phase 2 Plan at the Society of Maritime Industries conference 2024 © Raj Gedhu

Around the Services – Royal Navy

by Maj Gen Mark Totten
Director Naval Staff, Royal Navy

2024 has been a busy year for the Royal Navy Climate Change and Sustainability (Navy CC&S) team. Achievements of note have been:

- **'No Single Wets'** – a pilot project to remove disposable coffee cups from Navy Command Headquarters, that will now be rolled out to other sites.
- **Future fuels tabletop exercise** – developed and run by the team, supported by Defence Science and Technology Laboratory, to identify the operational impacts of using alternative maritime energy sources.
- **Circularity in spares** – a pilot project to unlock the potential to employ circularity principles in the value chain.
- **Maritime Solent Awards 2024** – the Logistics Lead of the team won the prestigious Sustainability Leadership category.

As work continues to progress against the nine lines of operation forming the Phase 1 Plan, embedding understanding, skills and activity across the Command, the Navy now moves to a more strategic position for Phase 2. The Phase 2 Plan paper has been published and focuses the Navy on climate change resilience. With a substantial understanding of the principal climate related risks that Navy people, operations and assets are exposed to, work is now underway to explore the range of future contexts that the Navy might operate within, to develop the risk picture and embed into strategy, planning and procurement.

Navy CC&S prides itself on international and industry collaborations. The last year has seen the team invited to support a variety of Defence and industry workshops and conferences, underscoring how respected their thought leadership in the field of climate resilience and maritime sustainability is.

The 2024 Navy CC&S conference was a resounding success in bringing together experts across the defence supply chain and collaborative partners. Opened by Second Sea Lord VAdm Martin Connell, the presentations went on to discuss the topic of CC&S within the maritime domain, and to help upskill the workforce.

The 2025 conference is set to be bigger and better again, with two packed days of interesting presentations on climate resilience themes, and the inaugural Navy CC&S Awards dinner. This event will recognise and celebrate the fantastic work being undertaken across the Navy, by motivated and enterprising individuals and units. With award categories in leadership, innovation, site and operational, it is an opportunity to acknowledge successful delivery in a challenging space. The awards will set the tone for a productive and impactful financial year 2025!

RN CC&S and ESS teams collaborate to remove disposable cups from Navy Command Headquarters © Mark England

Around the Services – British Army

by Maj Gen Richard Clements
Director of Army Basing and Infrastructure
and Army Sustainability Champion, British Army

Around 11,000 rooftop solar panels are installed on Salisbury Plain © Aspire Defence

Sustainable construction and behavioural change continue to play a critical role in the British Army's drive to become more sustainable and deliver benefits for its personnel.

Renewable materials were used in the construction of two flagship buildings completed this year; the new welfare facility at Army Training Centre Pirbright has a Glulam frame, while cross-laminated timber was used for an acoustically optimised band facility at the Royal Military Academy Sandhurst (see p.76). Cross-laminated timber is deemed an active climate protection measure and enhances thermal efficiency.

More SMART Single Living Accommodation has been delivered at Beacon Barracks and Royal Military Academy Sandhurst, with a further six blocks due to be completed across the estate this year. Using modern methods of construction, these modular units enable fast delivery of spacious ensuite rooms fitted with energy management systems, which learn how the building is used so that it runs as efficiently as possible. New sustainable multi occupancy short term transit accommodation is also in use at Bovington Camp and the Infantry Training Centre, Catterick. These blocks incorporate air source heat pumps, rainwater harvesting and solar panels.

In addition to new construction, solar is enabling efficiency on the Army's existing land and assets. Project PROMETHEUS has broken ground on a fifth solar array at Weeton Barracks, which will generate around a third of the site's energy needs. On Salisbury Plain, around 11,000 rooftop solar panels have been installed, generating green energy for reuse across garrisons and saving 600 tonnes of CO_2 emissions per year.

Further savings have been made through the Army's annual Utility Savings Challenge. Units achieved a reduction in CO_2 emissions of 23,000 tonnes, while water conservation totalled 107,000m^3, representing an average saving of three litres per person per day. Overall in 2023/2024, the challenge saved £9.4 million – enough to provide heat and power to the whole of Catterick Garrison for a year.

Outside infrastructure, Programme TERRA, the Army's Climate Change and Sustainability Programme led by the Deputy Chief of the General Staff, is cohering lines of effort across operational energy (including battlefield electrification, smart microgrids and energy storage), sustainable procurement, and estate energy and sustainability. TERRA will link to other Army programmes such as THEIA (Digitalisation) to seek opportunities for further efficiencies and sustainability. It will also provide links into wider Defence activity such as the Sustainable Support Programme at the Defence Science and Technology Laboratory, the Chief of Defence Logistics and Support's Operational Energy Authority, and the MOD's Climate, Energy and Environment Directorate.

The new welfare facility at Pirbright, built using sustainable materials © Henry Bros

Around the Services – Royal Air Force

by AVM Shaun Harris
Director Support, RAF

Lossiemouth Coastal Erosion project © Crown

The RAF is committed to maintaining our ability to operate globally in a climate-changed world and to exploiting technologies developed to mitigate climate change for operational advantage, on our journey to become a more sustainable organisation. Similarly, protecting our environment is vital, not just from a moral perspective, but also to play our part in reducing potential sources of future conflict. In order to do this, innovation and collaborative partnerships are essential.

In 2024, the RAF worked with World Fuel Services to provide nine million litres of aviation fuel blended with 40% Sustainable Aviation Fuel at RAF Lossiemouth. Aircraft including Typhoon and the Poseidon P-8 submarine hunters used the blend on routine operations, keeping Britain secure without compromise while demonstrating our commitment to reducing carbon emissions. This was followed by a groundbreaking initiative at the Royal International Air Tattoo, where the Typhoon display aircraft flew using a 35% Sustainable Aviation Fuel blend. This was a first at an airshow, achieved through collaboration with RAF Charitable Trust Enterprise, BAES and other key partners.

Another partnership led innovation saw the RAF trialling hydrotreated vegetable oil at RAF Wittering – a renewable fuel that can reduce CO_2 emissions by up to 90%. This initiative supported vehicles used to transport equipment for operations and exercises both home and abroad, together with deployable catering systems, involving a joint effort between the Fuels Role Office, ASTRA, Babcock, Phoenix 2, Western Global and World Fuel Services.

Beyond fuel, working with the Defence Infrastructure Organisation and contractors, alongside larger infrastructure initiatives, the RAF has introduced energy efficient upgrades like LED lighting. This has not only enhanced working conditions but also reduced emissions, showcasing how simple interventions can yield significant benefits – it all adds up!

Partnerships similarly extend into community engagement and environmental resilience. At RAF Lossiemouth, together with the Lossiemouth Community Council, post-holiday Christmas trees were collected for coastal dune restoration. Whilst at RAF Valley, volunteers worked with Keep Wales Tidy and Friends of the Coastal Path on a beach clean, helping protect ecosystems that defend against storm surges.

The RAF Air Cadets are similarly inspiring the next generation through environmental education. Their annual environmental awards programme recognises local achievements in biodiversity, energy reduction and recycling with 25 Parkwood Squadron winning last year for its outstanding Project Green Space initiative.

By building enduring partnerships and embedding sustainability throughout operations, the RAF continues to lead in environmental innovation while maintaining mission readiness.

Cooking on hydrotreated vegetable oil © Crown

An update from UK Strategic Command

by Maj Gen Zac Stenning
Director Strategy, UK Strategic Command

The rapid and increasingly uncertain impacts of climate change, coupled with the growing demand for energy, means that all areas of The Command must play their part if we are to maintain our operational advantage and ensure the resilience and safety of our people and capabilities.

Instances of floods, wildfires and storm damage are impacting our estate, our service personnel, their families and our capabilities today. In response we have established a 10-year Climate and Energy Programme aimed at enhancing infrastructure resilience and to hold climate risk at the strategic level. This enables investment into pioneering projects across UKStratCom ranging from local initiatives to support biodiversity, to enhancing international climate plans, to incorporating climate and energy security into our intelligence reporting.

On our UK MOD estate, sustainability groups across Defence Academy Shrivenham, Defence Intelligence, Defence Digital Corsham and Defence Medical Services collaborate with local charities, contractors and service providers to reduce waste and improve efficiency, yielding improvements in environmental performance at each of these sites. This is having knock-on impacts into the business, for example embedding sustainability into medical training and education is leading to initiatives such as reuse and repurposing of equipment for training, and research into solar to enhance resilience on deployment.

Our overseas bases, facing unique energy and sustainability challenges exacerbated by climate change, are recognised as innovation test beds. A climate innovation and exploitation fund, supported by J-Hub and Defence Support innovation teams, is investing in energy resilience projects, including waste to energy conversion, smart energy storage, and renewable energy sources like wind and solar, which will lend themselves to deployed energy research. Additionally, changes in regulatory standards for overseas are improving environmental outcomes – for example in Project APOLLO, where solar farms are offsetting construction emissions.

Lastly, we are pushing now to ensure sustainability is a thread in all operational planning. Defence Logistics and Support continue to pioneer in this space with their recent Circular Economics Concept Note, and our Integrated Warfare Centre is identifying advantages to warfighting through embedding climate and sustainability as a standard aspect of everyday business amongst partners and Allies – for example in the Five Power Defence Arrangements. This exchange of climate resilience and sustainability opportunities among partner nations enhances interoperability and warfighting capability in the face of climate change and helps our people recognise that sustainability matters at all layers of Defence. We will continue to play our part investing in a better, safer future.

Market garden at Defence Academy Shrivenham © Aaron Marcelo

An update from the Climate, Energy and Environment Directorate

by Chris Cottle
Deputy Head Policy, Climate, Energy and Environment Directorate

The Climate, Energy and Environment (CEE) Directorate is the Department of State team leading Defence's approach on all activity related to climate change, energy, sustainability, the environment and environmental protection. The team's role is to be the catalyst for cross Defence activity aimed at enhancing military capability, allowing UK Defence to fight and win in a climate-impacted world.

Climate change will have a significant impact on all aspects of MOD activity, from where and how Defence operates, and with what, to who Defence operates with. In this 50th anniversary edition of *Sanctuary* magazine, the directorate underlines the importance of the projects and work detailed in these pages, recognising the commitment of those who continue to dedicate themselves to overcoming these pressing demands.

The physical and cascading impacts of climate change are already being felt and will continue to present an unprecedented challenge in the coming decades. They are likely to drive food and water scarcity, displacement and migration, and humanitarian and economic crises, while impacting energy security, eroding resilience and reducing the capacity to respond.

Over its 50-year history, *Sanctuary*'s subject matter and focus has shifted to include strategic challenge. This aligns with the realisation that climate change and the action required to address its challenges is a whole system issue with security implications that transcend multiple policy areas and cut across departmental boundaries. The work of the directorate will ensure that the MOD is fit for the future by regenerating warfighting capability, seizing strategic advantage and building resilience. An aspiration for Defence will be to set the pace on climate and energy security and to lead NATO's Energy Security by Design. As well as closer ties with industry, the MOD will improve and modernise the estate and utilities, accelerating the understanding of risk while mitigating emissions.

Defence is engaged in several strategic efforts to combat the threat of climate change and to seize the opportunities for operational advantage. Meeting this challenge will take involvement from every corner of Defence, so thank you for your continued support and engagement with *Sanctuary* magazine.

Soldiers working with industry to test potential new equipment © Crown

RAF helicopters train with the Royal Navy at sea © Crown

An update from Defence Infrastructure Organisation

by Maj Gen Andy Sturrock
Director of Strategy and Plans, Defence Infrastructure Organisation

Although the threat posed by climate change and biodiversity loss has been clear for years, there has been a lag in the implementation of large-scale, co-ordinated action across Defence. However, the last year has seen real progress and acceleration. The Strategic Defence Review specifically notes the threat posed by climate change. Defence Reform has embedded the Climate, Energy and Environment Directorate at the heart of the Department of State, and the latest Front Line Commands' plans all feature sustainability prominently. The Department has also made some additional funding available to implement more immediate sustainability initiatives, although more funding will be required.

While these strategic developments have taken place, the Defence Infrastructure Organisation (DIO) has progressed work on an operational framework to cohere implementation across the estate. This framework, the Defence Approach to Sustainable Infrastructure, was endorsed by Defence in June 2024. The Defence Approach to Sustainable Infrastructure will allow Defence to maximise the collective effort through clearer prioritisation of requirements, greater coherence of delivery, more effective routes to market and improved benefits tracking.

"The scale and utilisation of our estate makes it a nationally important haven for nature"

To focus efforts, the Defence Approach to Sustainable Infrastructure has identified five priority lines of effort:

- **Climate resilience** – to protect military capability, we must make our estate resilient to environmental changes happening around us. Our Climate Impacts Risk Assessment Methodology (CIRAM) allows us to assess risks posed by climate change to MOD infrastructure. The approach will build on the CIRAM to confirm where the greatest climate adaptation risks are, identifying the mitigating actions.
- **Energy security** – access to an assured and affordable energy supply is critical to underpinning military outputs. Over the next 10 to 15 years, our demand for energy will increase at the same time as the nation goes through a huge transition in the supply mix available. We must develop a comprehensive energy transition plan to secure – and afford – the power we need. The first steps of this plan are a more programmatic approach to energy efficiency measures such as LED lighting, energy management systems and building fabric improvements. At the same time, we will develop routes to exploit our estate to generate more of our own electricity.
- **Decarbonisation of heat** – natural gas makes up 54% of our estate energy usage (by kWh), the majority providing heat. Unlike electricity, where grid decarbonisation will do much of the work, we can expect no external help with tackling our heat emissions. Our latest building standards ensure new builds and major refurbishments have carbon-free heating, but the legacy estate needs significant investment.

Dunescape at Penhale Training Area © Crown

New net zero ready Service Family Accommodation at Brunswick Camp © Reds 10

Over the next five years, energy efficiency measures will set the foundations as we confirm what technology solutions we should deploy at scale.

- **Water security** – climate change and other environmental factors are making access to water less assured. We are already seeing stricter regulation being applied, particularly where we abstract our own water. As we move towards the end of our existing Aquatrine water contracts, we will need to implement arrangements that help reduce waste and manage our water demand.
- **Natural capital** – the scale and utilisation of our estate makes it a nationally important haven for nature. As legislation around natural capital and biodiversity becomes more stringent, MOD will continue to meet its stewardship responsibilities. The approach will deliver the first MOD Nature Recovery Plan (see p.36) and is cohering an estate-wide approach to new biodiversity net gain legislation, enabling us to deliver our legislative responsibilities without undue impact on development plans.

While these higher-level developments help set conditions to scale efforts going forward, progress on practical implementation has continued. Amongst the initiatives implemented this year are new net zero ready single living accommodation blocks, delivered in partnership with the Army, which have shown what is possible and provided the standard for the programmatic approach to scale. These buildings harness modular manufacturing techniques to reduce construction waste and improve energy efficiency, and they include rainwater harvesting systems and air source heat pumps. They are quicker to build and cheaper to run – what is not to like?

We have continued to reduce the total waste produced on our estate and worked hard to reduce environmental impact. Last year, only 1% of our total waste went to landfill, and 98.7% of food waste was recycled.

DIO Regional Delivery are driving a ‘Big Green Five Agenda’ with Front Line Commands and our facilities management contractors to bring focus onto implementation of energy efficiency. The initiative covers:

- Electric vehicle charging infrastructure standardisation.
- Increasing coverage of building energy management systems.
- Accelerating our conversion to LED lighting.
- Enhancing the capacity of our grid connections and electrical distribution systems on critical sites.
- Setting energy reduction targets estate-wide.

There is still a long way to go before our estate is as resilient and sustainable as we need it to be, but over the last year we have made significant advances – we must now use these as a springboard for even more next year.

Sanctuary Awards 2024/25

Celebrating sustainability across the MOD

The Sanctuary Awards have been recognising outstanding sustainability and conservation efforts across the MOD for more than three decades.

In 2024/25, entries were sought for the following categories:

- **Environmental Enhancement Award** - projects focused on enhancing wildlife and biodiversity, environmental research, nature recovery, tackling pollution or contamination issues.
- **Heritage Award** - projects focused on archaeology, historic buildings, historic parks and gardens, historic landscape preservation, museum collections, heritage education and public engagement.
- **Climate Change Resilience Award** - projects or activities focused on taking action to enhance climate resilience through mitigation or adaptation.
- **Net Zero & Resource Efficiency Award** - projects that contribute to decarbonisation, reduce consumption of water, energy or other resources, renewable energy, recycling and waste management.
- **Sustainable Delivery Award** - projects that deliver against a MOD priority area, objective or commitment to improve or innovate sustainability e.g. of equipment or services, management of supply chains or product life cycles, digitalisation, or new build construction and refurbishment projects.
- **Individual Achievement Award** - for individuals who have made a significant, long-term, personal contribution to MOD sustainability or conservation as a volunteer, MOD employee or contractor.
- **Early Career Award** - for individuals in the first five years of their sustainability or conservation career, who have made a significant personal contribution to MOD sustainability or conservation.

The Silver Otter Trophy © Guy Salkeld

Winners of each category were further considered for the following overall awards:

The **Silver Otter Trophy** was donated by the Commandant of Otterburn Training Area in 1991, to recognise the best Conservation Group effort, marking the start of Sanctuary Awards. Currently the trophy is given to the best Conservation Group, establishment, community led project or individual conservation effort on the MOD estate.

The Operational Capability Award has replaced the Sustainable Business Award. It is given to the project which best delivers enhanced operational capability through sustainability. The trophy sets three spent 30mm percussion caps into a glass panel, representing the three elements of sustainability: social, environmental and economy, together with military operations. The stand is formed by a salvaged brick from Scraesdon Fort in Cornwall, representing sustainability in our buildings and infrastructure. By 2022 the trophy needed extra engraving space and a small section of salvaged oak floorboard from the neighbouring Tregantle Fort, which was undergoing conservation works to the Keep (see p.42), was acquired to make a bespoke base.

The **Innovation Award** has been judged by subject matter experts from the Defence Innovation Directorate, part of Military Capability within Head Office, since its inception in 2022. The award is given to the project or individual most deemed to have exemplified innovative behaviours by championing the adoption of new ideas,

The Judges © Crown

innovative ways of working and continuous improvement. This includes taking appropriate risk or early termination of work where relevant.

It is with great sadness that the *Sanctuary* team learnt of the death of Maj (Ret'd) Nigel Lewis, the incumbent winner of both the Individual Achievement Award and Silver Otter Trophy (see *Sanctuary* 52, 2023). In recognition of over 40 years of dedication to the owls and raptors of Salisbury Plain Training Area (SPTA), the Sanctuary Board felt it fitting to present a trophy in his honour. The **Nigel Lewis Trophy** is presented to the winner of the Individual Achievement Award and is in the form of an owl. It will ensure his name is remembered in the MOD conservation sphere for many years to come. The new trophy was kindly donated by Betty Lewis (Nigel's wife), and the SPTA Owl and Raptor Group.

The Sanctuary Awards 2024/25 ceremony was held as a hybrid event at the National Army Museum in London on 13 October 2025, and is available to watch on the MOD's YouTube channel. The results are on p.15.

The Nigel Lewis Trophy for Individual Achievement © Dick Clayton

The Judges

The Sanctuary Awards judging board for 2024/25 comprised of:

Martin Baxter
Deputy CEO
Institute of Sustainability and Environmental Professionals (formerly called the Institute of Environmental Management and Assessment (IEMA))

© Martin Baxter

Martin works in the UK and internationally to accelerate the transition to a sustainable future and support people in the development of sustainability skills and green careers. He has national and international experience in developing and implementing global environmental management standards. Martin heads the UK delegation to the International Organisation for Standardisation on environmental management and chairs the environmental management systems committee of approximately 100 countries. He is a board member of IEMA, and a non-executive director of the Society for the Environment and the Broadway Initiative. He is also a visiting professor at Cranfield University.

Richard Brooks (Chairperson)
Principal Environmental Manager – Forestry, Heritage and Engagement, Defence Infrastructure Organisation (DIO)

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Richard is DIO's lead for heritage (including Operation Nightingale), forestry, woodland creation, public access and recreation, deer management and environmental engagement. The latter includes oversight of the Sanctuary programme, MOD Conservation Groups and the DIO Conservation Stewardship Fund. He also previously led on ecology, environmental planning and sustainability. Richard has worked for the MOD since 2004, when he joined Defence Estates (now DIO) as the MOD's first dedicated Access Officer.

Chris Cottle
Deputy Head Policy
Climate, Energy and Environment (CEE) Directorate

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Chris is the CEE Directorate's strategic policy lead for energy, environment, sustainability, skills and culture. An MOD generalist by background, he has 20 years' experience of supporting national security priorities across Defence and His Majesty's Government in policy, strategy and operations (having been posted as a civilian to both Afghanistan and Iraq in support to operations). With a scientific background (MBiochem), he has a keen interest in conservation and sustainability in Defence, with the aim of future proofing the organisation to maintain and grow operational advantage whilst considering environmental impact.

Ray Dickinson
Assistant Head of Policy
Climate, Energy and Environment Directorate

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Ray worked in Defence for nearly 30 years, providing specialist advice on environmental protection and developing MOD environmental and sustainability policy. He has in-depth knowledge of environmental legislation and sustainability principles and how they relate to Defence. He was part of the team that developed the Defence Strategic Approach to Climate Change and the Sustainability Strategic Approach and became one of the founding members of the new Directorate charged with being a catalyst for a change in Defence's approach to the risks and opportunities being brought about by climate change. His role required keeping abreast of emerging government policy, legislative changes and Defence activities, influencing where necessary to ensure Defence maintained the flexibility to operate while supporting the wider climate change and sustainability agenda.

Dr Sam Healy
Group Director Environmental Social Governance (ESG), QinetiQ

© Sam Healy

Sam is responsible for ESG strategy and the delivery of a broad range of programmes across the QinetiQ Group including climate change, environment, ethics, community investment, and ESG stakeholder engagement. She is Chair of the ADS Sustainability Working Group and is a board director of the Institute of Corporate Responsibility and Sustainability. Sam has worked in environment and sustainability for over 25 years and is recognised as a QinetiQ Fellow for her leadership and contribution to sustainability. She trained as a geophysicist and has had various roles including research, strategy and leading a team delivering environmental research and advice for defence projects.

Andrea Nixon
Head of Capability and Deputy Director within Strategy and Plans
Defence Infrastructure Organisation

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Andrea's role is to champion and raise the profile of sustainability within infrastructure. Helping Defence to build a strategic road map of interventions to invest wisely to maximise impact, mitigate risk and realise opportunity. She aims to create an environment where the whole enterprise understands the ambition, wants to be involved, and supports the need to 'think, act and do' things differently. Andrea has supported Defence for 32 years working in a variety of departments including policy, operational delivery, training, security vetting and more recently strategy and plans.

Owain Redfern
Environmental Policy Manager
Defence Equipment & Support (DE&S)

© Crown

Owain's role includes the management and development of DE&S's acquisition environmental policy, guidance and environmental management system. He is currently leading the design and piloting DE&S's new Environmental Performance Assessment Tool, which will standardise environmental performance reporting and analysis. Owain joined DE&S in 2021 and led on the publication of the DE&S Environmental Strategy. He was the principal environmental SME for the Net Zero 2050 programme. Owain has an academic background in Environmental Policy and Management, complemented by extensive on-site experience in air emissions engineering.

The Editors would like to say a particular thank you to Ray Dickinson, who is stepping down from the judging panel on his retirement, after many years of service to both *Sanctuary* and the MOD.

Award	Project name	Full story
Environmental Enhancement Winner	West Chisenbury River and Wetland Restoration project	**p.22**
Environmental Enhancement 2nd Place	Otterburn Training Area – Foundations for Ecosystem Services	**p.56**
Heritage Winner	Meshing Our Heritage programme	**p.74**
Heritage 2nd Place	The Keep Historic Flooring project	**p.42**
Nigel Lewis Trophy for Individual Achievement Winner	Lynne Houlston at Castlemartin Range	**p.38**
Individual Achievement Award 2nd Place	Lt Col Mark Nash at Land Training Fleet Warminster	**p.64**
Early Career Award Winner	Joanne Bevan at RAF Boulmer	**p.48**
Early Career Award 2nd Place	Maj Peter MacKenzie – combatting overheating of military infrastructure	**p.60**
Sustainable Delivery Winner	Project ViTAL Living Lab – advancing science at RAF Leeming	**p.34**
Sustainable Delivery 2nd Place	Project Torbay – recycling old submarines into new	**p.69**
Climate Change Resilience Winner	BFSAI Zero – a climate change and sustainability vanguard programme	**p.18**
Climate Change Resilience 2nd Place	Ex TURNOUT 24 – refurbishment of Ayrshire Barracks' railhead	**p.31**
Net Zero and Resource Efficiency Winner	Hydrogen Derived from Wastewater Sources project	**p.78**
Net Zero and Resource Efficiency 2nd Place	Aramark UK – revolutionising catering through sustainable innovation	**p.51**
Innovation Award Winner	Project ViTAL Living Lab – advancing science at RAF Leeming	**p.34**
Operational Capability Award Winner	BFSAI Zero – a climate change and sustainability vanguard programme	**p.18**
Silver Otter Trophy Winner	Lynne Houlston at Castlemartin Range	**p.38**

The team of metal detectorists on Ex Druid Sacrifice
© Harvey Mills Photography

Ex Druid Sacrifice – discovering Celtic treasure at RAF Valley

by Richard Osgood
Senior Archaeologist, Defence Infrastructure Organisation

In 1942, as World War II raged across Europe, a runway extension was constructed at RAF Valley in Anglesey, North Wales. This work enabled American bombers to use the base before flying on to their main stations in East Anglia. RAF Valley lies within sand dunes which were disturbed by all the groundwork, so the potential for sand blowing around the exposed site and getting into aircraft engines was huge. A solution was to dredge peat from a nearby bog of Llyn Cerrig Bach and lay this over the airfield to encourage the growth of plants, subsequently stabilising the dunes. During this work, one of the vehicles engaged in the operation got stuck in the bog but, as fortune would have it, a chain had been uncovered during the dredging work, which was retrieved from the spoil heap and used to drag the truck from the mire.

A horse bridle emerges from the ground by the runway
© Harvey Mills Photography

The observant groundsman at the RAF base, William Owen Roberts, thought that this chain looked peculiar and thus sent a drawing of it to the National Museum at Cardiff for their opinion. Their reply? That it was an incredibly rare Iron Age slave gang chain around 2,000 years old! The Museum Director, Sir Cyril Fox, travelled to the site and, over the next couple of years, discovered around 180 items from an Iron Age hoard that had been spread across the runway during the stabilisation work – from swords and spears to parts of a shield, trumpet and many elements of Iron Age chariots. Altogether, this formed one of the most important collections of Iron Age (so-called Celtic) material in Western Europe, and some of the more magnificent items are on display at St Fagans Museum in Cardiff.

The material seems to have been placed into the lake of Llyn Cerrig Bach over a period of a couple of hundred years as a sacred place. Though Sir Cyril and others linked the later deposits to the work of the Druids and in particular, their attempts to fend off the Roman invasion of AD 60 by sacrificing special items to a venerated place and thus to the gods. This is perhaps unsurprising, as the Roman historian Tacitus, in his account of the assault on Anglesey, described the presence of black-clad women, like 'furies', holding flaming brands whilst Druids threw curses at the Roman legionaries, terrifying them until their Centurions urged them forward.

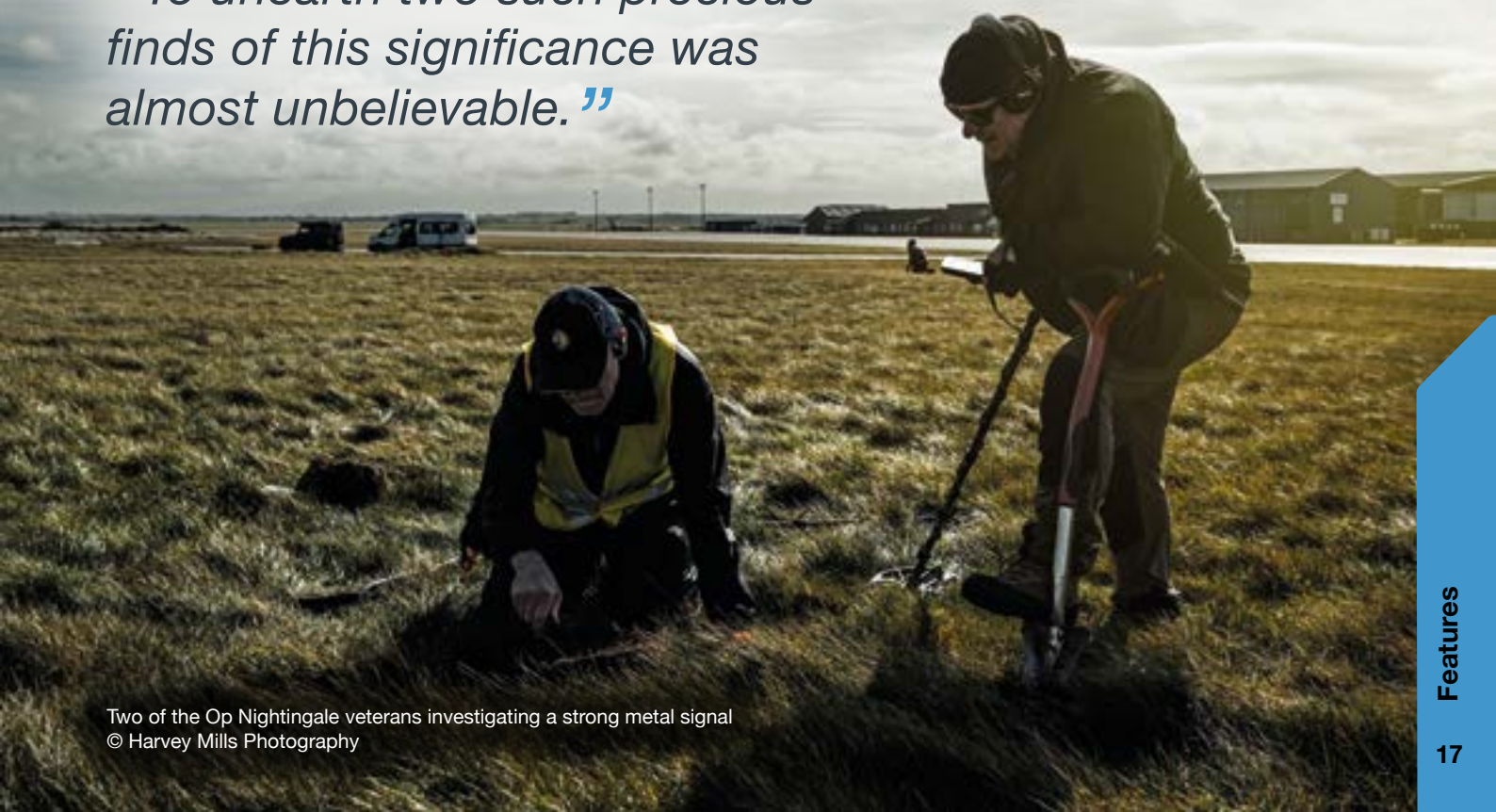
Not surprisingly, all management plans for the base make mention of this discovery. So, when redevelopment work was required at RAF Valley around the runway, a team of military personnel and veterans on the Operation Nightingale project, which uses archaeology to assist recovery, was put together. Normally prohibited on MOD land, the only solution for recovering any other possible elements of the hoard was to utilise metal detectors. Thus, over a few days in April 2024, the group surveyed land parcels where peat had been spread in 1942. Exercise Druid Sacrifice was in motion.

The work perhaps seemed to be akin to looking for an (Iron Age) needle in a haystack at times – with only modern metal objects being discovered – but thrillingly, on the second day, there was success. Former Sqn Ldr David Ulke unearthed a curved bronze item which had remnants of a red glass decoration. This artefact was a terret ring – used in the Iron Age to guide the reins of the ponies which steered the Celtic chariots. This was an extraordinary find and one which was a first for this type from the site. As the day closed, FS Graham Moore made a further discovery – this time, a bridle bit that would have been in the mouth of the pony. To unearth two such precious finds of this significance was almost unbelievable.

Both of these items are incredibly important – not least because they link to the hoard find of 1942 – and have since been declared 'Treasure' by the Coroner for North Wales. They have been gifted by the MOD to the National Museum of Wales and will, ultimately, be displayed at Oriel Môn museum on Anglesey. With more work scheduled at the air base, the team will return, and their presence has amply illustrated the effectiveness of management plans within Defence, ensuring that heritage considerations are enshrined within development plans.

When the fast jets of the 21st century RAF land on the runway strips, it is evocative to think of their Iron Age equivalents of military importance – the war chariots – and of these items being sacrificed to the bogs of Llyn Cerrig Bach. The warriors of modern times are ensuring that their ancient predecessors are remembered.

"To unearth two such precious finds of this significance was almost unbelievable."



Two of the Op Nightingale veterans investigating a strong metal signal
© Harvey Mills Photography

From the edge of the world – a new frontier for Defence sustainability in the Falkland Islands

Sqn Ldr Francis Merino
Engineering Plans Officer, UK Strategic Command

The Falkland Islands is home to one of the most remote and extreme MOD bases in the world. Existence is fragile, winds howl across the tundra, penguins outnumber people 300 to one and almost every necessity is shipped 8,000 miles. Operating a military base in the Falkland Islands is a logistical and financial challenge of immense scale. Over seven million litres of diesel is used annually to power the base (equivalent to the volume of nearly three Olympic swimming pools), four tonnes of fresh produce is flown in weekly to feed everyone on the base and 15,000 cubic metres of waste is mostly buried or burned every year. Historically, sustainability was a luxury that could not be afforded.

However, the Mount Pleasant Complex is self-contained, generating all of its own utilities, from every watt to every drop of water. This is where a transformative sustainability programme is pushing the boundaries of how the MOD integrates sustainability into its operations.

The first challenge was around power and energy. Though not an immediate operational priority, the move to electric vehicles is a centrally driven policy. Fleet expansion on the base raised concerns over safety, infrastructure, maintenance, training and general robustness in relation to electric vehicles. However, Defence thrives on problem solving, and after a truly interdepartmental 18-month effort, the MOD's first owned electric vehicles were fully operational, with an all-wheel drive for the Commander and a van for on camp deliveries.

But this was only the beginning. Reducing diesel reliance led to a new wind turbine project in collaboration with the Falkland Islands Government. Initially, only two 2.3MW turbines were proposed, but in-depth modelling proved at least four were needed. Armed with this evidence, the team had the credibility needed to galvanise support across Defence for this more stretching project, which aided in navigating the complex approvals process and turned ambition into action. With groundwork starting in 2025, once completed the four turbines will boost renewables from approximately 5% to 40% of Mount Pleasant's 30GWh annual demand. This will rise to nearly 90% when energy storage is taken into account, saving five million litres of diesel every year (equivalent to the volume of two Olympic swimming pools).

However, renewables alone are not enough. Their intermittency demands a strategic energy management approach. This led to the commissioning of a smart energy management feasibility study – an integrated system incorporating Artificial Intelligence and computer simulations to intelligently research how to optimise renewables, halve fuel consumption, improve blackout resilience and stabilise the power grid.

The data for energy demand on the Complex was limited, with half the base heated via diesel and the other half relying on electric heaters. The actual demand of the base was an unknown quantity. A six-month Royal Engineers study used power meters and infrared cameras to generate building specific power data by distinguishing heating from other electrical loads and evidencing assumptions to drive data led decision making.

The sun setting over the wreck of the Lady Elizabeth in eastern Stanley © Francis Merino

Moreover, renewables present seasonal challenges, particularly in the Falkland Islands, where solar and wind decline just as demand peaks in winter. Modelling revealed a greater than 10GWh winter deficit which batteries alone could not compensate for, prompting the undertaking of a synthetic fuels feasibility study. This initiative will examine the viability of synthetic fuels generated from surplus renewables to offset aviation and maritime demands. If successful, this approach could revolutionise Defence energy logistics, significantly reducing reliance on global fuel shipments.

However, sustainability extends beyond energy, and it therefore requires a systems-based approach. Nowhere is this clearer than in water management. The Falklands has only 30% of the UK's annual rainfall and it is falling by 1% per year. The availability of water has been effectively negative for four years due to increased evaporation.

Mount Pleasant consumes 500 litres per person per day, which is four times the UK's average. This is driven by ageing infrastructure, limited monitoring and the demands of remote operations. With the last hydrogeological survey dating back to 1997, a clearer understanding of both supply and demand is essential. Similarly, the existing wastewater treatment plant, while functional, lacks long-term resilience and is due for review.

Collaborating with the South Atlantic Environmental Research Institute, two innovative studies are underway. The first is a hydrogeological survey, which incorporates climate modelling and allows teams to better assess future water availability, as well as identify necessary interventions before shortages occur. The second study focuses on using natural processes and exploring the feasibility of using native rushes for natural wastewater treatment. Additionally, a UK Strategic Command project plans to trial a wastewater to hydrogen system in the Falklands, opening the potential to explore water circularity in the future. If successful, these solutions could be rolled out to other Defence installations.

Waste remains a pressing issue, but grassroots initiatives have significantly improved recycling rates. Plastics are now baled before being exported, crushed glass is repurposed for construction and single-use plastics are being reduced. Over 20% of waste from the base is now recycled or reused, and a trial is exploring the potential to 3D-print spare parts from waste, which would also alleviate some supply chain challenges.

Sustainability is not merely an environmental concern but is a core element of operational effectiveness, energy security and resilience. When approached strategically, sustainability turns challenges into opportunities and barriers into force multipliers. Although it is still early in the long-term project, the Falklands sustainability transformation could have far-reaching implications beyond the archipelago. Each challenge overcome lays the groundwork for future advancements, providing a potential future framework for Defence to accelerate progress globally. With a new mindset, these incremental developments could be embedded into Defence operations at every level. Ultimately, the question surrounding sustainability is not can we afford to do this, but rather, can we afford not to?

Hero or villain – half a century of deer management on the MOD estate

by Iain Robertson
Senior Environmental Advisor and Deer Operations Manager, Defence Infrastructure Organisation

Mature roe buck in high summer © Deborah Heath

Stretching from Cape Wrath to Cornwall, the MOD estate makes up 1% of the UK mainland. This diverse landscape of training grounds, ranges, munition storage and numerous facilities supporting military operations provides an ideal habitat for the UK's six deer species. These are the native red and roe deer, and non-native fallow, muntjac, sika and Chinese water deer. Across 240,000ha, it is estimated that there are around 20,000 deer currently found estate wide.

Influenced by changes in conservation policy, the requirement for deer management on the MOD estate was recognised in the 1970s. Regarded as a niche activity, a small group of passionate enthusiasts established the Services Branch of the British Deer Society, which later became Defence Deer Management (DDM). As deer became part of the natural environment conversation, DDM began attending MOD Conservation Groups and the Defence Infrastructure Organisation (DIO) appointed a Deer Operations Manager, alongside adopting a sustainable deer management policy.

The volunteer deer managers have a remit to protect defence assets and the environment, using sustainable and managed interventions. As an example, deer pose a particular risk to aircraft, especially on runways. The importance of DDM's support to defence objectives came into sharp focus this year when a fast jet was unable to take off due to deer on the runway. DDM carried out an urgent flight safety cull, allowing the jets clearance for a safe take-off to protect UK airspace.

Both native and non-native deer have positively impacted the landscape over thousands of years, and seeing deer in the wild can be awe-inspiring, although not everyone feels favourably towards them. Increasing numbers of deer and the

> *"Deer have no natural predators in the UK, so human interventions to control deer numbers are vital."*

reduction of available deer habitat has intensified the conflict between humans and deer. Farmers, foresters, ecologists and gardeners can perceive deer as villains who damage crops, woodlands, protected habitats and property.

Deer have no natural predators in the UK, so human interventions to control deer numbers are vital. DIO and DDM collaborate with deer management groups to reduce landscape-scale deer impacts on important designated habitats, ground-nesting birds and vital peat resources, which are key to locking in carbon. DDM deliver annual culls of around 500 deer on some individual sites, where large reductions in numbers are necessary to lessen the impacts of over-browsing and trampling of crops, woodland and sensitive flora and fauna. The south-west of England is seeing rising numbers of larger herding species like sika and fallow deer, and the team must negotiate site access around the operational and recreational pressures on the estate to carry out culls.

Rigorous monitoring of deer numbers through census and habitat impact assessment work is vital to inform sustainable deer management plans. This data collection is now commonly underpinned with drone counts. DIO and DDM have engaged with numerous landscape partnerships to count deer using drones at Otterburn, Warcop and Pirbright Training Areas, with other sites in the planning stage for further drone surveys. DIO and DDM are custodians of a comprehensive deer dataset which is regularly shared with research institutions and individuals. These inform reports on deer movements and the planning of physical measures to reduce deer-vehicle collisions.

As a central government department, Defence is committed to supporting the UK's sustainability objectives. The MOD's Climate Change and Sustainability Strategic Approach includes embracing net zero and climate resilience through woodland creation and habitat enhancements. Woodland creation offers many benefits, including carbon sequestration at Defence Munitions Beith and MOD West Freugh in Scotland; improving military training at Driffield Training Area in East Yorkshire and Fort George in Scotland; and providing shade for service horses in the face of rising temperatures at the Defence Animal Training Regiment at Remount Barracks in Leicestershire. Although deer do not directly contribute to climate change, high numbers of deer would negatively impact the success of this tree planting. Therefore, effective deer management will play an important role in the ability of Defence to implement woodland creation climate change solutions.

In a challenging and changing environment, DDM will continue to deliver sustainable deer management, guided by its foundational principles, to protect Defence assets and the environment. Working in close partnership with other responsible deer management organisations, DDM's future will focus on ecosystem resilience and biodiversity. DDM also has a key role to play in influencing work that supports climate change action and evolving policies and legislation. This will further the transition towards even greater sustainable practices that promote integrated environmental, social and economic benefits, supported by advances in technology.

While deer are the focus, DDM's volunteer deer managers have significant defence knowledge and are recognised for the benefits they bring beyond culling. This is particularly notable in the gathering of data to support wildlife crime prosecutions, including industrial-scale bluebell theft; assisting the MOD Police, MOD Guard Service and Safety Training Marshalls with monitoring trespass and illegal vehicular access; and providing additional early warning of safety concerns across the vast MOD estate.

Deer – are they heroes or villains? You decide…

Young muntjac buck early on an April morning
© Deborah Heath

The flooded site in November 2023
© Wiltshire Wildlife Trust

Chalk stream restoration at West Chisenbury wetland

Sanctuary Awards 2024/25

by Jenny Bennett
Senior Ecologist, Defence Infrastructure Organisation

The Defence Infrastructure Organisation (DIO) and Wiltshire Wildlife Trust have worked in partnership to deliver a pioneering project at West Chisenbury on the Hampshire Avon. The project aimed to restore a degraded stretch of a globally important chalk stream and remove phosphorus from the river. This is the first such project on a lowland chalk river system, creating a fully naturalised series of wetlands and braided channels, along with realignment of the main river channel through the centre of its floodplain.

Team member carrying out quality monitoring © Wiltshire Wildlife Trust

The Hampshire Avon is one of the finest chalk streams in the UK and is designated as a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC). However, the Avon, like many of England's chalk streams, is particularly vulnerable to nutrient pollution. Excess phosphorus causes increased growth of algae and large aquatic plants, as well as oxygen depletion, resulting in eutrophication.

The project site is an area of floodplain adjacent to the Avon in the heart of Salisbury Plain. In this location, the river was previously realigned, heavily modified and disconnected to the floodplain. The lack of flow diversity resulted in the loss of the characteristic water-crowfoot vegetation and siltation of the gravel bed, limiting invertebrate diversity and salmonid spawning.

The MOD Army Basing Programme relocated around 2,700 British Army personnel and their families to the Salisbury Plain area from 2017 to 2020. It involved the construction of 1,240 service family homes and accommodation for over 1,000 soldiers. This resulted in the closure of MOD's existing sewage treatment works at Larkhill and a new connection to Wessex Water sewage treatment works. This was estimated to increase phosphorus entering the Avon. As the river was already deemed to be in unfavourable

condition due to pollution from agriculture and the water industry, the additional phosphate loading from the new accommodation would add to the existing negative impacts. Mitigation was therefore required to achieve nutrient neutrality.

There were therefore two main drivers for the wetland project at West Chisenbury:

1. Quantifiable phosphorus capture from the river system through settlement of sediments with adhered phosphorus in wetland areas. The phosphate is then absorbed by growing vegetation.
2. Restoration of natural chalk river geomorphology and floodplain processes in accordance with SAC and SSSI conservation objectives.

The project also delivers a range of other natural capital benefits, including Water Framework Directive compliance, nature recovery, flood attenuation and carbon sequestration.

Hydrological and phosphate modelling were used to inform design. It is critical that the wetlands remain wet year-round to prevent the remobilisation of phosphate when inundated again. Equally, the design sought to maximise the retention time in the wetlands to amplify the degree of phosphate capture. The design avoids the use of non-natural materials and incorporates gravel riffles at the inflow to the wetlands to deliver the designed flow splits.

After obtaining the necessary permissions and licences, including ecological and flood risk considerations, construction started in August 2023. Excavation of the new river channel and wetlands progressed downstream, leaving a land bridge in place at the upstream connection. A large stretch of the old channel was backfilled to create a backwater habitat.

The new channel was connected to the main river in October 2023. One month on, it was already clear that the restored reach was hydrologically functioning in a more natural way, connecting the river to the floodplain and holding large volumes of water. Largely finished in 2023, water levels were too high to complete the excavation of one wetland pond, and contractors were remobilised in autumn 2024. The interim period enabled the project team to observe how the wetland functioned throughout the year and make some final tweaks to the design to match the modelled hydrology.

Modelling estimated that the wetland would remove 18kg of phosphorus a year. However, it is challenging to accurately model phosphorus uptake in a natural wetland system, and therefore a long-term monitoring programme is underway, involving water and sediment sampling. Excitingly, measurements from the first 14 months show a small but measurable increase in phosphate concentration and total organic carbon in wetland sediments. This suggests that sediments with adhered phosphates are being deposited in the wetlands as designed, and that there is an overall increase in biomass in the wetlands which is providing the long-term storage of phosphates as buried plant tissues.

Reducing phosphate input to our riverine ecosystems is fraught with difficulties and requires an integrated approach to nutrient and sediment management at the landscape scale. This must include agricultural land management as well as treatment of point-source pollution to prevent phosphorus from reaching the river in the first place. As part of an integrated approach, it is anticipated that the West Chisenbury wetland will provide a template for combining large-scale river and floodplain restoration with the capture and removal of nutrients from rivers, particularly chalk streams. Demonstrating efficacy for phosphorus capture from this pilot project will enable the approach to be replicated up and down the catchment.

Excavators cutting a new channel © Wiltshire Wildlife Trust

Safety in numbers – managing public access through positive partnership working

by James Nevitt
Senior Public Access and Recreation Advisor, Defence Infrastructure Organisation

Horse riders and range safety staff at Sennybridge Training Area
© GD Media

The MOD has a vast estate. Despite the specific and at times extreme nature of its use, the UK remains one of only a few nations continuing to deliver military training requirements alongside responsible outdoor public recreation.

The Defence Infrastructure Organisation's (DIO) Public Access and Recreation Advisory team support MOD's adherence to its public access policy. There is a presumption in favour of public access wherever it is compatible with operational and military training uses, public safety, security, conservation and the interest of tenants or licensees.

As well as providing expert advice on topics such as legislative duty and access infrastructure design, a key role of the team is to proactively work with external stakeholders. These partnerships aid MOD's reputation and are often mutually beneficial:

- They directly inform the visiting public about how to safely enjoy the MOD estate, how the estate is used and why restrictions may be in place.
- They share ideas and seek solutions to complex access management challenges.
- They can increase resources for managing and enhancing recreation opportunities.

Over the last 18 months, a series of projects have highlighted the importance of partnership working in supporting estate stewardship and recreational opportunities. The Institute of Public Rights of Way (IPROW) is a national organisation representing public access management professionals. The team are active members, raising awareness and seeking new project opportunities.

IPROW's quarterly magazine, *'Waymark'*, recently gave the team a slot to update members on planning guidance for the potential discovery of unexploded ordnance when carrying out public rights of way maintenance. The DIO Environmental and Ordnance Liability Management team provided support to give IPROW members a high-level insight into the extensive history of ordnance use across the UK. It also explained what to look for when planning work and directed members to the freely accessible, Health and Safety Executive endorsed, industry safety guidance booklet *'Construction Industry Research and Information Association C681: Unexploded ordnance – a guide for the construction industry'*.

Not content with just a magazine feature, the team sought to directly engage with IPROW's subject matter experts. Adapting to the impacts of reducing budgets amongst members, IPROW reached out for locations to hold regional workshops. The team arranged facilities at Salisbury Plain's Westdown Camp to provide a platform to discuss managing recreational off-road activity. Salisbury Plain Training Area is criss-crossed by a significant network of byways and permissive tracks, and managing appropriate off-road recreational behaviour alongside military use and environmental stewardship is a constant challenge. IPROW happily accepted the offer and, with the help of a sunny day, access officers from across the south of England enjoyed a day of site visits and insightful discussion, exploring new ideas and partnership opportunities.

Horse riders by a Red Flag at Sennybridge Training Area © GD Media

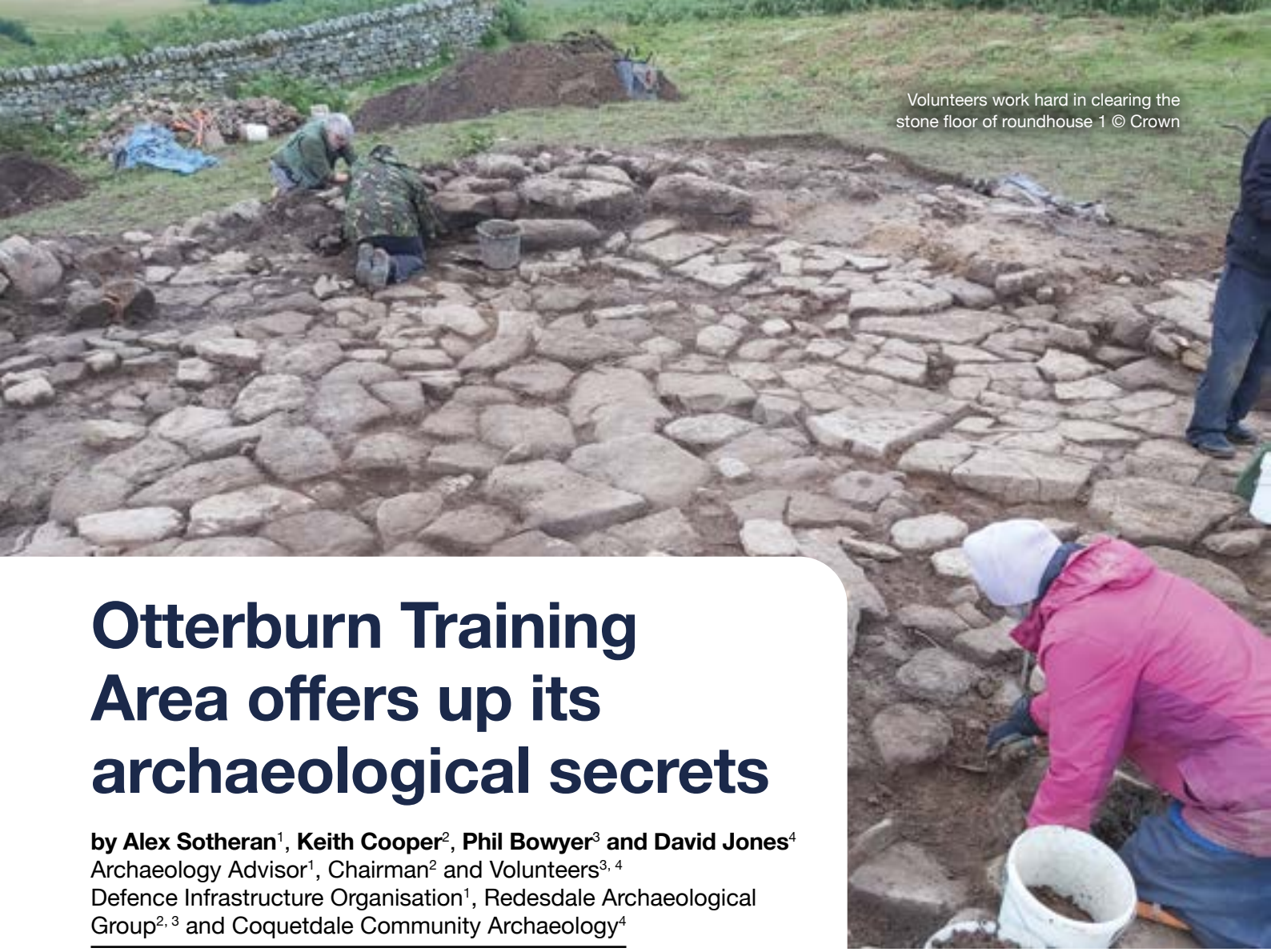
Whilst Salisbury Plain witnesses high volumes of recreational off-road vehicles, this is not representative of the wider MOD estate. Arguably, more common visitors are horse riders. To help riders have a safer experience, the team approached the British Horse Society, the UK's biggest equestrian charity, to see if they would agree to host horse riding on MOD land with specific guidance on their website. This freely available information would communicate to their members and the wider riding community about how and where they can access the Defence Estate safely.

In partnering with the society, the team had a direct, agency-endorsed means of communication to the equine community. By working with passionate horse riders, it also ensured the guidance was up to date and relevant to its readers. To give the online information the best possible impression, a jointly funded photoshoot was arranged through the society's marketing team. The Wales and West Regional Commander provided support, and the photoshoot took place on the Epynt Way – Sennybridge Training Area's 65km long distance trail (featured in *Sanctuary* 51, 2022). As well as providing an excellent photographic backdrop, the incorporation of the trail further highlighted DIO's work to facilitate appropriate outdoor recreation opportunities.

The superb imagery was incorporated into a joint DIO and British Horse Society media plan. Aligning the launch with the society's fundraising Rideathon challenge, the new safety guidance was well received and acknowledged in numerous equestrian publications, further extending its reach. An unexpected conclusion to the project saw DIO presented with a British Horse Society Access Award in recognition of equestrian access provision on the Epynt Way. The award was gratefully received by representatives from the Sennybridge Range Training Safety team, DIO, Rupert Prince (the Epynt Way Association Chair) and Landmarc Support Services at the 2024 Royal Welsh Show.

This recent partnership work perfectly highlights the important role the team plays in supporting the provision of appropriate outdoor opportunities across the MOD estate, as well as the positive reputation it builds. The team will continue to strive to build on these partnerships and encourage new and innovative opportunities.

MOD staff receiving a British Horse Society Access Award at the Royal Welsh Show © GD Media



Volunteers work hard in clearing the stone floor of roundhouse 1 © Crown

Otterburn Training Area offers up its archaeological secrets

by Alex Sotheran[1], **Keith Cooper**[2], **Phil Bowyer**[3] **and David Jones**[4]
Archaeology Advisor[1], Chairman[2] and Volunteers[3, 4]
Defence Infrastructure Organisation[1], Redesdale Archaeological Group[2, 3] and Coquetdale Community Archaeology[4]

The Otterburn Ranges were home to a number of archaeological investigations over the last few years, including two excavations and a walkover survey. In all three, local and veteran volunteers were at the heart of the work, during which Iron Age roundhouses, a Medieval chapel and Bronze Age cairns were identified. This article is an overview of this work and demonstrates the wide range of archaeological remains that lie on the Otterburn Ranges.

In 2024, Yatesfield was home to the third season of a three-year-long excavation on a number of Iron Age roundhouses. These had been identified through a LiDAR (Light Detection and Ranging) survey and the subsequent excavations were initially led by Wessex Archaeology during the evaluation phase and then later by Wardell Armstrong. This project was originally conceived by Phil Abramson and then continued by Alex Sotheran, the Defence Infrastructure Organisation's (DIO) Archaeology Advisors, and was funded by DIO's Conservation Stewardship Fund. These projects have many moving parts.

Support and management were provided by Landmarc Support Services (Landmarc) and the Otterburn Range staff provided further assistance, access, food, lodgings and safety briefings for the volunteers. It is thanks to all these people that the project ran so smoothly.

The excavations uncovered the remains of three Iron Age roundhouses and using Carbon 14 dating techniques, were dated to the 1st century BC to the 3rd century AD. These dates coincided with the building of Hadrian's Wall, some 20 miles south of Otterburn. Contact between the new and the old was identified through the discovery of several finds of Roman glass and metal objects, along with other typical Iron Age finds such as quernstones and pottery.

The roundhouses themselves were of substantial construction, with thick, stone-built walls and flagged stone flooring. Each measured approximately 7m in diameter, which would have given a snug feel inside. Intriguingly, there was no sign of a central hearth in any of

the three structures, although some charcoal was recovered, which may indicate seasonal occupation or use as working areas. The three roundhouses excavated were part of a larger group of similar earthworks, which were not excavated but give an idea of how extensive the settlement originally was.

The Yatesfield excavation was staffed by volunteers, both from Redesdale Archaeological Group and veterans under the Operation Nightingale banner, which uses archaeology to assist the recovery of wounded, injured and sick serving personnel and veterans, with safeguarding support provided by Dickie Bennett of Breaking Ground Heritage.

During the three years the local volunteers were joined by veterans from Op Nightingale. The wide variety of experience and skills enabled both groups to work together through a common interest in archaeology. Many of the veterans returned throughout the life of the project and real friendships grew, not just within the individual groups but across the community lines as well. Despite living in the region, most of the local volunteers had never ventured into the Otterburn Training Area, let alone worked there. However, the opportunity to work on projects within the training area proved to be irresistible and ensured a committed cohort of volunteers who attended each year through rain and shine.

Two comments from the professional archaeologists involved are revealing:
Sue Thompson, lead Archaeologist for Wardell

The rear wall of roundhouse 3, still in place © Crown

Armstrong, recalled that *"as a professional archaeologist, it is unusual to be involved in an excavation such as that at Yatesfield. It was a privilege to work with the Operation Nightingale veterans over three years, and the collaboration with local volunteers from Redesdale Archaeological Group made this a very special project. The archaeology was excellent, but the teamwork and friendships made during the excavations make this site one to remember"*.

DIO Archaeologist Alex Sotheran commented: *"As important as archaeology is, I knew that it would be recorded properly and professionally by Sue and her team from Wardell Armstrong. It was the social aspect that made this final year so special. Some strong friendships have been created during our time at Yatesfield. Operation Nightingale is about recovery and reducing isolation of the participants from the veteran community, so it was good to see this being tackled and led as ever by Dickie and Breaking Ground Heritage"*.

Sunshine and showers accompanied the volunteers working together on the Yatesfield excavations © Keith Cooper

Ecclesiastical stonework from Linbrig © David Jones

The roundhouses at Yatesfield did not exist in isolation and it was apparent from the LiDAR data that there was a much wider landscape to consider, so in 2023 Redesdale Archaeological Group began a landscape survey of the terrain surrounding Yatesfield. This survey threw new light on the wider historic environment. Volunteers recorded features indicative of prehistoric agricultural activity reaching back to at least the Bronze Age. Visible surface features ranged from primary cairnfield clearance, through subsequent linear clearance characteristic of a developing 'proto-field system', to remains of more developed rectilinear field boundaries typical of the Iron Age/ Romano-British era, which is thought to be when the excavation site was occupied. The findings suggest that there had been periods of sustained agricultural activity over many centuries prior to the occupation of the enclosed settlement site.

After discussion with MOD Archaeologist Alex Sotheran, it was decided that Redesdale Archaeological Group volunteers would carry out further landscape surveys of adjoining areas in 2024. The area spanned terrain between two scheduled Romano-British enclosed settlement sites at Yatesfield Hill and Barracker Rigg. This survey recorded evidence of a similar prehistoric field system development, along with remains of later Medieval and post Medieval activity. It also identified over 20 previously unrecorded small burial monuments of varied structures typical of Bronze Age funerary practices, along with four previously unrecorded standing stones, two of which were located adjacent to a grouping of three probably Bronze Age ring cairns.

West of the Yatesfield Hill settlement, a newly recorded complex features three ring cairns and two standing stones, one now leaning. Three further ring cairns were newly recorded within 100m of this complex. Further south, two previously unrecorded standing stones were identified.

Just west of the scheduled area on Barracker Rigg, a grouping of 20 cairns, nine of which appear to be small Bronze Age burial monuments (four kerbed cairns, four ring cairns and an unusual rectilinear arrangement of slab stones) were newly recorded. Interestingly, all these features were located along or close to a long stony bank running east to west. In the scheduled cairnfield further north, the 18 cairns recorded included at least three small burial monuments. Overall, the Redesdale Archaeological Group's findings identify a rich resource for further study of the development from Bronze Age to Iron Age field system features, and the relationships to Bronze Age burial practices, of which a number of different forms were identified.

Prehistory may have been all the rage at Yatesfield and the surrounding areas, but Otterburn also contains archaeology of much later dates and between 2018 and 2023, Coquetdale Community Archaeology investigated Linbrig, a Medieval settlement by the River Coquet. Initial excavations involved a 14th century domestic building, a grain-drying kiln of the same period and a set of medieval structures which had been repurposed in the late 17th century, probably for stock management.

Ecclesiastical stonework from Linbrig © David Jones

Every season the team identified ecclesiastical material – a dressed impost block, chamfered window surrounds and a masonry block with a floral decoration. A highlight was a piece of ruby-coloured window glass that probably came from Normandy. None of these finds were expected in an upland farming community.

Research showed that Linbrig had been on a Medieval manor called Aldensheles, with references from 1317 to a chapel somewhere on that manor. LiDAR analysis and a wall found in 2022 suggested that faint remains near the centre of the settlement should be investigated.

A trench there revealed two well-built side walls of a building. The north wall had a chamfered plinth, typical of a late Medieval ecclesiastical building, while the south wall was mortar-bonded with better foundations than the north wall. Just outside the south wall were the remains of another wall in the same style as the north wall. With the chapel built across a slope without a horizontal platform, it would probably have suffered from structural problems. In an attempt to fix these, it seems that a new and better south wall was constructed to make the building narrower and stronger.

Over 100 stone roofing tiles lay on the remains of an internal flagstone floor. There was little pottery, but about 30 rebated or chamfered stones together with collections of highly degraded glass were identified.

A document from 1325 described the manor of Aldensheles as devastated by the Scots. It is probable that the chapel was destroyed in 1318 when the nearby Harbottle Castle was captured. The person charged with its defence was Richard de Horsley, who also held the manor. The chapel was not rebuilt, but local people remembered it. Above its floor, Coquetdale Community Archaeology found a burial dating from between 1460 and 1635. Memories of a sacred place persist, and burials are sometimes found in long abandoned churchyards.

Coquetdale Community Archaeology's identification of the chapel was the culmination of a major project and added real significance to what might otherwise be considered just a well-preserved upland farming settlement.

These recent works demonstrate the wide range of archaeological remains that lie buried beneath the ground on the Otterburn Ranges and their surprising nature. It is only by understanding and recording these features that the DIO Historic Environment team are able to develop long-term management plans for protecting the historic environment on the MOD estate. However, in addition to this long-term goal, volunteers, both local and veterans, were at the heart of all this work, and the enjoyment and wellbeing that comes from being involved in archaeological work cannot be understated.

Shortly before going to print we had the sad news that Phil Bowyer passed away. His work on Otterburn is a testament to his enthusiastic and professional approach to recording the archaeology of the ranges, identifying new features and engaging those he worked with. Phil will be very sadly missed.

Yatesfield Hill standing stones and ring cairns © Phil Bowyer

The Departmental Adaptation Plan

by Ray Dickinson
Assistant Head Policy, Climate, Energy and Environment Directorate

The Climate Change Act 2008 legally obligates government to prepare for a changing climate by developing plans to adapt to the risks and opportunities posed by climate change. Government departments are required to introduce their own Departmental Adaptation Plan. For the MOD, the 2021 Climate Change and Sustainability Strategic Approach sets out Defence's 2050 strategic ambition. The goal remains for Defence to operate successfully under changing climate conditions, preserving operational capability and strengthening UK resilience and adaptive capacity.

Climate change will impact where Defence operates, how it operates, what Defence needs to operate and who Defence operates with. Climate is recognised as a principal risk for Defence. Adaptation involves modifying strategic decision making and business as usual functions to adjust to a changing climate.

This plan will capture the actions Defence is taking, and plans to take, to build resilience to climate change by adapting its existing people, equipment and infrastructure, as well as how it prepares and plans for future operational needs. Adaptation goes hand in hand with mitigation actions to reduce emissions and therefore causes of climate change. To reflect the scope and scale of MOD climate change adaptation activities, these have been split into five 'lines of effort':

- **Climate-informed decision making** – climate change is considered and its impacts included in all relevant and applicable MOD decisions.
- **Climate-ready force** – an agile force, trained and equipped to operate effectively in all anticipated climate conditions.
- **Climate-resilient estate** – an estate able to support operational readiness in changing climate conditions.
- **Supply chain resilience and innovation** – ready access to key supplies, materials and services.
- **Enhance adaptation and resilience through collaboration** – reduce adaptation costs and build unity of purpose through engagement with Defence stakeholders.

The 4th Battalion, The Royal Regiment of Scotland deployed to West Yorkshire to help with flood defence efforts during Storm Dennis © Crown

There are four cross-cutting themes:

- **Defence operating model** – how decisions are taken.
- **Energy transition** – understanding the impacts of fuel and energy changes.
- **Professionalisation** – enhanced knowledge, skills and capabilities of the workforce.
- **Information and data** – an evidence-based approach.

Within each cross-cutting theme, there are a series of tools and processes which have been, or are being, developed to enable delivery of the lines of effort. These in turn support the Defence core mission of working for a secure and prosperous UK with global reach and influence.

Personnel from the Royal Dragoon Guards and British Army Training Support Unit deployed on a humanitarian aid mission following Hurricane Eta in Belize © Crown

Polymer railway sleepers minimise climate impacts at Ayrshire Barracks

by Maj James Appleby
Officer Commanding, 507 Specialist Team Royal Engineers

The use of railways for military logistics is key to the efficient movement of large loads and the sustainable movement of combat equipment to training or operational areas. Exercise TURNOUT is the annual multi-national rail engineering exercise where UK troops train with NATO partners to increase interoperability. As part of Ex TURNOUT 24, Reservists from 507 Specialist Team Royal Engineers (STRE) and attached partners from Italy, the USA, Germany and the Netherlands undertook the renewal of the loading sidings for the Ayrshire Barracks railhead in Germany on behalf of the Defence Infrastructure Organisation (DIO).

Whilst the exercise was a training serial, 507 STRE stepped up to deliver live works coupled with generating savings for Defence. Commercially, railway contractors attract premium prices. By partnering with the Rail Division of Quattro Group UK to hire specialist rail construction plant, the team delivered around three times the volume of repairs for DIO, when compared to quotes from local contractors. Delivering more in-year repairs within the available budget allowed the DIO to use funds more effectively on assets elsewhere.

The timber sleepers supporting the railway sit on terrain with a high water table and have degraded significantly over their 20 to 30 year lifespan. Keen to make the project as sustainable as possible, the team looked into how they could best increase the lifespan of the new assets and mitigate the local factors that increased the degradation of the railway.

The team undertook research within the civilian rail industry, liaising with infrastructure managers such as Network Rail and Deutsche Bahn to identify timber alternatives that would increase the lifespan of the sidings, while allowing as many of the existing railway components to be reused. Working with Sicut Enterprises UK, the team identified and installed composite recycled polymer railway sleepers as the replacement material.

The Sicut sleepers allowed a doubling of the lifespan of the renewed track. As they are impervious to water, this mitigates the impacts of the high water table whilst also having a lower embodied carbon value than new timber or concrete sleepers. The use of recycled polymer sleepers delivered an overall saving in emissions of around 31,020kg CO_2 equivalent, compared to traditional construction, and has eliminated the felling of around 120 mature trees for replacement sleepers. The project has also diverted up to 25 tonnes of waste material from landfill and has served to further enhance the sustainability of military rail transport into the future.

New recycled polymer sleepers being laid at the railhead © 507 STRE

Whale Island's Native Oyster Restoration project

by Harriet Rushton
Wrecks Environmental Manager, Salvage and Marine Operations

The Whale Island Native Oyster Restoration project at HMS Excellent is a marine conservation initiative on the MOD estate funded annually by the Defence Infrastructure Organisation's Conservation Stewardship Fund. The project grows and releases European flat oysters *Ostrea edulis* into the Solent, contributing to Blue Marine Foundation's Solent Oyster Restoration initiative. Whilst the numbers released from Whale Island are a small percentage of the larger project, it is hoped that these locally grown individuals will thrive and that the project will demonstrate the viability of maturing oysters in challenging conditions, encouraging others to support native oyster recovery.

As *O.edulis* grow, their shells fuse together to form reefs, and by creating new marine habitat this ecosystem engineer generates a range of benefits. For example, oyster reefs help defend against coastal erosion and provide favourable habitat to other marine life, which live on, in and around them, boosting local biodiversity. Also, they sequester carbon whilst constructing their shells and improve local water quality as they filter feed (one oyster can filter 200 litres of water a day).

The Solent once hosted Europe's largest *O.edulis* fishery but the population has been decimated, and the fishery finally crashed in 2013. Around the UK, oyster reefs have declined by 95% due to overfishing, pollution, disease and habitat destruction. Worldwide, an estimated 85% of oyster reef habitats have been lost. Re-introducing *O.edulis* into the Solent should provide benefits disproportionate to the size of the organisms themselves.

Through a close relationship with Blue Marine Foundation, the project team determined there should be benefits from maturing *O.edulis* locally. The foundation typically source juveniles from hatcheries with optimal conditions. This can lead to stress and breeding failure when released into the Solent as conditions here remain challenging for this species, with elevated pollution and disease levels evident. Oysters matured here should already be accustomed to local conditions and so are more likely to survive when released.

The Whale Island Native Oyster Restoration project was established in 2022 with the aim of providing a stock of adult *O.edulis* which had

A sub-set of *Ostrea edulis* in their crate © Crown

Crates being removed for maintenance © Crown

Crate and oyster cleaning taking place on the pontoon © Crown

Batch one of *Ostrea edulis* being released in the River Hamble © Crown

acclimatised to the local waters. The project acquires around 2,000 juvenile oysters at a time, grows them in crates suspended beneath a pontoon until they are around a year old and releases them onto prepared reefs in the Solent.

Blue Marine Foundation replicate the oyster's natural habitat by depositing sterilised oyster shells and coarse sediment onto the seabed. This is important for oyster larvae, which need a hard substrate to attach to and grow. Once an oyster colony is established, it should spawn, increasing the population and expanding the reef habitat along with its associated benefits.

As one batch of HMS Excellent oysters is released, another batch is brought in to grow to adulthood. The juveniles are lifted, checked and washed regularly to maximise survival rates. During the warmer seasons, they require monthly tending, whilst over winter they may only be lifted termly. This continues until the oysters are large enough to survive in the wild on the reefs.

Whale Island's conservation volunteers undertake the oyster husbandry, removing marine growth from the cages, undertaking a stocktake of the oysters and learning about the marine life colonising the cages. The volunteers have identified a plethora of marine life, including sponges, whelks, sea slugs, feather stars, sea squirts, gobies, pipefish, crabs and shrimps. Maintenance is essential to ensure good water flow through the crates, which is necessary to maximise growth and survival rates.

The project's first oysters were released in the spring of 2024 at Blue Marine Foundation's reef in the River Hamble. This was supported by Portsmouth University's research vessel during marine conservation work. The foundation works closely with Portsmouth University on local conservation initiatives such as oyster, seagrass and saltmarsh restoration. The second batch is growing well and should be released in autumn 2025.

The project approached Defence Equipment and Support's (DE&S) media to advertise this as a MOD's marine conservation initiative. Much of the maritime traffic in and out of the Solent relates to HMNB Portsmouth, so funding this project demonstrates that the Royal Navy is a considerate user of the Solent and is dedicated to its sustainable management. This is especially pertinent as the halfway point of the UN Ocean Decade is reached in 2025.

Media interest grew and the project was widely reported on various outlets, including BBC, ITV, Royal Navy and DE&S media. This has subsequently peaked external interest and the team are in talks with youth organisations to foster interest and encourage other similar initiatives to be established where conditions allow.

The project team has engaged widely within MOD, running environmental away days for teams across Defence. They learned about the project and marine life found in the Solent, assessed the oysters and removed marine life from the crates.

Taking soil samples for carbon capture analysis at RAF Leeming © Crown

Project ViTAL Living Lab – advancing science en route to net zero

by Wg Cdr Katie Farley-West
Head Air Innovation Fund, Royal Air Force

In 2021, the RAF sought to maximise the contribution of innovation in its route to achieving net zero. The MOD is responsible for around 50% of all government departmental greenhouse gas emissions. In turn, the RAF is responsible for approximately 50% of MOD's emissions, but the make-up of the footprint is unclear.

The RAF's solution to this challenge was Project ViTAL, led by the Station Commanders of RAF Leeming and Professor Oliver Heidrich of Newcastle University, who served as Co-Directors. This unique partnership was born from the desire to understand how RAF stations generate emissions, enabling the MOD to gather evidence to support prioritised funding and ultimately the adoption of green technology interventions.

By creating a measurable backbone, ViTAL would scrutinise and validate energy and carbon-saving potential. In bringing together internationally leading academic experts and representatives from across the RAF, ViTAL would accelerate carbon-reducing technology and decision-making

Deploying seismic sensors to survey subsurface at RAF Leeming © Crown

data directly to RAF decision makers. This in turn would enable sharing and scaling of best practices across MOD, academia and the wider UK economy.

In daily collaboration from October 2021 to 2024, RAF Leeming's eXperimental team (RAFX) and Newcastle University ran six experiments. The first was on carbon accounting led by Prof Heidrich; the second developed new solar technologies led by Libby Gibson. The capture of carbon in the soil at RAF Leeming was tested by David Manning's team, and the potential to use geothermal energy for heating was investigated using a low-disturbance seismic sensor by Mark Ireland. The sustainable ground transport experiment was led by Phil Blyth, while the final experiment on life cycle costing and assessment

was led by Prof Heidrich. The project benefitted from a great project management team led by Kate Morris and Debbie Wilde. A key aspect to highlight is the novel use of RAF Leeming itself as a 'living lab', acting as a microcosm of everyday life with working, living and green spaces all located together – much like a mini village. This was critical to bringing together data and insights through life cycle assessment.

ViTAL led to notable academic achievements. Prof Heidrich has been invited personally to speak at NATO forums as well as international conferences and policy events. His team have published in high-impact journals, highlighting the importance of decarbonising the military in the UK, Europe and worldwide.

ViTAL also enabled significant learning. The project highlighted military emission tracking and reporting gaps at a global level, enabling Newcastle University to raise a call for global action and include this data within the Intergovernmental Panel on Climate Change for greenhouse gas emission reporting. This work produced world-leading insights, paving the way for thorough recognition of military emissions and effective planning for carbon-reduction targets. ViTAL was also the first to develop a prospective life cycle assessment framework for militaries. This can be used across the MOD and NATO to understand the future life cycle environmental impacts of military estates, equipment and operations.

ViTAL enabled the world's first investigation on the full life cycle environmental and cost impact of basalt rocks for enhanced rock weathering carbon capture, based on real-world data. This clarifies the real benefits of carbon capture, leading the way for greater implementation of soil-based CO_2 removal. ViTAL also took the opportunity to exploit the world-leading research on lightweight solar photovoltaic technology, partnering with Swansea University with the aim of fitting solar on the MOD's ageing infrastructure. This approach could be expanded across other MOD infrastructure in the future. The developed photovoltaic is also more sustainable and ethically sourced compared to current technologies.

ViTAL explored low-carbon alternatives to road transport fuels, enabling the spin-off Project ZyHYDA between the RAF, Teesside Airport and industry, funded by the Department for Transport. This work is central to enabling the RAF to test and understand viability on station for the hydrogen economy. Much of ViTAL's academic learning has been published in the renowned academic journal *'Nature'*.

The impact of ViTAL has been significant in achieving international reach for both the RAF and UK academia. The uniqueness of the project, its broad applications and its honed media – shared through RAF channels but enhanced through the creativity of the university team – placed RAFX on an international footing. RAFX engaged in person with the US Marine Corps on numerous occasions, as well as with the French and Singaporean Air Forces. As a direct result, RAF Leeming is now twinned with Miramar US Marine Corps Base and French Air Force Base Cazaux and is able to consult on investments and innovation opportunities. ViTAL was also briefed at personal request to Her Majesty The Queen whilst visiting RAF Leeming in 2024, and also by Chief of the Air Staff in international forums; notably in the Global Air Chiefs Conference and the Royal International Air Tattoo in 2024.

A one-of-a-kind project, with a proven, successful template, Project ViTAL Living Lab has created an ever-stronger community as we work to strengthen our future climate resilience.

Hydrogen powered support vehicles air side at RAF Leeming © Crown

The MOD Nature Recovery Plan

by Oliver Howells
Principal Ecologist,
Defence Infrastructure Organisation

The MOD estate exists to enable service personnel to live, work and train for military readiness. The pages of *Sanctuary* have documented the wealth of biodiversity across the estate for 50 years, and the important role it plays in conserving habitats and species across the UK is well understood. The defence imperative means there are 1,000 MOD sites around the country, including remote parts of the UK. Due to its long history much of the estate has escaped agricultural intensification, development and other land use pressures which have impacted the wider countryside and led to the UK being described as one of the most nature depleted countries on the planet in the State of Nature Report 2023.

In 2025, the MOD published its first-ever Nature Recovery Plan to outline how it can integrate military training and support the country's nature recovery goals. The plan sets out a strategic approach to considering nature in a way that actively supports the defence mission. As a minimum it must meet legal commitments to wildlife, but by managing land and military development sensitively, it can go further. It includes three strategic outcomes: to support military training, to safeguard the estate for nature and to deliver high-quality estate stewardship.

A/Sgt Paul Smith releases one of the 107 hedgehogs released to date at RAF St Mawgan, in partnership with Prickles and Paws hedgehog rescue © Cpl Andy Morris

These are supported by several objectives and commitments, including the creation of more habitats that directly support military training and operations (e.g. woodlands), improving the condition of protected areas (e.g. Sites of Special Scientific Interest), delivering more and better priority habitats for nature (e.g. peatlands) and contributing to nature networks beyond MOD boundaries by engaging with external projects and partnerships.

The MOD estate is already important for nature, but it is not immune from environmental pressures such as air pollution, invasive species and climate change. Military use can also impact on sensitive sites and habitats, but nature-based solutions can mitigate these pressures and future-proof the estate against emerging risks, such as wildfires or flooding linked to a changing climate.

The plan will deliver a more resilient Defence estate. It will be a better place for service personnel and their families to live, work and train. At the same time, it will support wider sustainability goals for decarbonisation, climate adaptation, water conservation, health, wellbeing and many other benefits. The Nature Recovery Plan demonstrates MOD's intent to deliver even more positive action for nature, helping to ensure the estate remains one of the most important for wildlife in the UK.

Common lizard on khaki combats © Iain Perkins

The explosive discovery of Shoeburyness's seagrass meadow

by Tim Gardiner[1], Rosie Horner[2] and Jim Pullen[3]
Biodiversity Officer[1], Senior Marine Biologist[2] and Drone Contractor[3] Environment Agency[1], Defence Infrastructure Organisation[2] and Independent Contractor[3]

QinetiQ operate the MOD Shoeburyness site, located in Essex in the outer Thames Estuary. At Shoeburyness, weapons systems are tested to ensure they are safe and reliable for the UK's armed forces. This can involve firing munitions from Foulness Island across the extensive mudflats of Maplin Sands. Exposed sand and mud stretch up to 5km from the shore at low tide, forming an important habitat for wildlife, including migratory birds and mud-dwelling invertebrates.

On Maplin Sands, 241ha of dwarf eelgrass *Zostera noltei* was reported in the 1970s, which had decreased to 162ha by 2012. Despite its decline in many locations, dwarf eelgrass is a vital component of intertidal coastal environments, forming seashore meadows that are covered by high tides but uncovered at low tides. Seagrass meadows sequester carbon and store it for hundreds of years. These seagrass carbon sinks have a range of additional benefits for coastal areas, trapping sediments, storing nutrients, supporting fish populations, providing food for geese and buffering sea wall flood defences against wave action.

To provide a modern baseline for dwarf eelgrass on Maplin Sands, a MOD funded drone survey was undertaken in the summers of 2023 and 2024 to provide an accurate, up-to-date estimate of eelgrass coverage on the mudflats. Due to the health and safety risks associated with access to Maplin Sands from Foulness Island and the risk of unexploded ordnance, drones were used to estimate eelgrass coverage on the extensive mudflats. The drones mapped the eelgrass area in a systematic grid formation at a height of 120m. Low level photographs were taken at 5m above the mudflat to complement the higher-level coverage. This allowed an estimation of the percentage of mudflat covered by eelgrass, which ranged from 40% to 96%. Analysis of the high level mapping revealed a total of 214ha of dwarf eelgrass on Maplin Sands, which is the third largest meadow in England. Only Lindisfarne in Northumberland (670ha) and St. Austell Bay in Cornwall (359ha) have larger meadows. The eelgrass at Maplin Sands was also notable for the near absence of macroalgae, which can smother eelgrass by cutting out light.

Extensive seagrass meadow on Maplin Sands, with drone shadow © Jim Pullen

Fortunately, the eelgrass meadow on Maplin Sands is afforded legal protection by the Essex Estuaries Special Area of Conservation. Drone surveys showed that the eelgrass area has increased by 32% from 2012 to 2024, which is encouraging given the large declines elsewhere. The team would like to thank Project Seagrass for their support with this project.

Seagrass bed © Rosie Horner

Celebrating Lynne Houlston – championing conservation at Castlemartin for over 20 years

by James Nevitt
Senior Public Access and Recreation Advisor,
Defence Infrastructure Organisation

Lynne Houlston, Castlemartin Ranger
© Pembrokeshire Coast National Park

Castlemartin Ranges lies on the south coast of Pembrokeshire Coast National Park. As well as being one of the UK's most vital training areas, its renowned coastal scenery, geology and history has much to offer humans and wildlife alike.

Uniquely, Castlemartin has a dedicated ranger. This role was created in 2003 following Castlemartin's designation as a Special Protection Area for its rich birdlife and the emerging requirement for a new integrated land management plan at Castlemartin Ranges.

The ranger role was seen as essential to support long-term conservation management, develop stronger links with local and recreational communities, and provide expert support and advice to Defence Estates, now the Defence Infrastructure Organisation (DIO), on behalf of Pembrokeshire Coast National Park Authority and the Countryside Council for Wales, now Natural Resources Wales.

Lynne Houlston took up the joint-funded role on 9 June 2003 and is now one of the longest-standing team members at Castlemartin Camp. Her dedicated and experienced understanding of the natural, historical and recreational nuances are relied upon to keep the complex machine running.

The natural environment

Due to its natural landscape and rare wildlife, Castlemartin Ranges is subject to numerous environmental designations, including as a Site of Special Scientific Interest. As part of DIO's environmental stewardship, Lynne is directly involved in monitoring the designated conservation features. Her enthusiasm and unwavering dedication mean Castlemartin has received over two decades of high-quality environmental recording.

To supplement her recording, Lynne has worked hard to establish collaborative partnerships with a wide range of specialists, all drawn to Castlemartin because of its noted features and species. Amphibian and Reptile Conservation, Bumblebee Conservation Trust and Pembrokeshire County Wildlife Recorders are a small handful of specialists Lynne works with, all contributing to DIO's wealth of ecological data.

Detailed records collected on special features, notably chough and grey seals, provide datasets that raise national awareness and enable informed judgements regarding these species within the context of the range requirements. This work has been crucial in enabling Castlemartin to deliver world-class training exercises. Lynne has also spent many hours passing on her passion, knowledge and recording skills to countless seasonal wardens, volunteers and visitors.

A visitor attraction

Castlemartin holds some of Wales's most distinguished natural and historical features, such as the Green Bridge of Wales and St. Govan's Chapel. As well as opportunities for coastal walks and wildlife watching, the cliffs also offer internationally renowned cliff climbing. This and more draws thousands of year-round visitors.

Lynne working with the Cambrian Caving Council and DIO © Crown

Along with her commitment to Castlemartin's natural environment, Lynne has been instrumental in facilitating a wider range of manageable and sustainable public access that would ordinarily not be achieved. This has been aided by the numerous long-standing partnerships Lynne has developed and nurtured, including the Access and Recreation Stakeholder Group and the Cambrian Caving Council.

Historic reflections

Lynne's vision and commitment are perfectly demonstrated in her Reflections from Castlemartin project. In 2019, Castlemartin celebrated its 80th anniversary. Lynne recognised that this represented a significant milestone for those residents who had lived and worked in and around Castlemartin all their lives.

Lynne spent many hours carrying out research, uncovering photographs and articles, and teasing out interviews from former residents to retell Castlemartin's history. With the aid of a videographer, Lynne's project, funded by the DIO Conservation Stewardship Fund, produced a short, poignant film telling the story of those who lived and worked in the area around 1939.

Going further, Lynne organised a commemorative day celebrating 80 years of Castlemartin for staff, former residents and their descendants. This also provided the ideal launch for the film, allowing contributors to enjoy the fruits of their labour and reminisce about the area's history during a guided tour. Post-event, news of the film spread throughout Pembrokeshire, prompting Lynne to tour local communities in her own time, giving well-received talks alongside a film screening.

After all this hard work, Lynne followed up her remarkable achievement by bringing the story up to the present day with a second DIO Conservation Stewardship Fund financed film entitled *'Castlemartin – A Story of Wildlife, Weapons and Welsh Mountain Sheep'*. The film further reflects countless hours of work and Lynne's passion and dedication to a place she loves.

Above and beyond

Lynne's commitment has raised Castlemartin Range's profile as a training area, a designated natural environment, a historic landscape, a place of recreation and a community in a way that would never have happened without her vision and enthusiasm. Lynne has been a keystone for positive working relations between the three funding partners. Throughout her tenure, she has played an instrumental part in supporting the balance of Defence requirements alongside Castlemartin's designated special features and recreational opportunities. MOD has an awful lot to thank Lynne for.

Lynne giving HRH King Charles III a special tour of St. Govan's Chapel on His Majesty's 2022 visit © Pembrokeshire Coast National Park

Air-to-air refuelling of RAF Typhoons © Crown

UK Defence's role in climate security – working internationally in pursuit of climate security

by Kitty Rodwell
Adviser – Climate Security and International Engagement, Climate, Energy and Environment Directorate

Climate change is no longer just an environmental issue; it is now recognised as a systemic risk to national resilience and strategic stability, as outlined in the UK's National Security Strategy. As nations grapple with the far-reaching impacts of a changing climate, the role of defence forces in addressing these challenges has come to the forefront. By recognising the interconnectedness of climate change and security threats, the UK is paving the way for innovative solutions and collaborative efforts to safeguard our planet and its inhabitants on an international scale.

The effects of climate change extend beyond rising temperatures and extreme weather events; they have profound implications for global security. From resource scarcity to mass displacement, climate-related challenges have the potential to exacerbate existing conflicts and create new threats that challenge the resilience of critical national infrastructure and defence readiness. As sea levels rise and natural disasters become more frequent, vulnerable populations are at increased risk, leading to social unrest and potential conflicts. The impacts on military capability globally are already being seen. Extreme weather is damaging infrastructure, disrupting defence output and generating implications for deployments. Globally, militaries have already been deployed in over 68 countries to support climate hazards since 2022.

By addressing climate security, nations can mitigate these risks, foster stability and build resilience in the face of a changing climate. The integration of climate considerations into defence strategies is not just a matter of environmental responsibility, it is a strategic imperative for safeguarding national and international security in the 21st century, underpinning deterrence, readiness and resilience.

Having developed a comprehensive Climate Change and Sustainability Strategic Approach, UK Defence recognises that our ability to understand the impact of climate change across Defence, and adapt to it, will be key to strategic advantage. Building resilience and improving operational advantage are objectives at the centre of the UK's approach. The MOD is committed to accelerating work to future-proof our capabilities, embed climate risks to secure resilience and strengthen joint approaches with our Allies that ensure interoperability.

Addressing climate security necessitates international cooperation, and NATO lies at the heart of UK Defence. Only by working together can MOD surmount the challenges and fully grasp

the opportunities presented by climate change. Together with Allies, the UK strives to deliver co-ordinated responses to climate-related threats. Through joint exercises, information sharing and capacity-building initiatives, UK Defence forces are strengthening global resilience to climate change impacts. The UK is committed to working with Allies to develop policies at NATO that ensure operational effectiveness, resilience and interoperability. This includes NATO Energy Security by Design and NATO's Climate Change and Security Action Plan.

As a founding member of the Climate Change and Security Centre of Excellence, the UK is further strengthening our collaboration with Allies. The MOD believes the unique and rapidly achievable value of the Centre of Excellence is in its research outputs for the Alliance, which help build a shared understanding of the threat picture and support the development of NATO policy. This includes the security implications of climate change and collaborative projects with the Energy Security Centre of Excellence. This further supports the development of the Energy Security by Design concept. The UK is driving this work forward with sponsoring nations to embed considerations of the impacts of climate change, energy security and sustainability into our collective thinking.

Elsewhere, UK Defence actively supports multinational and bilateral approaches. In 2024, the

Raising the NATO flag © Crown

Transformative technologies, such as drones, help foster stronger international partnerships © Crown

first International Climate Security Wargame was hosted, exploring the interaction between climate change and systemic competition. The second iteration was held in February 2025, welcoming international participants from key Allies. Initiatives such as this provide insights that shape UK Defence and UK government approaches to climate security and enable collaboration with Allies to enhance resilience in the face of climate-related threats.

UK Defence has developed Joint Climate Action Plans with key Defence partners, strengthening longstanding relationships. These reflect our intent to strengthen co-operation between organisations, focussing on climate adaptation and resilience, green technology and innovation, and the geopolitical consequences of climate change to support organisational transformation. In 2025, UK Defence will lead an International Capability and Energy Security Forum, welcoming participants from more than 10 nations around the globe to investigate advantage, resilience and interoperability through the energy transition.

There are challenges to delivering a joined-up international approach – resource constraints, competing interests among nations, shifting geopolitics and a need to balance strategy against traditional security threats can hinder collaborative efforts. There are, however, opportunities for UK Defence to lead by example and drive positive change on the global stage. By investing in new technologies, promoting sustainable practices and fostering innovation in climate resilience, UK Defence can not only enhance our own operational capabilities but also act as a strategic convenor, shaping international standards on climate and energy security. By continually engaging internationally, MOD can generate a shared understanding of the threat picture with Allies, integrate climate and energy security into strategy and Defence planning, and drive forward adaptation that builds resilience and ensures interoperability. There is still much to do, but this can be best achieved through a combined, internationalised effort.

The room prior to work, showing the rotten floorboards © Crown

The last line of defence – the Keep at Tregantle Fort

by Kathryn Sayner
Historic Building Advisor, Defence Infrastructure Organisation

Tregantle Fort, constructed between 1859 and 1864 and known colloquially as one of 'Palmerston's Follies', is a Royal Commission fortification built to deter a perceived French attack. Set atop the cliff overlooking Whitsand Bay on the Rame Head peninsula in Cornwall, the fort commands extensive views out to the southern seascape and across open fields to the north. By the time of completion, the original use of the fort was no longer needed, and although designed for 87 guns, only a small number of these were ever fitted. It is recorded that only one gun was experimentally fired at the fort in 1886.

As the final stronghold, the semi-circular Keep, positioned on the eastern side of the inner fort, is a two-storey building with a ditch and a drawbridge. This self-defensible structure was designed with strategically located gun emplacements in the outer rooms. By 1895, six 64-pounder rifled muzzle-loading guns had been installed in the Keep. Five guns were on the roof and just one is believed to have been fitted inside the Keep, located in the room covering the drawbridge.

While the Keep interior was not fully fitted out at the time of construction, it has seen various later interventions and uses. For example, the sloping gun platforms set with shallow falls to manage gun recoil were levelled up to allow the rooms to function as habitable spaces for visiting units.

Today, the fort – a nationally designated scheduled monument and a listed building – is a busy tri-service military training establishment on the Defence Training Estate. As custodians of the heritage asset, the Defence Infrastructure Organisation (DIO) and the industry partner Landmarc Support Services (Landmarc) manage the conservation requirements of the structure while simultaneously maintaining operational requirements.

The fort is included on the national Heritage at Risk register, with one reason being the vacant Keep's declining condition. The historic timber flooring to the Keep was found to be in a serious state of deterioration, presenting a risk to those entering the building for inspections and maintenance, inevitably leading to the building being placed out of bounds.

To arrest the decay of the flooring and to promote sustainable future use of the Keep building, a programme of conservation repairs, funded by the DIO's Conservation Stewardship Fund, commenced in 2018. Undertaken by experienced contractors and informed by a detailed historic building survey, the project involved careful salvaging and making good of the floorboards.

Scheduled Monument Clearance granted by the statutory body, Historic England, required retention of as much historic fabric as possible, and where new timber was required, a more economically viable and sustainably sourced wood was permitted. One of the gun emplacements, constructed using thick oak boarding, was reinstated in the room overlooking the drawbridge to maintain an original feature of the interior.

The project required consideration of protected species with cross-disciplinary work alongside an ecologist to ensure the work did not disturb any rare greater horseshoe bats. This successful collaborative working is evidenced by the subtle and creative adaptations made to the flooring in several rooms. The contractor created wide access points for the greater horseshoe to fly into the voids beneath the suspended flooring, allowing a way through the building for any bats while maintaining the integrity of the flooring finish.

During the work, interesting objects dating from World War I (WWI) and World War II (WWII) were discovered under the flooring. These finds, including WWI breeches and WWII American dress buttons, evidence past uses of the Keep and give an insight into the social history during those times. A specialist conservator was commissioned to clean and record the artefacts. Interestingly, blood-like stains on the breeches are now undergoing tests at Cranfield University to confirm if it is blood and whether DNA can be extracted.

"The project required consideration of protected species with cross-disciplinary work alongside an ecologist to ensure the work did not disturb any rare greater horseshoe bats."

The project has benefitted greatly from the involvement of heritage professionals. The continuity of Pearse & Sons' (formerly Pearse Brothers) input as sole contractors working on the flooring project has maintained the consistently high-quality finish approved by Historic England, and the continued effort to complete this project

Room with the new suspended timber flooring with bat access in the corner © Crown

Outer Keep room, covering the drawbridge with a sloping gun platform © Crown

The conserved WWI breeches © Crown

has been key to its success. This was particularly apparent during the pandemic, when Dave Pearse became seriously ill and sadly died. Steve, his brother, continued the works and saw the project through to completion while maintaining the legacy of high-quality workmanship and finish that the brothers had previously achieved together.

The well-informed and carefully considered conservation led project – undertaken by a team of stakeholders including the DIO, Landmarc, Pearse & Sons, Drakon Heritage and Conservation, and Historic England, and managed within a challenging budget and time frame – was successfully completed in 2024. The finished flooring shows a high standard of craftsmanship while enhancing and better revealing the significance of the Keep interior. The work has been well received by site users and Historic England, and the Keep can now be used again by the military for many years to come.

Shortly before going to print, we heard the deeply sad news of the death of Pieta Greaves, specialist conservator at Drakon Heritage and Conservation. Pieta's knowledge and enthusiasm will be very much missed.

A note from the editors: *An interesting fact for our readers – a small section of salvaged oak floorboard from the fort forms part of the bespoke base on Sanctuary's Operational Capability Award trophy.*

American military buttons © Crown

Black grouse shake their tail feathers at Garelochhead Training Centre

by Julian Boyce[1] **and Lottie Birch**[2]
Communications & Engagement Officer[1] and Ecologist[2], Defence Infrastructure Organisation[1, 2]

The Defence Infrastructure Organisation (DIO) has created an ideal dance floor for a flamboyant mating display by the endangered black grouse. The birds are taking to the firing range at Garelochhead Training Centre in Scotland, where the short grassland offers an ideal location for the males to get their groove on with a unique mating dance called a lek.

From dawn, the 'rookooing' sound of the iconic Scottish birds' mating calls can be heard echoing through Garelochhead Training Centre and the surrounding uplands, as the black grouse descend on the firing range. With their distinctive red eyebrows and white under-tail feathers, the birds are a special sight for local birdwatchers and military personnel alike. The males come on to the short grass areas at dawn and dusk to shake their tail feathers – as well as engage in the occasional spirited scuffle with rivals – in the mating dance. The display is intended to attract females watching from the longer grass nearby.

Despite finding a haven at Garelochhead Training Centre, the black grouse is one of the fastest-declining birds in the UK and is on the International Union for Conservation of Nature's Red List of Threatened Species. Driven by climate change and changes in land management, the birds have been moving further north as their favourite upland heathland habitats become scarcer. Their adoption of the Garelochhead range, which provides an ideal lekking habitat, is regarded as a positive step for black grouse conservation in the region.

To gain a detailed understanding of bird species across the training area, DIO and Landmarc Support Services commissioned a survey of breeding birds at Garelochhead Training Centre in 2023, as part of DIO's ongoing environmental monitoring of Defence landholdings in Scotland. It was conducted by John Simpson, a former MOD Police Officer specialising in wildlife crime, who today works as a full-time ornithologist with Wild Caledonia Wildlife Surveys.

In total, over 70 species were recorded during the survey, of which 48 species are believed to be breeding. The data from the survey, including the bird's conservation status, habitat requirements and land management requirements, is being used by DIO's ecologists to help protect and maintain habitats across the training area in careful balance with the site's military training activities. Bird species recorded at Garelochhead Training Centre include the osprey, sparrowhawk, Eurasian curlew, whinchat, grasshopper warbler and peregrine falcon, along with several species of owl. But the black grouse have the best moves.

A black grouse strutting his stuff © Crown

Black grouse lek © Crown

A horse rider and cyclists explore the trail © Crown

Creating Pirbright Military Heritage Trail

by Kathleen Letch-McMillan
Access and Recreation Advisor, Defence Infrastructure Organisation

The MOD has a policy presumption in favour of public access wherever it is compatible with the needs of operational and military training, public safety, security, conservation and interests of tenants. This means that clear and consistent public access management is required across the MOD estate to enable the public to safely access the existing estate where appropriate. However, it also gives us a chance to consider new access opportunities where they fit with the priorities and needs highlighted above.

The south-east of England has a wide range of MOD training areas that are under increasingly high pressure from the public who are looking to use them for recreational activities. Finding the balance between managing the MOD estate for its primary training use, while also enabling recreational use creates a significant challenge.

Information board eight on the trail © Crown

The Defence Infrastructure Organisation's (DIO) Access and Recreation Advisory team saw an opportunity to help improve public access around the Pirbright Danger Area. This is closed to the public 365 days a year due to the nature of the military training that takes place, with the wider estate being used for other low-level training. A route around the periphery of the Danger Area would offer a way for everyone to safely access the site, aiding better public access management and supporting the primary function of the training estate.

The aim of the project was to create and deliver a waymarked trail that would spotlight safe and easy access for walkers, cyclists and horse riders by creating a circular route. By utilising the current public right of way network, creating new permissive tracks and permissively upgrading a few footpaths to bridleways, a joined-up, versatile route was created that crossed over a variety of heathlands and wooded areas. Joining with the local public rights of way network, users could opt to complete short sections of the trail or enjoy the route as a whole.

It was decided that because of the rich military history of Pirbright, a remembrance-themed route would be appropriate. This was named the Pirbright Military Heritage Trail. The area has been home to many regiments and units since the 1870s, when the first military camp opened. Since then, the civilian and military population have been continuously intertwined, creating a close community that continue to support each other to this day.

The project was led by the Access team, supported by Defence Training Estate staff, DIO ecologists and archaeologists, Surrey County Council, Landmarc Support Services, Surrey Wildlife Trust, Thames Basin Heaths Partnership and local historians. It is a fantastic example of partnership working, with a wide range of interested parties all wanting to encourage safe and managed access to the site.

The project was funded by the DIO's Conservation Stewardship Fund, which delivers a prioritised programme of conservation projects to secure the MOD's licence to operate and train.

To identify the route on the ground, new directional fingerposts, road arrows and waymarker posts were created. A unique waymarker disc was designed, which shows an outline of a soldier with a poppy. This makes sure the trail is easily identifiable to all and reduces the chance of users entering areas they should not.

A total of 13 locations were picked for information boards to be erected along the route, giving advice about safe access to MOD land and explaining the military history and ecology of the site. The design allowed the project to focus on delivering key safety information to users of the trail while supporting wider environmental management objectives by directing visitors away from dangerous and environmentally sensitive areas. Working with the DIO ecology team, Surrey Wildlife Trust and Thames Basin Heaths Partnership, information on local fauna and flora species and habitats was added to the boards as points of interest.

A junction of the trail showing infrastructure © Crown

Local historians worked on the project to help bring to life around 150 years of military history in the Pirbright area. These sections on the boards allow trail users to learn more about the military presence, which has become intertwined with the local communities. A remembrance seat was installed at location eight on the trail, and other parts of the trail are open for seats to be added over the coming years. This creates a place for visitors to explore, reflect, remember and honour the sacrifices of our past and present military personnel.

The trail is an excellent example of the DIO helping local communities on the doorstep of a MOD training estate to connect with the site, understand the dangers of an active training area and safely enjoy the access that is on offer. The trail fits within the local Defence requirements and has provided a template to create more military heritage trails across the MOD estate.

The grand opening of the trail in November 2024 © Crown

Installing protective fencing for shorebirds © Crown

Joanne Bevan – boosting biodiversity at RAF Boulmer

Sanctuary Awards 2024/25

by Wg Cdr Charlotte Best
Station Commander, RAF Boulmer

Positioned less than a mile from the North Sea and within the Northumberland Coast National Landscape, RAF Boulmer is a non-flying unit that provides surveillance of UK airspace and tactical control of combat and support aircraft, 365 days a year, 24/7. The Station Environmental Protection Advisor, Joanne Bevan, joined the Civil Service in October 2023, bringing with her a love for nature and an appreciation of its value for biodiversity and mental wellbeing. On appointment, Joanne completed various environmental management courses. She contacted local community conservation teams and both the Defence Infrastructure Organisation (DIO) and Northumberland Council ecologists to seek their advice on how best to support wildlife conservation.

Actively engaging with the Whole Force at RAF Boulmer, Joanne reinvigorated the Station Conservation Group and championed a digital reporting tool to identify new wildlife sightings and areas of conservation interest. She encouraged resident squadrons to get out into the fresh air and contribute to conservation activity, ranging from simple litter picks to work to improve the condition of a pond for wildlife, which ironically had to be halted when great crested newts were unexpectedly identified. Highlighting the protected status of this species and adjusting the pond maintenance schedule ensured there was minimal disturbance, and work has continued outside of their breeding season.

By collaborating with a tenant farmer to postpone silage cutting and through educating personnel who deliver field training in that area, Joanne successfully protected ground-nesting skylarks, a Red Listed Bird of Conservation Concern. Night shift workers observed barn owls around the unit but identified that nesting areas were becoming overgrown and inaccessible even for the owls. In response, Joanne ensured the sites were added to the ground maintenance programme, nesting boxes were cleaned out, and four chicks and two adults were professionally ringed in 2024. Fittingly, the badge of 144 Signals Unit based at RAF Boulmer features a barn owl, which generated further enthusiasm on-site.

Bird ringers introduce Joanne to a barn owl © Crown

Taking expert advice, two dormant beehives were reinstated and a unit-wide brief on beekeeping created a real 'buzz'. Now, 20 volunteers run 'B-Squadron' with guidance from Alnwick and District Beekeeping Society. Monthly conservation mornings, known as 'Fresh Air Friday', attract an average of 12 participants. In addition to supporting wildlife conservation, promoting biodiversity and fostering sound habitat management, Joanne's initiatives are contributing positively to the health, wellbeing and team spirit of unit personnel. In September 2024, '*BBC Countryfile magazine'* published an article on RAF Boulmer's conservation efforts.

RAF Boulmer is known as a safe environment for oystercatchers, as coastal erosion and habitat disturbance have seen these Amber Listed ground-nesting birds move inland to breed (*Sanctuary* 51, 2022). The Station has previously been reactive to oystercatcher nests by marking areas to avoid once eggs were laid, but Joanne felt that more could be done to encourage them to thrive. Collaborating with DIO, Vivo, ID Verde and Northumberland Council's Space for Shorebirds team, Joanne led efforts to educate personnel, create safer breeding environments and proactively manage suitable habitats.

Using the digital reporting tool inputs, through conversations with colleagues and by undertaking daily walkarounds to identify new arrivals, oystercatcher activity was closely monitored. Once eggs were spotted, Space for Shorebirds rangers installed temporary fencing and signage to protect the nest sites. In the 2024 breeding season more and more nests were identified and protected, and when fledglings were seen venturing from their nests, everyone involved felt a deep sense of pride.

During winter, Joanne led work to create specific nesting scrapes and installed raised nesting boxes as a new initiative to protect eggs from predation and accidental damage. Selecting locations away from roads, pathways and operational areas will ensure a sustainable co-existence between the working station and the visiting oystercatchers.

The number of breeding oystercatcher pairs doubled from five nests and 10 chicks in 2023, to 10 nests and 25 chicks in 2024. At the time of writing, the 2025 nesting season is underway. There are nine oystercatcher nests around the site, noisy piping calls fill the air, 26 eggs have been laid and five chicks have hatched already. Oystercatchers form long-term bonds and often mate for life; they can live up to 40 years, so Northumbria Bird Ringing Group will be ringing chicks during 2025 to determine whether birds are returning here to breed.

Through Joanne's initiative, leadership and enthusiasm, personnel across the unit understand that protecting the environment is a shared responsibility and that even small actions can make a significant difference. The knock-on effect of this has been greater biodiversity across the site by linking multiple conservation projects together. In her first year as the Station Environmental Protection Advisor, Joanne has heightened awareness of nature at RAF Boulmer, and her encouragement of others to get involved has brought teams together for a common goal, fostering a real sense of pride in all they have accomplished. Joanne's debut as a conservation professional has been a huge success.

'B-Squadron' beekeepers discuss the hives © Crown

The risk to the Defence Training Estate

by Lt Col Stuart Biggers
SO1 Resilience, Climate, Energy and Environment Directorate

Combined Arms Manoeuvre School © Crown

The King's Royal Hussars take on Bavarian Challenge during Ex COMBINED RESOLVE © Crown

Defence is a significant landowner responsible for circa 1% of the entire UK landmass, with overseas training areas and bases as well. Two thirds of MOD land in the UK is held solely for the purpose of military training. This essential training function, across such a wide variety of terrain, is essential to the maintenance of UK Defence resilience. Consequently, from a landowner's perspective, the MOD is susceptible to all the same challenges and risks that a changing climate will bring. This is not just a case of having available land on which to train; the Defence Training Estate also has some of the highest percentages of Sites of Special Scientific Interest and protected habitats which Defence, as the landowner, is legally required to preserve.

Defence has long extolled mantras such as 'Train Hard, Fight Easy' and 'Train as you would fight'. The Defence Training Estate is therefore central to UK Defence resilience by enabling its readiness and preparedness to defend the nation. The impact of losing Salisbury Plain Training Area or some of Defence's overseas training facilities for substantial periods of time due to flooding or fire, for example, is currently immeasurable, unquantified and without mitigation, which could be significant in terms of cost and time.

Defence is now assessing what those impacts might be and mapping this over time against predicted climatic data provided by our colleagues in the Met Office. Historical data capture has been lacking and so baselining the current situation from which to extrapolate is taking time. Once this baseline is understood, the next step will be to superimpose the weather predictions over time, noting these are more difficult to assess the further into the future we look. This will give a prediction of frequency and severity by location. The compound impact of events such as prolonged hot and dry spells baking the ground, followed by high and prolonged rainfall exacerbating the likelihood of severe flooding, will need to be considered. There are any number of permutations that could be modelled.

Once frequency and severity are known, risk impact can be calculated. There are a number of ways this could be articulated, but a lack of availability of the training estate and its impact on Defence's readiness is one such metric. Others could include the wider impact of Defence Training Estate land on neighbouring areas with the concomitant legal implications. Either way, until Defence can quantify this risk, it cannot mitigate it. The journey, thankfully, has started.

Food from the lower carbon menu © Aramark UK

Aramark UK – reducing carbon in catering through sustainable innovation

by David Fradgley
Head of Marketing, Aramark UK

The United Nations highlights that food systems are responsible for approximately one-third of global greenhouse gas emissions, underlining the importance of sustainable food practices in mitigating climate change. Recognising this, Aramark UK introduced an initiative to reduce the carbon footprint of their catering for the MOD, showcasing how conscious food choices can benefit both health and the environment.

Operating under its Environmental, Social and Governance platform 'Be Well. Do Well', Aramark UK has taken decisive steps to reduce emissions through its Defence sector operations. Their core concept focuses on reducing carbon, one plate at a time.

The project began with a redesign of the MOD menu. In partnership with Foodprint, powered by Nutritics, Aramark UK's chefs gained access to real-time carbon data for each ingredient. This allowed for informed recipe reformulations that maintained flavour and nutrition while lowering the environmental impact. The result included a 13% overall carbon reduction in dish sales and an 18.2% decrease in average emissions per dish, dropping from 0.65kg to 0.53kg CO_2 equivalent across 78% of Defence sites.

Displays from the 'play your carbon right' experiential customer game © Aramark UK

Aramark further invested in training their chefs as sustainability leaders. Through Nutritics' education, chefs learned to apply carbon data during recipe development. Smart ingredient swaps, such as reducing red meat, were guided by site-level prototyping and feedback to ensure Defence personnel still enjoyed familiar, satisfying meals.

Crucially, the initiative engaged MOD personnel, building awareness and ownership. Interactive campaigns, such as the 'higher or lower' carbon game, created memorable, educational experiences that embedded sustainability into daily choices.

This project is not an isolated success but a replicable model. Aramark UK's carbon-conscious methods are now embedded in their food management system, allowing every future recipe to be carbon-optimised. Over 75,000 MOD personnel now benefit from more sustainable food daily, with plans to expand this model across other sectors served by Aramark.

'Public Sector Catering' recognised the significance of this work, featuring it as a cover story in November 2024. This initiative demonstrates how data-driven innovation, staff empowerment and stakeholder engagement can deliver measurable and scalable sustainability outcomes in public sector catering.

Aramark UK has reduced emissions and reshaped how their food for the military is created, delivered and understood. The initiative demonstrates how sustainable catering can put health, flavour and environmental responsibility on every plate.

Seventh century graves being excavated by veterans and archaeologists from Op Nightingale on Salisbury Plain Training Area (see *Sanctuary* 51, 2022)

The DIO Conservation Stewardship Fund – 10 years of delivery

by Richard Brooks
Principal Environmental Manager – Forestry, Heritage and Engagement (CSF Budget and Programme Manager), Defence Infrastructure Organisation

As is often highlighted in *Sanctuary*, the MOD estate is one of the most valuable in terms of ecology and heritage. Comprising 220,000ha in the UK and over 350,000ha overseas, it is hardly surprising that this includes a vast array of important habitats and a wide diversity of heritage assets. The fact that the estate has been in MOD ownership has meant that it has been protected from the pressures that other landholdings have been subject to, such as agricultural improvement and infrastructure development, including roads, utilities and housing.

To put this into context, the UK MOD estate has 168 Sites of Special Scientific Interest (SSSIs) covering 81,667ha, which is 37% of the Defence estate, including 74,200ha of other designations such as Special Protection Areas and Special Areas of Conservation. Our landholding falls within 13 National Parks and 19 National Landscapes. From a heritage perspective, in the UK the MOD operates in 9 World Heritage Sites, with 784 scheduled monuments and 853 listed buildings on our estate. The designated heritage covers all ages, from the Neolithic through to Cold War infrastructure. With such richness, it is little wonder that there is high demand to enable public access, allowing people to visit and enjoy the estate where it is safe and appropriate.

To ensure that the MOD delivers Defence's statutory and policy conservation stewardship commitments, the Defence Infrastructure Organisation (DIO) established the Conservation Stewardship Fund (CSF) in 2015. This year the CSF celebrates a decade of delivery and will reach a £30 million spend. The CSF is essential for securing compliance with many of the MOD's statutory and policy obligations related to the conservation or improvement of the natural and historic environment, landscape and public access features across the estate. A programme of CSF tasks helps to secure the MOD's licence to operate and train. It delivers an immeasurable

return environmentally and reputationally for Defence, which arguably greatly outweighs the financial investment. This is evidenced by the positive environmental successes and good news stories that the CSF projects generate. You only have to look back over the last 10 years of *Sanctuary* to note how many stewardship projects have been funded or assisted by the CSF.

The CSF SSSI and natural environment programme is essential for securing compliance with many of the MOD's statutory and policy obligations for conservation across the MOD estate in the UK. Under the Wildlife and Countryside Act 1981, MOD has a duty to *"take reasonable steps, consistent with the proper exercise of the authority's functions, to further the conservation and enhancement of the flora, fauna or geological or physiographical features by reason of which the site is of special scientific interest is designated"*. The MOD discharges this duty in part by delivering a programme to manage the SSSIs across the estate, aiming to implement management that ensures SSSI features are achieving or moving towards, favourable condition. In addition, all public authorities who operate in England, including the MOD, must consider what they can do to conserve and enhance biodiversity as part of the strengthened biodiversity duty introduced by the Environment Act 2021.

Similarly, CSF heritage funding for assets deemed as Heritage at Risk (or at risk of becoming so) meets with the Protocol for the Care of the Government Historic Estate, as signed up to by the MOD with the Department for Culture, Media and Sport. The CSF heritage programme is selected from scheduled monument and listed building inspections and is agreed with Historic England (or the devolved equivalents) to ensure that assets are removed from, or not added to, the Heritage at Risk Register.

Preparing for a campaign against bird trapping in Cyprus (see *Sanctuary* 48, 2019) © SBA-P

The CSF budget is limited and every effort is made to ensure that the benefit from spend is maximised. This is often achieved by working in partnership with other defence partners and external organisations. It is these projects which truly reflect the wider benefits of CSF in building partnerships, trust and delivery with other government departments, non-governmental organisations and charities. Examples include collaborations with the RSPB and Wildlife Trusts, as well as local authorities such as Pembrokeshire Coast National Park; funding internal defence partnerships, for example, Operation Nightingale (a regular in *Sanctuary*); and providing equipment to many Conservation Groups (who are also a mainstay of this publication).

Over the past 10 years, some brilliant and novel projects have been funded by CSF. It is impossible to name a favourite, as it is the cumulative effect of the CSF that has impacted so much in terms of our estate-wide stewardship effort. As in previous editions of *Sanctuary*, many CSF projects feature in this edition, including the winner of the Silver Otter Trophy (see p.38), whose post is 50% funded by CSF.

Fingringhoe Ranges saltmarshes © Crown

Project BACCHUS – keeping a subterranean Army marching on its stomach by growing underground

by Lt Col Simon Watkins
SO1 Research and Experimentation, Defence Support

The project in action © Crown

Project BACCHUS is an innovative project that aims to demonstrate the feasibility of cultivating food in austere tactical conditions. The project was conceived as a response to the challenges faced by Ukrainian forces at the Azovstal steelworks in Mariupol, where after 80 days food ran out due to the harsh conditions of sheltering and operating below surface. The British Army are increasingly focusing on operations in subterranean environments in an attempt to gain operational advantage by eschewing modern warfare's increasingly transparent and lethal battlespace.

Whilst food is recognised as a key component of operational effectiveness and maintenance of morale, the anticipated fragility of logistic supply in future high-threat environments would quickly necessitate reliance on operational ration packs. In low-light and austere conditions, ration fatigue can quickly set in, exacerbated by the basic nutritional content of current UK operational ration packs. Fresh ingredients that add nutrition, flavour, aroma and texture can be a force multiplier in maintaining the fighting power of troops.

Enter Project BACCHUS – an experimental endeavour headed by Lt Col Marko Bulmer from Specialist Group Military Intelligence, with Capt Richard Byrne and Chief Petty Officer Navy Nurse Ellie Walls providing the drive and technical expertise. The core team have been aided by Maj James Moloney from 8 Engineer Brigade, who brings extensive operations in subterranean environments knowledge, and Sgt Matt Breeson, an experienced Army Chef. Having obtained funding and sponsorship from the Defence Support Research and Experimentation programme, the team have utilised Wellington Barracks' underground car park with the aim of proving that it is possible to grow food in conditions of sub-optimal light, low consistent temperature and limited air flow. With the help of enthusiastic Wellington Barracks support staff, Project BACCHUS trials have demonstrated that it is feasible to produce a range of herbs, microgreens, mushrooms and leafy vegetables in semi-controlled, subterranean conditions – not to replace but to augment operational ration packs.

Having proved the feasibility of growing crops underground, the project's secondary aim is the development of a prototype lightweight, self-contained, deployable hydroponic grow box. This must be capable of producing a range of flavoursome and nutritious leafy greens, herbs, mushrooms and even plants with medicinal properties, that can be cared for and consumed by service personnel with minimal expertise or training.

Having completed phase one successfully, the team are currently searching for a sponsor for phase two – the further development and testing of a deployable grow box.

Archaeological research to assist the recovery of military personnel in Ukraine

The National Reserve Kyiv-Pechersk Lavra © Yulia Mysko

by Dr Sergiy Taranenko
Head of the Archaeology Department,
National Reserve, Kyiv-Pechersk Lavra

The 24 February 2025 marked three years since Russia's full-scale invasion of Ukraine. What began as Russia's intended three-day operation into Ukraine has since evolved into more than 1,000 days of conflict, destruction and the killing or wounding of more than one million people.

The team at the National Reserve Kyiv-Pechersk Lavra (the reserve) wanted to support the armed forces of Ukraine. The reserve was created in 1926 and consists of 140 historical and cultural monuments which make up the architectural complex of Kyiv-Pechersk Lavra. Since the beginning of a full-scale military invasion, more than half a million people have received the status of combatant, and war always leaves a deep psychological imprint on every soldier. Inspired by the MOD's Operation Nightingale, which uses archaeology to assist the recovery of wounded, injured and sick serving personnel and veterans, the team decided to explore how archaeological research could provide psychological rehabilitation of Ukrainian military personnel.

The project 'Spiritual Restoration through Culture' was launched in May 2023, with advisory support provided by the Defence Infrastructure Organisation's Senior Archaeologist Richard Osgood, who leads Op Nightingale, and Mark Brisbane from Bournemouth University. Our UK colleagues introduced the reserve team to the AMPHORA (Authentic and Meaningful Participation in Heritage or Related Activities) toolkit to put theory into practice, and the project has now been attended by more than 1,400 Ukrainian serving personnel.

The excavations focused on the site of an 11th to 12th century glass-making workshop located

Participants excavate the site © Olena Makhota

within the grounds of the Metropolitan Garden at the Kyiv-Pechersk Monastery. The site was chosen because of the high likelihood that artefacts would be discovered. Participants received an introduction to the site and its cultural heritage, conveying the importance of the research and the value of any artefacts found in uncovering more about the history of Ukraine. Several key locations in the garden were selected and participants were introduced to a variety of excavation methods and types of research. This included the cleaning and logging of finds and moving waste soil, but the most popular activity was soil sifting as this was when most historical artefacts were discovered.

The participants were really engaged in the excavations and showed keen interest in the history of the monastery, the site and the artefacts found. It has also been an educational experience for the reserve team, who learned how to identify whether participants wanted to talk and how to support them in participating at their own pace.

Project Spiritual Restoration through Culture at the National Reserve Kyiv-Pechersk Lavra has been a great success and continues to develop and deliver positive outcomes for the armed forces of Ukraine.

Foundations for ecosystem services – peatland restoration provides a licence to train at Otterburn

by Lt Col David Owen
SO1 Land Management, British Army

Otterburn Training Area in Northumberland is the UK's largest military training facility. The 56,000-acre expanse of moorland, woodland and farmland supports a wide range of habitat types of great importance. This includes four Special Areas of Conservation and 19 Sites of Special Scientific Interest, comprising extensive tracts of upland heather moorland, ancient woodlands, mires and species-rich hay meadows. The area is used heavily by multiple and varied military training, with artillery fired regularly into the large impact area.

Military training and climate change present a real wildfire risk at Otterburn Training Area. In 2018, a large peatland fire was accidentally started by artillery training, which may have released as much as 68,000 tCO_2e – approximately the same amount as the MOD's domestic travel carbon footprint in 2016/17.

Over the past five years, the team at Otterburn – Josh Feakins (Principal Estate Surveyor), Keith Anderson (Forester), Moira Owen and Karen Fisher (Ecologists) – have laid foundations across the vast Otterburn Training Area for ecosystem services to combat climate impact on military training. Their aim is to understand the value of carbon sequestration and progressively deliver collective benefits through ecosystem services on a landscape scale, beginning with the development of processes and selective pilots. Delivering climate resilience for military training through peatland restoration, carbon sequestration and biodiversity improvements is a key objective.

A blocked grip (man-made peatland drainage ditch), to avoid livestock drowning and reduce the wildfire risk of military training © Karen Fisher

10 acres of scrub planted at Laingshill Farm to stop cattle damaging and polluting riverbanks © Richard Postlethwaite

Collaboration has involved large organisations and individual tenant farmers. To ensure military training takes place at Otterburn, ecosystem services activities need deconflicting. For example, access to the impact area is allowed for only four weeks of the year, and clearance of unexploded ordnance is required. The whole of Otterburn is farmed by 36 tenant farmers of varied experience and views when it comes to farming, climate change and ecosystem management. This engagement takes place alongside collaboration with local and national environmental organisations to ensure compliance. Otterburn Training Area has good relationships with its

neighbours – including Northumberland Wildlife Trust, Northumberland Peatland Partnership and Natural England – ensuring positive outcomes with a view to future opportunities.

Good landlord-tenant relationships have generated additional peatland restoration, reducing the wildfire threat by targeting the area damaged by the 2018 fire and throughout Otterburn. Funded by the Department for Environment, Food and Rural Affairs' Countryside Stewardship Funds and the Defence Infrastructure Organisation has supported the implementation of grip blocks with fencing to control grazing and improve blanket bog generation. This helps reduce downstream flooding, an increasing threat to troops and local communities due to climate change.

"The MOD have been very helpful in assisting us to decarbonise our farm business through encouraging tree and hedge planting, funding critical infrastructure projects and offering support in accessing agri-environment schemes," said Scott Iley from Barrowburn Farm. A new cow shed provided by the MOD enabled Scott and his wife, Catherine, to switch from sheep to 100% cattle farming. The reduction of sheep provides increases in biodiversity and assists in peatland recovery. Barrowburn Farm has been declared a net negative farm after a recent audit, facilitated by MOD investment and novel approaches such as microbial manure digestion. A total of four cattle sheds have been provided by MOD as the landlord in the past three years. Another four sheds have been funded for this current financial year with more planned for coming years too.

Fast-tracking changes in land use has always been challenging on the MOD estate. However, Josh Feakins has expedited outcomes using an innovative rent reduction approach – a simple mechanism of providing finance through a pause in rents, allowing tenants to invest in farming infrastructure. One example from Cottonshope Farm is covering a yard with a roof to reduce manure washing into water courses, protecting the critically endangered freshwater pearl mussel.

These rent reductions, alongside long-term tenancy renewals, deliver goodwill and confidence for tenants to invest, as Richard Postlethwaite from Laingshill Farm attests: *"The MOD have been very supportive in assisting me to improve our farm using the rent reduction scheme. MOD engagement has also helped me improve my business through access to funding for biodiversity improvement. It is good to hear that the peatland restoration I have carried out has supported military training"*.

The work undertaken by the Otterburn team has taken place despite a small budget – well below what would be required to conduct large-scale action for the whole area. Funding had to be supplemented and indirectly sourced through delivery by tenant farmers, facilitated by the team's influence and supported by novel approaches underpinned by local knowledge, personal relationships and stakeholder engagement.

The challenge is great, but through innovative processes and collaboration, the hope is that fire risk can be reduced and foundations are laid for increased resourcing and impact to safeguard military training. As Professor Alistair Driver from Rewilding Britain remarked following a visit to Otterburn Training Area: *"Really effective re-wetting, areas of natural regeneration, native tree planting and reduction in stocking densities… are all helping to mitigate impacts of climate change and restore biodiversity"*.

Microbial treatment of cattle manure to reduce carbon emissions © Scott Iley

The strategic context and why this matters more than ever

by Ryan Walker
Strategy Advisor, Climate, Energy and Environment Directorate

The Strategic Defence Review signifies a landmark shift in deterrence and defence in response to growing and diversifying threats: war in Europe, growing Russian aggression, new nuclear risks, and daily cyber attacks at home. The operating environment will be shaped by increased strategic competition between state and non-state actors and by rapid technology change, that continually changes how armed forces must be organised, equipped, and fight. Interacting with these trends, climate change and environmental degradation were identified as 'persistent transnational challenges' driving competition for resources, migration, instability and more frequent humanitarian disasters, and will demand military adaptation for operations in more extreme weather conditions.

2025 marked nearly five years since the publication of the MOD's Climate Change and Sustainability Strategic Approach. As a first-of-its-kind document, it broke ground for the department, setting the agenda for UK Defence to adapt to climatic change, securing operational effectiveness and resilience into the future. The last five years have seen significant upheaval. The COVID-19 pandemic, Russia's invasion of Ukraine, energy price shocks and shifting political sands have preoccupied global attention and transformed the state of global affairs, while the threat of climate change has grown.

As a stark warning, in 2024, for the first time ever, global average temperatures breached the 1.5°C pre-industrial threshold. This sobering milestone moves the planet closer to irreversible tipping points. This means that food and water scarcity, damage to infrastructure, severe weather events and migration will become more frequent and intense, placing a strain on all nations.

Climate change also offers our adversaries opportunities to exploit instability, placing our security at greater risk. Climate insecurity means

A RAF C-17 Globemaster arrives in Egypt, to deliver UK aid for onward transfer to Gaza © Crown

more resource competition, which will drive future conflict. The physical impact of climate change will create more hostile environments, placing greater demands on UK Defence to adapt to become resilient in order to operate effectively. To illustrate this, in the last three years hazardous situations resulting from climate change have led to military deployments in more than 68 countries in response.

Extreme weather also poses a risk to military sites storing combustible materials, meaning accidental fires and explosions are concerning possibilities. Therefore, UK Defence must front up to these new realities and accelerate adaptation and resilience across our enterprise. Doing so is critical to ensure operational effectiveness and interoperability with Allies for the defence of our interests at home and abroad.

The speed of technological advances in energy and circular economy technology presents a strategic opportunity for Defence to build operational advantage, stimulate growth and increase resilience. We have witnessed Russia weaponising energy in Ukraine by destroying and capturing Ukrainian energy infrastructure. Energy is an increasingly important strategic capability in a context where Defence power demands are increasing, because of new combat innovations in AI, autonomous systems and directed energy weapons. The future battlespace will also require an increasing proportion of energy to be generated at the point of use.

Meanwhile, the UK government has pledged to make Britain a clean energy superpower and set this goal as one of its five core national missions – a clear statement of intent. This was further underscored at COP29 in November 2024, when the Prime Minister announced his ambition to reduce all greenhouse gas emissions by at least 81% by 2035, compared to 1990 levels. Thus, the signal from government is clearer than ever that climate action is a core priority.

Historically, only hydrocarbons have delivered the firm power baseload Defence needs to succeed on deployments. However, emerging trends in clean energy and storage offer exciting possibilities that could increase operational effectiveness and resilience. Harnessing technology in deployable, portable, clean energy sources such as Sustainable Aviation Fuel, nuclear small modular reactors, sustainable drop-in fuels, microgrids, batteries and hybrid vehicles could increase resilience and reduce dependence on fuel convoys for remote deployments. This will enable greater agility and self-sustainment, thus bringing down running and servicing costs. UK Defence can also unlock improved survivability and lethality from reduced acoustic and heat signature

UK Humanitarian Assistance and Disaster Relief operations will likely increase in a world more impacted by climate change © Crown

The MOD has also recently concluded an Estate Energy Review, looking at private energy generation on the estate, and is exploring potential energy projects in small modular reactors and renewables. These could reduce the energy overheads for MOD, with cost advantages that could be reinvested across Defence. This would also build energy security while supporting the government's clean energy and growth missions, including through development of AI Growth Zones.

Our competitors and adversaries face the same challenges of an increasingly hostile operating environment driven by climate change and are already innovating at pace to exploit the opportunities that will emerge. Both our collective determination and close collaboration with Allies are required to adapt, build resilience and ensure operational advantage in a climate-impacted world. Therefore, by bringing climate change directly into defence planning as a key principle, the core missions of national defence will be served.

The next five years offer an enormous opportunity to embed climate change and its implications into our planning and operations. Accelerating action will enable Defence to adapt to emerging challenges, build operational advantage and resilience, grow our technological overmatch and unlock cost advantages that support investment in UK warfighting capability.

Recognising Maj Peter MacKenzie's efforts to confront overheating infrastructure – not just a load of hot air!

Maj Peter MacKenzie
© Peter MacKenzie

by Lt Col Simon Watkins
SO1 Research and Experimentation, Defence Support

When deployed on operations in Iraq in 2018, Maj Peter MacKenzie observed that the design of defensive sangars (a protected sentry post) were effective at protecting soldiers from small arms fire but not at sheltering them from the heat of the sun. Wearing helmets and full body armour, the temperature inside the sangars regularly exceeded 55°C, making regular rotation of the sentries vital to manage the risk of heat exhaustion. Appalled by the degradation of operational effectiveness and health, this experience acted as a catalyst to what has become an impressive one-man crusade to address the effects of overheating military infrastructure.

Between 2023 – 2025, Maj MacKenzie undertook an MSc at Cranfield University specifically aimed at finding a solution to the overheating of sangars. His cost-effective solution exceeded all expectations. He approached the Defence Support Research and Experimentation team seeking assistance to fund a project addressing the broader issue of the inefficiency of Defence infrastructure in hot climates. Utilising thermal data capture equipment bought from the Defence Support Research and Experimentation fund, he deployed to Operation SHADER in Iraq for six months in 2024. Using his spare time to undertake field research that demonstrates the thermal inefficiency of operational infrastructure, Maj MacKenzie used this data to augment his academic research in the UK.

Improvised passive cooling techniques implemented on Op SHADER
© Peter MacKenzie

Defence infrastructure design is often poorly suited to hot environments, and a substantial proportion of energy used to cool it is wasted. Using the sangar concept as a starting point, Maj MacKenzie's work has demonstrated that significantly more efficient infrastructure can be built by incorporating passive cooling concepts. Passive cooling does not require any external power, is very cost-effective and has been used extensively for many thousands of years by numerous cultures living in hot climates. The benefits are clear, as air conditioning accounts for a significant amount of energy use within operational infrastructure in hot climates, costing millions of pounds. With UK overseas bases included in the MOD's carbon emissions, Maj MacKenzie's research – if implemented – has the potential to be a game-changer for our people and Defence's infrastructure energy consumption and carbon footprint.

In recognition of Maj MacKenzie having delivered a positive effect completely out of proportion to his rank, and the value of his work in improving the self-sustainment of operations and increasing the resilience of the global strategic base to effects of climate change, Chief of Defence Logistics and Support recently sponsored his passive cooling PhD. Maj MacKenzie hopes to use this further research to influence future Defence infrastructure design.

Leading the way for turtle doves at Foulness

by Mark Nowers
Turtle Dove Conservation Adviser, RSPB

A turtle dove in flight © Jan Lewis

Nestled on the south-east extreme of coastal Essex lies Foulness Island and Wakering Stairs: a vast, open, mostly arable landscape skirted with borrow dykes and sea walls. Sandwiched between the farmed landscape and the coast are large areas of scrub which have established around the many butts and batteries. It is these areas and the fringes of open brownfield habitats that support the most important population of turtle doves in the county.

The turtle dove is the fastest-declining breeding bird in the UK. Turtle doves are migrants, spending the winter in West Africa and arriving in the UK from mid-April, having crossed the western European flyway of France, Spain and Portugal. Unsustainable hunting in those countries was seeing up to a million birds a year being shot in the 2010s. A temporary hunting ban began in 2021 and within three years, the flyway population increased by 40% to 615,000 pairs.

Habitat loss here in the UK is also a significant issue, as turtle doves need access to abundant and accessible seed-rich habitat, thick scrub for nesting and fresh water. Operation Turtle Dove is a partnership project aiming to reverse the decline of the turtle dove. Its advisors are working with nearly 450 farmers and landowners across south-east and eastern England.

A major part of this work is running a targeted supplementary feeding programme. Since 2016, farmer John Burroughs has diligently taken on this role on Foulness. For 12 weeks from late April, seed is finely broadcast once a week on tracks or short vegetation, following an established protocol to absolutely minimise the risks of disease transmission. Turtle doves are highly mobile, ranging kilometres daily in search of accessible seed, so these patches dotted around the islands provide a valuable resource for them.

In 2023, QinetiQ funded a full survey of suitable turtle dove habitat on the island, which estimated the population at 11 to 16 territories (based on singing males). The survey report also provided recommendations for the management of nesting habitat and the creation of more foraging habitat.

As well as supplementary feeding, our farmer champion John also keeps a detailed log of day-to-day sightings, which allows the team to piece together a fairly accurate picture outside of full surveys. In 2024, John's records included sightings of juveniles, clear evidence of successful breeding, in three separate locations.

Looking ahead, the next step will be to deploy trail cameras in 2025 to monitor how often the various supplementary feeding patches are being used.

A turtle dove in a typical pose on a hawthorn © Liz Cutting

Red deer © Jon Hawkins

Wildfires on lowland heathland at Pirbright Ranges – a case study in nature-based recovery

by Ben Habgood
Nature-based Solutions Manager, Surrey Wildlife Trust

Fires have been a historic feature of lowland heathland landscapes for centuries, both as a natural occurrence and sometimes as a prescribed management tool. But with increasing global warming, wildfires now pose a more frequent risk to these vital wildlife habitats, not to mention the risk to local people and property.

In Surrey alone, there have been several major wildfire incidents since 2020. Pirbright Ranges is a 750ha site owned by the MOD, with some areas of the Range Danger Area leased by the National Rifle Association, and in 2022 it was subjected to a fire of unprecedented severity. Pirbright Ranges is one of more than a dozen heathland sites managed for nature by Surrey Wildlife Trust and is also part of Natural England’s Countryside Stewardship Higher Tier scheme. Progressing across this pristine lowland heathland site from July to August 2022, the blaze seriously damaged some 650ha of habitat of national importance for rare wildlife, including European nightjar, woodlark, adders and heath tiger beetle.

Distressingly, the blaze posed an existential threat to Surrey Wildlife Trust’s herd of 120 reintroduced native red deer, which have been on the site with Defence Infrastructure Organisation (DIO) and National Rifle Association support since 2010. This large, native herbivore was selected as its natural behaviours positively impact vegetation, maintaining open lowland habitat. This unique grazing and browsing activity ensures that the sward structure is kept at varying lengths and densities, benefitting the widest possible range of species. The red deer’s height and ability to forage on a wide range of forbs makes it the perfect species to keep scrub and coarse grasses in check across valley mires, bog systems and dry heathland. Enclosing a native herd within an active military suite of ranges, with unexploded ordnance risk on one of the rarest habitats on the planet,

means that Pirbright Ranges is a unique example of sustainable lowland heathland management.

The innovative use of red deer to deliver conservation grazing has ensured good outcomes for nature with minimal human interference. Across the Defence Training Estate, Surrey Wildlife Trust works closely with an elite team from Defence Deer Management to ensure high welfare standards and herd management, whilst operating on an area with very restricted access. Since autumn 2022, Surrey Wildlife Trust, Defence Deer Management and the MOD have worked collaboratively to restore vital infrastructure, carry out site surveys, deliver veterinary welfare checks and provide supplementary feeding to the deer.

Following the wildfire, an immediate priority was the replacement of some 3.85km of fencing, which serves the vital function of keeping the deer inside appropriate grazing areas. Surrey Wildlife Trust have also carried out specific landscape management actions around the site perimeter, creating fire breaks and areas of bare ground, which also provide habitat for basking reptiles and invertebrates.

No public access is permitted within Pirbright Ranges, and as such the site enjoys exceptional floristic diversity. As the site recovers, the grazing actions of the deer are boosting populations of rare native flora, including the pre-historic fern marsh clubmoss and moisture-loving marsh arrowgrass.

For other species, recovery will be a longer-term prospect. Optimal levels of vegetation across the site will not return for several more years. However, current conditions are favourable for breeding woodlark, a pioneer heathland species that favours open habitats and usually does well following fires on heathland. Another notable species that has proliferated across the site is common dodder, a semi-parasitic plant that attaches itself to host plants like common gorse.

Dartford warblers are less abundant now because they need mature heather and gorse that will take some years to regenerate. European nightjars require a complex mosaic of habitats including good ground cover and low tree branches, all of which will be abundant on Pirbright Ranges in the coming years.

Censuses carried out using a combination of thermal aerial drone detection, camera traps and visual surveys have revealed that the red deer herd itself is also in good shape, with successful calving seasons in June 2023 and 2024. Young calves are mobile within a few hours of birth, and no fire-related mortalities have been detected.

Red deer routes through fire-damaged habitat © Ben Habgood

Dartford warbler © Jon Hawkins

Surrey Wildlife Trust has ambitions to explore how other species reintroductions and nature-based solutions might boost biodiversity on the site further still. These could include the re-wetting of selected areas to improve resilience against wildfires and to offset some of the effects of climate change.

Lowland heathland does not remain in a static condition over time; it must be carefully managed to increase its potential for nature and ensure that it continues to provide ecosystem services such as carbon sequestration and flood control. The partnership between Surrey Wildlife Trust, DIO, the National Rifle Association and Defence Deer Management will enable this to happen to the benefit of all.

Biodiversity has increased on the south-facing bank at Imber Lines due to a new mowing regime © Mark Nash

Lt Col Mark Nash – driving carbon emission reductions at Land Training Fleet, Warminster

Sanctuary Awards 2024/25

by Lt Col David Owen
SO1 Land Management, British Army

One of the British Army's largest vehicle maintenance facilities has achieved a 70% drop in carbon emissions while embracing biodiversity. Imber Lines, home to Land Training Fleet (Warminster) was a collection of carbon intensive vehicle maintenance workshops providing vehicles to Field Army Training. Since 2019, the Head of Establishment, Lt Col Mark Nash, and his team have reduced carbon emissions from 363 tonnes CO_2 equivalent per year to 107 tonnes CO_2 equivalent per year. There have been annual savings of around £70,000, as well as cutting water consumption in half.

Lt Col Nash's strategy of 'spending towards net zero, not away from it' places carbon reduction ahead of savings – an approach that is all too rare but fully justified by its impact. For example, measures such as electric heaters offer marginal economic gains at first glance but prove more economical than gas boilers due to the controllability and reliability of electricity. When combined with the 'switch it off' culture at Imber Lines, these measures deliver significant economic and carbon benefits. Adaptation and pragmatism have been required but not at the expense of the aim, and Lt Col Nash has never lost sight of the reason for decarbonisation the economics facilitate. It is to the credit of all those involved that attitudes have shifted to accept his approach.

Through innovative use of the Local Infrastructure Improvement Fund (LIIF), Lt Col Nash has decarbonised facilities. One large workshop was previously lit by old sodium bulbs and heated by an outdated, unresponsive gas heating system positioned high above the floor. This workshop alone accounted for almost 30% of Imber Lines' carbon footprint. Replacing bulbs would save carbon and money, but securing conventional funding proved challenging, so LIIF was selected as an alternative funding source. Lt Col Nash successfully made the case that local solutions to climate change delivered social value and that modern LED lighting would create a better workspace. After LED installation – and with Warrant Officers controlling the old heating system more effectively – carbon emissions

dropped from 217 tonnes CO_2 equivalent to 56 tonnes CO_2 equivalent. LIIF also funded additional LED installations and submetering elsewhere on the site, providing accurate baselining that enabled targeted improvements. Throughout this process, Lt Col Nash maintained good relationships, benefitting from advice provided by the Army Regional Infrastructure Cell, the Defence Infrastructure Organisation (DIO) and VIVO.

Decarbonisation and biodiversity improvement have been a team sport. The Military Guard Service and their Operations Manager have provided biodiversity feedback from the night shift on nocturnal mammalian habits. In the absence of a building management system, the Warrant Officers have controlled heating and ensured that switches are turned off when not needed. One of the contractor staff has played a key role by broadening their remit to include extensive meter readings. Lt Col Nash has maintained detailed data, crucially facilitated by the DIO Area Utility Manager.

Imber Lines is not blessed with obvious habitat improvement opportunities, yet great strides have been made along the narrow banks and verges. Lt Col Nash engaged the local DIO Ecologist, who played a vital role in identifying indicators of biodiversity increase (butterfly, bee and orchid proliferation). They implemented a plan to plant locally grown wild plants as part of the Warminster Plan Bee project, which supports the rare large scabious mining bee and its rarer nomada cuckoo bee. Lt Col Nash, supported by the grounds maintenance contractor, changed the mowing regime, leading to a wealth of wildflowers and orchids on south-facing banks and small open areas. Biodiversity has increased in the designated areas. Despite its industrial nature, Imber Lines is becoming an island for pollinators, extending their ranges from Salisbury Plain to other areas of chalk grassland around Warminster. The DIO Forester advised planting 330 trees as part of The Queen's Green Canopy. The assessed carbon savings are approximately five tonnes CO_2 equivalent per year after 10 years of growth.

Lt Col Nash's vision for carbon reduction and biodiversity enhancement has engaged the leadership team, with everyone understanding and supporting the objectives. Lt Col Nash plays an important role in the wider Garrison Environmental Committee, contributing a wealth of knowledge and enthusiasm for green causes such as the Pollination Street project. In being an agent of change, Lt Col Nash has willingly risked personal credibility by championing solutions that may go against the grain. His leadership is demonstrated through consistent personal actions – stopping mowing contractors at the gate to implement an improved mowing regime, conducting power conservation patrols, personally collecting litter and never exceeding the optimal speed of 50mph in his electric car. This is truly 'walking the walk'. Lt Col Nash has connected the local solution to the global problem. His dogged determination has sustained the decarbonisation narrative despite setbacks, and he has been willing to challenge stakeholders to adopt different approaches using existing delivery tools to achieve tangible results.

As Defence establishments across the UK face increasing pressure to meet government net zero targets, the Imber Lines transformation offers a template for success. It shows that with vision, determination and smart investment, even the most unlikely facilities can become environmental champions.

A bee orchid flourishing at Imber Lines © Mark Nash

Lt Col Mark Nash enhancing the bee bank with plug plants © Crown

Defence climate, energy and environmental professionalism and culture

by Ros Cameron
Skills and Culture Assistant Head, Climate, Energy and Environment Directorate

Whether you are a specialist supporting our infrastructure and operations, managing our land and buildings, designing our vehicles, writing our policies or are out there serving on the front line, there is a genuine interest in understanding and acting on what Defence needs to do to meet the challenges posed by climate change. This will affect every aspect of Defence work to ensure that the UK maintains its operational advantage moving forward, whether in considering the longer-term suitability of equipment and kit or reducing energy waste.

Across 2024 – 2025, teams have used material from Defence's flagship 45-minute Defence Resilience and Climate Change Awareness course, provided by the Climate, Energy and Environment (CEE) Directorate, to understand how and why environmental factors impact our ability to do our job. It enables teams to use this knowledge and vocabulary in their roles, advice and decisions. When available, the significantly shorter Essentials Course will offer key facts quickly for those deployed overseas, or who need minimal knowledge to see where they can help through their daily behaviours. Team leaders can extract content to use in their everyday conversations.

McLaren Odyssey and electric adapted MOD Land Rovers © Crown

RAF personnel in the classroom © Crown

By joining regular events and specialised networks, such as Defence Green Network, speakers from the Directorate for CEE and across Defence have shared knowledge about the increasing risks and challenges facing Defence because of climate change. A highlight of the professional calendar has been the instigation of energy roundtables, in partnership with IEMA (Institute of Environmental Management and Assessment) and key Defence teams. Alongside high-level energy strategic thinking, these events are giving the broadest range of climate change, energy, environment and other professionals the opportunity to join the virtual discussion and evolve ideas with people from different backgrounds and organisations. The first event concentrated on where and how to push more effectively on operational energy security.

Through networking internationally, including with Singapore, Canada, Israel, Australia, New Zealand, Brazil and not forgetting Europe – Spain, Italy and France, the Directorate has been sharing challenges and solutions in environmental education and culture. The UK Defence approach sits well in comparison with others, but what matters most is the implementation: the actions

Defence people take that result in better decisions and provision for uniformed colleagues in meeting UK Defence objectives and assuring resilience.

The CEE Directorate has become deeply involved in leading developments with other government departments and working closely with several Defence professions. This is to establish, develop and promote the creation of professionalism for people whose roles directly relate to climate change, the environment and its protection, and energy. This broad mix of learning opportunities positions skills development for Defence people working across functions and from different professional backgrounds, towards maintaining viable establishments and running effective operations. Collaborating with other government departments, the Directorate is developing a common environmental curriculum and a professional structure around all government environmental professionals, which will enhance status, development and opportunities.

Working with the policy profession, the Directorate evolved a mini framework of career anchors and associated development to support those working in environmental policy and related roles. Initiating the development of a professional cadre and a learning offer for it, the Directorate engaged a small HR team to begin the construction of an umbrella framework for people in environmental and energy work streams. The terminology is not quite right yet, as this is such a broad area. It ranges from people working in property and acquisition to science and engineering, infrastructure and, of course, those enablers on whom all of Defence depends in finance and commercial, project management, data and beyond.

By mapping the roles and combining them into broad working areas, with indicative proficiency criteria and associated best learning options, the aim is to develop illustrative career paths and to work collaboratively with the professions to enhance people's skills and opportunities. The early work with the Defence Infrastructure Organisation and Defence Equipment and Support, corroborated by the Single Services, is supporting the development of an embryonic combined learning offer designed to improve core skills in influencing, communicating and management. Longer term, collaborating with established professions, it is planned to launch a framework illustrating the breadth and depth of climate change, energy and environment roles, with their key attributes and best learning, potential career pathways and guidance to build a successful career in climate, energy and environment.

The Directorate knows there are skills gaps in Defence, and there are issues faced in recruitment and retention, and is collaborating across key areas to try to reduce them and improve the lived experience. But what matters most is your help in developing a positive learning culture that follows through into everyday behaviours. The Directorate is always keen to hear from our professionals, so please do join events and Defence's important networks, and contact the Directorate directly to give your views.

A soldier releasing a small D40 drone by hand © Crown

Specialist Training School – embedding Environmental Protection throughout the MOD

by John Highmore
Specialist Trainer, Specialist Training School

Since 1996, the MOD's Specialist Training School has been facilitating role related training courses in Environmental Protection, alongside Health and Safety and Quality Management training, for a broad range of personnel across the workforce. The year 2025 will mark 30 years since the team began delivering training; that is an entire generation of MOD personnel who have benefitted from the valuable training provided.

The Environmental Protection training team's mandate is to increase awareness of key environmental issues such as sustainability, conservation and biodiversity, and to provide people with the necessary knowledge and skills to efficiently manage resources including energy, waste and water. The trainers also provide hands-on experience with spill response equipment, along with guidance on how to put in place robust plans for the prevention of pollution.

Specialist Training School's portfolio of courses includes an in-depth Introduction to Environmental Protection, a 'deep dive' into environmental law and policy, and a high level analysis of the skills required for the effective implementation of Environmental Management Systems. Courses in energy management and waste management are particularly appropriate for building custodians and Quartermasters, and for personnel who work in the supply chain and procurement. A course in marine spill response is typically offered to personnel who are due to deploy to the Falkland Islands or to those who will be working in coastal locations.

Specialist Training School's Environmental Protection trainers come from a wide range of backgrounds, including former military personnel, reservists and civilians who have worked in local government and for non-profit organisations. Among the team are trainers who hold qualifications from the National Examination Board in Occupational Safety and Health (NEBOSH), the Institution of Occupational Safety and Health, the Maritime and Coastguard Agency, Cambridge International Education and the Institute of Environmental Management and Assessment (IEMA).

Collectively, the team aims to ensure that the various Environmental Protection courses are up to date, relevant, informative and enjoyable. Although based at RAF Halton, Specialist Training School's team members regularly travel to different British Army, Royal Naval and Royal Air Force bases throughout the UK (and occasionally overseas), depending on the training needs of different units. Anyone who has an interest or a requirement to learn more about any facet of Environmental Protection is encouraged to attend one or more of the courses on offer.

The team very much hopes to be around for another 30 years and to continue adding value to the MOD at every opportunity. For further information, please contact air-safetyctre-stscourses@mod.gov.uk

Spill response training on the shorefront at RAF Akrotiri, Cyprus © John Highmore

Removing the hull of HMS TORBAY © Crown

Project Torbay – recycling old submarines into new

by Stuart
Chief Engineer, Submarine Delivery Agency

Project Torbay has achieved significant success in demonstrating the effectiveness of sustainable delivery through circular economy principles and innovative recycling practices. Led by Thomas, Submarine Recycling Lead in Defence Equipment and Support (DE&S), in collaboration with Stuart, Chief Engineer, and his team in Submarine Disposal and Devonport Infrastructure (SDDI), the project saw the extraction and recycling of 10.6 tonnes of NQ1 high-yield, naval strength submarine hull casing steel from the former HMS TORBAY.

Initiated to showcase the feasibility of recycling old submarines into new Defence components, SDDI, in collaboration with Babcock International Group, extracted the NQ1 high-yield, naval strength steel from the decommissioned submarine HMS TORBAY, located at Devonport Royal Dockyard. The steel was then sold to Sheffield Forgemasters Engineering Limited, who successfully recycled and repurposed it into new components for future Royal Navy submarines.

Repurposing the steel through an electric arc furnace meant the project not only achieved its recycling objectives but also contributed to reducing CO_2 emissions. It also generated a positive net revenue return for Defence Nuclear Enterprise and highlighted the MOD's commitment to sustainable delivery and environmental responsibility.

Furthermore, this collaboration between the MOD and industry exemplifies the MOD's efforts to enhance its supply chain resilience, reduce storage burden and promote the reuse of strategic resources within the UK. The project is a prime example of MOD teams collaborating and utilising their unique skillsets to deliver overall success, whilst maximising taxpayer value for money. This co-operative and proactive spirit saw the project successfully concluded in just 58 working days, from the initial identification of the opportunity to the completion of the sale to Sheffield Forgemasters.

Project Torbay also successfully demonstrated several innovative processes and techniques. It streamlined the sales contracting process for strategic materials and has set a precedent for future circular economy initiatives within the Defence sector.

As the MOD continues to pursue its 2050 net zero emissions targets, initiatives like Project Torbay play a crucial role in advancing sustainability goals while fostering partnerships with industry leaders. The project's impact extends beyond immediate benefits, offering a blueprint for future recycling endeavours and reinforcing the UK's position as a leader in sustainable delivery. SDDI are already working on a second batch of NQ1 to be shipped to Sheffield Forgemasters in the near future.

A note from the editors: *The use of first names in this article is reflective of the latest personnel security concerns.*

Military training amongst the clouded leopards of Brunei

by Duncan Savage
Environmental Adviser, Defence Infrastructure Organisation

The nation of Brunei, situated on the island of Borneo, contains some of the oldest rainforests in the world and is a global biodiversity hotspot. Unlike in much of Borneo, the Bruneian rainforest has not been felled to make room for palm oil plantations and is largely a primary forest subject to legal protection. British Forces Brunei operates five Jungle Training Areas within this rainforest, where the Resident Infantry Battalion and Jungle Warfare Division run a number of courses, ranging from basic fieldcraft to more advanced jungle survival techniques.

Conditions in the jungle are testing, with temperatures routinely exceeding 35°C. Navigation is challenging, with visibility often limited to 20m, so while soldiers spend significant time in the jungle, much of the wildlife remains elusive. It has been difficult to fully appreciate the range of species training takes place amongst and to understand the impact of this on the local wildlife. Following on from a successful camera trapping project in Belize (see *Sanctuary* 49, 2020), British Forces Brunei and Defence Infrastructure Organisation (DIO) collaborated with the Universiti Brunei Darussalam to assess the diversity and presence of fauna utilising the training area, and to evaluate the impact of military training on local wildlife.

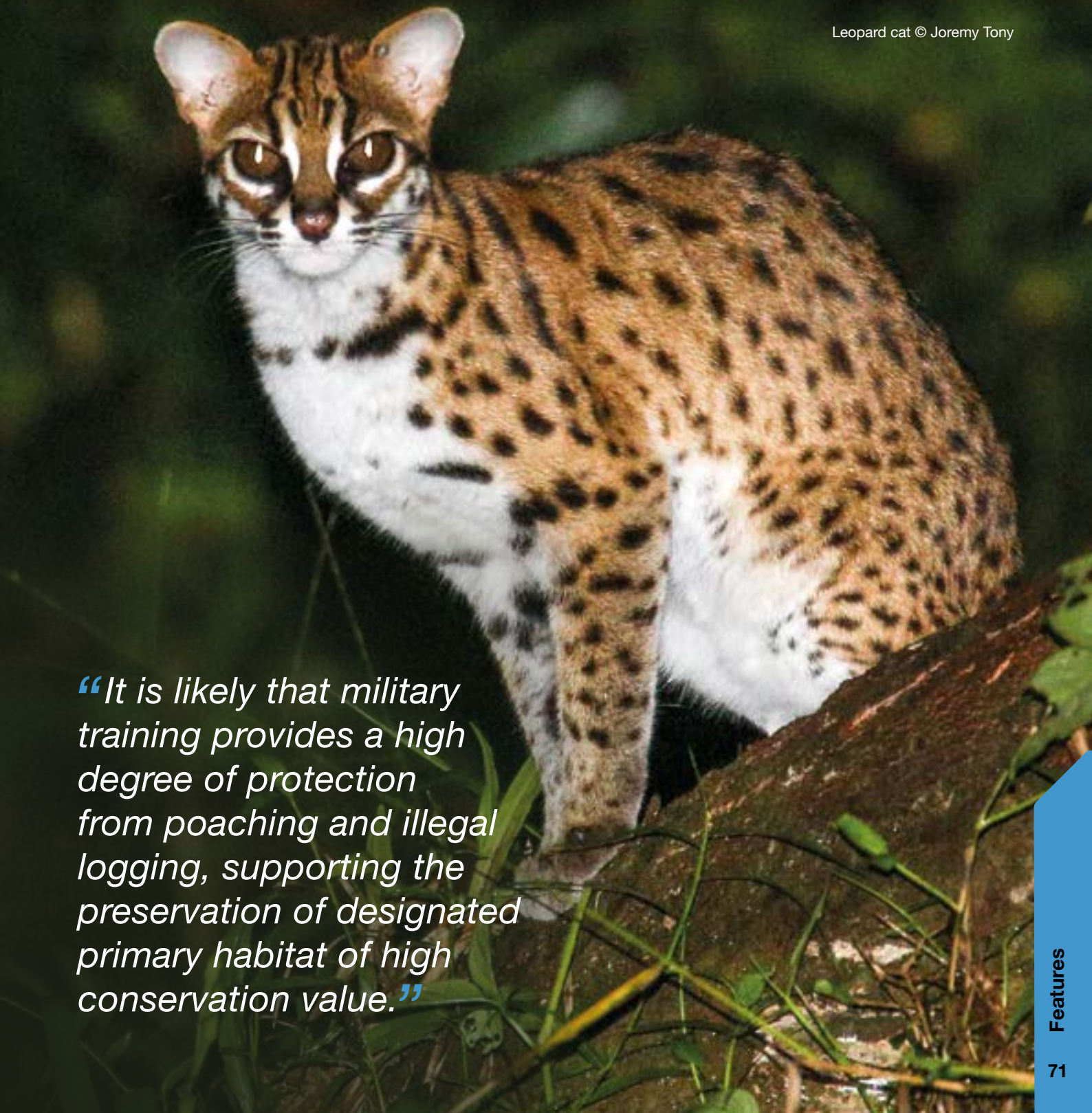
The initial proposal and enlistment of support from the university was undertaken by military spouse Jo Stead. Her background in and enthusiasm for conservation was invaluable in securing DIO Conservation Stewardship Funding to procure the necessary equipment. Whilst the university's Dr Ulmar Grafe, Dr Salwa Khalid and their team had been conducting studies into faunal distribution in Brunei, they had not previously had access to the British Forces Brunei administered Jungle Training Areas. The university team generously gave their time to support the development of the project and its ongoing administration, in exchange for the opportunity to expand the scope of their research. Initially, this included the installation of 30 motion sensor cameras across the expansive training areas, the periodic gathering of data and the evaluation of the project.

British Forces Brunei military training areas are busy and access can be unpredictable. This is especially so in the remote rainforest, where road

WO2 Troy Cole leading the team through the training area © Justin Jeffrey

access is limited and weather conditions can change swiftly. The British Forces Brunei team included WO2 Troy Cole, whose logistics support literally got the project off the ground, arranging helicopter transfers for the team to deploy into the deepest jungle training areas. More recently, WO2 Amit Gurung has continued to enable the project to flourish amongst other challenging priorities.

The project partners were hopeful this would be an opportunity to shine a light on some lesser known species. Results have not disappointed, with 30 medium to large mammals detected so far, representing 86% of the species that might be expected to occur. Most significantly from a conservation perspective, is the presence of four endangered or critically endangered mammals: the Sunda pangolin, the north Borneo gibbon, the otter civet and the flat-headed cat. In addition, multiple occurrences of the rare endemic Bornean ground cuckoo were detected. Other species included the stunning clouded leopard, as well as a rarely observed female; charismatic species such as the leopard cat; Bornean sun bear; and



Leopard cat © Joremy Tony

"It is likely that military training provides a high degree of protection from poaching and illegal logging, supporting the preservation of designated primary habitat of high conservation value."

Royal Gurkha Regiment practising tactical movement in the jungle © Maj Simon McMahon

binturong. Brunei has a strong framework in place for combating wildlife crime, however some of these species are targeted by poachers and sold illegally as pets or for use in traditional medicines.

Dr Grafe advised that the findings and preliminary evaluation confirm that the training areas harbour a highly significant proportion of the medium to large sized fauna found on the island of Borneo, with many endangered or critically endangered species. In common with findings of a similar project in Belize, it appears that the military training activity does not have a significant negative effect on these mammals and birds. In fact, it is likely that military training provides a high degree of protection from poaching and illegal logging, supporting the preservation of designated primary habitat of high conservation value. The greatest threats to wildlife are likely to come from outside the military training area boundaries. The sanctuary provided by the training area has prompted a further conservation stewardship initiative to provide safe and sustainable nesting sites for the endemic, critically endangered helmeted hornbill.

Sunda pangolin © Joremy Tony

This project represents a very successful use of the DIO's Conservation Stewardship Fund, both in expanding knowledge of the area and working with local partners to support host nation conservation objectives. The project has increased engagement with site staff and families on conservation and broader sustainability issues, with the resulting video clips being widely shared. Service families have enquired as to how they can support the project too, and there has been interest in establishing conservation events for the British Forces Brunei community, including activities such as beach cleans.

The Garrison Commander with staff from DIO's Access and Recreation Advisory team, opening the new path © Crown

Bulford Community Link

by Kathleen Letch-McMillan
Access and Recreation Advisor, Defence Infrastructure Organisation

Bulford Garrison in Wiltshire is home to many different regiments, creating a huge military community. A path that was originally used as a security path, running around the outside of the garrison, provided a key link for the community to access facilities safely and avoid the busy main access roads to the garrison. It provided access from two of the military housing estates to services which include the Household Cavalry Regiment welfare centre, a nursery, the shops, a gym, a medical centre and a school. However, it had fallen into disrepair. It was overgrown, with an uneven and slippery surface, making it unsuitable for families to use safely.

Families had made the Household Cavalry Regiment welfare team aware of the issues, and they approached the Defence Infrastructure Organisation's (DIO) Access and Recreation Advisory team for advice. The team saw an opportunity to apply for funding from the DIO's Conservation Stewardship Fund and create a new path, built to the standards needed for daily use. Having explored what was needed to reinstate this key link, the team approached Lt Col Whitelegge, Commander Tidworth, Netheravon and Bulford Garrison with the proposed plan. This was approved as the path upgrade would benefit personnel and their families.

Joint meetings were held between the Access team, the garrison, Vinci and Landmarc Support Services (Landmarc) to plan the specification for the path, with Landmarc carrying out the works. This involved clearing overhanging vegetation to create a 2.5m wide path, scraping back the original surface to make it level and laying a hardstanding surface to withstand a high volume of footfall.

Following the successful completion of the project, an opening ceremony for the newly restored path was held, with Lt Col Whitelegge and the Household Cavalry Regiment welfare team in attendance. Lt Col Whitelegge said: *"It is easy to find problems, it is far harder to make something better. This is a great example of a team hearing a concern of the community and working with them to deliver a solution. Feedback from the military community at Bulford has been highly positive, with users attesting to the greatly improved access the restored path is providing to on-site facilities"*.

DIO's Conservation Stewardship Fund helps to deliver the MOD's commitment to enabling public access across its estate where appropriate. This path shows that improvements to key links for our communities to allow safer and better access are just as important as facilitating access to the wider rural estate.

The old path © Crown

The view of Salisbury Plain from the excavation of Boles Barrow, with the lifted mesh to the left of the image © Crown

Ex Bluestone – the excavation and meshing of a long barrow

by Richard Osgood
Senior Archaeologist,
Defence Infrastructure Organisation

The excavation team starting to uncover human bones from Boles Barrow © Crown

Having been told to *"ride out or die"* (get some exercise!) by his doctor, William Cunnington of the village of Heytesbury in Wiltshire embarked upon a programme of excavating prehistoric monuments. He enlisted the support of the Parker family – who did most of the physical labour, it must be said – and his resulting work is some of the most important early archaeology in Britain. In 1801, he dug the Neolithic long barrow of Boles Barrow on Salisbury Plain – one of the more enigmatic sites on the military training area.

Although lacking in the treasures he would find in the Bronze Age burial mounds nearby, he noted the presence of human remains that were perhaps combat victims, as well as oxen skulls and a bluestone boulder. For those who know anything about Stonehenge, this is significant, as the only places to find such stones are in the Preseli Mountains of Wales and at the henge monument itself. The long barrow was thought to date to around 3700 BC – over 1,000 years before the bluestone circle at Stonehenge, so such an observation was fascinating. The site was further excavated by Dr John Thurnham in 1864 and he removed the human skulls he found and added them to his collection. The final intervention was by Henry Cunnington (grandson of William) in 1885; he also noted the presence of a dark layer at the base of the barrow – presumably human blood!

In the early 2000s, Historic England introduced a study entitled 'Heritage at Risk' which examined the status of designated monuments in England and the levels of threat they faced. Several MOD assets were on this initial list, including Boles Barrow. Under the Department for Culture, Media and Sport Protocol for the Care of the Government Historic Estate, MOD committed to acquiring regular condition data on our monuments. These

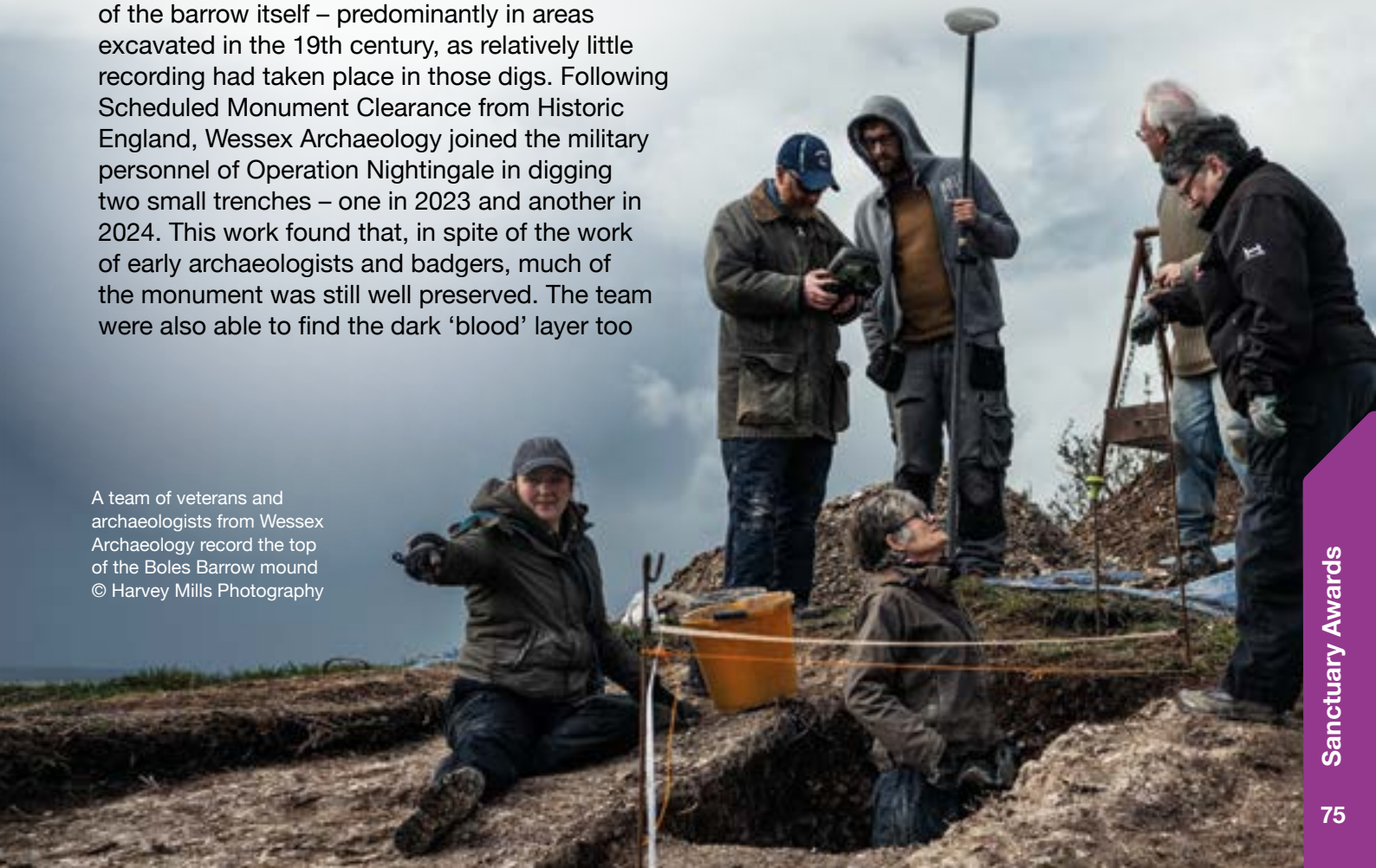
five-year studies illustrated that the biggest threat posed to the sites was from burrowing animals, primarily rabbits and badgers. To this end, from 2004, an assessment study on Salisbury Plain was established by English Heritage (now Historic England) into the efficacy of meshing over monuments to exclude these animals. This was funded by Historic England and the Defence Infrastructure Organisation's Conservation Stewardship Fund. Since the inception of the latter, 14 sites have been removed from Heritage at Risk with this method across southern MOD estates – Lulworth to Porton Down and the Plain.

During 2023 – 2024, an examination of the sustainability of this meshing was carried out at Boles Barrow – one of the first sites to be meshed. This evaluation revealed that the mesh was lasting far longer than its purchase guides gave as a shelf life, thus extending the effectiveness of the method. It was also clear that the once active badger sett had been dormant for over a decade, and the meshing also prevented any accidental damage from infantry actions. The programme has met statutory body approval to such an extent that these works are now an approved clause on the Standing Scheduled Monument Clearance for Salisbury Plain.

The project work to look at the mesh also provided a rare opportunity for limited excavation of the barrow itself – predominantly in areas excavated in the 19th century, as relatively little recording had taken place in those digs. Following Scheduled Monument Clearance from Historic England, Wessex Archaeology joined the military personnel of Operation Nightingale in digging two small trenches – one in 2023 and another in 2024. This work found that, in spite of the work of early archaeologists and badgers, much of the monument was still well preserved. The team were also able to find the dark 'blood' layer too – perhaps less dramatically this was, in fact, the buried Neolithic land surface, which is over 5,500 years old. From the environmental data within this, specialists can tell that the area has been a cleared chalk grassland for that time.

Other interesting discoveries were some of the elements of those oxen skulls found before and a limb bone of a fabled 'aurochs' or wild cow. These giants stood at around 2m at their shoulder height, so hunting them was really some accomplishment, especially when one thinks of the large horns they had too. Messrs Cunnington(s) and Dr Thurnham had not retrieved all the human bones either. The project work recovered 104 bones which were from at least three male individuals: two adults and one teenager. No skull pieces were located, or perhaps Dr Thurnham had all of these. The stones forming the barrow core were also excavated – these were sarsen, of similar stone to the large Stonehenge stones, but sadly there was no bluestone fragment.

A series of the Neolithic long barrows and Bronze Age round barrows of Salisbury Plain have now been meshed to keep burrowing animals out. The method is demonstrably successful in this aim, and the results of this excavation have shown that it is a most important endeavour.



A team of veterans and archaeologists from Wessex Archaeology record the top of the Boles Barrow mound
© Harvey Mills Photography

New Duchess of Edinburgh Hall with converted stables named 'Sullivan Block' © Willmott Dixon Construction Ltd

Historic stables modernised for Army musicians at Sandhurst

by Maj (Ret'd) Brendan Wood
Joint Band School Project Sponsor,
Army Basing and Infrastructure

The Royal Military Academy Sandhurst has new facilities for the Royal Corps of Army Music, thanks to a £12 million Joint Band School project. Using funding from the Defence Estate Optimisation Army Programme, a small and dedicated project team comprising the British Army, Defence Infrastructure Organisation, Willmott Dixon, Pick Everard and HLM Architects has delivered modern, sustainable, high-performance and acoustically optimised facilities for musical rehearsals, performances and collaborations for Army musicians.

The innovative design involved combining a purpose-built, new performance space with the transformation of an 1830s military stable block and former offices into a modern, usable space for the musicians. It comprises practice rooms, ensemble rehearsal spaces, offices, stores and changing facilities.

Sustainability was at the heart of the project. Research has shown that sympathetically upgrading and reusing existing buildings, rather than demolishing them, can make substantial energy savings. This is because the CO_2 emissions already embodied within the buildings are not lost. By seamlessly integrating the older infrastructure with the new construction to retain the heritage of the original building, and by sympathetically upgrading the stables and utilising the latest sustainable products, this major upgrade has been DREAM (Defence Related Environmental Assessment Methodology) rated.

The stables still had many period features, and the team wanted to ensure that as many of these as possible were retained. Across all the older buildings, the sash windows were refurbished, and layers of leaded paint were stripped back to their original finish. The original fittings, produced by Musgrave Bros of Belfast, including iron stable supports with the embossed family crest that would have been used for the horses' stalls, were incorporated into the new, modern surroundings.

Working with a historic building is often challenging, and the stables were no exception. Leaks within the old building had soaked the lime plaster, which required stripping back and drying out before being replastered using the original render and plaster recipe. Lime render was used to re-mortar joints throughout the external walls, in keeping with the period look of the building. Stripping back the ceilings revealed that they were packed full of horsehair and straw. Peeling away the layers of history, it became apparent that structural repairs were needed, as the walls showed weaknesses and cracks had begun to appear.

Throughout the old and new buildings, the latest sustainable construction methods were exploited, including the use of cross-laminated timber. This is an environmentally friendly, renewable resource building material and is deemed an active climate protection. Timber has the lowest energy consumption of any building material across its life cycle and is the most widely used renewable structural building material. Cross-laminated timber can serve as a bracing product, as it has a high capacity to withstand both vertical and horizontal loads. This made it an ideal solution for the construction of the new hall and atrium, as well as for the stable repairs. It is also lightweight, keeping air infiltrations low, which enhances the thermal efficiency of the buildings and works in harmony with the air source heat pumps.

Zinc is a sustainable, durable, versatile and recyclable product and an excellent choice for roofing. The new building combines cross-laminated timber with a striking zinc panelled roof to create a feat of architectural creativity that cascades natural light into the spacious atrium below. This has resulted in a purpose-built modern facility in which to rehearse, collaborate and function to the highest standard. Most importantly, the atrium has fantastic acoustics, creating a space that does justice to the talent and professionalism of the Army musicians.

The combination of old and new is also reflected in the names of the buildings. The upgraded historic stables have been named the Sullivan Block. Thomas Sullivan served as the Academy's Bandmaster from 1845 to 1857. He was also the father of Sir Arthur Seymour Sullivan, of Gilbert and Sullivan fame. The new building was named The Duchess of Edinburgh Hall and, appropriately, was formally opened in January 2025 by Her Royal Highness The Duchess of Edinburgh.

The new facility at the Royal Military Academy Sandhurst has been a hugely successful project. The team have combined old and new to create aesthetically pleasing buildings, with noise compliant facilities that are bright, airy and contemporary whilst meeting the highest specifications in sustainability. The Sullivan Block and The Duchess of Edinburgh Hall will enable Army musicians to carry out their supporting state and ceremonial duties, as well as their national and international engagements for Defence, both now and in the future.

Inside the old stables, prior to conversion © Brendan Wood

HRH The Duchess of Edinburgh meeting Army musicians © Crown

The project team © Babcock International Group

Hydrogen derived from wastewater at HMNB Devonport

by Steve Massey
Strategic Programme Procurement Specialist, Babcock International Group

Working in partnership with the Ministry of Defence, Babcock provides through-life support for submarines, surface ships, associated systems and equipment as part of a continuing commitment to support the nation's naval capability. Babcock's Devonport facility is co-located with HMNB Devonport and forms the largest naval support site in Western Europe. It is the UK's sole licensed dockyard for the refit, refuelling and defuelling of the nuclear powered submarine fleet.

The Hydrogen Derived from Wastewater project was set up by Babcock's strategic project procurement specialists. They convened a cohort of industry partners to investigate, provision and drive the science-based development of novel and radical fuel switch enabling technologies. The ultimate aim is to help decarbonise the Devonport facility and the wider maritime industry.

Babcock began by researching the best available technology and establishing a suitable procurement model. The team collaborated with hydrogen specialists, project contributors, programme managers and wider MOD stakeholders to foster good relationships and circular economy practices. They established processes early in the partnership to disseminate learning and determine procurement interventions. The team also conducted due diligence and risk caveat assurances as well as technical, capability, carbon impact and commercial assessments.

A panel based evaluation reached the decision to partner with technology provider HydroStar Europe. This Devon based research and development company presented a unique membrane-less process for producing high-quality yields of hydrogen by converting impure wastewater sources into green hydrogen. Produced by the electrolysis of water, green hydrogen has significantly lower greenhouse gas emissions. What was also novel about this approach was that the commercial strategy endorsed local procurement and transparency, enabling the engagement of local small and medium-sized enterprises with engineering expertise.

Babcock joined forces with industry partners – including MOD, HydroStar Europe, University of Plymouth and Southampton Marine Services Limited – to pioneer a radical solution for future energy security through an on-site production demonstrator of carbon-free hydrogen fuel produced from impure wastewater sources, such as roofline water, processed water (including from submarine effluents) and river water as the primary feedstock.

In April 2024, a six-month study commenced on sustainable alternative fuel which focused on creating a small-scale demonstration of a hydrogen production plant. This was to validate the process and to prove the cost-effectiveness of scaling up production.

A combined state-of-the-art demonstrator system was constructed at the Devonport facility for the production, storage and utilisation of green hydrogen to supply green power. Green hydrogen was produced through a hydrolyser process known as the HydroStar System, which converts wastewater into 98% pure hydrogen.

This trial proved that hydrogen can be used to reduce upstream and downstream Scope 3 emissions for a range of shoreside and dockyard power applications and can augment the provision of clean shipping fuel. The Southampton Marine Services Limited group were the primary user of the hydrogen produced during the trial and provided expertise and operational guidance to support the transition to clean shipping fuel for its watercraft fleet, including tugboats, survey boats and dive support vessels.

The trial also established the costs involved in the on-site production of hydrogen. This enabled a comparison in current costs with a localised manufactured commercial selling price to supply alternative emission free energy to operate dockyard infrastructure. This included mobile power generators, dockside supply units and gas powered boilers used to heat commercial offices, the leisure centre and service family accommodation. It also showed that by-products from the process – such as tritium, deuterium, silver and other precious metal ions – can be extracted from the wastewater, processed and sold to help fund future scaled-up facilities.

Life cycle assessments and economic research was presented and verified by the University of Plymouth which evidenced holistic environmental, economic and social impacts. These included a reduction in the use of white diesel and positive effects on nitrogen oxide emissions, as well as demonstrating further opportunities to enhance biodiversity net gain, negate river water pollution, protect resources and the environment, and improve energy security.

This project could provide the basis for the future use of hydrogen in dockyard infrastructure. The HydroStar System is a solution to decarbonise activities and ensures regulation keeps pace with innovation and contributes towards achieving carbon reduction and net zero targets. It has opened the reality of a maritime circular economy and a closed-loop solution, where contaminated wastewater is seen as a valuable resource to fuel dockside infrastructure and power maritime vessels. It has additionally demonstrated a route to market by creating zero carbon fuel production methods and has future-proofed commercial exploitation to produce hydrogen at an industrial scale.

Babcock will continue to collaborate with industry partners. The results of this trial will be used to nurture industry best practice standards and support the development of a regulatory framework for the use of hydrogen on naval bases.

Aerial view of HMNB Devonport © Babcock International Group

Ecology Hit Parade – The MOD Ecologists' top sites

by Oliver Howells
Principal Ecologist, Defence Infrastructure Organisation

The MOD owns almost 1% of the UK land mass. The importance of the estate for nature has been well documented in the pages of *Sanctuary* magazine for over 50 years and it has long been recognised as one of the most important estates for nature in the country. Well over one third is designated as Sites of Special Scientific Interest (SSSI), which are legally protected from damage, and there is a wide range of other legislation that safeguards species, habitats and other forms of natural capital across the estate.

The MOD first employed ecologists on Salisbury Plain Training Area in the mid-1990s when a commitment was made to manage the impacts of large military exercises. The small team of nine ecologists now employed by the Defence Infrastructure Organisation (DIO) has grown since then. The team carries out ecological impact assessments and provides advice across the UK and overseas estates on military operations and the day-to-day running of the estate. They also advise on major infrastructure programmes and projects, and the responsible stewardship of the estate to fulfil statutory commitments and support the wider government agenda for nature recovery, wherever it can be achieved alongside defence requirements. Here are five of the ecology team's top sites:

Oliver Howells, Principal Ecologist

I am fortunate enough to be the DIO Principal Ecologist and head of the DIO Ecology team. I've worked in Defence for nearly 25 years, and when I signed up to write about my favourite MOD site, I did not realise just how difficult it would be. It really is like choosing your favourite child, so I am going to veer from the brief slightly and talk about a selection of my best sites.

My introduction to Defence was working on a research project at Porton Down Ranges in Wiltshire, which is a classic example of land protected from agricultural improvement by being in MOD ownership. Its landscape of anthills and rare butterflies, such as silver-spotted skipper, make it uniquely special. Cape Wrath Training Area must be the wildest place on the estate with its stunning high sea cliffs and alpine heath perched on the north-west tip of Scotland. Magilligan Training Centre on the north coast of Northern Ireland is another truly wild place. It is part of one of the largest sand dune systems in the UK, and the damp dune slacks are packed full of the brick red sub-species of early marsh orchid in late spring. Castlemartin Ranges in Wales is another dramatic coastal site full of rare wildlife. It is characterised by the population of delightful

Beach at Cape Wrath © Crown

chough with their red bills and distinctive call (see *Sanctuary* 45, 2016). Predannack Airfield on the Lizard with its Cornish heath, Yardley Chase Training Area in Northamptonshire with its amazing veteran trees, the jungle training areas in Belize where we study the impacts of training on jaguars (see *Sanctuary* 49, 2020 for Yardley Chase and Belize) and even former MOD sites like the old Defence Munitions site at Dean Hill, Wiltshire are all amongst the remarkable places I have worked at. The best thing of all is that there are many more nature gems still to visit.

Choughs at Castlemartin © David Bundock

Helen Butt, Senior Ecologist

I work on a wide range of unique and biodiverse sites on the MOD estate, largely focusing on the south-east region of the UK. Dungeness, Kent is a geographical rarity. Often referred to as the UK's only desert, it can appear barren at first glance, but this unique and surreal landscape offers refuge for some truly specialist plants, insects and birds.

610-year-old self-seeded oak at Yardley Chase with saproxylic beetle surveying equipment © Iain Perkins

On the south-western side of the Dungeness peninsula, you will find MOD Lydd Ranges: a military firing range situated on reclaimed land of Romney Marsh, forming a crucial part of the Dungeness, Romney Marsh and Rye Bay SSSI. While the site has been used for military training for some 150 years, the shingle beaches here have evolved over thousands due to varying periods of stability and mobility of the foreshore. It is this periodic movement of shingle that gives rise to the distinctive vegetation you see at Lydd Ranges. As the foreshore is overtopped by high tides or storms, fine materials accumulate between the pebbles, allowing pioneer plants to take hold. Yellow-horned poppies are rare gems that can be seen growing at Lydd in the summer months. In more stable areas, salt tolerant species such as thrift and sea campion withstand the sea spray within a matrix of lichens.

Lydd can also be a welcome stopover for migratory birds, and for many like the marsh harrier, it is the first landfall for many hundreds of miles across the Atlantic and Europe. Male marsh harriers can often be seen performing tumbling courtship displays over the reedbeds.

The use of this area for military training is part of the reason why these rare habitats and species remain. Alongside the military, we work hard to preserve opportunities for nature to thrive here, while understanding and appreciating the ephemerality of some of its rarer habitats.

Yellow-horned poppy at Lydd Ranges © Crown

Sand lizard © Nick Moulton

Purbeck mason wasp © Bryan Edwards

Avocet at Shoeburyness © Martin Wilson

Lisa Wade, Ecologist

A white-tailed eagle from the Isle of Wight circles high over Kimmeridge Bay, casting shadows on the cliffs below; a hazel dormouse in the gorse snoozes in its nest, whilst reptiles such as smooth snake, sand lizard and adder bask on the calcareous grasslands and heaths. Remarkable invertebrates, not found in the UK outside of the Isle of Purbeck – such as Purbeck mason wasp – patrol the heaths, dodging the heath tiger beetles. Bats, such as greater horseshoe, join nightjars to patrol the night sky. Scenes like these and many more are transpiring across the ranges every night, an ever-changing kaleidoscope of habitats and their species.

Lulworth Ranges are located on the south coast of England, 10km west of Swanage, comprising 2,830ha of chalk and limestone grassland, heathland, ancient woodland, shoreline and cliffs. For over 100 years, Lulworth and the nearby Bovington have been used as tank and gunnery training grounds, and today they are renowned centres of excellence for armoured training.

The resultant lack of agricultural improvement has led to diverse and contiguous interacting high-quality habitats – marine, freshwater and terrestrial – and their special flora and fauna. This is what sets Lulworth Ranges apart from many other sites, providing some interesting challenges but also great opportunities.

Rosie Horner, Senior Marine Biologist

St. Kilda is a remote archipelago in the North Atlantic Ocean. It contains the westernmost islands of the Outer Hebrides in Scotland, making it the most remote part of the British Isles. The main island was inhabited for over 2,000 years, however declining population, food shortages and increasing contact with modern society led to the voluntary evacuation of the last residents in 1930.

Today, St. Kilda is a UNESCO World Heritage Site, known for its dramatic landscapes, seabird colonies and the preserved remnants of its human past. St. Kilda is also a Marine Protected Area, a Special Area of Conservation and a Special Protection Area due to the importance of its habitats for seabird populations and its unique marine habitats, which include reefs and submerged sea caves.

The MOD presence on St. Kilda began in 1957 when radar tracking systems were installed. The radar systems at St. Kilda are still present

"A white-tailed eagle from the Isle of Wight circles high over Kimmeridge Bay, casting shadows on the cliffs below."

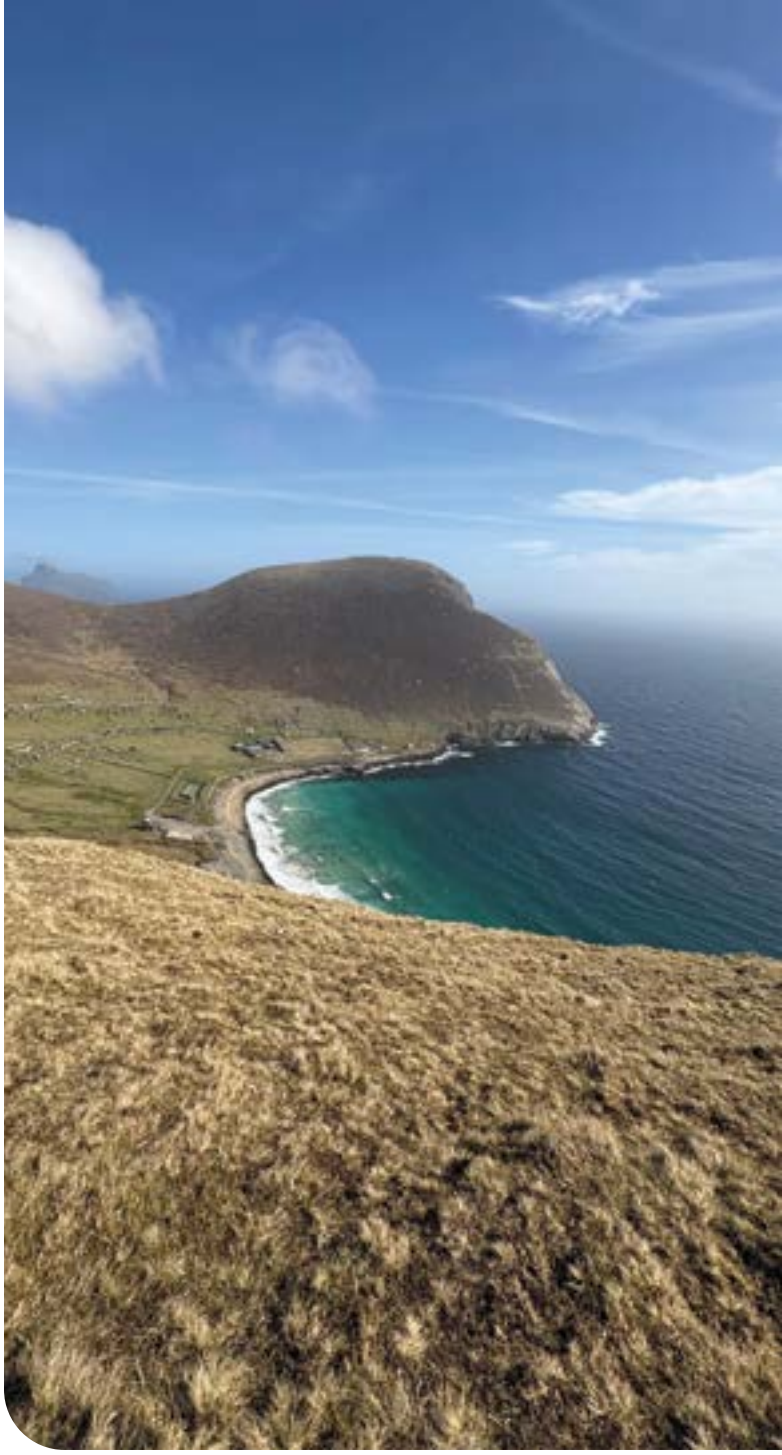
today and form part of the MOD Hebrides testing range. Since 1957, there have been various improvements to the MOD infrastructure on St. Kilda, including the recent renovation of accommodation and an energy centre to provide power on the island (see *Sanctuary* 51, 2022).

An ongoing issue in St. Kilda is the impact of coastal erosion, which led to a visit by MOD Ecologist Lottie Birch and me in April 2025. The main form of coastal protection is gabion baskets, which have withstood the force of intense waves. However, they are beginning to fail. To future-proof the estate in St. Kilda will be challenging, as repairs to coastal protection are difficult due to the challenge of getting building materials over to the island and the time restrictions on building due to breeding birds.

Joe Hamer, Senior Ecologist

MOD Shoeburyness is located on the east coast of Essex and comprises areas of Shoeburyness along with three islands – Foulness being the biggest and also the fourth largest island in England. Now used as a Test and Evaluation site, Foulness Island has had a military presence since 1848, making it fascinating not only for its heritage with significant archaeological interest but – most notably for me – for the whole host of wildlife it supports.

The site covers over 3,700ha, containing a range of arable land, grazing marshes, extensive ditch/creek systems and areas of scrub. The site increases by another 14,000ha when the tide goes out, revealing extensive mud flats and saltmarsh. The extent of coastal habitats, mixed with the grazing marsh and creeks, creates a nationally and internationally important site for a wide range of bird species, such as nationally important numbers of breeding avocets, along with tens of thousands of waders and wildfowl that overwinter there. The saltmarsh, sea walls and creeks support an array of rare and



St. Kilda Landscape © Rosie Horner

notable plants, and in the last few years, survey work has established that Shoeburyness holds one of the largest seagrass beds in England (see p.37).

Aside from all the wonders that come with coastal habitats, the island itself is also a wildlife haven. The creeks and ditches support a large population of water vole, and the diverse habitats create a nationally significant assemblage of invertebrates. While much of the island is under agricultural land use, many of the tenants are fantastic land stewards and participate in a number of environmental stewardship schemes or contribute to other non-governmental organisations. One such scheme is Operation Turtle Dove, which has led to significant numbers of breeding birds at the site and can be read about on p.61.

Celebrating 50 years of *Sanctuary* and Conservation Groups

by Julian Boyce
Environment and Sustainability Communications Officer, Defence Infrastructure Organisation

This 2024/25 edition marks the 50th anniversary of the creation of both *Sanctuary* magazine and the MOD's Conservation Groups. From humble beginnings in 1975, when *Sanctuary* launched as a newsletter to help the recently established MOD Conservation Groups stay informed about each other's activities, the publication has evolved to form a very special record that spans five decades of conservation and sustainability achievements across MOD's land and operations, both in the UK and overseas.

A short history of *Sanctuary* magazine

The importance of the MOD estate for supporting wildlife and heritage was formally recognised in the 1971 – 1973 Report of the Defence Lands Committee, chaired by Lord Nugent. The report called for active management of the UK military estate's biodiversity and heritage features, alongside the increasing demands for public access.

The first MOD Conservation Officer was subsequently appointed in 1973, in response to the Nugent report. With 20 years' experience running the Army's Ornithological Society, Lt Col (Ret'd) Christopher Norman Clayden was the perfect fit for the role (see *Sanctuary* 44, 2015).

The early editions of *Sanctuary* featured a stag door knocker on the front cover © Crown

MOD Conservation Groups were quickly formed to liaise with external organisations, develop land management plans and implement practical conservation measures. By 1975, 40 groups had been established.

Work started on a newsletter to provide a roundup of activities across the estate, and the first edition of *Sanctuary* was published – or rather, stapled together by hand! Three hundred copies were posted across the UK. The name was the idea of Lt Col (Ret'd) Clayden, derived from the ancient tradition of rights of sanctuary, which enabled protection from arrest in places of worship. A new interpretation was about offering sanctuary to flora and fauna on MOD property. The whole of the first edition was produced largely as a result of the efforts of Jane Partridge, who held the role of Editor. The front cover design, which was used until 1988, was based on Durham Cathedral's sanctuary door knocker. It was designed by Jean Clayden, Lt Col (Ret'd) Clayden's wife.

Within 10 years, two-thirds of the MOD estate had been surveyed and catalogued for its wildlife and archaeology in an endeavour involving 4,000 volunteers, from over 100 MOD Conservation Groups. The *Sanctuary* newsletter also grew and developed during this time, while remaining the mainstay of Conservation Group communications. It continued to be beautifully illustrated by Jean Clayden, highlighted by a special 10th anniversary edition packed full of her artwork.

In 1986, Col (Ret'd) James Baker took over the role of MOD Conservation Officer, after retiring from a career as an Officer of the Irish Guards.

The Environmental Engagement team, who produce *Sanctuary* and support MOD Conservation Groups, at the DIO Technical Services conference © Crown

He inherited responsibility for over 200 MOD Conservation Groups and an army of conservation volunteers, whose work he championed throughout the pages of this magazine. Col (Ret'd) Baker stayed at the helm for 16 years (see *Sanctuary* 39, 2010) and developed the magazine into the format readers today will be more familiar with, featuring colour photographs alongside Jean Clayden's fabulous illustrations.

The Sanctuary Awards were born in 1991 with the arrival of the Silver Otter. This striking trophy was donated by the Commandant of Otterburn Training Area, to be awarded to the best Conservation Group-led project, or best individual conservation effort, on the MOD estate.

By 1993, 37 Sites of Special Scientific Interest had been designated across the estate (there are 168 today), and *Sanctuary* editions regularly described archaeological features not recorded anywhere else, as well as highlighting species that were thought to have been lost.

At the national level, the 1990s saw an increase in legislation to protect landscapes and wildlife, and in 1994, the first UK Sustainable Development strategy was published. Growing legislative and policy commitments meant the MOD could not rely solely on voluntary Conservation Groups' efforts, and it needed to improve how environmental management was embedded within the department. This led to the employment of a permanent, internal team of ecologists, archaeologists, built heritage experts and other environmental specialists in the 1990s. These in-house subject matter experts, now working as part of the Defence Infrastructure Organisation, continue to advise and support MOD projects and plans, and give expert direction to the Conservation Groups.

Developments such as the 2008 Climate Change Act and 2011 Greening Government Commitments prompted a further prioritisation of environmental protection and sustainable development within the department. In 2013, *Sanctuary* was rebranded as the Ministry of Defence sustainability magazine. As the concept and practice of sustainability has evolved, so too have the magazine and awards, with the introduction of the Sustainable Business Award in 2014 and an increasing focus on the social and economic pillars of sustainability. On the ground, the COVID-19 pandemic brought some major challenges for our Conservation Group volunteers across the country, with some groups unfortunately disbanding. However, numbers are beginning to pick back up, and there are currently over 70 groups across the UK and overseas, supported by the DIO Environmental Engagement team.

In 2021, the MOD Climate Change and Sustainability Strategic Approach was published following a 10-month review chaired by Lt Gen Richard Nugee, Defence Climate Change and Sustainability Review Lead. The Strategic Approach argued that the MOD must redouble its efforts to combat climate change and address sustainability issues.

The Conservation Groups showcased in the Around the Regions pages of *Sanctuary* magazine have seen transformation and development in recent years. While there are still plenty of 'traditional' groups carrying out activities such as species monitoring and larger-scale habitat improvements, there has also been an increase in smaller-scale groups in more urban areas. These are often built around historic gardens or polytunnel projects, with an emphasis not just on nature conservation but also on the health and wellbeing of volunteers and local military communities. This is highlighted in this year's magazine, with both the first and most recently formed Conservation Groups sharing their work (see p.88 and p.98 respectively).

Looking ahead

The efforts of MOD Conservation Groups in supporting the sustainable management of the MOD estate are more important now than ever before. Today, MOD has direct responsibility for managing almost 1% of the UK land area and is steward of an estate which comprises 168 Sites of Special Scientific Interest, 31,000ha of land across 13 National Parks, 19,400ha of land in Protected Landscapes excluding National Parks (includes England National Landscapes, Northern Ireland and Wales Areas of Outstanding Natural Beauty and Scotland National Scenic Areas), as well as 784 scheduled monuments and 853 listed buildings.

From the first Conservation Groups and *Sanctuary* newsletters in the 1970s, the MOD's approach to sustainability has centred on the premise that sustainability and Defence are not incompatible. The UK's commitment to tackling climate change and biodiversity loss requires Defence's full involvement and continues to include the invaluable contributions made by Conservation Group volunteers across the estate.

A cartoon of Col (Ret'd) Baker published in *Sanctuary* 39, 2010 © Crown

If you'd like to know more about MOD Conservation Groups, are thinking about getting involved or are interested in setting one up, please contact the Environmental Engagement team, who will be happy to help: DIO-ConservationGroups@mod.gov.uk.


Some of Jean Clayden's paintings © Crown

Around the Regions with the Conservation Groups

There are currently over 70 active MOD Conservation Groups. The following section provides an update on some of their activities over the past year.

KEY: UK MAP

- 1 Featured regional Conservation Group
- Other regional Conservation Group

1. **Spotlight on... Longmoor Training Area** Hampshire
2. **RAF Barford St John** Oxfordshire
3. **Kinloss Barracks** Moray
4. **Salisbury Plain Training Area** Wiltshire
5. **RAF Boulmer** Northumberland
6. **Dale Barracks** Cheshire
7. **Sennybridge Training Area** Powys
8. **HMS Excellent** Hampshire
9. **RAF St Mawgan** Cornwall
10. **Foxglove Covert** North Yorkshire

11. **Defence Munitions Gosport** Hampshire
12. **Yardley Chase Training Area** Northamptonshire
13. **Bicester Garrison** Oxfordshire
14. **Castlemartin Ranges** Pembrokeshire
15. **Newtown Range & Jersey Camp** Isle of Wight

Spotlight on… Longmoor Training Area, Hampshire

by Lt Col Jens Petter Gronn
Commander Defence Training Estate South East, Defence Infrastructure Organisation

The MOD's collection of Fieldcraft Training Areas at Longmoor/Bordon, inclusive of the co-located ranges in Hampshire, are more than just a training ground for soldiers. For over 50 years, it has been a remarkable example of how the Defence Training Estate can be managed for both Defence's needs and biodiversity conservation. This unique partnership, born from a long-standing relationship between the MOD and conservation organisations, has yielded impressive ecological results and has provided a compelling model for sustainable land management across Defence.

In 1973, there was intense scientific interest surrounding the unique dry and wet heathland found in the Woolmer Forest in the Longmoor/Bordon vicinity. The site was also near the duty station of the MOD's first Conservation Officer, Lt Col (Ret'd) Christopher Norman Clayden, who had been appointed with a specific remit to focus on potential conservation initiatives across the MOD estate. In 1974, Lt Col (Ret'd) Clayden chose Longmoor as the site to set up the first official MOD Conservation Group. He was joined by Lady Ann Brewis, a botanical adviser, as well as other experts spanning a full spectrum of conservation subjects such as entomology (insects), herpetology (amphibians and reptiles), ornithology (birds) and deer management. Together, they formed the backbone of the Longmoor Conservation Group (LCG).

Driven by a shared vision, the LCG focused on the ecological impacts of military activities while preserving Longmoor's rich natural heritage. This collaboration, innovative in its approach, was not only the first ever Conservation Group in Defence but the first of its kind in the UK. All MOD Conservation Groups can trace their lineage to the LCG and today they span the full breadth of the UK's MOD and overseas estates.

Early efforts focused on understanding and mitigating the effects of past military use. Decades of training and activity had left their mark. These had combined with other meteorological and climate related factors and had a detrimental impact on both the local habitat as well as the species living in them. The LCG began meticulously surveying and assessing the site's flora and fauna. This initial research highlighted the presence of several nationally important species and habitats – a vital step in informing subsequent conservation strategies. One immediate concern was the decline of certain species. Reports noted a significant drop in sand lizards *Lacerta agilis* to only around 40 breeding females by the 1970s. The strategies undertaken meant that the LCG would later reverse this, along with many other declining trends, through initiatives focused on pond creation and restoration, habitat improvements and species recovery programmes.

Longhorn cattle at Woolmer © Crown

Longmoor Conservation Group's 50th anniversary celebrations © Crown

The real test of LCG's effectiveness came in 1992 with the planned expansion and re-routing of the A3 London to Portsmouth trunk road through the middle of the Longmoor Training Area. The main impact of this would be the migration of animals between Woolmer Forest into the Longmoor enclosure. Plans were confirmed to erect deer fencing on either side of the A3 – a common sight around the MOD estate now, but rather unusual at the time. One positive consequence of the A3's expansion was the isolation of training areas, which saw less footfall and cross-contamination, thus creating a more conducive sanctuary for flora and fauna.

A crucial mechanism for achieving conservation successes was the development of sustainable management plans. These regularly reviewed plans, created through collaborative efforts, integrated the MOD's operational requirements with the needs of conservation. They outline strategies for habitat restoration, species management and monitoring, carefully balancing military training activities with biodiversity protection. Management plans focus on habitat restoration projects and align them to protect vulnerable species. In Longmoor, the plans detail how efforts to restore and maintain areas of heathland and grassland can be achieved. These actions not only benefit specific species but also contribute to a healthier, more resilient ecosystem. Likewise, older forms of habitat restoration and conservation along with modern scientific strategies have meant that innovative initiatives – such as grazing strategies on degraded habitats – are utilised to maximise the conservation efforts and align them as naturally as possible with their environment.

Today, Longmoor sees thousands of troops using the camp's accommodation, ranges and Fieldcraft Training Areas to shoot, train and prepare for operations. Although military training remains the driving factor, there is constant collaboration and co-ordination with the Defence Infrastructure Organisation (DIO) Ecology team, as well as other invested stakeholders – most of whom are civilian – with the Hampshire and Isle of Wight Wildlife Trust as a major contributor. With 50 years now passing since its inauguration, the LCG's efforts have evolved, and wider stakeholder interaction has brought different focuses. One contemporary issue that directs the LCG's efforts is the threat posed by increased urbanisation within the Longmoor/Bordon area, resulting in competing priorities that must be balanced. There is a need to facilitate public access and home building alongside the continued requirement for the MOD to train, which remains a difficult balancing act that will focus the LCG's future management plans. Wildfire is a real threat due to increased urbanisation – careful collaboration centred around the LCG will help mitigate the impacts on military training, civilian infrastructure and the wider potential ecological damage.

The partnerships between the MOD and wider conservation organisations at Longmoor have become a national model for how military land and training areas can be effectively integrated with conservation initiatives. The collaboration extends beyond specific projects; it represents a deeper shift in attitudes, demonstrating that military lands can serve multiple purposes and be effective contributors to biodiversity conservation. The sustained commitment spans decades of effort, standing as proof that long-term, collaborative approaches are key to achieving meaningful and lasting environmental benefits.

Smooth snake © ARC

Longmoor was the Conservation Group that started it all – Lt Col (Ret'd) Clayden's initiatives kick-started *Sanctuary* magazine to enable Conservation Groups to share their activities and the Sanctuary Awards to celebrate their successes. Today, work incorporates wider issues such as sustainability, net zero, resource efficiency, renewables and recycling – and, of course, continues the more traditional conservation agenda. Since 1974, hundreds of thousands of volunteer hours have contributed to conservation across the UK and overseas, with individuals undertaking work on the ground, whether that be physical works or monitoring. There are ties to many charities and non-governmental organisations, as well as statutory bodies such as Natural England. Our volunteers are the eyes and ears on the ground, highlighting issues before they become problems and contributing to the success of the DIO's Conservation Stewardship Funded projects, which have delivered nearly £3 million of conservation improvements over the past decade alone.

"Our volunteers are the eyes and ears on the ground, highlighting issues before they become problems..."

Natterjack toad © ARC

In conclusion, the Longmoor story is a powerful demonstration of how effective collaboration can transform Defence estates from sites of potential environmental concern into remarkable biodiversity havens. Longmoor is just one of such successes and serves as both an inspiration and a model for others seeking to balance the needs of Defence with the protection of the natural world. The commitment of the MOD, the LCG and other partner organisations highlights the potential for achieving significant conservation gains, even with sometimes conflicting priorities. Importantly, Defence's reputation is enhanced by such commitments, and in an ever-changing world facing many natural challenges, it is more important than ever that Defence plays its part. As one of the largest landowners in the UK, Defence remains a vital cog in the nation's conservation efforts – never sitting back, Defence has been the trendsetter, as demonstrated 50 years ago at Longmoor.

Natterjack scrapes © ARC

RAF Barford St John, Oxfordshire

by Steve West
Environmental Officer, Defence Infrastructure Organisation

Although separate Conservation Groups have been operating on the different sites since 2004, a collaboration between the RAF Alconbury, Molesworth and Croughton Conservation Groups was formally instigated in August 2023 under the new RAF Commander, Sqn Ldr Sheeran. RAF Barford St John is operated by the United States Air Force (USAF) as a satellite of RAF Croughton.

Historically, there is little peregrine falcon activity within Oxfordshire's lowland regions. However, in late 2022, peregrines were observed around Barford St John, although it was unclear whether the birds had nested. In 2023, there was a concerted collaboration between the Defence Infrastructure Organisation (DIO) and USAF environmental teams to investigate this continued activity further.

Over the 2023 and 2024 breeding seasons, a rooftop nesting site was identified in Barford St John. Further observation confirmed that there was a breeding pair of peregrines, potentially raising offspring. In 2024, the teams ramped up efforts to make the possible nesting pair welcome, while also gathering photographic evidence to chart the use of the nest throughout the breeding season.

However, accessing such a high rooftop nesting site to deploy wildlife cameras proved challenging, exacerbated by the roof's state of disrepair. The conservation teams engaged the support of the site's maintenance provider, who undertook a remediation programme of works whilst the peregrines were away from the nest site. The scaffolding erected for the repairs enabled the team to deploy the camera systems. It was then a question of monitoring the site periodically for bird behaviour.

Excitingly, our observations led us to believe that there were chicks in the nest. Upon retrieval of the camera cards, we were presented with photographs that confirmed the birds were successfully raising a brood of chicks, with images captured across a range of developmental stages.

This project provided a breeding pair of peregrine falcons with a safe place to successfully raise a brood of three chicks to fledge, assisting the survival and expansion of a Schedule 1 protected species. Peregrines are the UK's biggest falcon; they prey on medium-sized birds and are famous for hurtling out of the sky at high speed in a spectacular dive (stoop) to catch their prey in mid-air.

The project continues for the 2025 season. With the assistance of VIVO, our base maintenance provider, we have deployed the cameras again – this time, one with video and one with still picture capability.

Peregrine adult with three eggs © Crown

Peregrine feeding hungry chicks in nest © Crown

Hope, the life-sized humpback whale © Alex Bidie

Kinloss Barracks, Moray

by Lt Jessie Broad
Support Troop Commander, 34 Field Squadron, 39 Engineer Regiment Conservation Group

Kinloss Barracks on the Moray Firth in north Scotland is home to 39 Regiment Royal Engineers. Bordered by the Moray coast and Findhorn Bay, the area is a Site of Special Scientific Interest. Kinloss is home to a fabulous host of protected species, including long-eared owls and otters. It is perfectly placed within a community with a strong culture of conservation. Therefore, it was a natural step for the Regimental Quartermaster, Lt Col Horrocks and Capt Alex Bidie to initiate a Conservation Group in 2023. Since its foundation, the group has sought to steer the regiment towards greater engagement with the surrounding natural world.

Engagement with community groups and charities has fostered strong relationships locally, sharing knowledge that positively impacts the regiment's standing in the community. In collaboration with the Marine Conservation Society, the group organised a beach clean. Waste was surveyed to understand what was being thrown away, and litter was collected over a set distance to help quantify the refuse on Scotland's beaches. In partnership with Moray Ocean Community, the regimental dive team conducted a survey of subtidal seagrass in Burghead Bay to support local scientists. This data will contribute to the countrywide database of seagrass distribution and help inform policy decisions and future regeneration projects.

The group and members of the unit attended a shore watch course and volunteer in science projects in support of the charity, Whale and Dolphin Conservation. Two of the group's members trained as marine mammal medics with the British Divers Marine Life Rescue charity. This prepared them to support the refloating of stranded cetaceans and the rescue of injured marine mammals. In August 2024, these skills were put into practice during the successful rescue of two seal pups.

In July, the regiment hosted the Sapper Games, the Royal Engineers' annual inter-unit sports competition. To promote conservation, the group invented the Eco Trophy, which encouraged competing units to consider their environmental impact and inspired action to reduce their carbon footprints – an initiative that looks hopeful to remain a feature of future games.

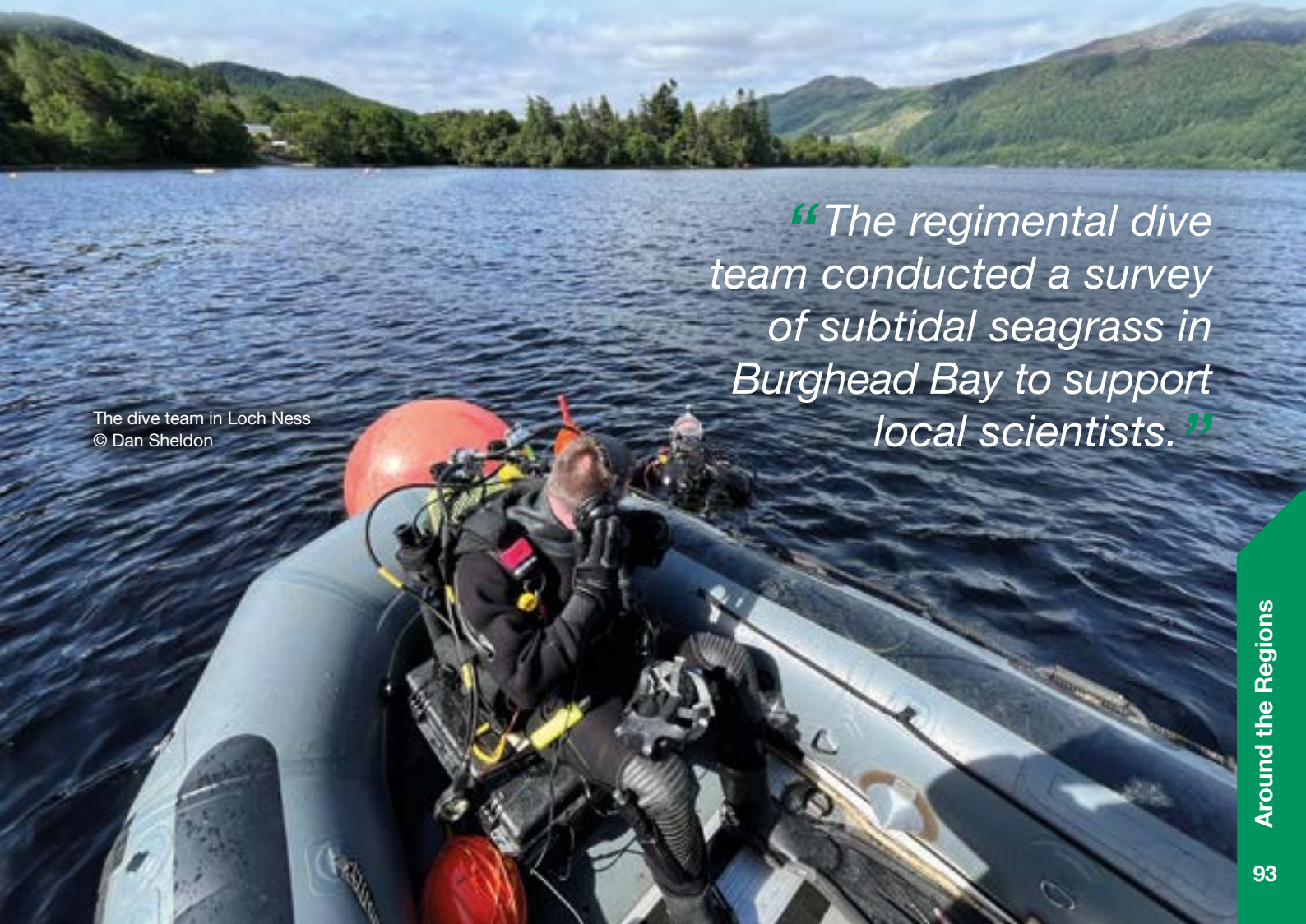
Last summer, the group collaborated with Roy Dennis, founder of the Roy Dennis Wildlife Foundation, who has a long-standing relationship with Kinloss Barracks from its time as a RAF camp. The RAF helped him translocate white-tailed eagles and red kites to the UK, flying them into Kinloss on Nimrod aircraft from Norway. Sadly, while military airlifts for endangered birds of prey are now only a fond memory, he was generous enough to visit the unit and host a discussion on the protection of the bird species that nest here today. With a particular focus on how Kinloss can encourage the growth of arctic tern and curlew populations that nest within Kinloss' training area. To further support these species, Kinloss Barracks is a proud advocate of No Mow May. The extensive grassland around the airfield is not cut between the months of May and September every year.

Sappers removing invasive species © James Gill

Since the Conservation Group's foundation, the unit has taken part in the Global Charge project, 1st (UK) Division's sustainability event. In September 2024, Maj Gill, in collaboration with the Conservation Group, organised the entire regiment to pause normal works for the day and engage in community sustainability tasks. The dive team cleared rubbish out of Loch Ness, two squadrons removed invasive species from local wildlife reserves and another squadron conducted a litter pick of the local town as well as a beach clean. The workshops team constructed and erected bird boxes around camp. Several local conservation charities were invited along, headlined by Hope – a life-size inflatable humpback whale supplied by Whale and Dolphin Conservation, who filled the gym hall.

Recently, 39 Engineer Regiment won the Army Safety Group Unit Environmental Award. Looking forward, the group hopes to continue their work making and erecting owl boxes, as well as conducting a survey to understand how many bird species currently nest on-site. The group has also set plans to establish a wildflower meadow, focusing on a variety of poppy species to co-ordinate with the unit's Remembrance events whilst also supporting pollinators. The regiment looks forward to the Big Butterfly count and to working with ecologists from the Defence Infrastructure Organisation and the local community, who travel up to advise on the most impactful ways to utilise the 1,800 acre site. An exciting project is ongoing, working closely with tree specialists to establish a new woodland area by planting a selection of native trees.

Kinloss Barracks' Conservation Group is still in its early days. Constantly evolving, the group intends to continue growing from their success in the Unit Environmental Awards. Inspiring new members with aspirations to make Kinloss one of the most eco-conscious camps, with a reputation within the local community for its engagement and positive impact on this wild and special area.



"The regimental dive team conducted a survey of subtidal seagrass in Burghead Bay to support local scientists."

The dive team in Loch Ness
© Dan Sheldon

Salisbury Plain Training Area, Wiltshire

by Lt Col Jamie Powell
Senior Training Safety Officer & Conservation Group Chairperson, Defence Training Estate SPTA

The Salisbury Plain Training Area (SPTA) Conservation Group was established in 1977, originally consisting of three separate groups for the Warminster, Bulford and Larkhill Ranges.

It is a very active group with approximately 100 members, covering disciplines from aquatic environs, various bird projects, botany, moths, butterflies, bees, mammals and archaeology. There is also a wider remit for organisations such as the RSPB, Defence Deer Management and statutory bodies. It is fortunate to have many experts and other enthusiastic conservationists supporting so many projects, which all support the Integrated Rural Management Plan and the Defence Infrastructure Organisation (DIO) ecologists, archaeologists and foresters who manage this unique and vast area of chalk grassland.

A really good example of a recent project was undertaken by John Hughes using new technology. Long-eared owls now breed on SPTA and a song meter was used to detect their breeding sites. Whilst barn and tawny owls are well studied on Salisbury Plain, the much rarer and elusive long-eared owl is poorly recorded.

The bird is very difficult to census by conventional survey methods but can be located by their calls during their breeding season. Between June and September 2024, at the end of the long-eared owl breeding season, a song meter was used to determine the presence of the bird and to identify breeding sites. A song meter mini bat recorder was obtained on loan from the DIO and modified by fitting an acoustic microphone, which was used to conduct surveys during 40 nights at 29 sites across SPTA East. The meter was deployed each night at 2000hrs and then collected the following morning at 0800hrs.

The 12 hours of nocturnal bird vocalisations recorded each night were uploaded into the British Trust for Ornithology Acoustic Pipeline, where bird vocalisations were detected and identified using the European Nocturnal Breeding Birds classifier. There was no need to listen to the 12 hours of recording as the classifier produced a four-second clip of any bird detected. Clips that reported long-eared owls were independently checked by listening to the recording and by spectrogram analysis using Wildlife Acoustics Kaleidoscope Lite analysis software.

Calls of long-eared owls were detected at 18 of 29 survey sites on 250 occasions. Care is needed when interpreting this result as it could be one owl calling 250 times or 250 owls calling once. Calls were most frequently recorded at two sites. A long-eared owl's nest with two young was found at site A, and long-eared owls were detected calling at site B during 11 nights between 19 May and 17 September 2024 and probably bred at this site.

A wasp mimic cranefly © Iain Perkins

Hares on SPTA © Ian Grier

Long-eared owls are the most common owl on the Isle of Man and in Ireland where tawny owls are absent. The larger tawny owl is the most common owl on SPTA and during this survey they were recorded 1,659 times. Tawny owls are known to threaten long-eared owls, so it was surprising to find tawny owls nesting within the long-eared owl's home range at both sites.

Other rare breeding bird songs recorded during this survey were 283 quail, 765 grasshopper warblers and one churring nightjar. Passive Acoustic Monitoring using the song meters held by the DIO have great potential for surveys of rare nocturnal breeding birds on SPTA, and plans are in place for surveys during future breeding seasons.

Maj (Ret'd) Nigel Lewis MBE, who ran the Owl and Raptor teams on SPTA West and Centre for many years, sadly passed away on 14 November 2024. The MOD Owl and Raptor project on Salisbury Plain Training Area had recently celebrated its 40th anniversary. Nigel initiated the Owl and Raptor project to erect nest boxes for birds of prey when he was posted to Warminster in 1983. Under Nigel's inspired leadership, the project has continued to monitor, ring and collect valuable data on the owl and kestrel population. Nigel was supported by a small team of enthusiastic volunteers who turn out on Saturdays throughout the year. The project monitors tawny owls, barn owls, little owls and kestrels. Over the years, Nigel erected a total of 336 owl and kestrel nest boxes on the Plain.

In 2023, Nigel was awarded both the Individual Achievement Award and the Silver Otter Trophy at the MOD's annual Sanctuary Awards, recognising his outstanding contribution over 40 years. His enthusiasm and commitment are a great loss to the group, and we are delighted that the winner will now receive the Nigel Lewis Trophy in his honour.

Two long-eared owl chicks in their nest at site A © John Hughes

Nigel Lewis holding two barn owls © Justine Hadfield

The oystercatcher salute
© Simon Moore

RAF Boulmer, Northumberland

by Joanne Bevan
Station Environmental Protection Advisor, RAF Boulmer

In the picturesque coastal region of Northumberland, RAF Boulmer is a crucial pillar in the UK's air defence system. The station is home to around 1,000 service personnel, civilians and contractors, all playing a vital role in maintaining the UK's air defence network. Beyond its defence role, RAF Boulmer takes the stewardship of its operations and administration sites seriously, located in an area bordering a National Landscape, formerly known as an Area of Outstanding Natural Beauty. The Conservation Group has formally been active since 2021.

The oystercatcher is a striking black and white wading bird with a distinctive black and bright orange bill. Oystercatchers have been a significant part of RAF Boulmer's history, returning annually to breed, and the Conservation Group has been protecting these birds for several years. In 2024 the Environmental Protection Advisor, Joanne Bevan, got in touch with Space for Shorebirds, who are dedicated to protecting shorebirds on the Northumberland coast. Conservation is crucial as the Eurasian oystercatcher population has declined by 21% in the past 30 years. They are Amber Listed for conservation concern in the UK and globally classified as Near Threatened by the International Union for Conservation of Nature. Changes in farming practices and increased coastal disturbances have caused these birds to nest further from the shore into the littoral areas, including RAF Boulmer.

The team gravel scrape laying © Simon Moore

In 2024, RAF Boulmer personnel, in collaboration with Space for Shorebirds, provided fencing and signage for the nests, which proved invaluable to the programme. This year, 50cm square nesting boxes – lined with gravel and equipped with a sunshade for chicks – are being trialled, marking a first for Northumberland. Although the fencing improved the protection of the birds, it is hoped that the boxes will protect them even more and minimise disruption to grass cutting and estate management, including building and infrastructure projects.

Known for their loud 'peep-ing' calls, oystercatchers will let you know if you are too near with a loud warning call and aerial displays, confronting crows and gulls that fly above their nests. Richard Willis, Senior Wildlife Ranger with Space for Shorebirds, explains that *"The safe space that the base provides is ideal for these noisy birds, and with the enthusiastic support from the RAF Boulmer team, the birds have been incredibly successful in raising their chicks, especially compared to other parts of the Northumberland coast where they lack the same protection. This means the oystercatchers at RAF Boulmer are incredibly special in a local context"*.

Balancing operations and conservation is challenging, but the Station embraces it. A technical build is set to start in June 2025, and the preliminary works in 2024 left exposed gravel that oystercatchers used for nesting last year. In preparation, the Conservation Group created gravel scrapes and with the new breeding boxes, hoped to redirect the birds. Despite this, a pair nested on the exposed gravel, while others used the new boxes! Nature has a mind of its own. Working with contracting staff and the Station estates team, the plan is to try to mitigate what can be frustrating delays to programmed works.

The Station Commander, Wg Cdr Charlotte Best, is a passionate advocate for all conservation efforts on the Station, and with leadership from the Station Health, Safety and Environmental Protection team, Defence Infrastructure Organisation (DIO) and their regional prime contractor, VIVO, a safer breeding environment for these birds has been created. Although the team occasionally finds themselves searching for eggs masquerading as perfectly round stones, their vigilance is invaluable. The entire station takes an active interest in the birds and their nests, regularly reporting sightings and concerns.

Breeding numbers at RAF Boulmer nearly doubled from six nests in 2023 to 11 in 2024, with only one nest lost to predators. One day, an oystercatcher pair was found sitting unusually quiet in the car park near their empty nest. However, their resilience shone through as they laid eggs again late in the season, and the pair successfully hatched two chicks.

Mrs Kirstie Metcalfe, Senior Estates Facilities Manager for DIO, said: *"The oystercatcher project is an inspiring example of stewardship by RAF Boulmer, and DIO are grateful for the opportunity to support all involved. DIO are committed to empowering the site to undertake comprehensive conservation, creating safe habitats for the growing population of oystercatchers and other wildlife whilst enabling responsible development in key areas. It is a privilege to collaborate with passionate individuals who share a common vision"*.

As summer draws to a close and autumn takes full hold, the sites go quiet, almost as if the kids have left home... there are just a few limpet shells left to remind us of our successes and tempt us to do even better for these beautiful birds next year.

"Conservation is crucial as the Eurasian oystercatcher population has declined by 21% in the past 30 years"

Spot the eggs – in the centre of this photo © Simon Moore

Dale Barracks, Cheshire

by WO2 Scott Green
Unit Welfare Warrant Officer & Conservation Group Chairperson, Dale Barracks Conservation Group

Barry the buzzard © Scott Green

When 22 Multi-Role Medical Regiment (22 MMR) moved into Dale Barracks, Chester, over the summer of 2024, the Commanding Officer was keen to get to know the neighbours. The welfare team attended a community update meeting on their Network for Nature project, which is creating a thriving, more connected, wildlife-rich landscape across north-west Cheshire. After the meeting, 22 MMR looked for ways to work with Chester Zoo to enhance their project. From that moment forward, 22 MMR Dale Barracks Conservation Group was created.

Dale Barracks has a small back door training area that hugs the Shropshire Union Canal and makes a perfect environment for all kinds of nature to flourish. The first task for the Conservation Group was to understand what is currently calling Dale Barracks home. The small team of volunteers have been surveying the site over the last few months, studying hours of tracking camera footage and of course giving all the animals nicknames. So far, we have Barry the buzzard, Harry the heron and Neville the newt, to name a few. All the data captured will be handed over to the zoo to feed into the larger conservation project.

The next job on the list was to transform a small patch of ground beside the sports pitches into a nature trail. This trail will offer a space for people to go and get back to nature, surrounded by locally sourced wildflowers and bug hotels. The Conservation Group have planted 48 trees, which over the coming years will form a screen and create its own little world surrounded by nature. In a time when looking after your mental health is so vital, this trail will offer the perfect space for people to focus on their mental health – and also a space to hide from the Regimental Sergeant Major when he is looking for someone for guard duty.

The last job on the list (so far) is to invest time and effort into a small pond located on camp. Over the last few years, this pond has become overgrown and abandoned. The Conservation Group plans to manage the pond to enhance it for wildlife and make it more accessible for people to enjoy.

The Conservation Group is only a few months old, but there are already lots of activities planned for this year and into the future.

The conservation group planting trees © Scott Green

Sennybridge Training Area, Powys

by Maj Andrew Butcher
Senior Training Safety Officer, Sennybridge

The 85th anniversary of the formation of the Sennybridge Defence Training Estate takes place in 2025. The area is known simply as the Epynt to the local community, who were most impacted in 1940 when 219 people and 54 farms were cleared from the land to enable training for World War II. While conservation was not the highest priority back in 1940, over the last 85 years, Sennybridge Training Area has undertaken some wonderful conservation initiatives, boasting some remarkable results. With 31,000 acres of rugged Welsh hillside, its main residents – other than service personnel – are the Epynt hill sheep, with 45,000 hefting on the hill.

Along with the Conservation Group, the sheep play their own very special part on the Epynt, working in partnership with the ground to produce the most remarkable waxcap fungi. These burst into colour around November each year, when ignited by a hard frost. It is thought that these waxcaps are probably the best in Europe, if not the world.

Nobody knows more about the waxcaps at Sennybridge than the group expert Ray Woods, who has been an active member for the last 40 years. Ray has written many articles on waxcaps, and the group have collectively benefitted from his vast knowledge. We would like to sincerely thank Ray for his continued support – we are all grateful.

Water plays a fundamental part on the training area, with varying sizes of rivers and streams which flow into the Usk and Wye. The ferocity of the water flow at certain times of the year can contribute to flooding further down the county in Crickhowell and Abergavenny. Therefore, creating leaky dams is very much on the agenda, which is a fairly simplistic solution to an ongoing problem.

The group have a varied membership, from military historians to archaeologists, geomorphologists and botanists, hydrologists and mycologists, and those that simply have a general interest in conservation. Our 2024 study day saw the group enter one of the ranges on the eastern side of the Epynt, an area normally out of bounds, enabling us to explore uncharted territory.

This year, there is a plan to do the same, and the group can decide which area of the Epynt they wish to cover. We hope this will make the Sennybridge Conservation Group fully inclusive and allow our resident experts to share their knowledge of their particular field with the whole team.

Ray Woods passing on his vast knowledge to the group © Crown

One of the many fantastic vistas seen on the training area © Crown

HMS EXCELLENT, Hampshire

by Ian Mackfall
Environmental Protection Advisor, HMS Excellent Conservation Group

Pyramidal orchids © Ian Mackfall

On the south coast of England sits a series of man-made islands and a low-lying peninsula that forms HMS Excellent. The main site is Whale Island, which is home to the Royal Navy's Fleet Headquarters. The peninsula also comprises another satellite island, Horsea Island. All the above are surrounded by Portsmouth Harbour, which is both a Special Protection Area and a Ramsar site. Within these boundaries, two of the units of land are designated as Sites of Special Scientific Interest (SSSI), and the whole of Horsea Island was recently designated as a Site of Importance for Nature Conservation by the Hampshire Biodiversity Partnership.

Horsea Island information board © Ian Mackfall

Both Whale and Horsea Islands are man-made – Whale Island was developed as a firing range, while Horsea Island was constructed as a torpedo testing range in the late 1800s. The infill was chalk waste from the nearby chalk pits. This is what makes Horsea Island so special: it has the same calcareous grassland in the SSSI as the neighbouring Portsdown Hill. The main unit of the SSSI supports calcareous grassland and is assessed as being in favourable condition, while the other is under a five-year management plan to improve its condition from unfavourable to favourable recovering.

Horsea Island was designated SSSI status in 1986 and the incumbent Environmental Protection Advisor established a Conservation Group in 2002. To this end, and to aid the management of the site, surveys are carried out regularly. Bryological surveys for mosses, lichens and liverworts have identified 54 species, including the rare bearded earth-moss. Botanical surveys are carried out and have identified 149 species, of which the rare walled bedstraw proved particularly noteworthy.

Butterfly surveys are conducted frequently, and resistant elm trees and buckthorn saplings have been planted to promote and encourage certain species. Moth surveys are also completed in the summer by a team of enthusiasts. The team uses the light-trapping method, which has proven highly effective, especially for nocturnal species. This allows the observer to catch large numbers of moths and subsequently release them safely back into their environment. The survey method proved extremely successful this year, recording 174 species of moth – both large and micro – with the yarrow pug and the L-album wainscot being particularly notable.

Dwarf thistle © Ian Mackfall

Common spotted orchid © Ian Mackfall

Bird monitoring is carried out by a local birder who produces a spreadsheet of all sightings, with the most recent listing a total of 50 species. This figure does not include the waders that frequent the foreshores – of particular note recently was a migrant grey phalarope. A successful ringing campaign was conducted in the summer of 2024, with 54 blue tit chicks being ringed.

Much is being done to improve the biodiversity and infrastructure for the existing flora and fauna. Certain areas of the sites are left fallow to promote existing nature, for both flowers and insects alike, while bird boxes and hedgehog boxes are installed throughout the site. All the bird boxes are made from woodcrete, which is extremely durable, does not warp or rot, is maintenance free and has excellent thermal properties. Horsea Island was also selected as a hedgehog release site in 2018, and to date, a total of 42 hedgehogs have been released successfully. An apiary is well-established on-site, with 10 hives altogether. The unique honeys produced are bottled and made available to site personnel.

> *"A superb hidden gem that stands out as a fine example for outstanding nature conservation and habitat management."*

Utilising volunteers, beach clearances take place on a bi-monthly basis and where possible are timed to tie in with national events like World Oceans Day and The Great British Spring Clean. As part of the management plan, both people and animals are used to help improve the condition of the site. Animals are used for grazing in the autumn months, while people from Hampshire and Isle of Wight Wildlife Trust, along with numerous other volunteers, take part in scrub clearance during the winter months.

To increase public awareness and staff on-site involvement, the Environmental Protection Advisor entered the SSSI section into the South & South East in Bloom competition in 2024, in the 'Small Conservation' category. We were up against the likes of Arundel and Farnham, to name but a few. Much work was done over the winter months to manage invasive privet and dogwood, with the help of Hampshire and Isle of Wight Wildlife Trust and our volunteers. A large narrative board was erected at the main entrance to display the site's flora and fauna, and benches and signs were erected to encourage personnel to enjoy their surroundings.

The judges' observations and recommendations were extremely positive. The site was said to be unique and unequivocal for its biodiversity and unspoilt nature, *"A superb hidden gem that stands out as a fine example for outstanding nature conservation and habitat management"*. At the award ceremony, which was held at RHS Wisley in September 2024, Horsea Island was awarded the elusive Gold award. This achievement sets the site up for entry this year, with the ultimate aim of winning another Gold and Best in Category, which would put the icing on the cake.

The Whole Force joined in with the tree planting
© Cpl Andy Morris

RAF St Mawgan, Cornwall

by Sarah Kretowicz
Station Health, Safety and Environmental Adviser, RAF St Mawgan

RAF St Mawgan remains committed to developing its ecosystem, improving biodiversity and protecting the life cycles of threatened species by promoting awareness of environmental issues. Since 2021, RAF St Mawgan has focused on conservation, recycling and waste management, which has improved the health and wellbeing of the Whole Force by increasing their exposure to and understanding of the natural world.

During the COVID-19 pandemic, a wellbeing garden was created so personnel could be with others in an outdoor setting whilst observing social distancing. This area was later planted with sensory plants to create a pleasant and relaxing space, which is still utilised by the Whole Force community today.

Additionally, a community garden was created where personnel could grow their own fruit and vegetables. The area has two polytunnels with raised beds allocated via a waiting list. There has been extensive landscaping within the area, which has continued into 2025 with the addition of musical and sensory equipment. Competitions were run in late spring to encourage personnel to participate in growing, as well as making recycled and biodegradable pots. This whole area has been named Roots to the Future, celebrating the Whole Force ethos of growing fruits and vegetables and creating memories with their families.

In 2021, it was decided to participate in the No Mow May initiative on an industrial scale and to permanently reduce herbicide use, which resulted in a reduction of approximately 100L of neat herbicide in the first year alone! This reduction allowed for rewilding in some areas, with the strimming of these areas stopped. RAF St Mawgan has a hedgehog release site, established in December 2021, and the cessation of strimming in those areas has reduced injuries to these protected creatures. To date, 102 hedgehogs have been released at RAF St Mawgan!

All these initiatives have increased flora on the unit and provided more food sources for wildlife and pollinators. Logs from felled trees have been used to encourage invertebrates, further adding to the available food sources on-site. The number of beehives has also increased from six to 10.

In addition, in 2022, over 300 mixed fruit trees were planted alongside 200 broadleaf trees under The Queen's Green Canopy initiative. The trees were planted in four different areas, collectively known as the Platinum Orchard, which serves as a permanent memorial to Her Majesty, the Late Queen Elizabeth II.

Foxglove Covert, North Yorkshire

by Carl Watts
Reserve Manager, Foxglove Covert Local Nature Reserve, Catterick Garrison

Foxglove Covert Local Nature Reserve was established in 1992, on a boggy area between Cambrai Lines and the Catterick Training Area. While the benefits of being closer to nature are now well known, this was not the case over 30 years ago. It is remarkable then, that Foxglove Covert owes its origins to Maj Tony Crease, who understood the need for rehabilitation of fellow Royal Scots Dragoon Guards following their return from the First Gulf War and decided to focus his energy on the establishment of this wonderful nature reserve. The expansion of the original 20 acre plot to a 100 acre reserve has brought both benefits and challenges to the current team of staff and volunteers who manage the site.

Most habitats are thriving, but one of the final land parcels granted by the MOD has proved problematic for several years. A 2ha monobloc conifer plantation on the southern edge of the reserve is dominated by closely planted Scots pine and Sitka spruce. The original intention in creating such an area was to prepare for Arctic warfare through a simulation of Scandinavia's taiga forest.

The plantation has almost nothing to offer nature, and observations over the last few years have amounted to a few goldcrests, mixed flocks of wintering tits and finches, and the odd roe deer.

Through storm damage, there are plenty of fungi that have spread and been recorded, but the plantation is close to being a wildlife desert.

Inspired by the trend in rewilding projects, a conversation was had with representatives from Forestry Commission England. A simple, cheap and effective plan was formulated for the ring-barking, or girdling, of a fifth of the trees within the plantation. Cutting the whole circumference of the tree through the bark and cambium results in the slow death of the tree, causing foliage depletion over a number of years and enabling light to penetrate the canopy.

Simple hand tools are all that are required for the work, in this case, drawknives. Permission was also granted to 'halo' areas around broadleaf trees, providing a good excuse to wield the felling axe. Haloing is a woodland operation which removes trees and lower vegetation from around older and maturing trees, enabling them to retain space and light. The open spaces help to increase ground vegetation with brambles, ferns and wildflowers, and the standing deadwood created becomes a haven for wildlife.

Surveying the impact will be interesting, and the results could prove useful for other plantation sites.

Using a drawknife to ring-bark © El Biggs

One ring-barked conifer – just 500 to go! © El Biggs

Frater Lake © Raff Turk

Defence Munitions Gosport, Hampshire

by Raffaele Turk
Environmental Manager, DM Gosport

Defence Munitions (DM) Gosport has a history of supporting local wildlife through the effective implementation of a MOD Conservation Group, as the site provides a natural wildlife refuge within the urbanised town of Gosport. First initiated in the 1990s and chaired by various individuals, it was resurrected in 2017 by the current Environmental Manager, Raff Turk, after a short hiatus and has continued for the past eight years. The MOD's Conservation Groups provide a vital community resource, helping to maximise the wildlife value of the estate and mitigate the devastating effects of climate change and biodiversity loss.

Hybrid elm planted by the Conservation Group © Raff Turk

DM Gosport is a Defence Equipment and Support munitions depot located within southern Hampshire on the western shore of Portsmouth Harbour. The site footprint covers approximately 208ha, encompassing lowland meadow, coastal grassland, woodland (including semi-ancient), freshwater ponds, saltwater lagoons, scrubland and an industrial built estate. The site is an upper-tier Major Accident Control Regulations establishment due to the holdings of munitions – a risk to wildlife and the local community that must be strictly controlled through various regimes. The high-security systems and lack of public access provide an opportunity for wildlife to thrive with limited human interaction.

Most of DM Gosport is designated by the Local Planning Authority as a Site of Importance for Nature Conservation due to the expanses of botanically rich grasslands that support pollinators. Other ecological features include a heronry and bat hibernaculum situated within a scheduled monument (Fort Elson), oyster beds within the tidal Frater Lake, badger setts, rabbit burrows and more. As DM Gosport borders Portsmouth Harbour – an area of high ecological value designated as a Site of Special Scientific Interest, a Special Protection Area and a Ramsar site – many wildlife interactions take place. Wetland birds, including curlew, redshank and black-tailed godwit, can be common. Additional Red Listed avian species present are lapwing, skylark, cuckoo, whimbrel and more. Other notable faunal species include the great crested

newt, common toad, adder and roe deer. Green-winged orchid, cowslip, pepper saxifrage, yellow rattle, field scabious and autumn lady's tresses orchid are examples of interesting flora.

Butterflies and moths are a primary conservation focus; small heath, grizzled skipper and white-letter hairstreak are three Red Listed species that are regularly identified, with activities focused on supporting their growth and stability. In 2024, a white admiral was identified for the first time in years within a woodland glade encased in bramble and honeysuckle, and it will be actively added to the 2025 surveying programme with Butterfly Conservation.

To mitigate the harmful effects of Dutch elm disease and support the white-letter hairstreak butterfly, DM Gosport has supported the trial planting of hybrid elm cultivars since the mid-1990s. In 2024 and 2025, additional saplings were provided by the Hampshire Forestry Partnership and successfully planted by the Conservation Group. These cultivars integrate into the existing ecology, maintain disease resistance and are suitable for the butterfly life cycle. The original hybrid trees directly support the existing colony, while the newer saplings aim to expand the distribution of the population and increase abundance.

Wych elm has also been planted across the site as part of the species mix for the net zero led woodland creation project, which has seen approximately 7,000 trees planted across DM Gosport. Although the primary purpose is carbon sequestration, secondary benefits include habitat creation and diversification, with the elms providing an opportunity for further enhancement of the butterfly colony.

DM Gosport is fortunate to support the nationally rare large golden case-bearing moth, with the growth of the species' foodplant (dyer's greenweed) present amongst the grasslands. Management efforts have been directed at conserving both the foodplant and the moth, while managing scrub and rank grasses through a staged topping and mowing approach. Once larval casings of the moth are present on the vegetation, monitoring will be initiated, and the data submitted to Butterfly Conservation. A transplanting project may be developed, seeking to create and supplement populations further from the flood risk coastline zone at DM Gosport, as well as at Thorney Island – which has a MOD Conservation Group about 8km along the coast to the east. Here, dyer's greenweed already exists in a field grazed by cattle, and the surrounding environment is suitable for the moth.

DM Gosport continues to support the Praise Bee charity by implementing two solitary bee nests, with a focus on the red mason bee, providing an opportunity to study and conserve the species. The 2024 season results identified 86 pupae! Praise Bee also kindly provided a box of viper's bugloss seed to trial the development of a wildflower meadow on a gravelled and disused area of the site with a low ecological value. The Conservation Group got together with the Defence Infrastructure Organisation and sowed a range of beds that will be monitored across the 2025 season for successful germination. Viper's bugloss is a hardy native wildflower species that is considered drought and disease tolerant, providing crucial nectar for a range of insects, including all native bee species, many butterflies and other pollinators.

DM Gosport Conservation Group members take part in the Viper's Bugloss project © Iain Perkins

Yardley Chase Training Area, Northamptonshire

by Kevin Rowley
Hymenoptera Recorder, Yardley Chase Conservation Group

The Yardley Chase Training Area Conservation Group has been in existence now for 45 years, with the first 20 years documented in a book titled *'A Walk on the Wildside'* by Tony Richardson. Ten years ago, Jeff Blincow invited the author of this article to join the team in undertaking a water invertebrate survey of some of the ponds. They were fantastic! Of great quality and with a real diversity of grassland and woodland ponds. Species found included: great crested newt; toad; water beetle, including the black-bellied diving beetle *Dytiscus semisulcatus*; Odonata (an order of predatory flying insects that includes dragonflies and damselflies), including the downy emerald *Cordulia aenea*; and many water bugs, including the sphagnum bug *Hebrus ruficeps*. The latter is not regularly found in Northamptonshire but occupies the mossy areas around the edges of some of the ponds.

The Aquatic Invertebrate role within the Conservation Group was already taken, but the team was looking to expand. As there had been very little work done on Hymenoptera (a large order of insects that includes ants, bees, wasps and sawflies), with just 49 species recorded so far, it was a great opportunity to initiate a new sub-group. With plenty of room to grow, this would also help inform the understanding and management of the site.

As the area is a Site of Special Scientific Interest, the team agreed to align all monitoring with the Common Standards Monitoring approach, with key focuses on rare species, saproxylic species, nest recording, transect monitoring and species listing, so the data could be used for various assessments.

Sawfly *Cephus pygmaeus* © Robin Gossage

Ruby-tailed wasp *Chrysis sp.* © Bob Gill

The site covers an area of 200ha and has some of the oldest oak trees in Northamptonshire, as well as excellent grassland, a large area of wood pasture and around 150ha of woodland that is home to rare saproxylic species. There is a population of brown tree ants *Lasius brunneus* that nest in the heartwood of the old oak trees and they can be seen running in the bark ridges on the tree trunks. They have been recorded in 23 of the trees on-site, and a future project is planned to determine if the range extends further. There is also a healthy population of large-headed resin bees, which these days are spreading further northwards. They feed on the composites for nectar in the grassland and make their nests in the burrows of dead wood. They also use the resin from pine trees on-site to create the dividers between the chambers in their burrows.

By recording all the Hymenoptera nests, we can understand where and what we need to protect. Wasp nests *Vespula vugaris* and *Dolichovespula media* can be in places with close proximity to humans. However, they can also find great habitat in the middle of bramble patches underground, out of the way of the cadets that train on the site. The hornet *Vespa crabro* likes to find holes in dead trees or branches and is also found in quieter parkland areas.

The honey bees *Apis melifera* have plenty of ancient trees to nest in, but they have taken a real liking to the entrances of some of the World War II bunkers. The entrances were built with large cavity bricks and as they have degraded, the holes provide safe areas for the bees to nest. This has caused some issues in the past. There are a few bee banks that were created by grazing cattle running up south-facing banks and clearing the grass. These have managed to continue to be free of grass and the solitary bees have moved in. The banks now have a great population of red-girdled mining bee *Andrena labiata*, which has created a great microhabitat. The males hatch first and hang around the holes, waiting for the females to emerge so they can be the first to mate. Once they have, the nomad bee *Nomada guttatula* is waiting to enter the hole and parasitise the larvae. If it is not them, then the dark-edged bee fly *Bombylius major* is hovering outside the holes and flicking its eggs in with great accuracy. If all else fails, the ants just barge in, grab the larvae and carry them off. It is a tough world out there!

The team has recently set up regular transects around the grassland areas to monitor the bumblebees and the sawflies. The figures have been heavily affected by the increased drought and wet periods recently, however, as the years go on, the data collected will become more valuable and comparable. The team are hoping to extend these out to the woodland and into the parkland in future years.

Yardley Chase is a wonderful place to be with brilliant wildlife diversity. It can take you back in time but is also a great example of how nature and the military can benefit and coexist with each other.

Brown tree ants *Lasius brunneus* © Jeff Blincow

Bicester Garrison, Oxfordshire

by Gary Beckett
Estate Conservation Officer, Bicester Garrison

Bicester Garrison Conservation Group's first meeting was held in June 1978, following an illustrated talk by the then MOD Conservation Officer, Lt Col (Ret'd) Christopher Norman Clayden. The role of the first Conservation Officer was created in response to the recommendations of the Nugent Committee, which recommended that the MOD do more to manage their land. The Garrison's Conservation Group was then presided over by a Brigadier, with the aim to establish at Bicester a team of environmental experts who were specialists in their fields.

In more recent years, Bicester Garrison Conservation Group has been focusing on scrub management. Scrubland habitat has always been part of the British landscape and occurs where grassland and meadow changes into woodland. It typically contains shrubs, bushes and trees, as well as wildflowers and grasses. The margins between woodlands and meadows means scrubland forms part of the rich mosaic of habitats. It is extremely valuable for a wide range of wildlife, providing a continued source of nectar, fruits, seeds and shelter, as well as breeding and nesting sites.

A stand of scrub with varied plant species, age and structure will support breeding birds and butterflies, as well as many other species. Best practice is to leave patches of scrub – and the occasional tree – to grow on naturally, helping to improve the diversity and age structure. A good example is leaving areas of dense blackthorn, which is a perfect habitat for nightingale to nest during the breeding season.

Patches of scrub left uncut help protect mature scrub and dead wood. These undisturbed areas form a mosaic habitat that provides shelter and hibernation areas for invertebrates, amphibians and reptiles. Additionally, they also support lichen communities and fungi.

Areas of scrub around or near freshwater ponds provide a terrestrial habitat for great crested newts. The ponds themselves support an array of freshwater life and plant species, ranging from those in deep water to those in marginal areas and drawdown zones. In addition to their importance to ponds, the surrounding scrub also serves as breeding sites for amphibious newts, frogs and toads, and as feeding areas for grass snakes, lizards, voles, shrews and certain bat species.

Scrub clearance is carried out between October and February to minimise the disturbance to wildlife, particularly nesting birds. Sensitive clearing is carried out at Bicester Garrison by willing volunteers to provide wildlife corridors, and their contributions over the years are gratefully acknowledged.

A note from the editors: *Many congratulations to Gary, who was awarded the British Empire Medal in June 2025, for services to the Defence Estate and to conservation.*

Scrubland wildlife corridor © Gary Beckett

Toads returning to their pond © Gary Beckett

Casings plugged with leaf mastic © Liam Olds

Castlemartin Ranges, Pembrokeshire

by Liam Olds
Conservation Officer, Buglife

Mason bees are named for their habit of using mud or other masonry products in constructing their nests. Some species use naturally occurring gaps between cracks in stones, others use hollow stems or holes in wood, and many exploit artificial nesting sites. But the gold-fringed mason bee is one of three bee species in Britain to nest in empty snail shells. The females use chewed up green leaves (leaf mastic) to close the shell opening, thereby protecting their developing offspring inside from predators and parasites.

The gold-fringed mason bee is found in many coastal and inland locations in southern England, though elsewhere in Britain and Ireland it is almost exclusively coastal, especially in lime-rich coastal dunes and grassland. Castlemartin Ranges in Wales is a military training area which covers about 2,250ha, the majority of which is designated as a Site of Special Scientific Interest, Special Area of Conservation and Special Protection Area due to many habitats and species of exceptional nature conservation value. One such feature is a large, lime-rich dune system that dominates the western end of the training area.

On 20 June 2024, a group from Buglife set out into these dunes in search of the short-necked oil beetle and found something surprising. Sited on the open sand were several piles of brass ammunition casings, suggesting that this bank had been previously used as a firing position.

Upon closer inspection, it was noted that many of these cases were plugged with leaf mastic. In the warm sunshine, the group observed at least 20 female gold-fringed mason bees entering and exiting the ammunition cases, seemingly ignoring the snail shells that were also available on the dune bank.

Female gold-fringed mason bee within an ammunition casing © Liam Olds

Snail shell nesting bees, such as the gold-fringed mason bee, are limited by both the abundance and quality of available snail shells, which could explain the intriguing nesting behaviour seen at Castlemartin. However, it does raise the question of how the developing bee larvae cope with the potentially high temperatures inside a brass ammunition casing during the hot summer months.

The observations at Castlemartin Ranges provide evidence that bees with specialist nesting habitats, such as the gold-fringed mason bee, can take advantage of artificial nesting locations when these are made available to them. This could prove useful for future conservation efforts for this species and other specialist snail shell nesting solitary bees in Britain and elsewhere.

A note from the editors: *Please be reassured that users of the training estate make every effort to collect spent ammunition casings. However, it is good to hear that nature has found a use for those left behind.*

Newtown Range and Jersey Camp, Isle of Wight

by Barry Angell[1] **and John Willmott**[2]
Entomologist[1] and Ornithologist[2], Newtown Range Conservation Group[1, 2]

Newtown Range has a long history and has been in the ownership of the South East Reserve Forces' and Cadets' Association since 1911. It was primarily built and utilised for regional training of troops prior to them being sent to the front during World War I and then again during World War II. Since then, the ranges and training area have been continually utilised by tri-service cadets, reserves and regular units for range packages, military exercises and training across the estate.

The Conservation Group is made up of 26 local experts and dedicated range staff who advise on the ongoing management of conservation, balancing the needs of the natural world and the importance of military activity across the estate. This year, we will be celebrating our 50th anniversary – formed in 1975, we were one of the first MOD Conservation Groups in the UK. Our founding members were Lt Col (Ret'd) Christopher Norman Clayden; Terry Rolf, who was the Range Warden; his uncle, Bill Shepherd; and Henry Angell. In 1973, Lt Col (Ret'd) Clayden was appointed the MOD's first Conservation Officer, and he spent a huge amount of time at Newtown Range working with the range staff.

The entire Newtown Estuary was designated a Site of Special Scientific Interest in 1952. Since then, the site has also been designated a Special Protective Area, a Ramsar site and a National Landscape (formerly called Areas of Outstanding Natural Beauty). Conservation work and numerous important projects continue to focus on issues such as Constant Effort Sites bird ringing and moth trapping, all of which are conducted by our dedicated Conservation Group, with advice and assistance from both Defence Infrastructure Organisation's Ecology team and Natural England.

The most significant and successful conservation project on the range in recent times was the formation of Clayden's Pond. It was decided that the disused B Range 200m firing point would make the ideal starting point for the pond. This idea was the brainchild of Lt Col (Ret'd) Clayden, who utilised Royal Engineer diggers to construct the pond. The old raised 200m firing point was used to form a central island, which over the years has provided an invaluable habitat for a wide range of wildlife, flora and fauna. It is also where Lt Col (Ret'd) Clayden's ashes are buried – his family visits every year to sit on his memorial bench, which overlooks the pond.

Newtown Range aerial view (west) © W. J. Woolcock

The distinct ridge and furrows found on the range meadows are the result of ploughing by horses and oxen over the centuries prior to the range establishment in 1911. The ridges in particular provide an ideal place for the thousands of green-winged orchid, dyer's greenweed, dodder, saw-wort, knapweed and heath dog violet. This rare flora attracts some rare butterflies such as the clouded yellow, marbled white, silver-washed fritillary and white admiral. Our meadows are annually cut and baled which ensures the continuation of this natural habitat.

Since 1977, John Willmott has conducted surveys for what was then known as the Birds of Estuary Enquiry – later renamed the Wetland Bird Survey – as part of the group, with the assistance of Bob Green and Matt Venables. In addition, the group have been recording the numbers of skylark and meadow pipit across the estate, including breeding surveys of skylark across 286 acres. In 2010, a total of 50 pairs were recorded, a rate of almost six pairs per acre, which is certainly a healthy population.

Ospreys come through Newtown during their migration, so it seemed a good idea to erect some artificial nests to attract them to breed, as had happened in other parts of the country. In 2012, three poles were erected, with triannual renewal of nests thanks to the invaluable help received from Scottish and Southern Electric. Unfortunately, attempts to attract breeding ospreys have been unsuccessful. However, since 2015, one nest has periodically seen peregrine falcons nesting, with all chicks being successfully ringed.

Nesting peregrine chicks on the purpose built osprey nest platform
© W. J. Woolcock

From the early part of the 2000s, nightingales have been frequenting the range, moving from a neighbouring habitat. Due to their very particular nesting requirements, substantial habitat management has been conducted, resulting in the retention of numerous nesting pairs – this is currently around 10 pairs. This year, Vinci Facilities kindly funded the nightingale project's next stage, with the clearance of a further section of scrub/copse to ensure the area is ideally suited for nesting. The estate is one of the very last areas on the island where nightingales nest, and this simple husbandry will almost certainly have a positive impact on their future on the island.

Date	Breed	Number	Date	Breed	Number
28/04/1987	Whimbrel	101	15/08/2010	Osprey	3
20/08/1987	Curlew	644	15/02/2015	Brent goose	880
14/10/1989	Song thrush	45	08/11/2015	Goldcrest	35
14/01/1990	Dunlin	1,950	11/12/2016	Bullfinch	43
14/01/1990	Shelduck	710	17/05/2020	Nightingale	14
19/12/1999	Blackbird	74	30/10/2022	Cetti's warbler	1
20/01/2006	Teal	1,080	16/07/2023	Linnet	297
09/02/2008	Wigeon	2,050	18/06/2023	Stonechat male +2 juv (first ever bred)	1
08/10/2009	Little egret	71	17/12/2023	Pintail	230

A table to show an example of some of the numbers of different birds recorded on various dates over the years.

Update – DIO Environmental Management, Protection and Sustainability

by Richard Brooks
Principal Environmental Manager – Forestry, Heritage and Engagement, Defence Infrastructure Organisation

Sanctuary 53 is a celebratory issue for me personally in many ways. Forgive me for a little indulgence. The magazine celebrates 50 years of MOD Conservation Groups, which is a great success story. Conservation Groups are vital in recording biodiversity across our amazing estate. The groups generate a vast array of data which is utilised to ensure that activity and development take into consideration the habitats and species that exist alongside Defence. This data proves that the MOD estate remains a hugely valuable estate in terms of biodiversity and creates thriving environments for a range of rare and protected species. Many groups also undertake heritage recording and engage in community activity. I am hugely proud that my team provides support to these groups and I would like to take this opportunity to thank every Conservation Group member, past and present, for your dedication – it is genuinely a pleasure to work with you.

This edition also highlights a decade of the Conservation Stewardship Fund (CSF). I have been the CSF Programme Manager for its 10 years and have been fortunate to visit many CSF supported projects. It has been a privilege to work alongside some brilliant people and teams from the Defence Infrastructure Organisation (DIO), wider Defence, contractors, statutory bodies, charities and environmental groups in the delivery of so many successful projects. Thank you to everyone who has been involved.

This is also the 11th *Sanctuary* that I have overseen – how time flies! *Sanctuary* celebrates great examples of Defence's commitment to conservation and sustainability, but it is a credit to the *Sanctuary* team that it has developed so positively over time by broadening its content to include wider sustainability agendas across Defence. A challenge with so much happening in this area. Changes are often made following feedback, so if you have any suggestions as to how we can continue to improve *Sanctuary*, then please email: DIO-sanctuary@mod.gov.uk

Calling notices for the next *Sanctuary* magazine and Awards are published in the spring. The Sanctuary portal (https://sanctuary.awardsplatform.com/) will also remain open throughout the year for you to submit article ideas to us. I encourage anyone involved in relevant projects to take the opportunity to highlight your endeavours and successes.

Finally, my gratitude to everyone who has been involved in the success of the 53rd edition of *Sanctuary* magazine and the 2024/25 Sanctuary Awards, with particular thanks to Melanie Worman, Holly Broomfield, Jamie Thompson, Iain Perkins and Julian Boyce from the Environmental Engagement team.

Richard Brooks with members of the MOD Access Forum at Longmoor Camp © Crown

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Submissions

If you would like to contribute to *Sanctuary* magazine or enter Sanctuary Awards, please email the team at:

DIO-Sanctuary@mod.gov.uk

Please could the editors ask, with sustainability in mind, that you pass the magazine on for others to enjoy and only recycle it as a last resort. Thank you!

Three turbines at Mare Harbour, Falkland Islands © BFSAI

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