SANCTUARY

The Ministry of Defence sustainability magazine

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SANCTUARY

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Front and back cover image
HMS Medway alongside in Curacao. The Atlantic Patrol Task (North) provides a presence in the vicinity of the UK Overseas Territories, capable of delivering Humanitarian Assistance and Disaster Relief and responding to natural disasters, particularly during the annual hurricane season.

All photographs taken during COVID-19 complied with the social distancing requirements in place at that time.

Special thanks go to Harvey Mills Photography for his ongoing support in the provision of images for use in the magazine.

Sanctuary magazine is produced for the Ministry of Defence by the Defence Infrastructure Organisation and is printed on FSC certified paper at a minimum.

Editors' message

We hope you enjoy the new look and feel of the magazine. These style changes have been driven by readers' responses to a survey in *Sanctuary* 50, 2021. What you think? We would be pleased to receive your feedback so we can continue to develop *Sanctuary* over the coming years.

You can also get in touch with the Editors if you are interested in writing an article for the next edition, or in entering Sanctuary Awards 2023. We will then add you to our calling notices, ensuring you are the first to hear when submissions open.

The Environmental Engagement team (previously called the Sanctuary and Conservation Groups team) have been busy conducting a MOD Conservation Group review and updating our contact records. Conservation Groups are mandatory on MOD sites with statutory designations and act as stakeholder engagement forums for facilitating conservation activities. During COVID-19 some groups became dormant, others sprang up and we sadly lost touch with some due to members moving on. If you are a part of a Conservation Group, please do make sure to look at the updated map (p.89) and list of active groups (p.90), to confirm your site is registered as open. If your group is not on the list, you are thinking about setting up a new group, or would like help reinvigorating your group, we would love to hear from you. We can offer support, advice and funding for some projects too.

As ever, our thanks go to our authors for volunteering their contributions to this 51st edition of *Sanctuary* magazine.

The Editors

Sponsors

We would like to say a big thank you to our sponsor – their continued support, which allows limited copies of this iconic magazine to be printed, is much appreciated:

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Foreword

by **Lt Gen Sharon Nesmith**
Deputy Chief of the General Staff, British Army

I am delighted to be able to introduce the 51st edition of *Sanctuary* magazine, the MOD's annual showcase for sustainability and conservation projects. This edition will continue to highlight our collective endeavours and many successes over the past year.

My own role, alongside that of my fellow leaders in the British Army, is to drive the culture needed to respond to the challenges and risks posed by climate change, addressing both the causes and consequences. Our goal, through the Army's Project TERRA Directive, is to embed climate change and sustainability into the very fabric of the Army, delivering sustainable operational effectiveness.

2022 has provided plenty of evidence of the challenges faced. From wildfires to water resources challenges, increases in energy costs, to supporting civil authorities responding to climate caused emergencies, all provide a stark reminder of the need to improve our own performance and build resilience for the future. Every single person in Defence has a role to play in tackling climate change.

▶ Lt Gen Sharon Nesmith © Crown

Yet progress has been made as we continue working with allies and partners. Indeed, NATO's Jens Stoltenberg acknowledged that climate change is 'a crisis multiplier'. Our electric vehicle fleet is growing, more zero carbon buildings and solar farms have opened, and further greener practises have been implemented. The Sovereign Base Areas Cyprus project is one such initiative that can be read at p.32.

It is inspiring to see the continued contribution towards social value that sustainability projects provide to our serving personnel and veterans' recovery. Running for the last decade, Operation Nightingale provides the opportunity for involvement in archaeological investigations, with recent projects including excavations at an Anglo-Saxon cemetery on Salisbury Plain Training Area (p.28).

A *Sanctuary* staple, 'Around the Services' (p.6) facilitates a forum for services to discuss their sustainability initiatives and aspirations. I would like to thank the work of the hundreds of MOD Conservation Group members, both in the UK and overseas. These mandatory groups directed under JSP 850, are made up of serving personnel, civilian staff and external subject matter experts, the majority being volunteers, facilitating the critical stakeholder engagement for managing conservation across the MOD. Readers can learn more of the fantastic work the Conservation Groups do in 'Around the Regions' (p.92) and view an updated map of active Conservation Groups (p.89).

Finally, it would be remiss of me not to congratulate the winners of the 2022 Sanctuary Awards (p.3). For over 30 years the outstanding efforts in sustainability and conservation across the breadth of the MOD have been recognised and rewarded. This year is no different, with the bar set particularly high, posing a formidable challenge to the judges in deciding the overall winners. We must maintain this trend, and I wholeheartedly encourage you all to enter in 2023.

Sanctuary Awards 2022

Celebrating sustainability across the MOD

The Sanctuary Awards have been recognising outstanding sustainability and conservation efforts across the MOD since 1991. The awards celebrate and encourage group and individual efforts that benefit sustainable development; environmental and heritage conservation; utilities and resource saving measures; sustainable construction and procurement; or community engagement. To be eligible, projects must relate to MOD land, property, activities or equipment, in the UK or overseas.

▲ Sustainable Business Award © Crown

In 2022, entries were sought for the following categories:

- **Environmental Enhancement Award –** projects focused on wildlife and biodiversity, environmental research, or tackling pollution and contamination issues
- **Heritage Award –** projects focused on archaeology, historic buildings, historic parks and gardens, historic landscape preservation, museum collections, heritage education and public engagement
- **Individual Achievement Award –** for those who have made a significant personal contribution to MOD sustainability or conservation as a volunteer, MOD employee or contractor
- **Social Value Award –** projects focused on any of the social aspects of sustainability, including heritage, public access, community engagement and education
- **Sustainable Procurement and Construction Award –** projects to improve sustainability of equipment or services, management of supply chains or product life cycles or new build construction and refurbishment projects that innovate in fields such as new materials or design
- **Net Zero and Resource Efficiency Award –** projects that contribute to the MOD's net zero ambition, reduce energy, water or resource consumption, renewable energy or recycling.

The Sanctuary Awards board for 2022 comprised of:

Security, Policy and Operations (SPO)

Julia Powell (Chairperson)
Head of Policy
SPO Climate Change and Sustainability

Ray Dickinson
Assistant Head of Policy
SPO Climate Change and Sustainability

Defence Infrastructure Organisation (DIO)

Alan Mayes
Head of Strategy and Policy
DIO Transformation and Change

Richard Brooks
Principal Environmental Manager
DIO Environmental Support and Compliance

Defence Equipment and Support (DE&S)

Owain Redfern
Environmental Protection Policy Lead
DE&S Chief Environment and Safety Officer

Defence Support

Air Commodore Ange Baker
Head Futures, Fuels and Sustainability
Support Operations

External Judge

Martin Baxter
Director of Policy and External Affairs
Deputy CEO
Institute of Environmental Management and Assessment (IEMA)

The Sanctuary team reviewed all nominations and conducted a long listing selection exercise where appropriate. The Sanctuary Awards board for 2022 then judged the entries using the Sanctuary Awards online portal. They individually reviewed each category and awarded a maximum score of 50 points to each nomination. Once each judge had completed their assessment, the board met to conduct a moderation exercise, where they discussed their individual choices and made a group decision as to the winning and highly commended entries.

Winners from each of the categories were further considered by the board for one of the following overall awards:

- The Sustainable Business Award is given to the best larger scale or commercial project which delivers sustainable solutions to enable the armed forces to live, work or train
- The Silver Otter Trophy is awarded to the best establishment, Conservation Group, community led project or individual conservation effort on the MOD estate.

This year all long listed entrants were also considered for the new Innovation Award, which is given to the project or individual most deemed to have exemplified innovative behaviours by championing the adoption of new ideas, innovative ways of working and continuous improvement. This includes taking appropriate risk or early termination of work where relevant. The Innovation Award was judged by subject matter experts from the Defence Innovation Directorate, who are part of Military Capability within Head Office.

The Sanctuary Awards 2022 ceremony was held on 21 March 2023 and the results can be seen in the following table.

◀ Silver Otter Trophy © Crown

Award	Project Name	Further information
Environmental Enhancement Winner	Project Neptune – creating clean water ponds at Bicester Garrison	p.79
Environmental Enhancement Highly Commended	Sands of LIFE Project – sand dune restoration at Pendine Range	p.14
Heritage Winner	The Tower Refurbishment Project at HMNB Gibraltar	p.20
Heritage Highly Commended	HMS ECHO's wreck investigations in the Baltic, Barents and Bristol Channel	p.60
Individual Achievement Winner	Capt Nigel Williams	p.52
Individual Achievement Highly Commended	FS David Parkinson	p.40
Social Value Winner	The Armed Forces Equine Charity's HorsePower Project – equine assisted interventions to support veterans' recovery	p.79
Social Value Highly Commended	Litter Picking Watch Romney Marsh's MOD Beach Clean Project at Lydd Ranges	p.79
Sustainable Procurement and Construction Winner	Queen Elizabeth Class Logistics Centre Project at HMNB Portsmouth	p.34
Sustainable Procurement and Construction Highly Commended	St Kilda's Sustainability Project – upgrading radar, telemetry equipment, accommodation and energy facilities	p.68
Net Zero and Resource Efficiency Winner	Project Prometheus – constructing the British Army's first solar farm at the Defence School of Transport Leconfield	p.46
Net Zero and Resource Efficiency Highly Commended	Protected Mobility Engineering and Technical Support's (PMETS) Technology Demonstrator 6 Project – the hybridisation of the Foxhound and Jackal platforms	p.26
Sustainable Business Award Winner	Queen Elizabeth Class Logistics Centre Project at HMNB Portsmouth	p.34
Silver Otter Trophy Winner	Capt Nigel Williams	p.52
Innovation Award Winner	Project Liverbird – installing energy efficient and renewable energy generation equipment at HMS Eaglet	p.74

◂ HMS Medway alongside in Curacao, as seen from an old Dutch Fort, capable of delivering humanitarian assistance and disaster relief © Crown

Around the Services

Royal Navy

***by* RAdm Paul Beattie**
Director Naval Staff, Navy Command

In 2022, the Royal Navy (RN) launched its Climate Change and Sustainability (CC&S) team, working within the Director Naval Staff Directorate. The team has developed the CC&S plan, now endorsed by the Navy Executive Committee, with phase one activities underway. This has three overlapping phases, split into nine Lines of Development, each with a 2* lead; Data; Culture and behaviour; Governance and HQ; Estates; Operational capability and force development; Support, maintenance and logistics; Research, development and innovation; Allies and partners; Commercial and finance.

The CC&S team sees the permanent appointment of a Head of Climate Change and Sustainability (who will co-ordinate the CC&S programme, providing coherence across the Lines of Development and between other MOD broader government departments). Alongside this will be a Commander, who will drive culture and behaviour through engagement, education and media. Navy will continue to build the team by recruiting expertise from across the Whole Force and together will focus on removing blockers, exploiting innovation and promoting good practice.

The CC&S team's engagement with the RN community will grow in 2023 through roadshows, media attention and education, focusing on the need for individuals to understand their role in the fight against climate change both in shore bases and at sea. A new RN CC&S website will launch and opportunities to employ the MyNavy App in support of CC&S initiatives is being researched.

Also, within the Director Naval Staff area of responsibility, the Estates team are working to bring establishment Building Energy Management Systems back into use. Connected to the Vivo Energy Management Bureau, this should lead to substantial and enduring cost reduction. It is hoped this will be re-invested into further green initiatives such as those already underway:

- A 'Smart Building Demonstrator' is being piloted in Single Living Accommodation (SLA) at HMS Collingwood to reduce energy use. If this technology can prove significant savings are achievable against standard SLA, it will be rapidly rolled out across the RN estate
- Electric vehicle charging infrastructure to support white fleet vehicles is being rolled out and options for an integrated approach to enable charging of non-white fleet vehicles investigated.

CC&S is now featuring as one of the First Sea Lord's top six priorities for the RN in order to support the wider UK government's global CC&S commitments. It has been a successful 2022 in RN CC&S but there is much more to achieve, quickly, in the next two to five years.

◂ Royal Marine from 45 Commando under the northern lights in Norway © Crown

▲ Combat Water Supply System 'Modular' during transportation trials © Crown

British Army

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

Defence is responsible for around 50% of central government's emissions, and with the Army accounting for nearly 20% of Defence's emissions, significant steps need to be taken. The Army must adapt and change across the full spectrum of activities and combined with 'start small, think big, scale fast' thinking, sustainability is firmly embedded in its agenda.

Project Prometheus is a rolling programme that will deliver over 70 solar farms across the Army estate. The first, at the Defence School of Transport Leconfield, is already producing over 30% of the camp's electricity. Spare capacity is fed back into the grid and planned additional battery storage systems will ensure demand and supply are better matched.

Earlier this year, the Army Approach to Battlefield Electrification was published. The aim is to provide significant battlefield advantage through the continued electrification of military platforms, but also to drive down carbon emissions and shorten the logistics train.

The Deployable Infrastructure 2028 Programme looks to replace all diesel generators in the Field Army with scalable hybrid generators. The Manoeuvre Shelter Project is researching a more efficient tentage solution, one that will reduce heating and cooling requirements by utilising modern materials in tent construction.

The Combat Water Supply System is currently delivering small scale water purification and packaging. This reduces the need for bottled water on deployed operations, saving on logistic movements and single use plastics.

In addition, the hybrid vehicles mentioned in last year's *Sanctuary* continue to be developed. The £3 million investment in the Foxhound, Jackal and MAN-SV truck has proven very successful. Exploiting greater torque from an electric engine, means quicker acceleration and a competitive advantage on the battlefield.

The military white fleet is changing too. By 2025 over 25% of vehicles will be 'hybrid or better' and by 2030 all the Army's cars and vans will be so. Supporting this, 160 electric vehicle charging points have been installed and a further 850 are planned over the next three years.

Finally, as with all new constructions, the new Single Living Accommodation block at Imjin Barracks, Gloucester, will meet the Defence Related Environmental Assessment Methodology standards. These will have better heating and ventilation and the capacity to personalise heating in bedrooms and specific zones.

The Army's demonstrable investment in sustainable initiatives will help to achieve its ambition to contribute to a net zero carbon emitting estate by 2050.

▼ New Single Living Accommodation for Imjin Barracks © Crown

▲ Drone in mid-flight © Crown

Around the Services

Royal Air Force

by **AVM Paul Lloyd**
Chief of Staff Support, Royal Air Force

The Royal Air Force continues to commit to environmental protection and sustainability, with several initiatives taking place driving innovation and the exploitation of technology, alongside sympathetic environmental projects. The following are some recent achievements:

Drone flight using synthetic kerosene
A large drone was successfully flown using an entirely fossil fuel free synthetic kerosene, made by mixing raw materials with high sugar levels (such as food waste), with bacteria to create an oil substance which is converted into aviation fuel using chemicals and heat. Synthetic kerosene can be made anywhere and does not require large scale infrastructure, making it an attractive option for military deployments around the world.

Carbon sequestration increased by reseeding an airfield
RAF Waddington's 192ha airfield suffered from a large-scale soil pest infestation (crane-fly larvae) which threatened to close the airfield. The entire airfield was replaced with specially developed airfield grasses from the tall fescue family; known to increase carbon sequestration, reduce soil grub damage, and increase bird deterrent. Waddington increased its airfield carbon sequestration rate from 8.47 tonnes of CO_2 per year, to 14.0 tonnes of CO_2 per year, an increase of over 65%.

No Mow May
At RAF St Mawgan, in conjunction with a team from the Eden Project, No Mow May was implemented, an initiative originally launched by botanical charity, Plantlife. The team identified an area of grass that, since being allowed to grow, has enabled the skylark to nest. Another area has seen the camomile plant flourish. This rare yarrow plant was identified in a further area, which was so unusually successfully abundant that the Eden Project returned to harvest the seed. Furthermore, following a reduction in herbicide use, grassland areas that were previously kept bare were recolonised, complementing a programme to release hedgehogs, for which grassland edges provide a vital habitat.

Queen's Green Canopy (QGC)
The QGC, a national initiative to honour the Platinum Jubilee of Her Majesty, the Late Queen Elizabeth II, encourages tree planting across the UK, from single saplings in small dwellings, to more extensive woodland planting. The aim is to leave a lasting legacy for future generations. Throughout 2022 the RAF has contributed to QGC across the length and breadth of its estates. While flight safety is key when encouraging nature near airfields, our Station teams are successfully delivering projects from single ceremonial trees to more extensive woodland creations. Some 12,000 trees are anticipated this year.

◀ QGC planting at RAF Cranwell, with children from RAFA Kidz © Crown

Sanctuary Feature

A progress report – the Climate Change and Sustainability Directorate's first full year

▼ The Royal Electrical and Mechanical Engineers helped design and build a fleet of rapidly deployable mobile processing laboratories that were used across the UK to increase COVID-19 testing capacity © Crown

***by* James Clare**
Director, Climate Change and Sustainability

Last summer's record temperatures in the UK, which saw us reach over 40°C for the first time, highlights the disruption we can expect now and into the future. This warning was echoed in a Europe-wide drought that saw the uncovering of a 'hunger stone' at Děčín in the Czech Republic. This was one of several stones in central European rivers engraved to mark levels during previous unprecedented droughts and give a warning of the famines and hardship ahead. These two unsettling moments bring into sharp relief the importance of the MOD's Climate Change and Sustainability (CC&S) Directorate's work, its role embedding sustainability into the heart of Defence and its decision making, and the work underway across Defence and our suppliers.

> "£6.6 billion+ R&D investment over next four years"

During the first year as a full team, CC&S have delivered most of the initial actions from the department's Strategic Approach. They have developed a comprehensive top-down view of Defence's emissions footprint and worked to support the building of capacity and capability across Defence. Through the Defence Suppliers Forum, a collaborative space has been created to share best practice and build consensus around the best approach for Defence and the wider Defence community. Allies and partners have been engaged to build a shared understanding of how climate change is reshaping the global security landscape.

> "£30 million for 138 projects since 2021, with 64% to small and medium enterprises"

Progress over the last year has been significant, but the scale of the challenge faced demands greater ambition and speed, a point which has been reinforced by senior leaders and advocates across Defence. CC&S will need to accelerate its pace and extend the scope of their work. This includes embedding environmental sustainability into Defence's policies and processes, rolling out a coherent education strategy and fully integrating climate risks into planning activities. These are large, demanding pieces of work, but the breadth of this year's Sanctuary Award entries, and the continuing passion so evident in them, demonstrates that Defence has the ability to deliver on its ambition and to adapt and become resilient to the impact of climate change.

The wider value of Defence

The rising importance of sustainability has placed demands on all organisations to transparently report on the broader benefits they bring to society, and Defence is no exception. By collaborating with the broader defence sector and industry leaders, CC&S will demonstrate the ways in which Defence supports our way of life and in turn, will equip key stakeholders with an understanding of Defence's true value.

> "£26.1 million developing technology projects across the UK"

This collaborative attitude extends to their work with the Defence Suppliers Forum, which is focused on emissions that Defence cannot directly influence (i.e. wider scope 3 emissions). The Defence Suppliers Forum is building a shared approach and common level of understanding to tackle the scale of challenge.

This work on emissions complements the ongoing efforts to implement the social value model within the MOD's procurement process. This ensures that contracts deliver against key MOD outcomes and support wider government objectives. Social value policy is now active for all competitive procurements across MOD, and a Social Value Centre of Expertise has been established.

CC&S has been corralling the Defence wide activity in driving sustainability, bringing together teams who are engaged in working with partners to showcase the broader benefits of Defence. They will continue this work in collaboration with industrial partners to explore and champion the wider environmental and social benefit of the defence sector.

Sustainable Development Goals and Defence contributions

Defence contributes to the UK delivery of several United Nations' Sustainable Development Goals (UN SDGs).

▲ The Sustainable Development Goals © United Nations. The content of this publication has not been approved by the United Nations and does not reflect the views of the United Nations or its officials or Member States. www.un.org/sustainabledevelopment/

Goal 8: Decent work and economic growth, Goal 9: Industry, innovation and infrastructure and Goal 16: Peace, justice and strong institutions
The primary economic benefit of Defence is peace and security which is fundamental to economic security.

Defence endeavours to ensure a secure and stable environment, which provides the foundation for economic growth and prosperity.

Latest figures show that MOD employs 60,500 civilian personnel and 148,000 UK Regular Forces.

Through direct expenditure, indirect expenditure, and direct public sector employment, the MOD supports a total of 427,000 jobs, of which almost 415,000 are based in the UK. Defence makes a significant contribution to the UK skills base by being one of the nation's largest employers of apprentices. Over 90,000 armed forces apprenticeships have been started since 2015.

Goal 3: Good health and wellbeing, Goal 4: Quality education and Goal 5: Gender equality
Defence supports a highly skilled and integrated workforce and is striving to be a more diverse and inclusive organisation which is stronger, healthier, and more resilient. In addition to this, it supports the wider government agenda through contributing to the upskilling of UK talent. At any one point there are approximately 20,000 armed forces personnel undertaking an apprenticeship, over 6,000 of which are in science, technology, engineering and maths subjects.

Goal 11: Sustainable cities and communities and Goal 15: Life on land
Defence has direct responsibility for managing almost 1% of the UK land area, which has significant natural environment and cultural value. This includes:

- 169 Sites of Special Scientific Interest, which is 6% of the UK total and 37% of the MOD estate
- 31,000ha across 13 National Parks
- 19,000ha of Areas of Outstanding Natural Beauty, across 33 sites
- 771 scheduled monuments and 853 listed buildings.

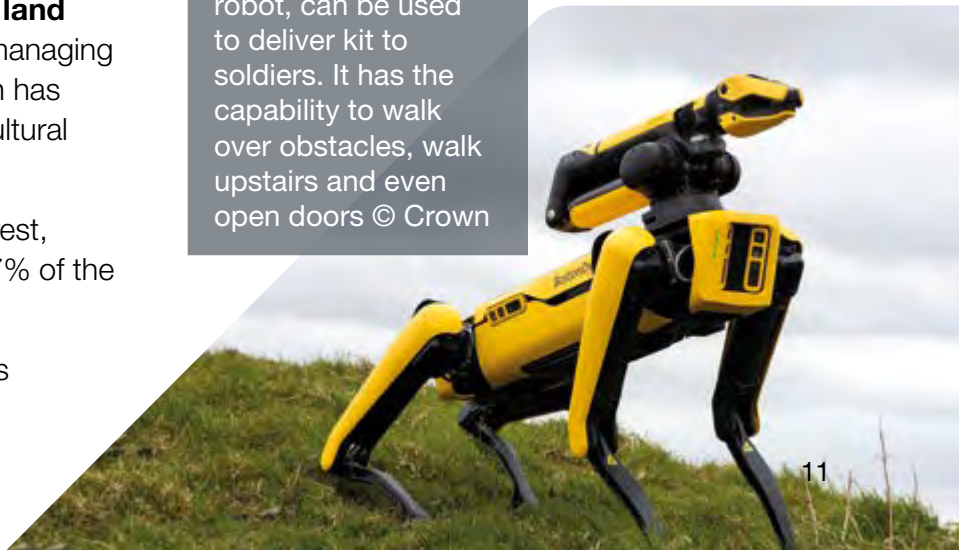
The MOD estate is an important asset with valuable habitats and natural carbon stocks. Work has now begun on a complete natural capital asset register, valuation statement and decision support tool. Being able to put a value on natural capital will assist decision making and allow investment prioritisation.

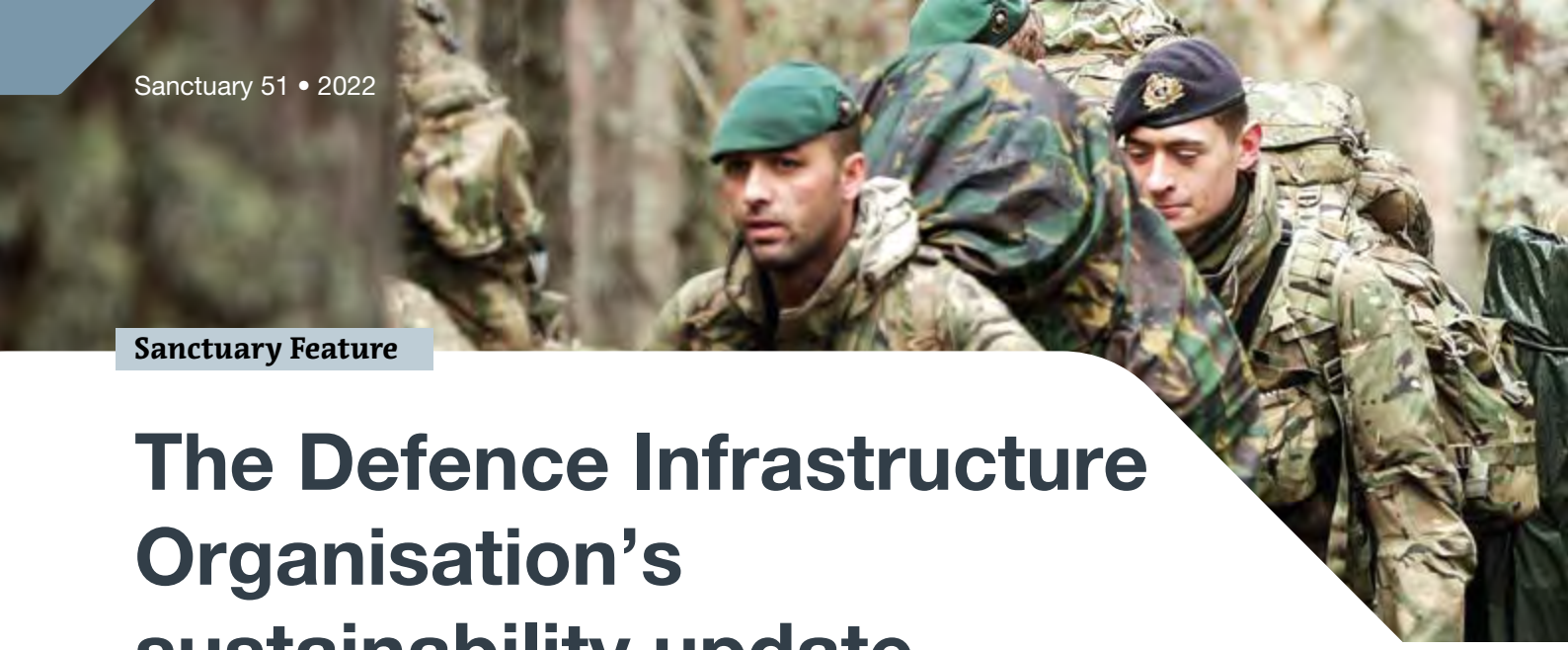
Goal 12: Responsible Consumption and Production and Goal 13: Climate action
The MOD Climate Change and Sustainability Strategic Approach sets the department's 2050 ambition, setting out how climate change will be integrated into Defence policies, strategies and plans.

Defence activities mirror UK society and MOD must play its full role in supporting the government's net zero agenda. The MOD also has a role in influencing its supply chain to adopt sustainable practices and include sustainability information in its reporting cycle.

The future
MOD will be working to embed expanded sustainability reporting. Their ambition is not just to comply with regulatory reporting requirements but to be leaders across government, driving forward sustainable value creation and impact into ways of working across the organisation.

▼ Spot the dog, an agile mobile robot, can be used to deliver kit to soldiers. It has the capability to walk over obstacles, walk upstairs and even open doors © Crown





Sanctuary Feature

The Defence Infrastructure Organisation's sustainability update

by **Maj Gen Robert Walton-Knight**
Director Strategy and Plans,
Defence Infrastructure Organisation

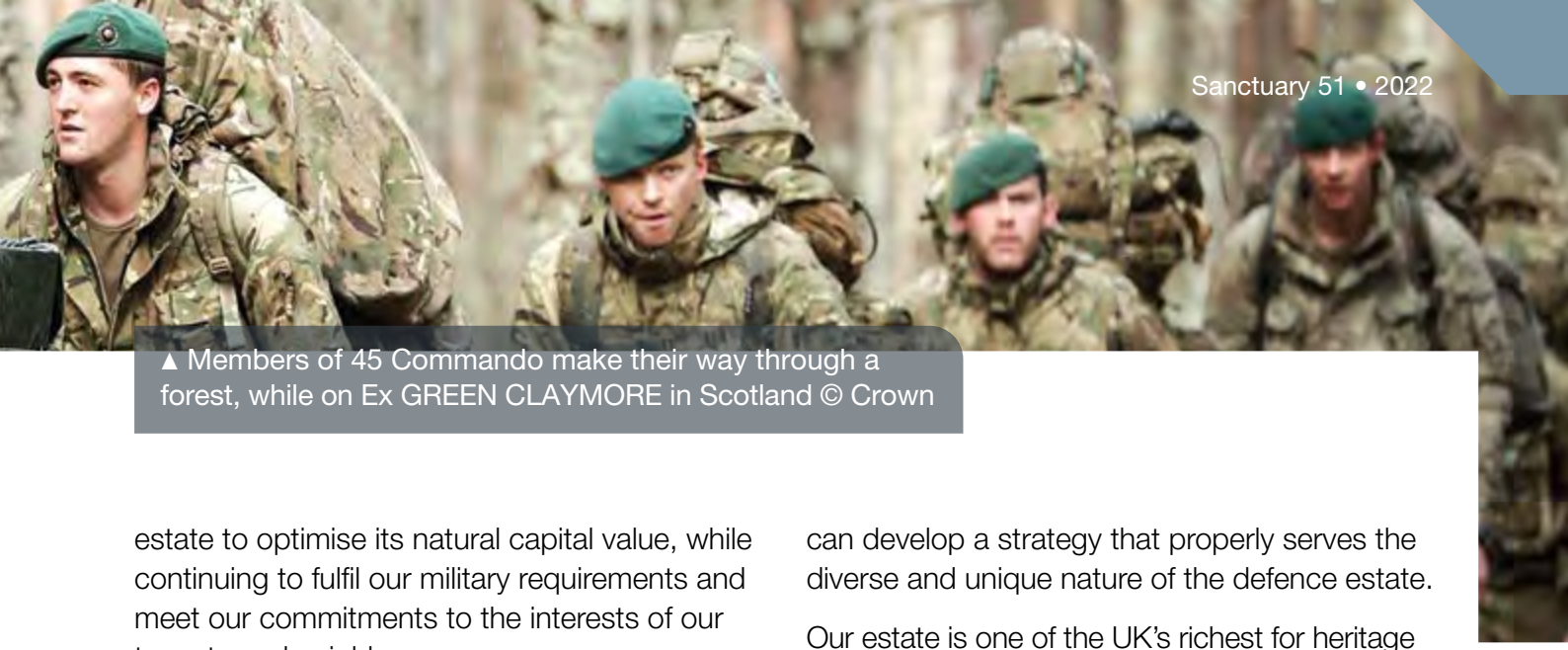
Sustainability is the greatest global challenge we face and will increasingly affect every decision we take individually and organisationally. This is, as an issue, where we first think of emissions and the UK need to be net zero, but it is biodiversity and maintaining balance across the global biosphere that is most important. The loss of habitats, the damage to environments, the loss of species and the impact on food chains will lead to profound and irreversible changes for life on our planet. There is much more we must do to protect the environment on which we depend, including emissions reduction.

The Defence Infrastructure Organisation (DIO) are playing a major part in leading Defence towards its sustainability and environmental targets and ambitions. Recognising the developing Defence Sustainability Strategy, DIO has put in place its own Sustainability Strategy which will ensure we continue to improve on our commitment to a greener, more sustainable estate. You will see examples throughout *Sanctuary*, but there is more detail of our ambitions set out in the strategy itself.

The rural defence estate will be a major contributor towards many wider government targets with increases in biodiversity net gain, forestation ambitions, natural capital accounting and carbon sequestration. Defence starts from a strong position with the estate representing around 1% of the UK land mass – in excess of 200,000ha. We operate across 169 Sites of Special Scientific Interest, covering 37% of our estate. This overlaps with 80,000ha of designated Special Protection Areas and Special Areas of Conservation. Our estate falls within 13 National Parks and includes 30 Areas of Outstanding Natural Beauty. We estimate there to be in the region of 20 million trees under our management.

With such a highly designated and environmentally important estate, you naturally assume that our rural land and training areas are a net absorber of carbon. Frustratingly, this may not be the case. Early works commissioned with Cranfield University suggest that we are actually a net emitter. DIO is undertaking further research to better understand what can be changed in our management and use of the

▼ Members of 1 Squadron RAF Regiment blend into the environment while on Ex BLAZING CHARIOT on Salisbury Plain Training Area © Crown



▲ Members of 45 Commando make their way through a forest, while on Ex GREEN CLAYMORE in Scotland © Crown

estate to optimise its natural capital value, while continuing to fulfil our military requirements and meet our commitments to the interests of our tenants and neighbours.

DIO is finalising the first Defence Woodland Masterplan which will act as a guiding document under the MOD Rural Estate Land Use Strategy and contains a digital geographic tool which identifies areas of the estate with the least barriers to creating or extending woodland. This will help us to deliver our part of the government's England Trees Action Plan and other UK forestation plans to achieve a 17.5% tree cover. We are confident we can contribute towards this challenging target while supporting and improving military training alongside biodiversity net gain, forestation ambitions, natural capital accounting and carbon sequestration all increasing.

We are also developing a Peatland Strategy. Degrading peat is one of the highest contributors of carbon emissions in the UK. Defence is a custodian of large swathes of peatland with 22% of our estate considered as peatland and 9% of it deep peat. We have a unique opportunity to contribute to the national carbon sequestration effort. Our Peatland Strategy will not only identify our peat holdings and their condition but also the potential for rewetting and restoration to reduce any further degradation and increase our contribution to sequestration.

DIO has also started writing the Defence Nature Recovery Strategy, an element of the Greening Government Commitments. We are engaging with the MOD's Climate Change and Sustainability Directorate and the Ministry of Justice to develop an initial plan for how we can develop a strategy that properly serves the diverse and unique nature of the defence estate.

Our estate is one of the UK's richest for heritage designations, with more than 750 scheduled monuments and 850 listed buildings. As responsible stewards, we must turn our hand to the continued protection of these heritage assets. In past and present *Sanctuary* issues, you will see many examples of the excellent heritage work that DIO and our partners have delivered across the estate. Part of our core business is to manage, preserve and where possible to improve these buildings and monuments to ensure they are sustainable into the future. I was lucky enough to visit an active Operation Nightingale archaeological dig, with DIO Chief Executive, Mike Green, to see rescue archaeology first-hand at an at risk Anglo-Saxon cemetery on Salisbury Plain Training Area. It really brought home the richness of our estate and the diversity and value of the work that we do.

I hope you enjoy reading this copy of *Sanctuary* and that it brings to life the critical role DIO plays in delivering Defence's sustainability ambitions, and the part we play on the rural estate in protecting and enhancing biodiversity.

▶ Gen Walton-Knight discusses progress whilst Mike Green (far left) excavates with veterans © Harvey Mills Photography

▲ Fencing at Pendine
© Sands of LIFE

Sands of LIFE

at Pendine Range

by **Laura Davies**
Sands of LIFE Project and Monitoring Officer, Natural Resources Wales

Over the last 80 years nearly 90% of the open sand on Welsh dunes has disappeared, replaced by dense grass and scrub. The presence of alien species such as sea buckthorn, which was planted historically to help stabilise the dunes, combined with a lack of traditional grazing, a declining rabbit population, air pollution and climate change has resulted in dunes becoming overly 'fixed' as the sand can no longer move through the dunes.

Sands of LIFE (SoLIFE) is a major conservation project led by Natural Resources Wales (NRW) to rejuvenate sand dunes across Wales. A £5 million budget, funded by the European Union LIFE programme and Welsh Government, has allowed NRW and its partners to conserve and restore Welsh sand dunes across four Special Areas of Conservation on 10 separate sites.

One such site is Laugharne-Pendine Burrows (MOD Pendine). The Pendine Range complex is part of MOD's Long Term Partnership Agreement estate which is operated and managed by QinetiQ on behalf of the MOD. It sits within the Carmarthen Bay Dunes Special Area of Conservation because of its international importance for dune wildlife. Unfortunately, the range now suffers from vast swathes of dense, thorny thickets of sea buckthorn, a highly invasive shrub which is not native to Wales and which out-competes indigenous species. The wetlands of the site (dune slacks) are also threatened by native scrub, such as willow and birch, which is colonising round the edges. The dunes have become over-grown and over-stabilised, resulting in the rare dune habitats falling into an unfavourable condition, with the decline or loss of European protected species such as the fen orchid and petalwort. Restoration works are therefore essential to improve the biodiversity and the conservation status of the site.

Sustainable, low intensity grazing by cattle or ponies keeps the dune grassland open. It slows down and stops the otherwise inevitable losses to these threatened habitats and associated rare species, like dune gentian. Grazing is effective long-term management which helps to control coarse grasses, bracken and scrub. Grazing animals also create small patches of bare sand which are vital to the specialist invertebrates found on the dunes, such as robber flies.

However, the reintroduction of grazing requires good stockproof fencing, especially on a site like Pendine Range, where livestock and military operations must be kept separate.

To restore this unique site an extensive programme of scrub clearance and fencing was agreed between the SoLIFE project, NRW's Environment Officer Ruth Harding, QinetiQ and Defence Infrastructure Organisation (DIO) representatives. Each organisation was responsible for different aspects of the works, with SoLIFE and the DIO leading on the practical on the ground delivery. The works were carried out as part of the UK wide MOD Site of Special Scientific Interest Condition Improvement Project, funded by the DIO Conservation Stewardship Fund.

A large amount of preparation was required, including reviewing ecological reports (which highlight key areas for restoration), liaising with the organisations to agree the plan, obtaining consents, commissioning archaeological advice and letting contracts. It was essential that all parties understood the importance of why the work was needed and the sensitivities of such an important site. Delivering large scale practical works involved experienced contractors using a range of specialist, heavy machinery. Negotiating access to an active firing range is challenging enough, but other issues such as supply chain difficulties, rising costs and the COVID-19 pandemic all added to the mix. Despite this, everyone involved remained positive and worked together to ensure these essential conservation works went ahead.

SoLIFE used different methods of scrub removal. Due to the potential presence of unexploded ordnance (UXO) in a high risk area, the first year's scrub removal avoided any ground disturbance. Mature native scrub was cut at ground level and the stumps treated with herbicide. Sea buckthorn was cut low and the arisings were mulched. The following year, after discussions with the QinetiQ team, specialist contractors and other parties to agree safe working practices, SoLIFE opted to pull up the sea buckthorn using a tracked excavator with a specialised selector grab. This machine allowed the buckthorn to be plucked out, taking the roots with it. This method does cause ground disturbance, but this is minimised as the roots are pulled in one movement, which helps protect any potential archaeological interest. It is impossible to ensure that 100% of the sea buckthorn is controlled using the pulling method alone because some plants are too small to grab, while others snap while being pulled or subsequently germinate from fallen seed. To ensure a thorough job, SoLIFE followed up works in the following autumn with targeted treatment of a glyphosate-based herbicide.

Arisings have been chipped and removed to biomass power stations. However, the quantity of sand present on roots adversely affects

◄ Sea buckthorn
© Sands of LIFE

► Fen orchid rediscovered at Pendine
© Kevin McGinn

the machinery and reduces the quality of the biomass product. If necessary, arisings were also chipped or stacked in sacrificial hollows in the nearby dunes, which are of low-quality habitat.

On MOD Pendine's sand dunes there is a chance that unexploded ordnance may be unearthed as they were favoured locations for wartime training, and of course military testing continues today. Therefore, the UXO risk had to be fully mitigated, especially where there was ground penetration due to root pulling or erection of fence posts. QinetiQ provided a 'heat map' risk assessment which indicated areas of higher and lower hazard. In addition, SoLIFE commissioned a third-party expert consultant to carry out magnetometer scans of the fence lines and watching briefs for the scrub removal (where the scrub was too dense to scan). Although no dangerous ordnance has been found to date, experts are always on hand to manage and dispose of any finds.

The results of the conservation work have been impressive. Since 2019, SoLIFE have cleared 13.5ha of sea buckthorn and 5ha of native invasive scrub, as well as installing 3km of sustainable stock-proof chestnut fencing. The project is now in its final year of practical work and SoLIFE are determined to complete the full targets, with a further 3.5ha of scrub clearance and 4km of fencing planned. This supplements DIO's own programme of Sites of Special Scientific Interest improvement works on-site that includes removal of sea buckthorn and restoration of conservation grazing.

Over the past 20 years the MOD's work for the benefit of fen orchid involved the creation of small excavations, known as scrapes. These involved removing nutrient-rich material, scrub clearance and the re-blocking of a large ditch to help restore the natural hydrology of the dunes. The work is beginning to pay dividends, as dune grassland habitats have been restored, allowing specialised dune plants to thrive. In July 2022 the Botanical Society of Great Britain and Ireland discovered fen orchid at Pendine Range for the first time in nearly 20 years. Pendine now joins Kenfig as the second Welsh site for fen orchid. This is a genuine success story and a great example of the long-term commitment needed to support nature recovery at this and other important wildlife sites.

Sands of LIFE, NRW, MOD/DIO and QinetiQ are equally enthusiastic about the positive changes that are a direct result of active management and restoration works at Pendine Range.

▶ Pulling sea buckthorn with a selector grab
© Andrew Twigg

▶ Sea buckthorn clearance
© Sands of LIFE

Sanctuary Feature

Visitor engagement on Cramber Tor

▼ A training unit yomps into the Dartmoor landscape, just south of Cramber Tor © James Nevitt

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

Dartmoor is internationally known for its brooding and at times hostile environment, immortalised in the works of Agatha Christie and Arthur Conan Doyle. The landscape's wild terrain has been used to help create realistic military training for nearly 150 years. Cramber Training Area sits south of Princetown, home of the intimidating Dartmoor Prison. Land around Cramber Tor has been leased by the MOD since 1980. However, given its long heritage the area continues to be viewed as the 'newer' Dartmoor Training Area. Used for discrete foot-based dry training, it also remains lesser known. This low-level training ensures public access is unrestricted; rights of way give opportunities to walkers, horse riders and cyclists, and the wider open access designation means those on foot choose to explore further afield.

In 2013 the MOD's licence to train was renewed for another 40 years by Dartmoor National Park Authority. This was subject to planning conditions which included undertaking a visitor survey every five years. The survey is designed to identify whether military presence on the Tor has a direct impact on recreation or whether there is an impact on latent demand for recreation (for example whether visitors choose to go elsewhere because of military training). Each survey builds on studies from previous years, which currently includes 2002, 2011 and 2017 (see *Sanctuary* 47, 2018).

In 2017 the Defence Infrastructure Organisation (DIO) and the park authority agreed that, to reduce costs, the survey would be carried out by DIO, led by their senior public access and recreation advisor. Five years on this agreement was renewed for 2022, providing a positive opportunity for DIO to engage directly with visitors to the estate. While not yet formally reported on, the 2022 surveyor feedback follows trends from previous studies – supporting the observation that the military presence has minimal impact on visitors and their use of the area. For many surveyed, the military presence even has a positive impact on their enjoyment of the area, adding interest or a unique edge to their visit.

Positive results do not mean the MOD can rest on its laurels. Retaining positive public perception relies on continuing to balance delivery of realistic training with minimising the impacts on the sensitive characteristics of the moor. This includes ensuring visitors enjoy a sense of wild, remote escape. DIO are confident it can continue to maintain this balance.

▶ Dartmoor ponies near Nun's Cross © James Nevitt

▲ Developing ground flora in roadside glades © Elisabeth Airey

Sanctuary Feature

Bats, bees and trees – tree safety work in Swaledale

by **Elisabeth Airey**
Regional Head Forester,
Defence Infrastructure Organisation

The Yorkshire Dales National Park is an area known for its majestic limestone uplands and dales. Driving west along the A6108 from the historic garrison town of Richmond towards Reeth, this scenic route passes through a wooded four mile stretch of Catterick Training Area, sitting on the eastern flanks of the Pennine Hills. MOD land extends into the national park to the banks of the River Swale. The area is notable for its ecologically important woodland and grasslands which form part of the Lower Swaledale Woods and Grasslands Sites of Special Scientific Interest (SSSI). It is here that ash-rich woodlands dominate the landscape and ash trees punctuate dry stone walled meadows holding iconic Swaledale sheep.

◀ Specialised forestry equipment working from the road © Jason Watkin

The challenge is Chalara ash dieback *Hymenoscyphus fraxineus*, a fungus that was first found in the UK early in 2012 on nursery stock imported from Europe. Since then, Chalara has made steady progress across the UK, growing within colonised trees, attacking the bark and cambium – the layer of living tissue beneath the woody bark. The fungus colonises quickly, encircling twigs and branches, causing the classic symptoms of branch dieback and canopy decline as the cambium dies. Secondary tree decay fungus can exploit these weakened trees, leading to large scale timber decay and a loss in structural strength, increasing the risk of unpredictable tree failure.

Work to quantify the baseline of Chalara across the Northern Defence Training Estate started in August 2019. A second survey in 2020 revealed that canopy decline was accelerating, and a clear plan of action for tree safety works had to be agreed to ensure the safety of all users of MOD land. The Swale corridor was identified as the priority work area due to the high number of affected trees and the constant 'target' the public highway presented. Felling ash trees colonised by Chalara within falling distance of the road would minimise the risk of tree failure affecting road users.

Drawing together a working group to inform and plan the project, individuals from Defence Infrastructure Organisation (DIO) and its industry

partner Landmarc Support Services (Landmarc), North Yorkshire County Council, Yorkshire Dales National Park Authority and the Forestry Commission met to discuss project design, constraints, timescales and a communication strategy. A working group site visit helped to emphasise the necessary requirement for the work within the sensitive landscape setting, and for ideas and information to be explored within the context of the high-profile site.

Throughout summer 2021, essential data about trees, bats and stakeholders was collated, to gain statutory approvals for, and inform the local community about, the proposed work. Numerous veteran trees within 20 metres of the road were identified for retention because of potential bat habitats. Individual tree locations and information about the habitat type – branch and stem cavities and cracks – was recorded, and canopy work specified for each tree to ensure that valuable features were kept intact. During this survey work, a colony of wild honeybees were found, using a cavity in a mature tree that had to be felled. The tree was tagged and a plan to safely move the stem that held the hive to a new position was agreed.

Careful planning, collaboration and communication between the working group members was essential to make sure clear information was communicated to the public and the necessary full road closure was approved by North Yorkshire County Council Highways, causing minimal disruption to the local community. Throughout the duration of the road closure the emergency services and essential public transport, including the school bus, would still have access along Swaledale's arterial transport route.

With a felling licence from Forestry Commission and SSSI assent from Natural England in place, the project was successfully undertaken during winter 2022. Contractors working with specialist forestry equipment were able to utilise the road as a working platform, reaching in to dismantle each tree, allowing for the retention of standing timber monoliths that would become deadwood reserves of high ecological value. This method of delivery removed the need to access the roadside woodlands where the ground was soft, easily damaged and steep. Natural fracture pruning was prescribed to produce rips and tears in the retained wood, to replicate natural tree failure and encourage decay and habitat formation.

▲ Natural fracture pruning to create a tree monolith © Elisabeth Airey

The DIO and Landmarc teams had delivered similar projects in other areas of the country and this experience of lessons learned was invaluable to the Swaledale project. North Yorkshire County Council staff were keen to draw on this knowledge base to help inform their own response to Chalara, and the MOD was commended for the proactive approach it had taken. Nine months after the harvesting work, ground flora and regrowth flourishes in the newly created roadside glades, bringing structural diversity to these woodland edges.

▼ Secondary colonisation of ash by timber decay fungi © Elisabeth Airey

▲ British Fleet entering the dockyard, 1938 – The Tower is a familiar landmark
© HM Government of Gibraltar

Breathing new life into The Tower

at HMNB Gibraltar

by **Tony Robertson[1] and Kathryn Sayner[2]**
Area Manager (HM Naval Base Gibraltar)[1] and Historic Building Advisor[2], Defence Infrastructure Organisation[1,2]

The British Overseas Territory of Gibraltar occupies a narrow, rocky peninsula along Spain's southern Mediterranean coast. The small headland covers an area of just 2.6 square miles, with a population of over 34,000. The landscape is dominated by the Rock of Gibraltar, an impressive monolithic formation of Jurassic limestone rising to 426 metres.

Gibraltar has been a strategic British military base for over 300 years and all three services maintain a presence there. Its strategic location at the western entrance to the Mediterranean Sea makes it well situated for observing shipping channels through the Straits. The Royal Navy undertake regular security patrols of the shores and protect British, Allied and partner vessels that are passing through or visiting. The naval dockyard was constructed between 1894 and 1906 and was especially important during the two World Wars, when utilised by both British and Allied warships.

Command Headquarters (HQ) are located at The Tower, a quadrangle building prominently located on the dock frontage at HMNB Gibraltar. Built in 1905, it originally served as the area HQ for the Royal Navy and since 1989, has been HQ of British Forces Gibraltar. As the highest profile and most visited building, The Tower plays a central role in the strategic operations across the MOD Gibraltar estate.

The Tower is a key architectural focal point along the waterfront and complements the historic character of the Naval Base. The three-storey building has a central courtyard and includes offices, meeting rooms and welfare facilities. It is constructed in random coursed limestone with dressed stone quoins, reveals and lintels. Prominent and characteristic design features include the external balconies and the observation tower. The tower is positioned centrally on the façade to command the view, looking out over the dockyard and the seascape beyond.

The general appearance of The Tower had become tired and dated, having last undergone refurbishment work in 1989. The facilities no longer met the requirements of a modern-day workforce and upgrades were needed to improve fire safety and means of access into and around the building. A design for the refurbishment project was commissioned by the Defence Infrastructure Organisation's Regional Delivery team in 2019 and the industry partner, Mitie, produced the detailed specifications for the work. The designs included innovative measures to upgrade safety and access

requirements and enhance green credentials. The detailed and sympathetic scope of work also set out to conserve the historic building and better reveal features integral to the significance of this iconic landmark.

Working against challenging time and budget constraints, careful consideration, skill and effort were shown to achieve this sustainable project. The entire Command had to relocate to a temporary workspace, which involved significant logistical and preparatory work. The project started just as the COVID-19 pandemic hit, meaning the construction site had to close for seven months. However, in liaison with HM Government of Gibraltar and Heritage Trust Gibraltar, experienced local contractors started work in October 2020.

Externally, the refurbishment included cleaning the limestone masonry. This was effective in removing staining and enhancing the contrast of the pale limestone finish against the architectural detailing such as the balcony features. In liaison with HM Government of Gibraltar and the Heritage Trust Gibraltar, sections of the original 1905 balustrade to the walkways and balconies were sympathetically refurbished and reinstated, with subtle adaptations made for building regulations approval. The replacement of ceilings to the underside of the walkways and balconies with a slatted finish has further improved the aesthetics and created a uniform and clean appearance.

The internal courtyard was improved through the removal of visual clutter such as redundant signage and modern lamp posts. The new granite effect resin bound finish complements the architectural integrity of the building. These simple measures have opened up the central courtyard feature and enabled a more flexible use of the space for military events.

A full internal refurbishment of all the offices has brought them up to a modern standard without compromising features of interest. Previous unsympathetic work, such as the surface applied trunking and conduits, were rationalised and removed. New services were discretely located, freeing the stonework of later, inappropriate interventions.

The observation tower was previously only used for access and was suffering from damp problems. The refurbishment work included repairs to the tower to prevent further water ingress and has created usable space for archiving. This element has been particularly successful in encouraging visitors to venture up to the tower rooms and experience the fantastic views out over the busy dockyard and beyond.

Sustainability measures have been integrated into the building, including the installation of adaptive and automatically controlled lighting in the offices, and the pre-heating of water using the newly fitted solar panel on the roof. In addition, energy efficient lighting has been provided to the exterior

◂ The internal courtyard before work started © Crown

▸ The newly refurbished courtyard © Crown

◂ The Earl of Wessex visiting The Tower as part of his visit to Gibraltar to mark Her Majesty, the Late Queen Elizabeth II's Platinum Jubilee © Crown

of the building, the courtyard and around the internal walkways. Where practicable, all group floor building facilities have been made wheelchair accessible to improve access.

During the site work, a surprising discovery was made – an air raid shelter beneath the building. The project team worked proactively with the Heritage Trust Gibraltar to ensure this historic feature was appropriately recorded. An access door was also installed to the shelter for future inspections.

From the start, the project was carefully managed and delivered to ensure effective and ongoing communication with Gibraltar heritage bodies and maintain good collaboration between all stakeholders. The successful project has breathed new life into the building, enhancing its historic and architectural interest and underpinning the military ethos of the site. The internal refurbishment has vastly improved the working and practical facilities, providing an operational and compliant environment that will secure further future investment. An outstanding result has been achieved.

The newly refurbished building was officially re-opened by His Excellency, The Governor of Gibraltar on 23 March 2022. The success of this project has been reported in local media and the project team have received positive feedback from the building users, external heritage bodies and visitors to the site. The Tower was even recently visited by the Earl of Wessex as part of the Gibraltar Platinum Jubilee celebrations.

British Forces Gibraltar said of the completed project, *"The refurbishment of The Tower has seen the creation of a modern workplace within an historic setting. The HQ British Forces Gibraltar has operated out of The Tower for over a century and this refurbishment well and truly brings the building into the 21st century. After 18 months of construction, all the personnel who work in The Tower were excited to see the finished product, and it did not disappoint. The combination of modern office space and reinstated heritage elements of the building really make The Tower one of the best office spaces within the MOD Gibraltar footprint".*

This work was more than just a straightforward refurbishment project. A conservation led approach was taken for the sensitive work which sought to celebrate the legacy of the historic building, provide the necessary upgrades and facilities while conserving it for future generations. The project exemplifies the MOD as an active steward of the historic environment and promotes the continued use of this key building on the MOD Gibraltar estate.

◂ The newly refurbished Tower © Crown

▶ Scrape creation in progress
© Ruth Taylor

Sanctuary Feature

Habitat creation for natterjack toads at Theddlethorpe Range

by **Ruth Taylor**
Outer Humber and Coast Assistant Warden, Lincolnshire Wildlife Trust

Theddlethorpe Range on the Lincolnshire coast has a varied history – an air weapons range until 1973 and in more recent years, a base for ammunition disposal. It is adjacent to Saltfleetby Theddlethorpe Dunes National Nature Reserve and designated as a Site of Special Scientific Interest (SSSI), managed for nature conservation in partnership with Lincolnshire Wildlife Trust. The range is home to moonwort *Botrychium lunaria*, marsh pea *Lathyrus palustris*, harvest mouse *Micromys minutus* and natterjack toad *Epidalea calamita*.

Natterjack toads were first described as a British species in Lincolnshire by Sir Joseph Banks in 1776. Changes in land use and loss of habitat have confined the one remaining Lincolnshire population to the coast at Saltfleetby Theddlethorpe Dunes, where they have been monitored annually since the 1970s. Records show they were present here in 1886 and at Theddlethorpe Range in the 1920s and 1930s. One local resident recalls a sand quarry with nesting sand martins. As a boy he would reach into their nests and occasionally pull out a natterjack toad which had been using the nest as a burrow.

Natterjacks are a boom and bust species. However, this population has at times been on the verge of local extinction. Between 2003 and 2019 the toads produced an average of 25 strings of spawn a year, but recently the population has started to boom. In 2021 the team counted 192 spawn strings.

Males sing to attract a mate and are now being heard from areas away from their traditional breeding sites. Since 2020, up to six males have been singing from the freshwater marsh on the Theddlethorpe Range.

A site meeting between Lincolnshire Wildlife Trust, Defence Infrastructure Organisation (DIO) and Amphibian and Reptile Conservation identified heavily vegetated pools within a dune slack as suitable for enhancement as breeding scrapes. Joe Hamer, Ecologist, secured funding through DIO's Conservation Stewardship Fund, with Natural England providing permission for work to be carried out. In September 2021, work to remove scrub and create 14 new scrapes was completed. This has doubled the number of suitable waterbodies for spawning. The boom continued on the nature reserve in 2022, with 347 spawn strings recorded.

Hopefully in the next few years, the expanding natterjack toad population will find the new scrapes and start to establish a new breeding colony on the Theddlethorpe Range, helping to safeguard the future of this rare amphibian on the Lincolnshire coast.

▶ Male natterjack toad calling
© Matthew Blissett

▲ St Mary's Church
© Tony Stirling

Sanctuary Feature

Tyneham village renewable energy project

***by* Tony Stirling**
Training Safety Officer Lulworth Ranges, Defence Training Estate

Prior to the outbreak of World War II, Tyneham was a working village – a simple, rural community (around 225 people), with a Post Office, church and school. Most inhabitants relied on farming and fishing for their livelihoods.

As the Allies planned the task of liberating Europe, the War Office needed to requisition land for troop training, with Lulworth Ranges considered crucial to prepare troops for taking part in Operation OVERLORD (D-Day). In November 1943, the inhabitants of Tyneham were given 28 days to evacuate their homes. While it had originally been intended to hand back the village, post war tensions with the newly formed Warsaw Pact drove the need to maintain a large standing army in Europe. The difficult decision to compulsorily purchase the land was made in 1952.

▼ Tyneham school
© Tony Stirling

To this day, Lulworth Ranges continues to provide armoured and dismounted live fire and fire and manoeuvre training facilities for MOD use, plus a limited amount of dismounted dry training. In conjunction with its beautiful and environmentally important location, Lulworth Ranges is one of only two sites available in the UK for mobile Armoured Fighting Vehicle (AFV) range practices, with most of the training area being used for tracked and wheeled AFV live firing.

Tyneham is open to the public 46 weekends of the year, school and public holidays, averaging 137 days per year. A data capture exercise ran during the summer of 2020 to provide an indication of footfall through the village and established an average visitor count of 1,500 people per day.

St Mary's Church and the village school were heated by two gas fires that were fed from an underground LPG tank and driven by a gas operated generator, a system that was unreliable and inefficient. The MOD Tyneham Village Steering Group decided to replace this obsolete fossil fuelled equipment with a renewable energy system capable of providing sufficient frost protection levels of heating alongside new LED lighting, enabling visitors to better view the interior interpretation boards. The estimated £35,000 project was funded by £20,000 from a grant provided by the Defence Infrastructure Organisation's (DIO's) Conservation Stewardship Fund and the remaining monies from the Tyneham Fund (which primarily consists of voluntary contributions from the general public).

The village is located in an Area of Outstanding Natural Beauty and this meant a number of planning issues needed to be resolved before the project could move forward. In addition, both St Mary's Church and the old village school were given Grade II listed status just prior to awarding the contracts to deliver the works. Following a great deal of support and guidance from subject matter experts within DIO's Technical Services and direct engagement with Dorset Council's senior conservation officer, the team managed to get approval to deliver the project during the ranges' summer stand-down period of 27 July to 30 August 2020.

The contractors selected to deliver the task were approved by Landmarc Support Services and other MOD suppliers. No sooner had the works started when further challenges became apparent. In both buildings small asbestos panels were discovered, located behind the gas heaters. To resolve this, a specialist contractor with the necessary permissions to dispose of the material in accordance with government legislation, was called in. The safe removal and disposal of the asbestos took approximately 10 days, and fortunately did not adversely affect the project timetable.

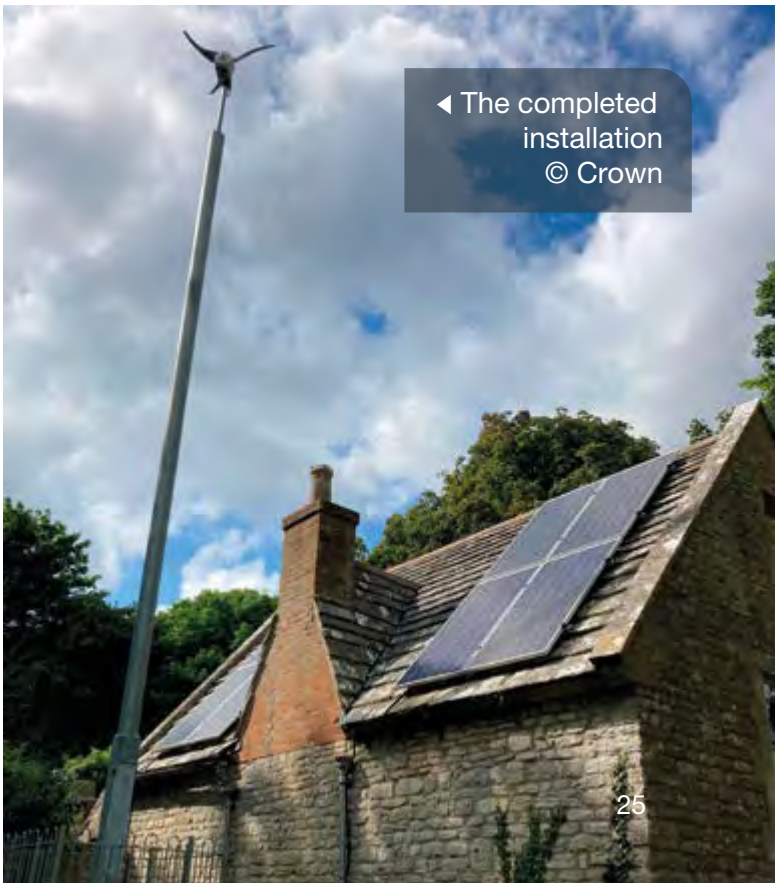
A swarm of protected Dorset black bees had also taken up residence in the school chimney breast. A visit from a suitably experienced person was arranged to determine whether the bees could remain in situ while the solar panels were attached to the roof, or if a new home would need to be found for them. By pure chance one of the installation engineers happened to be an enthusiastic beekeeper and despite the high summer temperatures was happy to wear his full body beekeeper suit while fitting the relatively heavy and cumbersome solar panels.

Since completion, the system has performed extremely well at maintaining the heating levels required to keep the building interiors frost free. It also provides sufficient lighting to allow visitors to safely access and enjoy the various interpretation boards that adorn the buildings' interiors. Equally satisfying is seeing the bees continuing to thrive in their old but albeit slightly altered surroundings.

This project has provided an excellent example of multi-agency collaboration to deliver an effective green technology solution in a remote location, on budget and to target. It was also both worthwhile and enjoyable.

▼ Removal of an old LPG gas tank © Tony Stirling

▶ The bee suited contractor fitting the solar panels to the roof © BU Energy



◀ The completed installation © Crown

▲ Jackal and Foxhound at Defence Security Equipment International © NP Aerospace

Exploring the benefits of hybrid electric drive military vehicles

***by* Steve Brown**
Director of Programmes, NP Aerospace Limited

NP Aerospace Limited, a Coventry based engineering services company, design, manufacture and integrate armour products and engineered systems for defence and law enforcement users worldwide. Products supplied to MOD include Osprey body armour; Mk6 and Mk7 combat helmets; Mk6 bomb disposal suits; the Snatch Land Rover; and Mastiff, Ridgeback and Wolfhound 'Cougar' Protected Mobility vehicles. NP Aerospace are the Engineering Authority for the MOD Protected Mobility fleet of vehicles, having been awarded the £63 million Protected Mobility Engineering and Technical Support (PMETS) contract in 2018. This runs to 2026, with options for a further four years. As part of the PMETS framework, the MOD contracts NP Aerospace to deliver 'non-core tasks'. These vary but include updating or upgrading the Protected Mobility fleet via platform modifications. One of these tasks, funded by Defence Equipment and Support (DE&S), was the design and development of hybrid electric drive lines for Foxhound and Jackal vehicles. This explored the viability of retrospectively modifying in-service platforms to identify and characterise the benefits offered in terms of performance and environmental sustainability and answer the question 'What will hybrids do for us?'

The project, known as Technology Demonstrator 6, was contracted in June 2020. NP Aerospace approached the task collaboratively, working with General Dynamics Land Systems UK, Supacat, and Magtec, an electric drive and battery technology company, to complete the integration of electric motors, replacement engines, batteries, controllers and cables. The vehicles were delivered to UTAC Millbrook, a vehicle test and engineering facility, in April 2021 who undertook a range of trials to fully explore the capabilities of the platforms, capturing performance data including drivability, fuel economy, endurance and reliability.

The integration was highly complex. DE&S set out a requirement for minimal platform modifications on what was ultimately a concept demonstrator, meaning it was crucial to have close collaboration between all stakeholders and respond with agility to customer feedback. One of the largest challenges was the development of new software for the hybrid drive vehicles, having never previously been implemented onto a MOD wheeled defence platform, as opposed to the more benign environment of on-road vehicles. The challenge was overcome by industry collaborating in an iterative development loop. This led to

software that enabled unique 'tank steering', or neutral steering, that gave the Foxhound vehicle the ability to rotate 360 degrees while stationary. This illustrates the additional benefits of electrifying wheeled platforms, providing the vehicle with enhanced manoeuvrability in tight and confined spaces, and in near silence. Other challenges were the inclusion of electric drivetrain components such as motors and batteries into a tightly packaged platform, overcome by careful item selection and relocation of existing hardware.

The project has been successful, with prototype platforms delivered on time and with tangible benefits demonstrated. It has proven that it is possible to overcome technical constraints and modify in-service platforms to introduce hybrid electric technology. Implementation on the UK's current fleet of wheeled vehicles will allow MOD to realise the monetary and non-monetary benefits that hybridisation enables. This includes the reduction in atmospheric emissions and savings on fuel use thanks to technologies like regenerative braking.

The implementation of hybrid drive technologies also allows for engine optimisation, with the Jackal engine reduced from a six-cylinder to a smaller four-cylinder engine due to the additional power available from the electric drivetrain. This improves fuel consumption and reduces tailpipe emissions, while providing the space necessary to package the additional components. The platforms demonstrated up to 30% improved fuel efficiency, allowing the vehicle to stay in the field longer, or lessen the amount of fuel required to travel a set distance, reducing logistic burden and costs. Off vehicle power requirements can be delivered via the batteries rather than relying on an idling engine or standalone petrol/diesel generators, potentially meeting the heating and lighting requirements of crews on exercise.

Reliability and occupant safety will be improved too. The use of electric motors reduces the number of moving parts in a mechanical system, while the combination of an internal combustion engine with electric drive offers redundancy in the event of failure of either system, both of which improve the overall platform reliability. This has a direct benefit to troop survivability, with less likelihood of the platform breaking down while operating in hostile environments.

Benefits breakdown
Up to 30% better fuel economy
Quality and quantity of emissions reduced
Silent running electric drive at long range
Simpler to drive and reduces driver burden
Improved platform driving characteristics
Much improved off-road accessibility
Simplification of drivetrain components
Reduced support burden
Neutral turn ability
Off board power available
Future proofed

Alongside delivering multiple technical and operational enhancements such as silent mobility and increased on board and off board power, the introduction of hybrid technology proven via the Technology Demonstrator 6 contract provides a greater understanding of what could be achieved across the PMETS vehicle fleet. This would reduce the British Army's reliance on fossil fuels, a step towards the government's 2050 net zero goal. NP Aerospace is proud to have delivered this project, leveraging industry collaboration to produce two prototype vehicles that help inform the MOD's strategic planning regarding the implementation of hybrid technologies.

▶ Foxhound in build at NP Aerospace premises, Coventry © NP Aerospace

▲ 7th century graves being excavated by a veteran
© Harvey Mills Photography

Sanctuary Feature

A gift of rings – excavations on Salisbury Plain Training Area

***by* Richard Osgood**
Senior Archaeologist,
Defence Infrastructure Organisation

In February 2020, just as the news of COVID-19 was hitting the UK, Wessex Archaeology was undertaking an evaluation of the land at Avon Camp on Salisbury Plain Training Area. The work, stripping linear trenches to see if there was any archaeology on-site, was in advance of a planning proposal for a small scale development. This excavation revealed a series of brown soil-filled rectangles cut down into the chalk – the telltale hallmarks of graves and therefore possibly a cemetery.

The planning proposal fell through, yet news of the discovery had got out. During lockdown there were several reports from MOD Police that metal detectorists (an activity prohibited on MOD land) had been apprehended, rendering the Avon Camp site extremely vulnerable. In all likelihood, this was going to be an Early Medieval (Anglo-Saxon) cemetery and these graves often include items that can be found by a metal detector if the burial is shallow enough.

Keeping this in mind, a Defence Infrastructure Organisation Conservation Stewardship Fund grant was acquired to allow for 'rescue' archaeology excavations run by Phil Andrews of Wessex Archaeology. This work would remove that threat to the site and provide another super opportunity to the veterans on the Operation Nightingale programme, an initiative to assist the recovery of wounded, injured and sick military personnel and veterans using archaeology. The site had easy access, guaranteed archaeology and a beautiful setting – all key components to the success of such projects. As a result, Exercise Ring-Giver was born, a nod to the fact that the geophysical surveys on this site had revealed two large circular ring ditches which the team would investigate.

For three weeks in 2021 and a further three in 2022, a team of archaeologists, local volunteers and military personnel laboured under a blazing sun to recover as much archaeology as possible and tell the story of this particular site. As with many of these Early Medieval burial grounds, the location on higher ground is key. You can see one of the other major contemporary sites (Barrow Clump) from Avon Camp, and the cemeteries discovered during the Army Basing works broadly fit this pattern too (see *Sanctuary* 47, 2018).

The chalk geology of the Plain is a wonderful canvas for archaeology and when the mechanical excavator took the topsoil from the site after the farmer had harvested his hay crop, the archaeology below was very clear indeed.

▶ Photography from the Training Safety Marshall drone showing the central ring ditch and surrounding 7th century burials © Crown

A circular ditch around 10 metres in diameter was soon exposed, with a series of rectangular features to the east of the circle, arranged in a well organised row. When all of the turf was removed, two of the training safety marshalls flew their drones over the excavation to capture a photograph of the dig site and all of the archaeology. It was so striking that this image was later used by the leading archaeology journal '*Antiquity*'.

The circular ring ditch was quite shallow and with nothing in it, but it did demarcate the area of a central burial of an adult male cut deep into the chalk. Although some of the burials will be radiocarbon dated, our current thinking is that this burial (and the one within the circle examined in 2022) may well have been the first of the cemetery as they sit on the highest point. Neither had any objects in the grave but perhaps they did not need to for prestige; the monument itself being enough. The rectangular graves adjacent to these rings were also soon confirmed as graves, with a mixture of male, female and child burials. In the two seasons the team have found around 50 individuals (it is difficult at this stage to be too precise as some of the graves had more than one person in them). For example, one grave held three skulls and the bones of at least four people.

Around one third of the burials were accompanied by objects and the typology for these items is so well dated that the team are very confident in believing that the cemetery is of mid to late 7th century. It is not always easy to state the sex of the skeleton from a cursory inspection of the bones on-site – this is a job for the specialist in the lab after the excavation. However, from our initial assessments, it does seem that the females were buried with more items than the males. Although one man had a large iron knife and a spearhead, the women were provided with items such as necklaces of amethyst and glass beads, bone combs, spindle whorls, and a whetstone to sharpen blades. There were also a couple of perforated Saxon coins or 'sceatta' designed to be worn around the neck. It is less common to find burial goods with the really young children, but a single grave of a child excavated in 2022 proved an exception to the rule as they had a

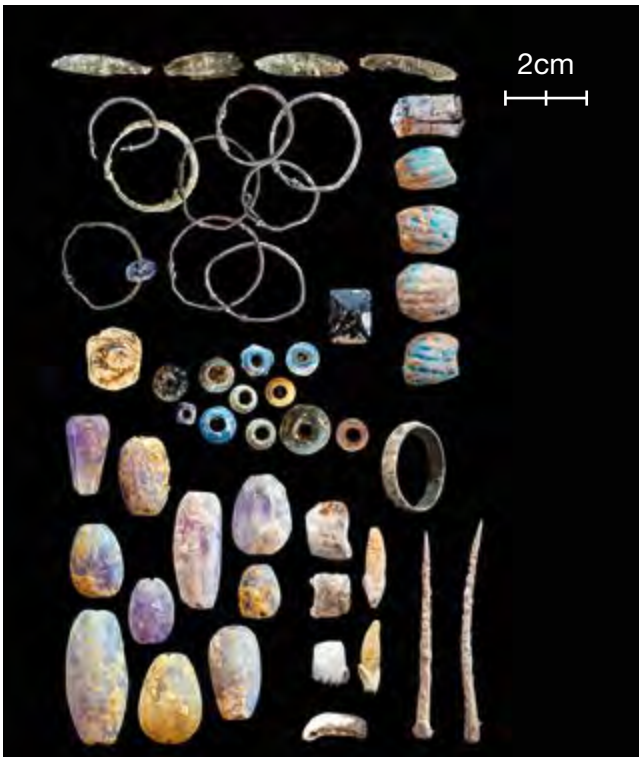
▼ Turf being removed down to the chalk, revealing the brown archaeological features against the white bedrock © Harvey Mills Photography

▶ An archaeologist draws a plan of one of the graves © Harvey Mills Photography

necklace of Roman coins, blue glass beads, and some bronze disks – one of which was also covered in silver and had Saxon patterns on it. Although the graves were from a pre-Christian era, this child's burial was probably closest in time to the spread of Christianity in the later 7th century. The grave too was beautifully fashioned, cut with straight sides deep down into the solid chalk.

This child's burial had been worked on by Sean, one of our military veterans on Op Nightingale, a Falklands War veteran who had just completed his first year of an archaeology degree at the University of Bradford. Sean worked both years at Avon Camp and was interviewed by Professor Alice Roberts for the BBC's 2021 season of 'Digging for Britain', just before he embarked on this new undertaking. The support from the British Army wellbeing team emphasised to us how successful this sort of venture can be.

The excavation was hugely assisted by Conservation Group volunteers and by experts such as the group 'Weorod'. The latter visited the site to show the team how items looked in the 7th century when pristine, and to explain more about life in this period. The blacksmith, Ian Thackray forged a copy of one of the knives found, to illustrate all the processes involved. In 2022, the team were also able to welcome the new British military Cultural Property Protection Unit within 77 Brigade as part of their heritage training. The UK is committed to having such specialist knowledge in the armed forces for any deployments. The team excavated graves, ditches and Bronze Age pots – all great awareness experience.



▲ Some of the 7th century grave goods found in 2021 © Harvey Mills Photography

What then of the human remains the team recovered? They will be assessed by Wessex Archaeology for illnesses, diseases, ages and heights. The Crick Institute will then establish whether there are any DNA links and hence family relationships between the people, and indeed those found at Bulford, Tidworth and Barrow Clump. It is thought that the people buried at Avon Camp lived at Figheldean or Ablington in the Avon Valley below the site. If it had the beautiful sunsets the team were privileged to see this summer, it was probably an idyllic place to live.

▼ One of the soldiers being taught to take levels by Phil Andrews of Wessex Archaeology © Harvey Mills Photography

▲ Two military volunteers excavate one of the graves © Harvey Mills Photography

▲ Extended jet trial using FXR © QinetiQ

Sanctuary Feature

Removal of sulphur hexafluoride from Land Ranges Flash X-Ray operations

by **Robert Lawson**
Group Lead Operations Engineering, QinetiQ

QinetiQ manages 15 UK Test, Trials, Training and Evaluation sites on behalf of the MOD through the Long Term Partnering Agreement. The recent upgrade to the Flash X-ray Radiography (FXR) systems used on range trials is one example of how teams can identify and implement new ways to reduce environmental impact and contribute to net zero.

FXR systems are used to capture images of very fast trial events through fire, smoke and metal that cannot be captured using normal photographic techniques. The systems traditionally used sulphur hexafluoride (SF_6) gas due to its excellent electrical insulating properties. However, fluorinated gases are major contributors to the global greenhouse effect. SF_6 gas has significant Global Warming Potential of 23,500, meaning 1kg of SF_6 is equivalent to 23.5 tonnes of carbon dioxide (CO_2). Due to the way the FXR systems are required to function for trials, SF_6 gas was regularly released. During a typical year of FXR operations, approximately 63kg of SF_6 gas was released into the atmosphere, equivalent to 1480.5 tonnes of CO_2.

The MOD Pendine Instrumentation team were made aware of an equipment modification that would remove SF_6 gas use in equipment operations, replacing it with compressed air. In July 2020, a MOD funded Long Term Partnering Agreement minor investment of £280,000 was secured with the aim to completely remove SF_6 gas from all FXR operations, along with providing cable upgrades, new laptops and digital film investment.

Consultation with the manufacturer was vital to not only understand the modification required, but to ensure it would not cause any degradation in performance. Between September 2020 and June 2021 equipment was sent to the manufacturer for modifications, while still maintaining FXR availability on-site. The modified equipment was then subjected to rigorous testing on return to Pendine Range. Finally, in January 2022 the modified FXR equipment was recommissioned and in use.

The change has resulted in a total removal of SF_6 from FXR activities and its 1480.5 tonnes of CO_2 equivalent emissions. This contributes to both the MOD and QinetiQ's net zero ambitions, benefitting the environment while also maintaining an effective and sustainable mobile FXR capability fit for the future. The project is a fantastic example of a team identifying a series of improvements in equipment operations that have significant environmental benefits and taking action to then make a change.

▶ Trials set up with X-ray heads in protective metal cases © QinetiQ

Sanctuary Feature

Assessing natural capital and ecosystem services in the Sovereign Base Areas, Cyprus

▲ *Pinna nobilis,* common name the fan mussel © Defence Infrastructure Organisation

by **Ruby Plackett**
Environmental Scientist, Natural Capital and Ecosystem Services, Mott MacDonald Group

In 2020, the Administrator of the Sovereign Base Areas Administration and Commander British Forces Cyprus issued a sustainability programme mandate that sets targets for net zero greenhouse gas emissions by 2050. The mandate drives sustainable strategy objectives to enhance natural capital, build resilience against adverse climate events, introduce green supply chains and promote a sustainability culture among its people. The resulting British Forces Cyprus and Sovereign Base Area (SBA) Sustainability Working Group identified the need to develop their understanding of ecosystem services and natural capital in the SBAs as an initial priority under this mandate. The aim was to help them identify their current stock of natural capital and identify opportunities to build resilience against climate events, decrease carbon emissions and promote a sustainability culture using ecosystem services.

▼ *Hyla savignyi,* also known as the Savigny's treefrog © Defence Infrastructure Organisation

Natural capital is defined as the world's stocks of natural assets including geology, soil, air, water and all living things. It is from this natural capital that humans benefit from a wide range of ecosystem services, making human life possible. The emergence of natural capital as a subject reflects the recognition that the environmental system plays a vital role in outlining human wellbeing and economic output.

The most obvious ecosystem services include food, drinking water and plant materials used for fuel, building materials and medicines. There are also many less visible ecosystem services such as the climate regulation and natural flood defences provided by forests, the billions of tonnes of carbon stored by peatlands, or the pollination of crops by insects. Even less visible are cultural ecosystem services such as the aesthetic inspiration and sense of home many get from wildlife and the natural environment.

The Sovereign Base Areas Administration appointed Mott MacDonald to map out the existing natural capital within their landholdings. This included undertaking an initial assessment of the provision of ecosystem services and developing a natural capital approach for SBA and British Forces Cyprus. This focused on climate driven change, while supporting the

delivery of carbon and sustainability targets. As well as producing some opportunities for the SBA to develop or use emerging natural capital tools and a strategy for future conservation of their assets. The work has been undertaken in consultation with experts and practitioners in the SBAs, Republic of Cyprus and Defence Infrastructure Organisation. This has identified opportunities for more collaborative ways to develop an ecosystems approach which will benefit the SBAs and the wider island.

The project focused on five ecosystem services including: carbon on land and in marine areas, biodiversity risk, water provision and food production. Mott MacDonald quantified the current and future status of these ecosystem services using specialised modelling software. The outputs of the modelling software provided user-friendly interactive maps and an online dashboard. The potential impact of climate change pressures on the region includes rising temperatures, increasing evapotranspiration and reduced rainfall. The impact these effects may have on ecosystem services was also mapped and quantified, aiding in assessing the functionality of the aspirational military development plans and to the local population.

The presentation of outputs in an interactive, user-friendly online dashboard help greater decision making for a non-technical audience and provide a strategic basis for the integration of the natural environment within SBA programmes. The dashboard can also be used by estate land managers to identify risks and exploit opportunities. The project can provide a greater integration of the natural environment in the SBA aspirational programmes, enabling delivery of wider objectives to support the local ecosystems now and for the future. The SBA is full of rich biodiversity, including the Akrotiri Salt Lake, a Natura 2000 protected site and a popular place for flamingos and migratory birds.

Many of the MOD and SBA operations, both in the UK and internationally, have large areas of land that benefit from a natural capital approach, through which natural assets are assessed and changes valued and accounted for in a systematic way. For example, different land management approaches impact on the amount of carbon captured by plants and soil, the severity of flooding, the quality and quantity of food, and the availability and quality of green space for recreation, which in turn impacts on physical and mental wellbeing. Enhancing the quantity, quality, location and accessibility of natural capital will provide greater resilience in the face of pressures on the environment and ensure the valuable benefits are secured for people now and in the future. This digitally enabled, innovative approach delivers a natural capital solution to drive better decision making for environmental outcomes, working towards sustainability targets.

Many thanks to the former Environmental Policy Officer for the Sovereign Base Areas Administration, Graham Johnstone for their outstanding support and enthusiasm for the project.

◂ Turtle eggs, found along the Sovereign Base Areas Administration coastline © Defence Infrastructure Organisation

▾ The European shag, along the Akrotiri coastline © Defence Infrastructure Organisation

▲ Photovoltaic array on top of the QLC roof © Francis Construction

The Queen Elizabeth Class Logistics Centre

providing net zero support for the carriers

***by* Iain Greenlees**
Infrastructure Superintendent,
HMNB Portsmouth

The 830-year history of HMNB Portsmouth is a story of adapting the waterfront, and its immediate hinterland, in response to the changing support needs of new classes of Royal Navy vessels and new thinking in civil engineering. This change has recently focused on optimising support to the Queen Elizabeth Class (QEC) carriers on their journey to full operational capability, culminating in the creation of a logistics centre adjacent to their berths. Throughout the delivery of the QEC infrastructure programme, increasing emphasis was placed on the sustainable carbon footprint of Naval Base activity, contributing towards the site's ambition to achieve net zero by 2040.

◀ Internal view of the QLC, ready for fit out © Iain Greenlees

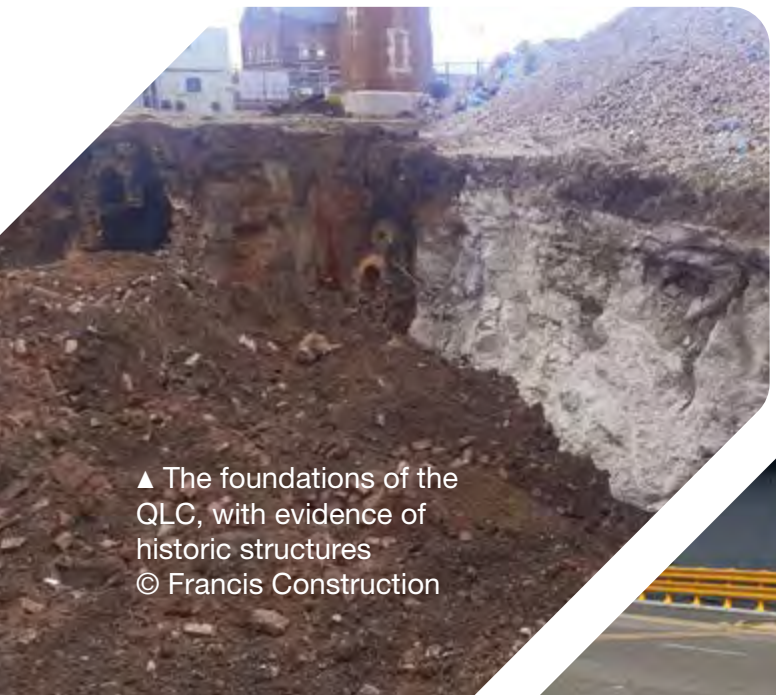
Early analysis found that the volume of movement of stores, spares and tools into the two aircraft carriers required a different approach to other classes to meet the tempo of both vessels at their operational readiness. The concept of a joint Royal Navy, wider MOD and industry logistics planning hub was initiated, bringing together all those directly involved in the engineering and stores planning. A prototype office and tented capability was established, allowing the concept to be tested through 2020 and the scale of the final facility to be refined. With no suitably sized building near the carrier berths, a new build solution was needed. This provided the opportunity to address the lowest workable environmental footprint in both construction and use. A competition for the storage and logistics handling hub was competed by BAE Systems under the Maritime Support Delivery Framework. In May 2021 the build contract was awarded to Francis Construction.

The best location identified lay on land reclaimed in the 18th century. It is part of the dockyard's Historic Conservation area and was the location of a mid-19th century iron foundry. It was therefore critical that construction was delivered with minimum ground disturbance, without threatening the adjacent wharfs and Sail Loft. In the autumn of 2020, the Naval Base successfully bid for £3.5 million Government Public Sector Decarbonisation Scheme funding for seven carbon reduction projects across the site. This included the installation of an array of 678 photovoltaic panels on the roof of this project,

generating over 200kW of electrical energy, and fitting low energy lighting throughout. Highly efficient thermal cladding and use of battery powered forklift and stores handling machines were also adopted. These initiatives, connected to the base's large scale battery system to support overnight use, have enabled the facility to be fully net zero in its enduring operation.

Lessons learnt from the experience gained in 2020 and early work with the delivery team identified that a 10% reduction in the planned volumetric capacity of the finished facility could safely be achieved, still leaving sufficient resilience for future growth demands. To minimise disturbance to the ground, the project team adopted Rigid Inclusion – a new piling technique. This uses real time data gathering of the ground and concrete pour to more precisely measure the effectiveness of the pile, leading to faster delivery with greater quality control. A first in Defence and one of the first uses in the UK, this technique was used to drive 587 piles to support the structural foundation. At just 12 metres, these shorter piles resulted in less disturbance, better ground settlement and lower risk to the adjacent historic structures. No legacy contamination was found in preparing the foundations but inevitably historic below ground structures were identified. Working closely with local heritage experts, the project team adjusted the design, minimising the impacts of construction and preserving this legacy. The Queen Elizabeth Class Logistics Centre (QLC) was successfully handed over for operational use in June 2022.

The 'do nothing' annual utilities for a similar scale warehouse was forecast at £80,000. The power generated in the roof mounted photovoltaic array is capable of supplying at least three QLC facilities, offering a positive operational carbon impact. During construction every opportunity was taken to reuse existing material, reducing the environmental impact. As a new build project, carbon has inevitably been embedded in the manufacture of suitable materials. Through careful modelling, practical experimentation and technical negotiation, the volume of material finally used in construction was over 10% less than initially planned, reducing this impact too. With the facility generating more and demanding less than baselined in its early operation, there is an emerging opportunity for it to become genuinely net zero across its full life cycle. At current rates of generation, the excess electrical energy generated offers the chance to offset the overall carbon embedded in its construction and final demolition. Every year technology unlocks another glimpse into the techniques and behavioural change that are needed for the country and industrial world to rise to this remit. From its conception, this project wrestled with this net zero goal then designed in the opportunity to be best in class for 2022.



▲ The foundations of the QLC, with evidence of historic structures
© Francis Construction

► The QLC ready for operations
© Iain Greenlees

Sanctuary Feature

The sky is the limit! Adventurous birdwatching in the RAF

***by* Sqn Ldr Jayne Lindley**
Sustainability Development,
Strategic Command

The RAF Ornithological Society (RAFOS) is a volunteer organisation comprising of serving and retired RAF personnel of all ranks, ages, expertise and backgrounds with a common interest in the conservation of birds. Collaborative relationships exist with the Royal Navy and British Army, with the common goal of sharing information and expertise to further promote conservation and sustainability. RAFOS aims to promote systematic observation of bird life at locations both home and abroad, advise and assist other organisations in survey work, local ringing schemes and ornithological field activities. The society mounts regular field work and liaises with regional, national and international ornithological organisations.

RAFOS expeditions run throughout the year. In addition to developing bird survey techniques they test military logistical, planning, fieldcraft and map reading skills. Members have to sustain trekking for over eight hours (depending on the aforementioned map reading skills), while covering challenging terrain in all weathers. Examples include Ex SIMMER DIM on the exposed islands of Orkney and Shetlands or snowy survey conditions of Ex WINTER DUCK (Scotland). The expeditions are usually self-funding through personal contribution but occasionally attract grants from partner organisations benefiting from the expedition findings.

Ex SIMMER DIM

Ex SIMMER DIM (so named after the night long twilight found in the Northern Isles around midsummer) was a citizen scientist survey expedition. It was launched in 2018 to augment the work of the Joint Nature Conservation Committee (JNCC) as part of seabird census work to track population trends of specific birds found in the UK. It ran in 2018, 2019 and 2021 (with 2020 lost due to the COVID-19 pandemic).

Ex SIMMER DIM deployed a 13 strong team from all corners of the UK, in two vehicles from HQ Air Command to the Shetland Islands, some 800 miles away. Once ration procurement, catering, accommodation, fitness and health requirements, technical equipment, ferry bookings, risk assessments and budget were included, the expedition would have tested the most seasoned logistician, and that was just the journey there!

The aims were to undertake a complete census of all species of seabirds breeding on the western and north-western peninsulas of Mainland Shetland. This included contributing to the JNCC and Seabird Group partners to determine whether population trends recorded at local levels by the Seabird Monitoring Project were representative of national trends. It would also identify long-term trends (past 45 years) through comparison with the previous three censuses. A key aim was to help determine the level of change recorded since Seabird 2000, a period when the populations of some seabird species of Britain and Ireland are predicted to have undergone dramatic change.

▶ Shetland's night long twilight
© Jayne Lindley

Not for the faint hearted, the Ex SIMMER DIM 2019 Shetland team surveyed 240km^2 of wilderness, ranging in character from 300ft high vertical sea cliffs, through heather moorland, peat bog and hags, to stretches of rocky and sandy beaches. Each covered between 7-15 miles daily on foot, often over demanding and unforgiving terrain and in all weathers. The expedition leader's smart watch showed a total of 121 miles of survey, an average of 13.5 miles per day. However, some individuals did more, including one sub-team's mammoth peat bog trek of 15 miles. Over the course of the Ex SIMMER DIM expeditions a staggering (literally, in many cases) 555km^2 were surveyed by RAFOS volunteers, which did not include the oftentimes long trek to the survey co-ordinates.

Key seabird species of interest included Arctic tern, Arctic skua, great skua, fulmar and kittiwake. The Seabird Monitoring Programme report 1986-2019 records that Arctic skua numbers have declined by 70% since Seabird 2000 to around 785 breeding pairs. This is the greatest decline of any UK breeding seabird over the period. Conversely, great skua had prospered, increasing by 18%. However, since then the avian flu pandemic has had devastating effects on many seabirds. In the context of the global picture, Scotland's Arctic skua population represents only 1% of the world's widespread and abundant numbers. The Scottish great skua population represents 57% of world's numbers.

JNCC and Seabird Group partners have been furnished with extensive seabird breeding census data from these areas of Mainland Shetland for long-term population-trend analysis and comparison. This will help to determine, among other things, the level of seabird species change recorded since Seabird 2000. In addition, the expedition contributed data to the British Trust for Ornithology's BirdTrack project, with 961 records covering 72 species and nest records for non-seabird census species for the Nest Record Scheme. This included curlew sightings, which are the UK's bird of greatest conservation concern due to recent population decline and range contraction.

Other flora and fauna were also recorded. Rarity submissions were made to the British Birds Rarities Committee, several Rare Breeding Bird Panel records were raised, as were Nest Incorporation of Debris Monitoring forms (supporting further PhD level research). Others were sent to the Pollinator Monitoring Scheme and Flower Insect Timed count records to the Centre for Ecology and Hydrology's database.

◀ A great skua defending its territory and a potential nest site
© Keith Cowieson

▶ Arctic skua
© Keith Cowieson

▲ Surveying in a snow storm
© Richard Somers Cocks

◀ Arctic tern
© Jayne Lindley

Ex WINTER DUCK

The WINTER DUCK series of expeditions have been running since 1999, with only a few gaps for the Second Gulf War and the COVID-19 pandemic. In 2022 the team deployed into the eye of Storm Malik, a different challenge to those of drifting snow and blizzards usually faced by the adventurous birdwatchers.

The team surveyed 235 sites covering 1,800 miles. In order to reach bird overwintering sites and cover large swathes of Scotland, a vehicle was used. The team tackled weather incidents along the way from poor visibility and overturned trees to running repairs to vehicles damaged in the high winds. A total of 1,180 BirdTrack records were created with 109 species observed, amounting to slightly more than 21,000 birds recorded. Interestingly, species diversity has remained constant over recent years at just under 110 species. Of note, sea ducks such as common scoter and eider were in very small numbers, as were Slavonian grebes and divers. While wetland birds were the focus, some iconic views of golden and white-tailed eagle were recorded.

So, what does the future hold? The expertise and enthusiasm of the RAFOS to continue to support the scientific surveying and monitoring of birds, in order to understand species population trends is boundless. The work will continue as a vital contribution to UK and global bird population monitoring, which will help partner organisations and government agencies to make strategic decisions on habitat, land use and climate change impact. The team already have our sights set on the next citizen scientist expeditions and are ready for the challenges ahead – the sky really is the limit for the RAF's ornithologists.

▶ Fulmar on a cliff edge
© Jayne Lindley

▶ Curlew chicks
© Jayne Lindley

▶ Evidence of plastics in nesting material
© Keith Cowieson

Sanctuary Feature

Military training at Canadian Forces Base Suffield

a story of disturbance and biodiversity

by **Sheri McNamara**
Base Environmental Officer,
Canadian Forces Base Suffield

▲ Training with pronghorn at CFB Suffield
© CFB Suffield Biology Group, Delaney Boyd

Canadian Forces Base (CFB) Suffield is one of the leading military training and research areas in the world. It also represents one of the largest expanses of uncultivated native prairie remaining in Canada. This training area has considerable value for native prairie conservation. It hosts a wide variety of wildlife habitats, sensitive features, wetlands, plants and animals, including several federally listed Species at Risk (SAR), all while providing world class military training opportunities. There are currently 30 SAR species present and known to breed on the base, though more SAR species could be present during migration.

British Army Training Unit Suffield (BATUS) began training at CFB Suffield in 1971 and remains the primary land user. The impacts created by military training are addressed and managed by incorporating the requirements of grassland biodiversity in conjunction with training mandates. CFB Suffield and BATUS have recognised the importance of conducting training in a manner that does not compromise the environmental integrity of the area. Owing to this, training is conducted in a way that respects the principles of sustainability.

Disturbance created from military training is monitored and managed through the Range Condition Assessment. This is a methodical process conducted by CFB Suffield to assess land cover and impacts from training in order to support sustainable land management.

As grassland ecosystems are extremely multifaceted, the objective of the assessment is to reduce the complexity of ecosystem variability into a simplified classification scheme. This allows for land management recommendations to be based on areas of disturbance, providing BATUS the opportunity to plan training based on rest and/or relocation recommendations for templates and villages in the area.

Disturbance is an important component of native prairie ecosystems. Prior to colonisation, native bison roamed through the area now known as CFB Suffield. The erratic pockets of disturbance created by the nomadic bison, as well as naturally occurring ecological processes like fire and wind, aided in the creation of heterogeneity across the landscape. Habitats which experience various forms of disturbance, like military training areas, have been found to support a more diverse array of species, including SAR, compared to less disturbed areas such as nature reserves and protected park areas. Therefore, sustainably conducted training by BATUS supports wildlife biodiversity and plays an important role in the persistence of SAR at CFB Suffield.

▼ Great plains toad at CFB Suffield
© CFB Suffield Biology Group

▲ FS Parkinson delivering STEM activities to students from the Air and Space Institute in partnership with the Lincoln City Foundation © Crown

FS David Parkinson's Carbon Camp Zero

by **Sqn Ldr Chris Lyons**
RAF Coningsby Engineering Wing,
RAF Coningsby

Flight Sergeant (FS) David Parkinson is an integral member of the unit STEM (science, technology, engineering, and mathematics) team at RAF Coningsby. As part of STEM activities, he wanted to raise awareness of sustainability initiatives in the RAF and so devised an activity called Carbon Zero Camp. Using real world challenges, participants from schools, RAF Cadets and Scout groups learnt about different forms of sustainable and renewable resources. Equipped with this knowledge, the students then set about designing an 'armed forces camp of the future'.

Participants were provided with resources and specialist briefs from the judges on areas of the design that they might consider during the presentation phase. This included the use of solar power, recycled materials, and sustainable fuel initiatives, such as the current RAF Project MARTIN, which aims to achieve 50% sustainable fuel by 2050, and the Chief of Air Staff's mission to achieve net zero by 2040. The students considered growing food, use of waste in regeneration of energy, building materials, energy efficient vehicles and aircraft before briefing their plans back to the STEM team judges.

Initially delivered to children face-to-face, Carbon Zero Camp evolved into a virtual format due to the COVID-19 pandemic. FS Parkinson also expanded the project from being small scale and local to RAF Coningsby, to extending across England and Wales. Since 2021 the event has reached over 5,000 children with profound effects. It has taught participants about the RAF's mission to be a responsible environmental citizen and the role technology can play in tackling climate change. The project also raised awareness of the plethora of initiatives that children can get involved with, and drive at a small, local level in their own schools and homes. These included recycling, turning off lights, timers on lighting systems and wildlife friendly planting. FS Parkinson made sure to explain the longer-term, positive influence students could have as they go through their lives.

▲ The Mega Ultra Fast. Designed to transport and save people in countries in need, it can become invisible using biomimicry to mirror the environment it is flying in
© RAF Coningsby STEM Ambassadors

Carbon Zero Camp exceeded all expectations with students proposing amazing ideas, models and presentations, produced by children aged as young as five. From the initial delivery concept to four schools during British Science Week, followed by the roll out to national groups and school federations, some truly inspiring results were seen. One Scout from Wales produced a computer aided design presentation of his idea for the next RAF aircraft. It included interactive elements and was powered purely by synthetic and renewable energy resources. A class from Orpington designed an aircraft that collected rainwater as it flew and harvested it to cool the engines, send oxygen to the pilot and release nitrogen back into the environment.

FS Parkinson's events received significant publicity both in magazines and online. HQ RAF Youth and STEM produced Twitter and Facebook pieces publicising the delivery and the numerous organisations who took part used their own media platforms to champion the event. The project's wide-reaching influence raised awareness of the RAF in both the local community and wider areas not traditionally served by a military presence.

The work FS Parkinson produced links to initiatives currently being undertaken across the MOD and led to reputational enhancement. It highlights that the military is not only working at the cutting edge of technology but is also a considerate citizen with a strong global consciousness. FS Parkinson's work in planting concepts in the minds of the next generation has provided them with a positive view of MOD's wider aims and encouraged them to consider new and ground-breaking ideas that could shape future policy and practices of Defence.

Being a STEM Ambassador is not FS Parkinson's core function but is undertaken voluntarily alongside a very busy primary role. At his own volition, and almost single-handedly, his educationally enjoyable activities have left an environmentally positive legacy for many children with no previous awareness of the RAF or the wider MOD. The key to the success of Carbon Zero Camp is FS Parkinson's dedication to making learning fun from inception to delivery, while focusing on the core message of 'It is your planet and you can influence its future', which has inspired all the students taking part.

To register your interest in taking part, please email con-gmbstemambassadors@mod.gov.uk

◀ FS David Parkinson, having delivered a STEM day to Newark Air and Space Institute and the Lincoln Air and Defence College © Crown

▼ Walton Academy Grantham's Carbon Zero Camp included robotic fitness instructors, rainwater collection and filtering, solar panels and wind turbines
© RAF Coningsby STEM Ambassadors

▲ Castlelaw Training Area, looking across to Castlelaw Hill Fort, clearly showing the defensive ramparts © AOC Archaeology

Sanctuary Feature

Seeing beneath the ground – the Castlelaw archaeological survey

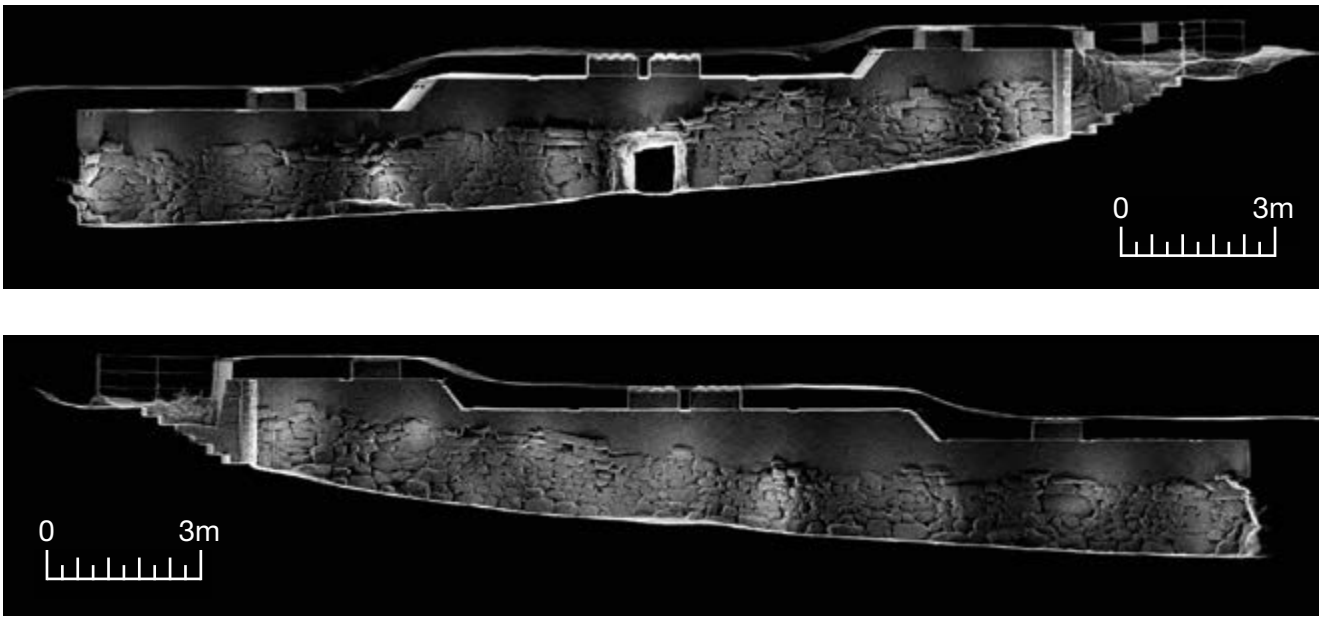
by **Alex Sotheran**
Archaeology Advisor,
Defence Infrastructure Organisation

Castlelaw Training Area is a small rifle range located to the south-west of Edinburgh in Scotland. Scheduled monuments are archaeological remains that have been afforded protection in law to ensure they are preserved in their present form. Despite its size, the range is home to three scheduled monuments. Two are prehistoric forts, Castle Knowe Hill Fort and Castlelaw Hill Fort, plus a prehistoric ring ditch house. There are also other archaeological features, such as ridge and furrow remains and World War I (WWI) trenches. The latter shows that the military usage of the land goes back at least a century.

In 2021, the Defence Infrastructure Organisation (DIO) contracted AOC Archaeology to undertake a geophysical and topographical survey of the two forts and the WWI trenches. This would help to aid management of the features as part of the MOD's commitment to protecting the historic environment of the ranges. The survey utilised several methodologies, including Lidar (light detection and ranging) data, a GPS survey, a magnetometry survey and a laser scan of the souterrain, an underground feature that is located in the Castlelaw Hill Fort.

In recent years, animals grazing on Castle Knowe Hill Fort in particular, have ensured that the grass and scrub is kept to a minimum and helped protect the underlying archaeological remains. However, the sheep have created erosion scars by burying into the soil to escape harsh weather which have increased in size due to water action. An ongoing programme of works has seen Landmarc Support Services repair damage as it has occurred, with the legal consent of Historic Environment Scotland. As climate change threatens the historic environment across the UK a new approach was required to ensure a snapshot of the current state of the ground was recorded in an archaeological survey. This would inform future management plans and allow DIO to track any further erosion, tackling it before the situation became unmanageable. The survey would also locate and record the extent of the WWI training trenches and their current state of preservation.

Castlelaw Hill Fort has been subjected to archaeological investigations in the past, firstly by Gordon Childe between 1931 and 1932 and then by Stuart and Margaret Piggott



▲ Laser scan image of the passage of the souterrain of Castlelaw Hill Fort © AOC Archaeology

in 1948. Surveys had also been carried out by the Royal Commission on the Ancient and Historical Monuments of Scotland in 1915 and again in 2005, with another geophysical survey undertaken by Glasgow University in 2009. Despite all this work, precise dating of the monument is still unknown. However, Childe recovered remains of Roman material during his excavations, suggesting that the site was finally abandoned during the Roman occupation of Britain.

The current geophysical survey of the lower of the two hill forts, Castlelaw Hill Fort, demonstrated that erosion was occurring. This was in part due to animal and human activity, both of which are prevalent on the site. As it is located on a busy public footpath it sees far more foot traffic than Castle Knowe. Despite the footpath not going through Castlelaw, the monument is directly adjacent to the path and so is easily visited. As well as surveying the erosion, the souterrain of Castlelaw was surveyed as part of the programme. A souterrain is a generic name given to an underground passage or chamber usually associated with prehistoric settlements. Their exact usage is difficult to assess, but they may have been larders, storage places or places of shelter in times of strife. This souterrain is at a depth of 2.7 metres below the ground level and runs for a length of 20 metres. It has a small sub circular chamber approximately 3.5 metres in diameter protruding from the passageway approximately halfway along. The laser survey showed with great clarity the stone walls and the building style of gathered rubble rocks, with smaller rocks used as props.

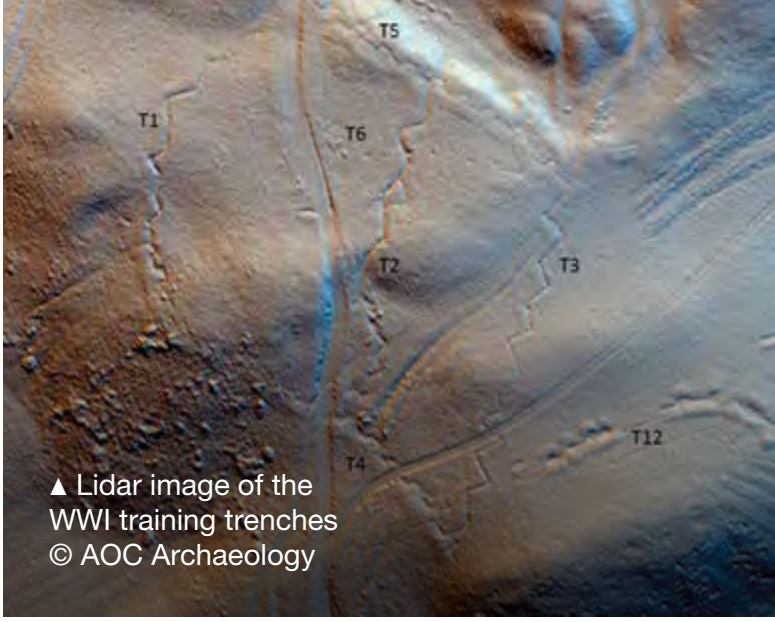
▼ Lidar image of the two hill forts, Castle Knowe at the top, Castlelaw at the bottom © AOC Archaeology

The upper portion of the passageway is made from modern concrete to stop the structure collapsing but was probably originally corbelled.

The palisaded fort of Castle Knowe was first recorded in 1971 by Richard Feacham and surveyed by the Royal Commission on the Ancient and Historical Monuments of Scotland in 1981. No other archaeological work has been undertaken on the monument since. The fort is a rough oval shape with two palisade trenches approximately 6 metres apart. Like Castlelaw Hill Fort, the date of the fort is unknown but there are the remains of three possible huts on the south side. It is also unclear how it relates in both date and use to Castlelaw Hill Fort, which is only 100 metres away.

The taller of the two hill forts, Castle Knowe had no less than 24 areas of erosion, mostly coming from animals and natural water erosion. Steps have been put in place to manage these over the past few years, including refilling of sheep scrapes and fencing the area off to allow the soils to recover. However, it is not just animals of the woolly kind that affect the monument, rabbits and moles also have an impact, burrowing into the ground and loosening the earth. The results of the surveys on both hill forts revealed very little in the way of prehistoric human activity. This was largely due to the amount of modern impact on the sites and the underlying magnetic geology interfering with the readings.

The survey also identified several sets of training trenches, to the north of the two hill forts, with some cutting into the ramparts of Castle Knowe. The area had been used extensively for military training and these scars in the landscape were testament to that strand of historical use of the site. One large area of trenches looked to be characteristic of WWI, with two sets of fighting trenches joined by communication trenches. The former being crenelated in plan, like the battlements on a castle, while the communications trenches had the typical zig-zag shape for ease of movement. The front fighting trench appears to follow the



▲ Lidar image of the WWI training trenches © AOC Archaeology


▲ Castle Knowe Hill Fort © AOC Archaeology

contour of the ground, being sited on an area of high ground. What is unclear is the depth of the trenches, as they only appear as earthworks on the ground and their true depth is not possible to gauge without excavation. Other military remains also cover the Castlelaw Training Area. These appear to be smaller irregular trenches which probably date from a period later than WWI, along with a series of possible foxholes, but their true purpose remains unknown.

The monuments at Castlelaw Training Area are statutorily protected by Historic Environment Scotland. As the landowner, the MOD has a legal obligation to ensure that they are protected for their future survival, minimising any impact as far as possible. This survey work will greatly enhance our understanding of the issues faced at Castlelaw Training Area, allowing the MOD to ensure that damage from erosion is reduced, these monuments do not fall into disrepair and potential impacts of climate change are mitigated.

▲ Defence Cyber Academy lecture theatre with dual screens © Crown

Sanctuary Feature

Defence Cyber Academy – building inclusive spaces

by **Ryan Flaherty**
Contract Director, Defence Academy, Serco

It is tempting to take the convenience of connectivity for granted, but like everything, it comes at a cost. Cyber security has become an increasing risk to governments the world over. The MOD has created a new Defence Cyber Academy (DCA) to train their workforce with specialised skills to combat cyber security threats.

Officially opened by Commander of UK Strategic Command, Gen Sir Jim Hockenhull, the DCA is a centre of excellence for cyber education. It forms part of the Defence Academy of the United Kingdom, which provides higher education to the British Armed Forces, international service personnel, the Civil Service and other government departments. The MOD partnered with Serco to repurpose an existing building from the 1960s to develop the physical site for this new academy based in Shrivenham. The DCA has set about breaking new ground not only for its subject matter, but also for the way it has been constructed.

Sustainability was a key focus of the project, with existing red brickwork on the exterior of the building incorporated into the new design and the refurbishment bringing the building up to modern standards. To ensure energy efficiency, heating and cooling of the whole building is electronically controlled and 98% of the construction waste was recycled.

The building was specifically designed to support neurodiverse individuals. Spaces with intuitive wayfinding elements can assist the brain's innate positioning systems, so the DCA carpet tile design strategically incorporates fire escape routes. Personally controlled lighting and sensitive acoustics are other features a specialist designer incorporated to generate a positive sensory experience. The building interior includes soft furnishings and breakout spaces, in a neurodiverse friendly colour scheme. The overall look and feel is different to a typical Defence building, underpinned by inclusive design to support colleagues of all abilities. Finally, the building features state-of-the-art technology infrastructure worthy of a cyber curriculum, including 1,200 data points. A special lecture theatre screen design enables learning enhanced by neurolinguistic programming. Some people learn better from words, while others learn through images, so dual screens enable a teacher to use both at the same time and engage everyone in the room.

Serco supports the Defence Academy through delivery of the Joint Services Command and Staff College and Defence Academy Campus Integration contracts. From building design to final décor, the Serco team were proud to deliver this new facility for cyber operations.

Sanctuary Awards 2022

▲ The fully functioning solar farm at DST Leconfield © Catherine Bunney

DST Leconfield

the British Army's first solar farm

by **Maj David Owen**
Renewable Energy Officer, British Army

The solar farm at the Defence School of Transport (DST), Leconfield, delivered under Project Prometheus, was the first of approximately 70 across the British Army estate. It has helped the Army to begin decarbonisation at scale, understand renewable energy project delivery, generate savings and more importantly improve energy resilience and security.

Planning for the solar farm at DST Leconfield began in 2019. Securing funding was challenging due to a large initial capital expenditure, competing priorities, expectations of financial return and organisational understanding of technology and potential. Developing bespoke cost models and supporting commercial branches to economically exploit the solar farm was not business as usual and required all parties to innovate and adapt. Solar farms take up a lot of space and after consultation, 2.3ha of the old Helmand off road driving circuit was selected at DST Leconfield. An innovative approach was developed to use Crown permitted development rights to confirm, via the Defence Infrastructure Organisation's (DIO) in-house planning team that planning permission was not required in consultation with the local Planning Authority. This was the first time the MOD had used such an approach for a solar farm. This saved money, time and is already providing a blueprint for future solar farms, where site circumstances are appropriate. Construction began at DST Leconfield in May 2021.

A Preliminary Ecological Appraisal was carried out. The site did not have any particular ecological importance, being a former driver training circuit consisting of disturbed ground and sparse grassland. Therefore, the recommendations were to maintain it as disturbed ground and create more species-rich grassland once the development had taken place. After consultation with the DST Leconfield's Conservation Group, some opportunities were identified to improve

biodiversity locally. This included installing nesting boxes, invertebrate habitat creation and wildflower planting. These were funded and facilitated by the project team, supported by site staff and community volunteers. The Conservation Group can use the ecological improvements to further develop existing relationships with other local organisations, such as the Beverley Beekeepers Association and Bishop Burton College.

This project was threatened by uncertainly caused by both Brexit and COVID-19. Thorough planning and continued support at a senior level was essential for delivery. After a construction period of five months the solar farm was opened in September 2021 by the Rt Hon Jeremy Quin MP, the then Minister for Defence Procurement.

Savings of £308,000 are projected for year one, meaning that the solar farm will outperform its financial projections by over £50,000. Over the life of the solar farm, more than £8 million of savings is likely and probably a conservative estimate. The solar farm is projected to repay its initial investment in less than 10 years and will continue generating energy and savings for 20 years after that milestone. The project is projected to save 400t CO2e (carbon dioxide equivalent) in the first year. This is less than the original 700t CO2e expected due to increasing decarbonisation of the electricity grid, but still the equivalent of removing 250 petrol cars from the road per year. It will provide at least 30% of DST Leconfield's electricity needs.

The Army's first solar farm is a game changer for contributing to UK decarbonisation. The benefits of this renewable energy asset justify similar projects which will help to take the next steps on the way to net zero. Funding is now forthcoming for further installations and energy storage projects to manage the seasonality of solar. This solar farm has also illustrated a clear method of potential protection from volatile energy markets created by changing political and economic situations.

The solar farm at DST Leconfield has provided a focal point to showcase progressive infrastructure; permitted development; detailed stakeholder engagement maximising opportunities for community; conventional infrastructure and efficiency; decarbonisation; ecological improvement; and exploitation of renewable assets. Relationships with industry were also strong throughout the project. Greg Mckenna, Managing Director of Centrica Business Solutions said: *"It has been a privilege to work alongside the Army to deliver its first major solar scheme... by showing leadership on sustainability and carbon reduction, the Army has put in place a template which the rest of the public sector and industry can replicate".*

▶ The mink proof tern raft being floated as part of biodiversity additions © Emma Jobling

▶ Rt Hon Jeremy Quin MP opening the solar farm © Mike Fairfoot

Sanctuary Feature

Seventy saplings for seventy years

by **Ronke Adeleke**
Communications Manager,
Aspire Defence Services Limited

Under the Project Allenby/Connaught contract, Aspire Defence Services Limited (ADSL) has handled the delivery of various services on garrisons at Aldershot and Salisbury Plain since 2006. This contract includes estates management and maintenance, grounds maintenance, stores, security, transport, office services, administration, sport, and leisure. One element is tree management, with the aim of maintaining a balance between public safety and conservation, whilst ensuring measures are taken to comply with contractual, legal and statutory obligations, plus planning conditions.

Approximately 250 woodland areas, totalling 307ha and spread over 1,093ha are managed by ADSL on behalf of MOD. ADSL's environmental team is also responsible for the management of over 20,000 individual amenity trees across the estate. Detailed plans are used to oversee the management of associated environmental and health and safety issues.

▼ Col Roy Jones and Nick Kirwan (ADSL) installing a commemorative plaque © ADSL

Over the last three years, ADSL has implemented a habitat management plan aimed at adding value for the environment and the local community. This will conserve and enhance over 250 woodland compartments and several specialist grassland areas across Salisbury Plain and Aldershot Training Areas. The intention is to increase the species diversity across the estate and to ensure a more resilient tree stock for the future while maintaining tree health and public safety. Where possible, the plan also aims to increase tree numbers to support environmental and bio-diversity targets. Overall, it will ensure that there is not a net loss of trees.

In line with this plan and to mark Her Majesty, the Late Queen Elizabeth II's Platinum Jubilee, groups of seventy saplings were planted at each of the garrisons managed under the Project Allenby/Connaught contract. This signified one tree for each year of Her Majesty, the Late Queen Elizabeth II's 70-year reign. The tree planting initiative was in support of The Queen's Green Canopy; a unique tree planting project inviting individuals and organisations across the United Kingdom to 'plant a tree for the Jubilee'.

Tree species were selected based on the following criteria:

- Appearance – many of the trees serve an ornamental function and therefore species needed to support the wider landscape design (e.g. Queen's Avenue in Aldershot)
- Resistance – species were selected based on disease resistance and ability to cope with climate change (e.g. specific varieties of elm which are resistant to Dutch elm disease)

◀ Saplings at Aldershot © ADSL

- Biodiversity – trees and woodlands are a vital part of our environment and support a wide range of other plants and animals. Where possible, it was important to select native species, for example field maple, common beech, hornbeam and hazel. It was essential to also select foreign species which are more adapted to the UK's future predicted climate.

At the end of the selection process, more than 600 trees from a mix of species had been chosen. These were planted by ADSL across Aldershot, Larkhill, Warminster and Tidworth Garrisons. In addition to the saplings, hundreds of bulbs were also planted in each of the new groups of trees to provide colour and habitat while the trees develop.

This project was a collaborative effort between the British Army and ADSL, with support from Gavin Jones, a long-term subcontractor who provides tree and grounds maintenance services for the contract. In addition to creating a legacy in honour of Her Majesty, the Late Queen Elizabeth II, another objective of this exercise was to develop a more sustainable estate for the British Army. The project is just one part of a multi-year project to reduce carbon emissions and increase tree coverage across the British Army estate.

The initiative concluded with a tree planting ceremony at Aldershot Garrison. Maj Gen Eastman, Lt Gen Cave and ADSL's Chief Executive Officer, Allan Thomson planted three oak trees at Montgomery House. This was in similar fashion to the Verdun oak tree planted in the grounds of Windsor Castle by Her Majesty, the Late Queen Elizabeth II and the then Prince of Wales, His Majesty King Charles III, during the launch of the initiative in spring 2021.

The British Army's broader sustainability agenda is aimed at achieving the government's Net Zero Strategy for 2050. This includes plans to plant more trees, while also looking for ways to achieve carbon free heating and increased water efficiency by 50%.

Although the planted trees will take a few years to make a significant change on the estate, the impact of the project can already be felt and has begun to yield positive results and responses from the local community. In just a few months the saplings have started to grow, bulbs have flowered, and meadow grass has developed around the trees.

▶ Col Roy Jones with the Gavin Jones' team at Warminster © ADSL

▶ Meadow grass dotted with wildflowers at Tidworth, Netheravon and Bulford Garrison © ADSL

▼ View south over the new rock armour
© Maj Josh Wardman

Sanctuary Feature

Ecology meets heritage at Gibraltar's South Mole

by **Duncan Savage**
Environmental Adviser,
Defence Infrastructure Organisation

The South Mole plays a significant operational role in the British Forces mission in Gibraltar. It offers berthing for UK and Allied ships in Admiralty waters, with the ambition to host the Queen Elizabeth class carriers in the future. Known variously over the course of its history as Muelle Neuvo, New Mole, the Careening Wharf, and Admiralty Mole, South Mole is one of a trio of breakwaters protecting Gibraltar Harbour. The seaward northern end is owned by MOD and the land connection by the Government of Gibraltar.

The mole (defined as a pier, breakwater, or a causeway between places separated by water) was initially constructed by the Spanish in 1620. Originally it stood at the foot of one of Gibraltar's principal fortifications, the Torre del Tuerto (the Tower of the One-Eyed Man), since replaced by Alexandra Battery. The South Mole was extended over the course of its history to its current length of about 1,200 metres, with MOD's section of the mole created as part of the dockyard extension constructed between 1894 and 1906. Archival evidence from engineering drawings and photographs show the mole with numerous mooring posts along the quayside, many coal stores constructed along its length, with associated tramways, and a lighthouse at its seaward extent. The quay wall of fine ashlar masonry, many mooring posts and sections of tramway can still be found today, as can parts of the stone wall which may have formed part of the coal sheds. A circular plinth surrounded by fine stone blocks marks the likely remains of the lighthouse. Adjacent to the lighthouse, at the head of the mole, stand the remains of a naval gun battery. The South Mole has significant heritage value, although not formally designated.

Due to its exposed location, the South Mole is vulnerable to climate impacts. The potential for erosion risks the integrity of the structure, which could cause subsequent damage to this significant heritage asset. South Mole is protected from the sea on its south-western flank by rock armour, which requires occasional maintenance to ensure the mole can remain operational. In some areas this rock armour had been completely lost. This rock armour is also one of the few remaining habitats of the Mediterranean ribbed limpet *Patella ferruginea*, a marine gastropod protected under Annex IV of the EU Habitats Directive. Limpets are a key coastal invertebrate species as they limit the space available to barnacles and macroalgae, which enables a greater number of other species to coexist.

Formally widespread across the western Mediterranean, the Mediterranean ribbed limpet has declined significantly, especially along the northern Mediterranean coast. Neighbouring Spain has classified it as endangered and has developed a national conservation strategy to help restore populations. In common with other limpet species, once submerged, they travel to graze on plankton and algae. Before the tide goes out, they

return to the same spot, known as its home scar. This means replacing the rocks populated by the limpets' home scars would likely be lethal.

Further to engagement with Government of Gibraltar, it became clear that the safety of a significant proportion of limpets must be assured before approval for works could be granted. The Defence Infrastructure Organisation's industry service partner, Mitie, and its subcontractors, proposed a solution to translocate the populated rocks with limpets attached, to an approved alternative location with limited human traffic. Similar approaches had been successfully trialled elsewhere in Gibraltar, giving confidence that efforts would prove successful. Costing was based on a price per populated rock.

The work consisted of collocating rock armour in undermined zones and expanding the layer thickness. Resistance to abrasion and weathering was built into the specification, with the intention of providing additional climate resilience. Rocks were placed individually to achieve a dense, fully interlocked armoured slope where each rock is held in place by its neighbours. The work was supervised by a marine biologist to ensure compliance with the approved methodology.

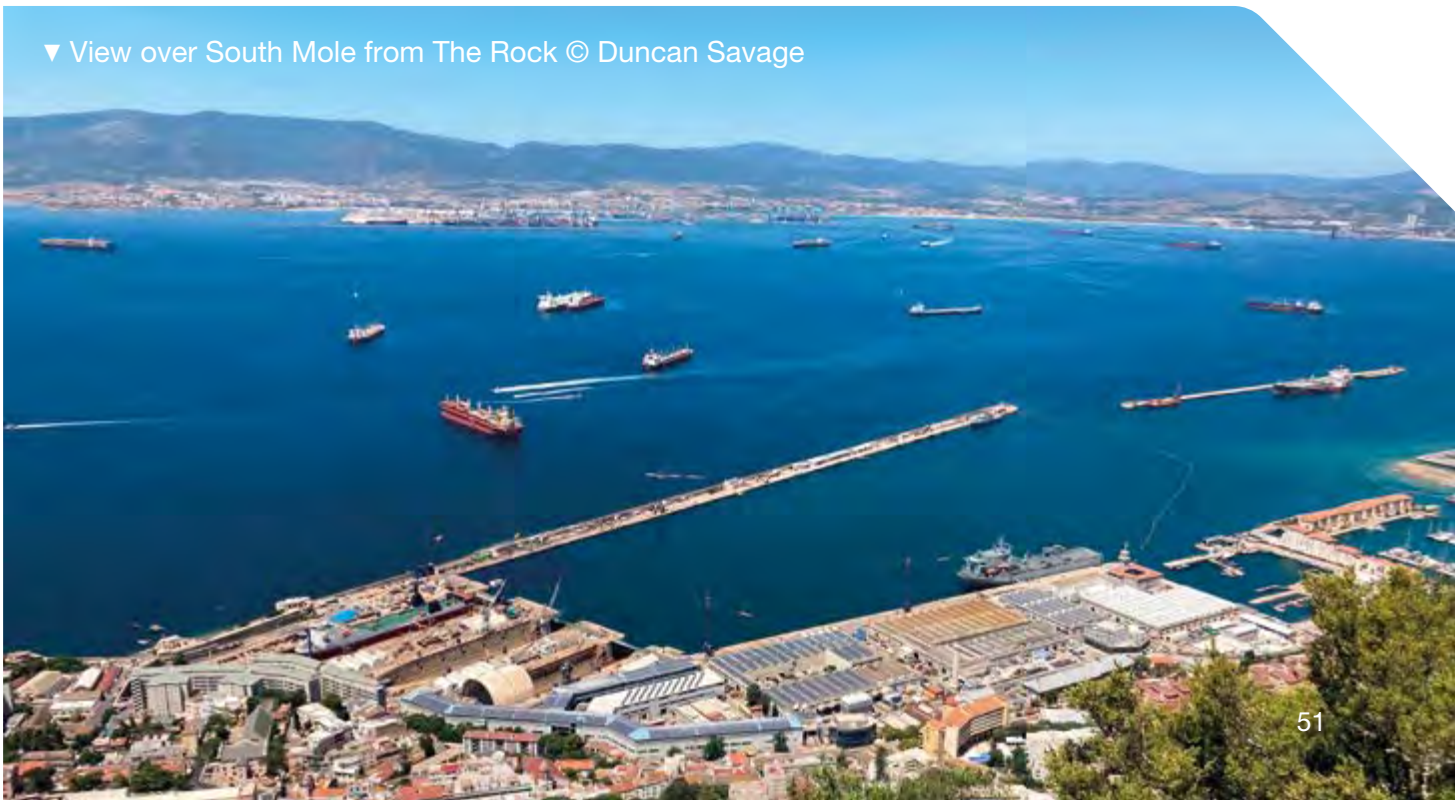
A complication arose when the limpets reproduced in between business case approval and delivery. Due to the limpets' hermaphroditic nature, such events can be difficult to predict.

◀ Limpet in situ on South Mole rock armour © WO2 Jamie Edwards

The result was that the previously accounted for population of 620, increased to over 1,000, with some of the newer members of the community colonising previously unoccupied rocks. Therefore, cost estimates had to be adjusted to accommodate moving 60 additional rocks. The relocated limpets are now subject to ongoing monitoring over a ten-year period to enable reporting on population numbers. If they continue to reproduce, the hope is that this will form an additional stepping-stone in connecting fragmented limpet populations. In the meantime, the replenished rock armour has already been recolonised by a new limpet population.

The project represents a successful example of supporting operational requirements while ensuring environmental compliance and the protection of a heritage asset.

▼ View over South Mole from The Rock © Duncan Savage



◂ Nigel (standing, front row, second from left) and the Recycle Now campaign team © Crown

Capt Nigel Williams

at South Cerney Station

by **Lt Col Julia Symons**
Commanding Officer,
29 Regiment, Royal Logistic Corps

Capt Nigel Williams was the Army Force Protection Advisor for 29 Regiment, Royal Logistic Corps for 13 years, advising South Cerney Station on how to implement and enhance its safety management procedures. His unmatched drive and commitment to sustainability projects has enabled the unit to become one of the most established and green focused Stations in Defence. This work was way above and beyond his expected remit to manage safety.

In 2009, after reading government documents on climate change, risk and security, Nigel analysed the threats to the establishment. His forward thinking vision to work with nature and science inspired and empowered service personnel, civil servants, colleagues, industry partners and contractors, to work together under his 'One Station, One Team, One Family' mantra. From the outset Nigel was the driving force in educating staff in environmental protection. He personally prepared and pioneered a Regimental Environmental Management System and a Strategic Safety and Environmental Action Plan.

Under Nigel's guidance the unit was formally recognised in 2014, when the Duke of Gloucester Barracks Conservation Group at South Cerney came runner up in the MOD's Sanctuary Awards Environmental Project category. During this time Nigel championed the Fuel Oil to Gas Project to protect an aquifer. The switch to gas made a yearly saving of £50,000. To ensure energy security, he installed emergency generators to maintain operational capability and life support during future power outages. Annual waste and recycling campaigns were held to inspire personnel, achieving a 70% increase in rates of recycling. To maintain staff motivation, Nigel volunteered the unit to take part in Regional Command's 2016 Army Energy Month. He programme managed the behavioural change campaign which inspired the formation of the youth club's Energy Warriors group. This saw 58 primary and 30 secondary school children participate in the energy saving initiative, resulting in a £1,000 award.

His courage, strength of character and tenacity came to the fore when he boldly entered the Regiment into the Energy Managers Association's national competition at ExCel London, where it competed against industry. For leadership,

◂ Removal of the fuel oil tanks to protect the aquifer © LCM Environmental

inspiration, teamwork and energy efficiency the unit won the 2017 Energy Management Team of the Year Award. Nigel is highly persuasive and continued to inspire personnel to work together, meaning the unit won further awards in 2018. In fact, the Unit Environmental Award was won at the Army Safety and Environment Conference for two consecutive years. At the 2018 MOD Sanctuary Awards, 29 Regiment, The Royal Logistic Corps' Energy Management team, led by Nigel, won the Utilities Project Award as well as the much coveted Sustainable Business Award. Case studies appeared in both the annual MOD Sustainability report and the Department for Environment Food and Rural Affairs report that year.

Conservation success was down to Nigel forming amicable relationships throughout the community, including the Station playgroup, Farming Wildlife Advisory Group, British Trust for Ornithology, Rural Link for Veterans and the Royal Agricultural University in Cirencester. In 2019, the Army Safety Centre selected him to lead an advisory team deployment to support the British Army Training Unit Kenya. Over nine days, 226 military and civilian personnel were trained. While in theatre he wrote their Environmental Management Plan. On returning to the UK, Nigel managed the Climate Impact Risk Assessment Methodology workshop with the Station team.

In 2020 his processes were included in the 1(UK) Division 'Project Green Rhino' business model, putting environmental protection and sustainability at the heart of unit business. This has been adopted across 32,000 personnel, nine brigades and 89 separate establishments. To inspire others, Nigel has published numerous articles in MOD, Army and industry magazines. He has appeared as a guest speaker for the Defence College of Logistics and Personnel Administration and lectured for the Defence Green Network, the Land Warfare Centre and represented the MOD during the 2021 Energy Management Exhibition.

Through good environmental leadership, management control measures and behavioural change, the unit, led by Nigel, made a 38.7% reduction in CO_2 emissions over 10 years. It won the Energy Managers Association's Public Sector Energy Management Team Award in 2021. A case study also appeared in the Cabinet Office, State of the Estate report that year. Forging a strong relationship with the Army Basing and Infrastructure team, Nigel drove the opportunity to install a 1.4MW solar photovoltaic site. This will provide one third of the site's annual electricity consumption. In its first year of operation 400 tonnes of CO_2 will be saved with annual costs reduced by £100,000.

Since retiring from the Army, Nigel refuses to rest and has proudly taken his place in the Defence Infrastructure Organisation's Technical Services team as a climate resilience manager. There he advises establishments on their climate impact risks. It is clear Nigel will remain a highly active member of the MOD for many years to come. You can read more about Nigel's new role on p.86.

▲ Nigel (standing, centre of photo in Army uniform) on deployment to British Army Training Unit Kenya
© Maj Karen Thomson (Army Safety Centre)

▲ The rolling pasture land provides habitat for many species
© Epynt Way Association

Sanctuary Feature

The Epynt Way – a modern trail in an ancient landscape

***by* Rupert Prince**
Chairman, The Epynt Way Association

Sennybridge Training Area (SENTA) in mid-Wales is located on a great dome of ancient red sandstone 12 miles long, five miles wide and rising to a maximum of 475 metres. The Epynt Hills are separated from the Cambrian Mountains to the north and Brecon Beacons to the south by broad river valleys. Vigorous feeder streams to these rivers have serrated the Epynt with many deep, sinuous valleys and on the north side with precipitous slopes, gullies and crags. The word 'Epynt' comes from the Brythonic Celtish word for 'place of horses'.

The outbreak of World War II drove the need for additional military training areas in the UK. The Epynt was requisitioned as an artillery practice area and on 22 May 1940 No 6 Practice Battery Camp Royal Artillery was formed. Creating the training area necessitated the requisition of 54 homes, mainly farms, meaning 219 people had to leave. Cilieni primary school, Babell chapel and the Drover's Arms pub were also requisitioned. A memorial marks the school site, while the chapel graveyard remains, and the pub is a training building. Many of the farm buildings also remain available for training, with one more recently converted to become the Epynt Way Visitor Centre.

Evolving to meet the changing needs of the armed forces, SENTA has continued to provide a vital resource over the decades and today is mostly a dismounted infantry training area. Crucially, about half of the 40,000 acres can be used for live firing for infantry weapon systems and artillery up to 105mm calibre. Those who have trained here never forget its unique, demanding landscape of tussocky grass, bracken, gorse and bog, as well as the challenging climate.

The area is famous for the red kite, now a common sight thanks to conservation measures. Curlew, snipe and skylark take advantage of the upland grassland. Wheatear, whinchat, merlin and short-eared owls live and hunt on the rough pasture. Brown hares and polecats are also present, while red squirrels retain a tenuous foothold. The acidic grassland, wetland, bog and heath combine to produce a rich diversity of species including flag iris and the rare pink waxcap fungus. Parts of the uplands are protected as Sites of Special Scientific Interest.

About 20 years ago a permissive path inside the MOD boundary was established. The path follows the circumference of the training area and is 65km long. It was designed to allow safe public access to the Epynt while enabling military training, including live firing, to continue

▶ A path for all seasons, even in the snow!
© Epynt Way Association

unhindered. The path is open all year round for use by walkers, cyclists and horse riders. For safety it is waymarked with 1.2 metres high yellow topped posts. To aid riders, five horse corrals were established, enabling riders to tack up, mount and dismount safely. In 2005, the Epynt Way won a Sanctuary Award and in 2007 the British Horse Society presented the MOD with an Access Award for the development of the path.

A team of local volunteers formed the Epynt Way Association to work in conjunction with the MOD to design and develop the path. The association continues today and is about 30 members strong. The mission of the association is to promote the use of the Epynt Way. This is achieved by the production of free leaflets available in local tourist information offices and holiday accommodation. A detailed guidebook of the route is also available to purchase. The association runs a website and has a broad social media presence.

The association works closely with the senior training safety officer for SENTA and members regularly walk the route, reporting any issues that need resolving such as rotted off posts or broken gates. Given the critical need for public safety because of the nature of the training conducted, the eyes and ears on the ground provided by the volunteers act as a force multiplier for the senior training safety officer. It also enables the MOD's industry partner, Landmarc Support Services (Landmarc), to be tasked to conduct specific repairs, making sure the path remains safe and fit for purpose. A strong working relationship has developed between the association, the MOD and Landmarc staff.

The Epynt Way Visitor Centre provides a learning resource where people can read about the history of the Epynt and learn about the geology, flora, fauna and natural history of the area. In addition to providing picnic facilities, there is a waymarked two-mile circular walk, giving outstanding views of the Brecon Beacons and a good flavour of the Epynt.

In the last 18 months, significant progress has been made to revitalise the Epynt Way to improve public access and aid its promotion.

► Enjoying the wide horizons
© Epynt Way Association

▲ Looking north-east towards Builth Wells
© Epynt Way Association

The staycation effect of the COVID-19 pandemic has brought more tourists to Wales. The path has seen much greater use by riders, walkers and cyclists. There is also an annual ultra-marathon around the route (the Eddum), which had 78 participants for 2022, with many returning from previous years.

The association, working closely with the senior training safety officer for SENTA, has suggested projects to improve public access, advancing the visitor experience given the 'COVID-19 effect'. The visitor centre was internally repainted thanks to a grant from Landmarc, which paid for a contract established by the association. An increase in horse riders highlighted the need for safer access to the route. So far, three additional long handled gates have been installed, enabling safer access for riders without the need to dismount to open gates. The association is not established as a trading organisation and so has few funds. However, development of an excellent relationship with the Defence Infrastructure Organisation's (DIO) senior access and recreation advisor led to an application to DIO's Conservation Stewardship Fund, which enabled the project. A survey conducted by the association has detailed a further 18 gates for installation. Working collaboratively with the senior training safety officer for SENTA and Landmarc, a detailed plan has been established which will standardise the approach to the path from every point of access. This will include common signage to the MOD boundary and information boards making access to the path clear, safe and unambiguous.

The association website was old and outdated but has now been completely revised thanks to the Conservation Stewardship Fund.

The new website (www.epyntway.org) is targeted at those likely to use the path. It has downloadable maps of the route and details of five additional circular walks that use public footpaths in addition to the Epynt Way. Local accommodation providers advertise on the site, the income from which pays for the annual maintenance of the website which is conducted by a local small business. Every post on the route is mapped and numbered. Recent work with DIO and Landmarc has enabled maps with marked individual post numbers to be uploaded on the site. This will considerably aid navigation for the public and further contribute to safety.

The next project is to completely update the guidebook, which will again be enabled by the Conservation Stewardship Fund. This collaborative working between the association, MOD and its industry partner will ensure the Epynt Way can provide safe public enjoyment of the MOD estate well into the future. Why not come and see for yourself?

▶ Enjoying a well earned rest at the Garth viewpoint
© Epynt Way Association

▲ The large window to the south-west end of the barrel vaulted Senior Gun Room, following the specialist stone conservation © Crown

Sanctuary Feature

Specialist stone conservation

at Britannia Royal Naval College, Dartmouth

by **Kathryn Sayner**
Historic Building Advisor,
Defence Infrastructure Organisation

Stretched along a hillside overlooking Dartmouth harbour and forming a striking landmark, Britannia Royal Naval College is the land based training school for naval officers. Designed by Sir Aston Webb and completed in 1905, the College replaced the training hulks, HMS Britannia and HMS Hindostan, first moored on the River Dart when naval training began here in 1863.

The enormous Grade II* listed Edwardian building includes the axial corridor, said to be the longest in Europe. It terminates at the dining hall, known as the Senior Gun Room (SGR), and the Chapel. The SGR and Chapel provide impressive meeting spaces for key events and are intrinsic to Royal Navy ethos and day-to-day College life.

In 2018, extensive areas of deterioration to the stone windows in the SGR and Chapel were identified. This prompted the completion of a detailed condition survey by a specialist conservation engineer. The survey later identified inappropriate paint and sealant coatings, likely applied in the 1970s, which were trapping moisture in the stone, causing deterioration and decay. Due to the trapped moisture, the iron cramps and fixings embedded in the original stonework construction had rusted and expanded, causing fracturing and delamination of the limestone. Stone fragments had broken away, creating a safety risk to cadets, staff and visitors.

The engineer and conservation stonemasons worked together to produce detailed drawings and specifications for the repair work and mortar samples were analysed to get the right lime mix. Following analysis of the later coatings and epoxy resin repairs, a methodology for their sensitive removal was developed. On-site, the team of stonemasons worked diligently to identify and record all the weak areas of stonework and points of failure. Small timber wedges were used to support defective areas, while new pieces of matching stone were hand sawn before being carefully positioned in place.

These specialist projects, completed in 2021, are a good example of both reactive maintenance and forward management of the listed building. Taking a well informed and minimum intervention approach from the outset, the carefully managed repairs are a success in appropriately conserving and better revealing the historic and architectural significance of the principal rooms. The collaborative project between the Royal Navy, Amey, the Defence Infrastructure Organisation and specialist conservation contractors, together with ongoing liaison with the Local Planning Authority Conservation Officer, has ensured a positive outcome with the continued use and enjoyment of these key spaces.

Sanctuary Feature

Dynamic Dunescapes at Braunton Burrows Training Area

▲ Horse Breakers Slack scrape area
© Rupert Hawley

***by* Dave Lincoln**
Deputy Training Safety Officer
Defence Infrastructure Organisation

Braunton Burrows Training Area (BBTA) is in the North Devon Area of Outstanding Natural Beauty and one of only seven UNESCO Biosphere Reserves in the UK. It is a Site of Special Scientific Interest and a Special Area of Conservation. Licenced to the MOD from Christie Devon Estates, it has been in constant military use since World War II (WWII). BBTA was a live fire and demolitions range until the early 1980s and has been a dry training area since. It is currently used by all branches of the British armed forces and some foreign forces for dismounted close combat, advanced driver training, aviation and littoral/amphibious training.

In early 1943, the Americans identified BBTA, the surrounding areas around the Taw/Torridge estuary, and along the coast from Woolacombe to Westward Ho! as resembling the different types of coastline they would expect to see in Normandy. Subsequently, the British sea and coastal defences were removed from BBTA and the US Assault Training Centre was established. In preparation for landings on Omaha and Utah beaches, 14,000 Americans trained on BBTA. They specialised in engineer demolitions, tanks, artillery, and amphibious assaults. Due to its historic importance as a key site for wartime training in advance of D-Day, BBTA contains a SHINE (Selected Heritage Inventory for Natural England) site on the Historic Environment Record.

BBTA represents the second largest sand dune system in the UK, covering 1,340ha and is of international importance for wildlife and dune geomorphology. The site is exceptionally rich, biologically-speaking, with no fewer than 17 (of 19) British National Vegetation Classification sand dune plant communities present. The site includes a significant number of Annex I & II habitats and species under the EU Habitats Directive. All are priority Section 41 species. In total, at least 22 threatened/near threatened and/or nationally rare/nationally scarce species of vascular plants occur. Since the 1950s the site has become increasingly vegetated, with the loss of open/early successional habitats. Today's estimates suggest that away from unstable, high foredunes, bare sand has largely been lost. As little as 5% or less remains 'open' though

▼ Members of the Training Safety team observing the scrape work
© Lt Col Tim Jalland

much of this is bare due to vehicle usage from training or through conservation management operations. Fortunately, conservation management has shown that mechanical scraping/turf paring in dune slacks and dry dunes creates the open, sandy conditions favoured by many rare species.

Dynamic Dunescapes is an ambitious project, rejuvenating some of England and Wales' most important sand dunes for people, communities and wildlife. The project at BBTA runs from May 2021 until September 2023. It aims to effectively 'wind the ecological clock back' and create significant areas of early successional habitat with an abundance of bare sand. This will allow bare sand loving species to thrive. The project had an initial desktop study carried out which indicated the site needed to be made safe (from WWII unexploded ordnance (UXO)) before any restoration works could begin. Funding for the Dynamic Dunescapes project came from the National Lottery Heritage Fund and the EU LIFE Programme (around £500,000). However, when the project partner, Plantlife, enquired about private Explosive Ordnance Clearance (EOC) as a civilian project, they realised the cost would have used most of the funding. The Dunescapes project officer approached BBTA's deputy training safety officer to ask if MOD could help with the WWII UXO clearance task. A request sent to 29 Group EOC was accepted under 'legacy contamination' by the Americans for D-Day.

A collaboration was formed between the Defence Infrastructure Organisation's (DIO) BBTA Training Safety, 29 Group EOC, Plantlife, Natural England, National Trust and Christie Devon Estates. The project identified 26 key areas across BBTA to create the bare sand habitat. The Plantlife methodology used contractors to surface clear each area of trees and scrub not natural to the dune environment. A team of one senior non-commissioned officer, one junior non-commissioned officer and 20 civil servants from 29 Group EOC then

▲ Pebble Slack – scrape work completed
© David Lincoln

searched and cleared the area of WWII UXO, before the contractors returned with heavy plant equipment to scrape each area, removing the root network and creating bare sand habitat.

Since May 2021 around 50ha have been cleared and 465 WWII UXO disposed of. The remains of a Cromwell tank were also found, which will be donated to a local tank museum. BBTA is used regularly by school trips, booked through the Christie Devon Estates, for environmental and WWII history lessons. An innovative way of promoting the Dynamic Dunescapes project is through education. DIO BBTA Training Safety, Christie Devon Estates, Plantlife and the Devon D-Day remembrance group aim to display the work being carried out, and the WWII history found for the local community and school visits. The Dynamic Dunescapes project is already having a positive impact with sand migration across the dunes, which will encourage the rare species to return.

▼ 29 Group EOC searching for WWII UXO
© Rupert Hawley

▲ LNS KURSIS, SAR42 and HMS ECHO on operations in the Baltic, January 2021 © Lithuanian Navy

HMS ECHO's wreck investigations

in the Baltic, Barents and Bristol Channel

by **Lt Cdr Philip Boak**
Operations Officer, Royal Navy

During 2021/22, HMS ECHO completed a series of wreck investigations in the Baltic, Barents and Bristol Channel. These were in addition to the ship's core tasking of military data gathering and maritime security operations. Such wreck investigations are important in their own right, as wrecks can pose a hazard to both surface and sub-surface navigation. Culturally, they are also significant, particularly as they are often the resting place of many sailors.

For each of the wrecks, existing information was first obtained from the United Kingdom Hydrographic Office, including position and depth. This enabled ECHO to proceed to the location and re-locate the wreck using her multibeam echosounder (MBES). The MBES data was logged over multiple passes, enabling a detailed image of the wreck to be obtained and the Hydrographic Office records updated.

The Baltic

ECHO was deployed to the Baltic from 3 – 29 January 2021 in a high-profile operation centred on presence operations. In addition, ECHO conducted three wreck investigations of the GOYA, WILHELM GUSTLOFF and HMS CASSANDRA. All three vessels were lost in relatively unknown campaigns in the Baltic.

The GOYA was a Norwegian merchant vessel, built in 1940 by Akers Mekaniske Verksted Shipyard, Oslo. The ship was commandeered by the Germans following the invasion of Norway in 1940 and utilised in support of the Baltic U-boat flotilla as a transport ship, depot ship and training vessel. The WILHELM GUSTLOFF was constructed by Blohm and Voss and launched in 1937. Originally used as a purpose-built cruise ship for the Nazi regime, she was repurposed for the war effort and utilised as a hospital ship and then a floating barracks for U-boat trainees in the port of Gotenhafen (Gdynia).

Both the GOYA and WILHELM GUSTLOFF were pressed into service during Operation HANNIBAL – the largest seaborne evacuation in history. Over a period of 15 weeks from 23 January 1945, 900,000 German civilians and 350,000 soldiers were evacuated from East Prussia to Germany and occupied Denmark, as the Germans retreated from the advancing Red Army. The GOYA and WILHELM GUSTLOFF were both sunk by USSR submarines, with the two greatest losses of life in maritime incidents in history. Of the 10,000 civilians and military personnel onboard the WILHELM GUSTLOFF

on 30 January 1945, over 9,500 perished, and of the 3,000 – 4,000 onboard the GOYA on 16 April 1945, there were only 650 survivors.

ECHO also surveyed the wreck of HMS CASSANDRA. Lost in 1918 during the fight for Estonian Independence, CASSANDRA was part of the Caledon group of C-class cruisers built by Vickers Limited. Commissioned into the Royal Navy in June 1917, the ship saw active service during World War I (WWI). CASSANDRA was part of a British force dispatched to the Baltics as part of the Allied intervention in the Russian Civil War. A key aim was to support the independence of the newly founded Baltic states of Latvia and Estonia against the Bolsheviks. On 5 December 1918, the British force was on passage to Tallinn, when CASSANDRA struck a mine near the Estonian island of Saaremaa. She sunk quickly, with 10 crew killed during the initial explosion and one falling overboard during the rescue attempt.

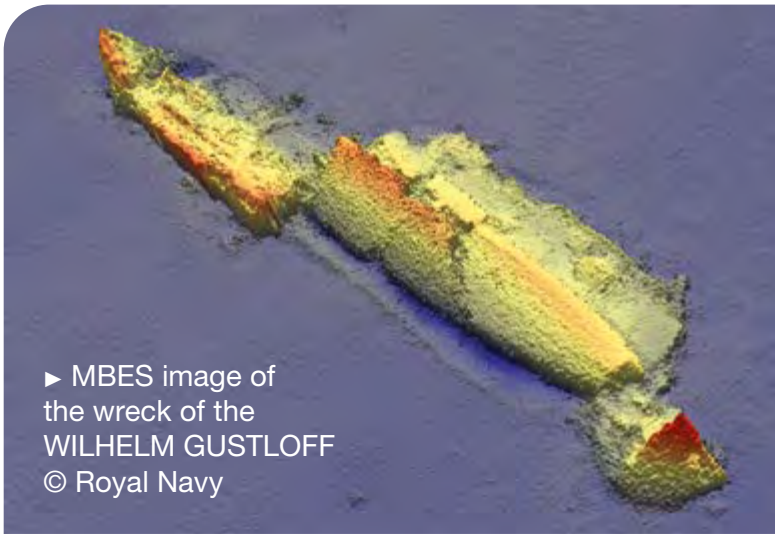
The Barents

ECHO deployed again for operations in the South Barents Sea from 14 August – 25 September 2021, carrying out MDG military data gathering while demonstrating the ability for sustained and independent deployment in the High North. Significant heritage opportunities presented themselves, focusing on the commemoration of the World War II Arctic Convoys and the search for two British cruisers – HMS EDINBURGH and HMS TRINIDAD.

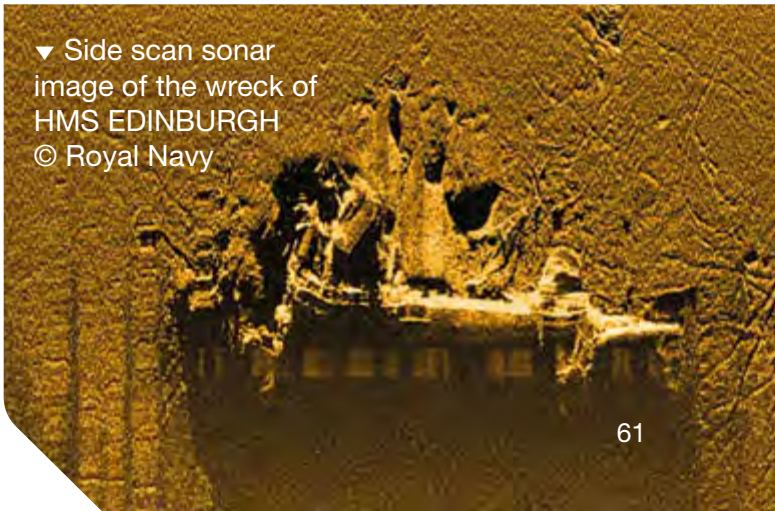
HMS EDINBURGH was a Town-class light cruiser built by Swan Hunter and commissioned in 1939. When Nazi Germany invaded the USSR in 1941, Britain and its Allies sent aid to the USSR via the Arctic Convoys, setting sail from the UK and undertaking the perilous journey to the Port of Archangel or Murmansk. These convoys came under constant threat from German air, surface and submarine attack.

EDINBURGH was part of the escort for convoy QP11, returning from Murmansk. On the 30 April 1942 she was hit by two torpedoes from the German U-boat U456. Severely crippled, the cruiser was taken in tow, but later engaged by three German Destroyers (HERMANN SCHOEMANN, Z24 and Z25). Despite her damage, the EDINBURGH managed to sink the HERMANN SCHOEMANN. However, a torpedo from another destroyer found its mark and the EDINBURGH was later scuttled by a torpedo from HMS FORESIGHT on 2 May 1942. Sadly, 58 men died in the attacks. EDINBURGH would later become famous for the post-war salvage of the 4,570kg of gold she was carrying.

ECHO managed to locate and survey EDINBURGH using MBES and side scan sonar. Towed behind the ship at depth, the side scan sonar was able to produce a detailed image of the wreck, picking out features such as masts and other debris which would not immediately be discernible in the MBES image.



► MBES image of the wreck of the WILHELM GUSTLOFF © Royal Navy



▼ Side scan sonar image of the wreck of HMS EDINBURGH © Royal Navy

▲ Baltic memorial at Portsmouth Cathedral
© Philip Boak

The TRINIDAD was a Colony-class light cruiser, built at HM Dockyard Devonport, and commissioned in 1941. While escorting Convoy PQ13 in March 1942, she came in contact with several German destroyers. She hit and damaged the destroyer Z26, before launching a torpedo attack. TRINIDAD became infamous as 'the ship that torpedoed herself' after one of her torpedoes developed a fault and slowly completed a giant circle which caused severe damage. After being towed and spending several months alongside at Murmansk, TRINIDAD began the long journey back to the UK but on 13 May 1942 she was attacked by over 20 German JU88 bombers. A direct hit caused a serious fire, with 63 men losing their lives, including 20 men from the EDINBURGH. TRINIDAD was scuttled on 15 May 1942 by a torpedo from HMS MATCHLESS.

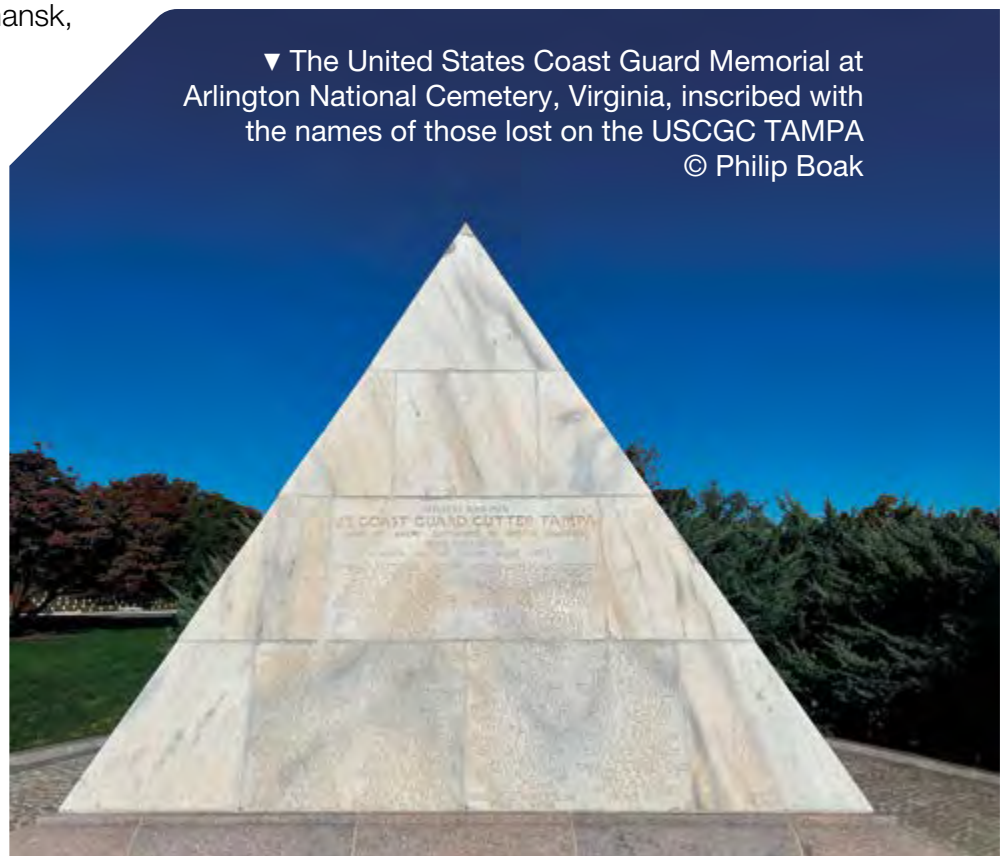
The exact position of the TRINIDAD has never been ascertained. ECHO located a feature at the suspected datum using her MBES and the side scan sonar was deployed in an attempt to identify what was thought to be TRINIDAD. However, after streaming the side scan sonar in depths of approximately 440 metres, the identity of the feature remained inconclusive.

The Bristol Channel

ECHO concluded the series of wreck investigations closer to home in the Bristol Channel in February 2022, surveying the wreck of the ARMENIAN and searching for the TAMPA. The ARMENIAN was a horse and mule transport, carrying the valuable pack animals from America to serve on the Western Front in France. On 28 June 1915, she was sunk by the German submarine U24, causing a crisis between Imperial Germany and the United States as the majority of the 29 crewmen lost were American. ECHO also attempted to locate the wreck of the United States Coast Guard (USCG) Cutter TAMPA. The TAMPA had been engaged on convoy escort duty from Gibraltar to Bristol and was sunk with all-hands by the German submarine UB-91 on 26 September 1918. She ranks as the highest American naval combat casualty loss in WWI. Although a possible wreck was investigated by ECHO, divers will be required to confirm the identity by locating a nameplate, ship's bell or other unambiguous feature.

In June 2022 ECHO was decommissioned after 19 years of service.

▼ The United States Coast Guard Memorial at Arlington National Cemetery, Virginia, inscribed with the names of those lost on the USCGC TAMPA
© Philip Boak



Sanctuary Feature

Preserving the ancient woodlands of the Senne, Northern Germany

▲ Senne Training Area from L Range looking north © Army Press Office

by **Lt Col Robert Mather[1] and Russell Whitaker[2]**
Commander DIO Overseas and Training Germany[1] and Estates Surveyor Germany[2] Defence Infrastructure Organisation[1,2]

The Senne and Stapel Training Area (STA) in North Rhine-Westphalia, north-west Germany consists of 12,500ha of grassland and open sandy heath, interspersed with woodlands and forests. It is considered one of the most important areas of nature conservation in North Rhine-Westphalia. Since 1891 the site has also been an important military training area for the Prussian and German militaries, and from 1945, a British Army base. Today, Normandy and Athlone Barracks and the STA (as well as Goldgrund Training Area to the south) is collectively known as NATO Forward Holding Base Sennelager. Recent geo-political events have seen it assuming a central and busy role as the main European training hub for British and other NATO forces. The site is managed by the Federal German landlord, Bundesanstalt für Immobilienaufgaben and its Federal Forest Agency, Bundesforstbetrieb Rhein Weser.

The STA is bordered by a number of settlements making the training area a complicated site to manage from a safe place to train perspective. A number of historical local agreements and the NATO Status of Forces Agreement restrict noise emissions, and the public right to use certain vehicular roads across the training area outside of military use also needs maintaining along with public walking and bridleways. The threat of historical and modern unexploded ordnance is still present and despite mandatory and legally compliant signs, flags and barriers, trespassing and fly tipping is common.

The tree management project at Eckelau and the Teutoburger Wald, provides an excellent case study of how the STA, with close British Forces and German civilian co-operation, is effectively managing its dual role into the future. This includes as an increasingly important place of conservation subject to German public scrutiny and as a busy and rapidly evolving military training environment.

The STA is listed as a Special Area for Conservation (Senne mit Stapelager Senne SAC) and a Special Protection Area (Senne and Teutoburger Wald SPA). Over 900 of the Red List (threatened and endangered) species of North Rhine-Westphalia live on the STA. Rare bird species include large populations of European nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea*, Eurasian wryneck *Jynx torquilla* and the great black woodpecker *Dryocopus martius*, the latter not usually found in the UK, but all of which find a natural home in the varied habitats of the Senne. The STA also contains many rare species of amphibian such as the moor frog *Rana arvalis*, natterjack toad *Epidalea calamita* and the great crested newt *Triturus carnifex*.

▲ Mortar firing on the Senne
© Army Press Office

Critical to the successful and continued breeding of these species are the bog woodland, old oak woodland, beech forests and residual alluvial forests that characterise the Senne and are recognised as Annex I habitats of the SAC. Through it are the Scots pine *Pinus sylvestris sylvestris* plantations from the 19th and 20th centuries onwards, and other introduced species such as black cherry and spruce, that have become the most common woodland in the STA. However, this trend is reversing. Among the conservation objectives stated in the Area Specific Arrangement between the German Ministry for the Environment, Nature Conservation, Agriculture and Consumer Protection and Bundesanstalt für Immobilienaufgaben, is the transition of non-native into deciduous forests, typical for the area. Due to the poor sandy soils and the drying out of the Senne this will take time and will be a challenge. British Forces is committed to balancing the military use of the estate with the objectives of the Area Specific Arrangement, and the wider environmental sensitivities through its Integrated Rural Management Plan.

Germany is part of the temperate, rainy climate zone of the mid-latitudes. Northern Germany's proximity to the sea has traditionally kept winters mild and summers not too hot but climate change has caused a gradual drying out of the Senne. Between 1881 and 2015 the mean air temperature rose by 1.4°C and mean annual precipitation increased by over 10%. Projections for 2040 to 2059 under the medium-high emission model suggest a further rise in mean temperatures between 1 and 2°C, alongside lower mean precipitation.

Increasing temperatures, instances of drought, and high winds across North Rhine-Westphalia have left the spruce tree population particularly vulnerable to European spruce bark beetle *Ips typographus*. These beetles tunnel under the bark, cutting off the supply of food and water that the tree requires to survive. Between 2018 and 2020, 250ha of about 400ha of spruce tree forest were utterly devastated, particularly to the north-west of STA in the Eckelau and the slopes of the Teutoburger Wald. This necessitated the felling and removal of infected trees, leaving large forest gaps and timber debris. A recent naturally occurring summer fire, significant enough to be reported in the local press, highlighted the potential fire risk from military tracer ammunition and hot rounds. These areas of forest are a secondary fire risk and needed to be removed.

Over the last two years large scale work has been undertaken to clear the areas of dead forest and create a re-ordered woodland set back from the roadside with hedge walls of blackthorn. This has been populated by new plantations of native species of beech *Fagus sylvatica* and oak *Quercus rober*. Fencing has also been installed to protect the saplings from the STA's large deer population. A particular challenge was that all of these tasks required additional unexploded ordnance clearance prior to starting. This work has been undertaken by Federal Forestry with £100,000 of funding over two years from the Defence

Infrastructure Organisation's (DIO) Conservation Stewardship Fund.

The outcome is a reduction in risk from falling trees for which British Forces are liable. This ordered and managed woodland now offers an improved landscape for military purpose, which is safer for the troops and public that frequently use local roads. The new forests are interspersed with 5-10 metre fire breaks, reducing risk and providing better access into the deep forests for troop movement and emergency fire vehicles. The project also supports the objective of the Area Specific Arrangement of a transition of non-native forests into deciduous forests typical of the area and has helped enhance natural reseeding on former bark beetle areas.

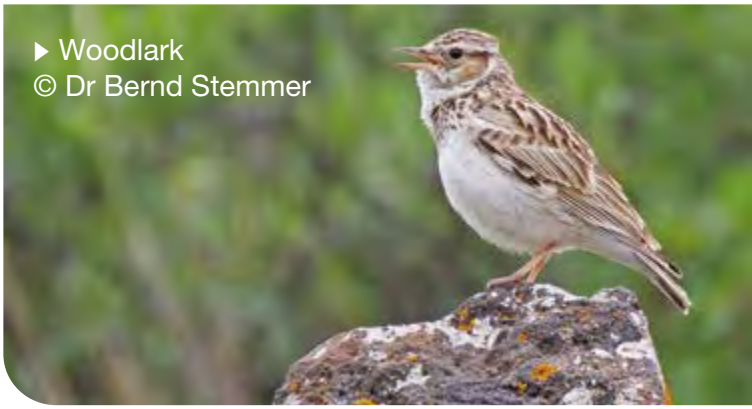
This is not the only example of British Forces co-operation with the German Authorities to support a sustainable STA. Efforts include much smaller and focused interventions to construct new ponds to support amphibian breeding and replanting of ancient fruit and lime trees. These conservation projects show the commitment of British Forces to work with their German colleagues and stakeholders to resource a project of significant impact. Without which, the fragile eco-structure of a German national treasure would suffer devastating and permanent loss, affecting generations to come.

Thanks go to Christian Lücke, Bundesförstbetrieb Rhein Weser; Duncan Savage, Environmental Advisor, DIO; and Dr G. Lakmann, Biologische Station Kreis Paderborn, Senne.

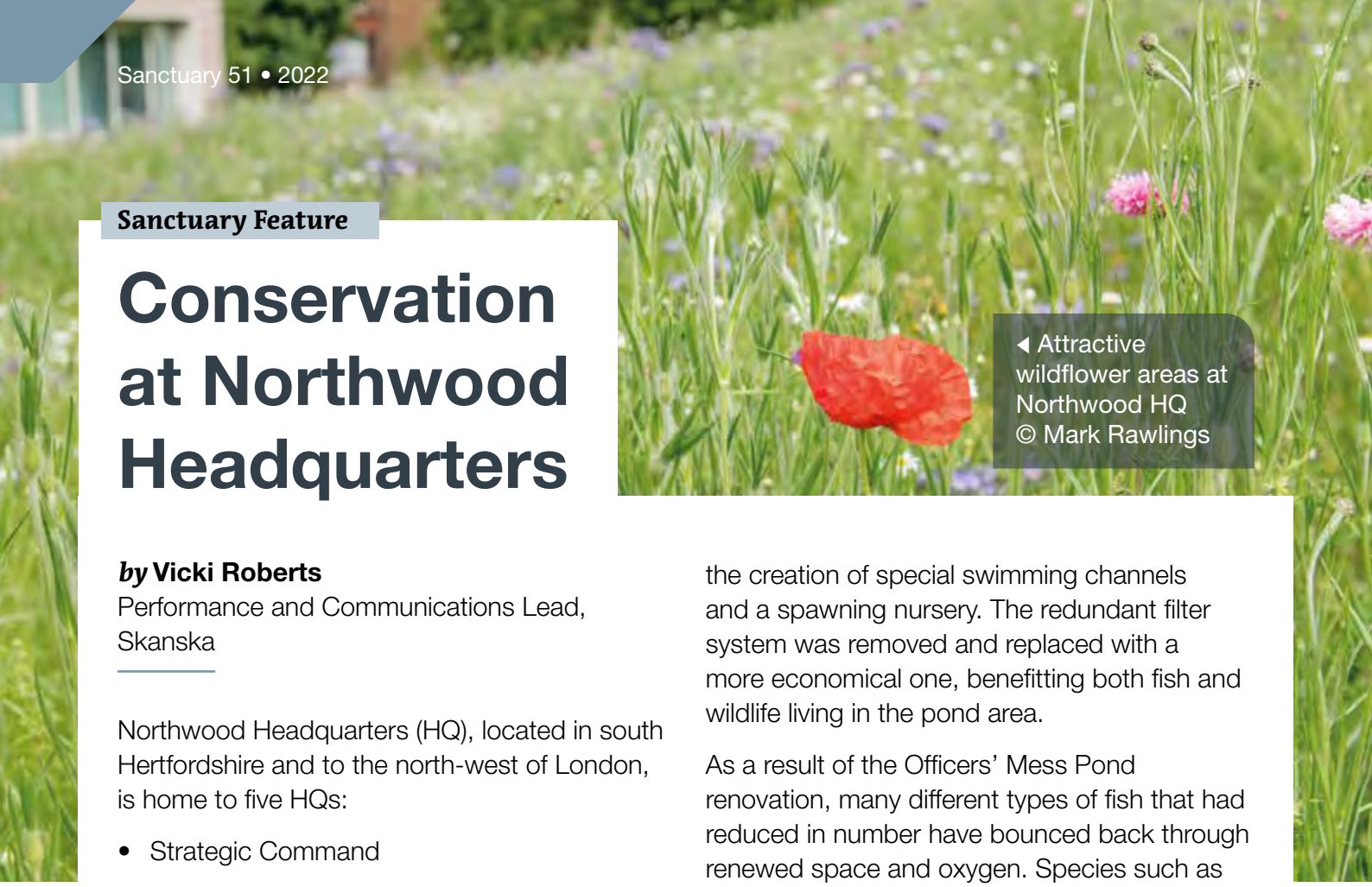
▸ Eurasion wryneck
© Dr Bernd Stemmer

▸ Great crested newt
© Dr Bernd Stemmer

▸ Natterjack toad
© Dr Bernd Stemmer



▸ Woodlark
© Dr Bernd Stemmer



◂ Attractive wildflower areas at Northwood HQ © Mark Rawlings

Sanctuary Feature

Conservation at Northwood Headquarters

by **Vicki Roberts**
Performance and Communications Lead, Skanska

Northwood Headquarters (HQ), located in south Hertfordshire and to the north-west of London, is home to five HQs:

- Strategic Command
- Permanent Joint
- Standing Joint Force
- Allied Maritime Command (NATO)
- Royal Navy's Maritime Operations Centre.

While the world went into turmoil due to COVID-19 restrictions, Northwood HQ decided to set their sights on improving the biodiversity on-site. The aim was to bring together enthusiastic representatives across the community and Skanska's facility management team to provide a collaborative, focused and coherent approach to the challenges of reducing resource consumption and waste and improving biodiversity.

One of the most visible achievements was the regeneration scheme of the Officers' Mess Pond. The Officers' Mess Pond is a key social space for officers living on-site, helping them to enjoy the environment and to relax from the stresses of their jobs. Over six months, the Skanska team painstakingly removed 30 truckloads of vegetation that had taken over the habitat of the pond. They took further steps to improve the environment for the fish including the creation of special swimming channels and a spawning nursery. The redundant filter system was removed and replaced with a more economical one, benefitting both fish and wildlife living in the pond area.

As a result of the Officers' Mess Pond renovation, many different types of fish that had reduced in number have bounced back through renewed space and oxygen. Species such as leather and grass carp are thriving in their new, high-quality environment. The improvements have also attracted wild birds back to the pond, which has welcomed breeding moorhens and ducks for the first time in seven years.

The Skanska team at Northwood HQ then began renovation works to the wider landscape. This involved replacing the beds of old and dying heathers with mixed, vibrant perennials and wildflowers, intended to attract pollinating insects and other wildlife. The development of this area includes more seating to create an attractive, enjoyable and relaxing space, encouraging all personnel on-site to get some fresh air away from the office. A mindful garden was also created with the aim of dedicating a peaceful place for personnel to visit to 'detox their minds' and improve their mental health.

In addition, the team purchased beehives to sit in the confines of the perimeter. The bees include the rare British native black bee, which has been enjoying the wildflower areas over the summer. Not only does this promote biodiversity but it also gives Northwood HQ the opportunity to harvest honey, raising money for local good causes. The beehives are regularly

maintained by resident beekeepers from across the community, which includes the MOD, Eastbury Park Limited and Skanska. The hives are now thriving with bees working hard to make some delicious Northwood honey.

Northwood recently also welcomed 10,000 worms to the site as part of the Worms at Work initiative. Worms at Work use large wormery digester units to process food waste that would otherwise end up in landfill. The premise of a wormery is to compost organic matter, in Northwood's case food waste from the kitchens on-site, into a nutrient-rich natural fertiliser worm cast, popularly called black gold. The resulting nutrient-rich compost will be used as a natural organic fertiliser and soil improver for planted beds and green areas around site.

The worms inhabiting the on-site wormery have settled in brilliantly and continue to thrive with each population top up (now approximately 80,000 worms in total). They are also breeding, confirming the suitability, efficiency and sustainability of this initiative. This has meant that each week the wormery processes between 80 and 100kg of kitchen food waste, that would otherwise be destined for landfill. There has been lots of interest regarding the units from military personnel to the kitchen staff, generating a real buzz and encouraging people to talk about the benefits of not only this initiative, but wider food waste reductions.

Lastly, the Skanska Motor Transport team have been continuing to work collaboratively with the MOD vehicle lease providers to support the conversion of a quarter of the fleet to ultra low emission vehicles to achieve the Road to Zero Strategy 2022 target. In addition, the Motor Transport team have introduced ultra low emission vehicles and dedicated charging points, a significant advance to the site's sustainability and efficiencies. Northwood HQ endeavours to be the first contract in building services to have 95% of the commercial fleet as ultra low emission vehicles.

The team at Northwood HQ have demonstrated a true collaborative spirit, working together to drive initiatives across the whole Northwood HQ estate, generating ideas and delivering results that reduce resource consumption, waste and improve biodiversity.

▼ Busy bees pollinating within the local area © Mark Rawlings

▼ Northwood HQ Officers' Mess Pond renovations underway © Mark Rawlings

▲ The new accommodation is complete © QinetiQ

Upgrades on St Kilda

sustainability in a UNESCO World Heritage Site

by **Lee Tucker**
Programme Manager, QinetiQ

There are 15 Test, Trials, Training and Evaluation (T3E) sites managed by QinetiQ on behalf of the MOD, through the Long Term Partnering Agreement. St Kilda is an isolated archipelago located 64km west-north-west of North Uist in the North Atlantic Ocean. The archipelago is owned by the National Trust for Scotland (NTS). The island of Hirta is leased to MOD and operated by QinetiQ as a T3E range, providing mission rehearsal and capability development in support of the armed forces. It is one of Scotland's six UNESCO World Heritage Sites and one of only a few to hold joint status for both cultural and natural significance. St Kilda is highly environmentally sensitive, designated not only as a World Heritage Site, but also as a Special Protection Area, Special Area of Conservation and a Site of Special Scientific Interest – designations which aim to protect and enhance its unique and delicate ecology.

QinetiQ recently used over £30 million of MOD investment to upgrade the tracking radar and telemetry equipment to sustain ageing obsolete capabilities, enabling UK and international customers to benefit from up to the minute technology and more accurate data. A further £20 million was invested in new accommodation and energy facilities. The Long Term Partnering Agreement team recognised that the project could contribute to net zero and sustainability ambitions, with opportunities to reduce, reuse and recycle materials and energy sought throughout. More efficient heating and power supplies were installed, alongside replacement water treatment equipment and storage facilities, removal of some old buildings and reinstating the ground. Working sympathetically to the needs of a dual World Heritage Site, the project spanned a four-year period and was completed in 2021.

Comprehensive environmental management and biosecurity plans were produced to ensure project impacts were minimised and QinetiQ employed a full time environmental manager on-site for the duration of the construction works. The team needed robust controls in place to ensure that non-native species were kept from the island, which included protection of ships' hulls and thorough checks before each sailing so as no rodents were transported to the islands. All official visitors were thoroughly briefed by the team about the biodiversity and importance of the island and given further guidance in the St Kilda handbook.

After culturally important artefacts were found in 2017 (*Sanctuary* 47, 2018), a full time on-site archaeologist was employed on the island. Prior to any groundworks, a comprehensive survey was undertaken of the planned area to ensure that any artefacts were preserved. This work was painstakingly undertaken, by hand, in extreme conditions, often in a small window of practicality. The team also restored some ancient rights of access in collaboration with the NTS experts.

Close partnership with a wide stakeholder community meant the programme of works was comprehensive and focused on delivering a more sustainable and sympathetic footprint. A long-term plan was developed and discussed with NTS, to ensure any threats to the sanctity of the protected areas were mitigated. The key features of the solution included:

- Using Siberian larch timber to complement the natural surroundings, in the new accommodation building, offering a sympathetic and natural vista when viewed from afar
- Using grass grown from native seedlings and transplanted to the roof, in native soil, for the accommodation and energy centre
- Improved energy efficiency of the new accommodation building and energy centre
- Harnessing waste heat from electricity generators
- Reducing both noise and light pollution to aid seabird conservation
- Reinstating land around the school house to original vegetation
- Reducing the visual impact of the facilities in the Village Bay area
- Reducing the footprint of the MOD site.

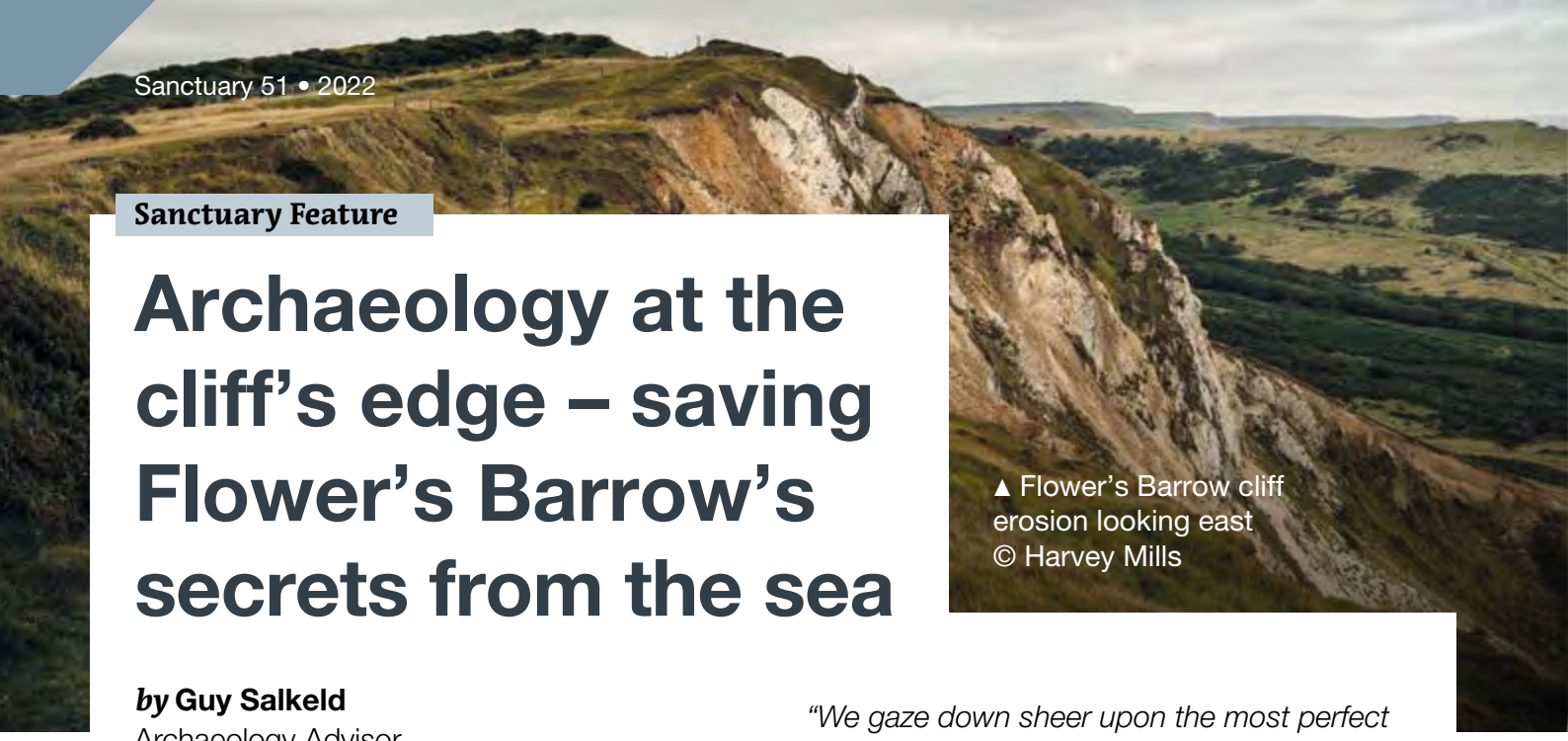
The difficulty of a programme in such a remote location cannot be underestimated. While this is a considerable piece of work on any site, the added complexities of working in a UNESCO World Heritage Site meant that every piece of work had to be carefully considered.

This ensured the outstanding environment on St Kilda was preserved during transport, build, storage and removal. Add to this all new equipment, materials and workers having to be transported by sea or air, sometimes in treacherous conditions, in a very tight annual weather window, and the achievement becomes remarkable. The management of waste was carefully considered and managed through an agreed plan. All spoil and non-indigenous building materials were shipped from the island and in most cases taken to the mainland. At around 6,500 tonnes, this was no small task and was undertaken by a contractor local to the Hebrides. The excavated soil and stone were retained and used for the later reinstatement project.

A critical success factor throughout has been the liaison and close relationship between the MOD, NTS and QinetiQ with all parties able to work together to balance the need for delivery with the obligation to protect this important and key environmental location.

▼ Internal construction begins after completion of the groundwork © QinetiQ

◀ Transportation of materials and equipment © QinetiQ



▲ Flower's Barrow cliff erosion looking east © Harvey Mills

Sanctuary Feature

Archaeology at the cliff's edge – saving Flower's Barrow's secrets from the sea

***by* Guy Salkeld**
Archaeology Advisor,
Defence Infrastructure Organisation

For anyone walking the Dorset Coastal Path or the Purbeck Hills between Lulworth Cove and Tyneham, Flower's Barrow hillfort makes a good place to stop after a long climb. The surrounding ground falls sharply away to the west, north and south-east and on a clear day the ramparts offer an unbroken view of an immense horizon. In the distance, the Dorset Downs give way to the South Purbeck Heaths and Poole Harbour, with the Isle of Purbeck to the east. Looking landward, the keen eye will find traces of Bronze Age cemeteries, Medieval fields, and battered tank targets across the pastures in the firing range to the north.

Most visitors find themselves drawn to a smaller section of rampart by the inner entrance, perched precariously at the cliff edge 175 metres above Worbarrow Bay. From here, as one visitor noted in 1903 in The Queen: The Ladies Newspaper and Court Chronicle, *"We gaze down sheer upon the most perfect little gem among all the bays on the south coast"*. The south is dominated by the sparkling blue waters of the English Channel, and it is impossible to believe that the sea was not important to the people who made this place many centuries ago.

Flower's Barrow is a small multivallate hillfort, having two sets of ramparts and ditches located on a hilltop. Hillforts date to the Iron Age, most having been constructed and occupied between the 6th century BCE and the mid-first century AD. Small multivallate hillforts are generally regarded as settlements of high status, occupied on a permanent basis. Recent interpretations suggest the construction of multiple earthworks may have had as much to do with display as with defence. These sites are rare, with around 100 examples recorded nationally. Their importance in understanding the nature of settlement and social organisation in the Iron Age makes all examples with surviving archaeological remains of national importance.

Hillforts are substantial structures that retain their strength to defend or impress to this day. Flower's Barrow however has been fighting a losing battle with the elements and much has already been lost. It is not known when the destruction of the hillfort began, but probably a third of the original structure had collapsed because of coastal erosion by 1744, when it was noted by the landowner, Edward Weld.

◀ Trench C in the hillfort interior © Wessex Archaeology

The southern half of the site has sheared away leaving a precarious platform below a steep bank up to nine metres high. The cliff edge below has been subject to cliff falls and slumps in the last 70 years, the product of geologically weak layers of chalk and gravel, the hydrology of Worbarrow Bay and increasing storm events.

Historic England launched its Heritage at Risk programme in 2008 to highlight the overall state of England's historic sites. The programme identifies sites that are most at risk of being lost because of neglect, decay, or inappropriate development. MOD has developed considerable expertise in managing heritage assets at risk from damage such as scrub, burrowing animals, and occasionally military activity. However, coastal change presents a difficult problem because it is irreversible, unpredictable and virtually impossible to prevent. Flower's Barrow is particularly challenging.

Historic England approached the MOD and suggested that a programme of archaeological research could save information before it was lost to the sea, thus mitigating the at risk status. The programme began with an analysis of Environment Agency lidar (light detection and ranging) data. Lidar allows earthwork features to be identified from a digital terrain model derived from millions of spot-heights measured by an airborne laser. The Historic England aerial survey investigator discovered new features across the site including possible hut platforms and field boundaries. Archaeological excavation would determine the extent of the damage and preserve information prior to inevitable further destruction. A continuing programme of scrub clearance will also enable Historic England to conduct a drone survey for further detailed earthwork analysis.

The Defence Infrastructure Organisation's (DIO) Conservation Stewardship Fund granted monies for a two-week excavation, carried out during the range shutdown in August 2022. Landmarc Support Services commissioned Wessex Archaeology to run the dig with support from Operation Nightingale veterans, serving personnel, volunteers, and Bournemouth University students. Op Nightingale is an initiative to assist the recovery of wounded, injured and sick military personnel and veterans by involving them in archaeological investigations. The fort is covered by multiple designations and required Historic England and Natural England consents. Most importantly, it is within the Lulworth Gunnery School live firing area and unexploded ordnance support from 29 Group Royal Engineers was vital to the exercise. Further essential support was given by the Lulworth Range manager and Bovington Armour Centre who kindly provided accommodation.

After extensive discussions, Historic England, DIO and Wessex Archaeology agreed a programme of excavation in three areas of the hillfort.

▼ Trench B at the top of the cliff
© Wessex Archaeology

In true British weather style, the range safety brief banned smoking on-site due to the risk of fire after the hottest, driest summer on record, while the risk assessment warned of the potential harm from thunderstorms and lighting. In the event, the weather changed rapidly over the fortnight, with sunshine, a tremendous rainstorm and spells of sea mists which blocked out the views and swirled round the trenches.

Trench A examined the slipped area and required careful siting due to difficult access conditions. It revealed a mass of gravel showing that the archaeology had not survived. Having been destroyed completely, it is no longer deemed at risk.

Trench B, by the inner rampart entrance, investigated an area which has already begun to erode. Digging by hand through the stony material was difficult but revealed large sherds of later Iron Age pottery (100 BCE - 100 AD) attributed to the local people known as the 'Durotriges'. Deeper down, the soil was less stony with more fragmented pottery sherds and pieces of local shale. With only a day to go the archaeologists discovered evidence of two large, vertical posts behind the rampart – possible remains of a structure or gatehouse and fantastically tantalising. Further discussion with Historic England will be required to understand the implications of this discovery from an at risk perspective.

Trench C investigated several features which were initially thought to be hut platforms cut from the gently sloping ground. The results were curious and none of the usual features associated with huts, such as drainage gullies, hearths, floors or pits were encountered. However, a quantity of Middle Iron Age (300 - 100 BCE) pottery was recovered which provides the earliest definitive

▲ Wessex Archaeologists recording Trench A in the slipped area © Crown

► Veteran excavating © Wessex Archaeology

dates for the hillfort. It may be that these platforms were once working areas or animal pens, but the results of environmental sampling will tell us more.

The archaeology has now entered the post-excavation stage where Wessex Archaeology specialists will study the finds and samples before a final report is written. Valuable information has already been gained about the extent of the damage due to coastal erosion, and an initial understanding of the dates and people, from the Middle to Late Iron Age, when the place was active. The continuing programme of research will build on the excavations to gather as much information as possible before Flower's Barrow, and the last traces of its makers, falls into the sea forever.

▲ The dig team comprising Wessex Archaeology, Royal Engineers, DIO, Royal Navy, veterans, volunteers, and students from Bournemouth University © Wessex Archaeology

▲ Wildflower meadow at Aldergrove © Sadie Budgell

Sanctuary Feature

Encouraging pollinators at Aldergrove

***by* Adam Mantell**
Conservation Officer, Ulster Wildlife

Aldergrove in Northern Ireland is home to Joint Helicopter Command Flying Station and 38 Engineer Regiment, situated adjacent to Belfast International airport in County Antrim. As with most military establishments the operational requirements of the site and infrastructure changes over time. Recent demolition of several blocks of housing in the barracks presented an opportunity for the team to consider how this land could be redeployed to benefit service families and the rest of the community at Aldergrove.

Barracks can sometimes have a rather institutional feel to them. The areas of demolished housing were initially left as rather unattractive mown amenity grass that was not serving a well-defined purpose, with a significant ongoing maintenance burden. A number of ideas for the land came to fruition including a cycle track, garden allotments, polytunnels and beehives (see *Sanctuary* 50, 2021).

Working with staff from Aldergrove, the Ulster Wildlife MOD Conservation Officer Adam Mantell, submitted a bid to the Defence Infrastructure Organisation's (DIO) Conservation Stewardship Fund to convert grassland into a wildflower meadow and establish a traditional orchard. Wildflower meadows are a vanishing feature of the UK countryside, with an astonishing 97% lost since the 1950s. They are a haven for wildlife, especially plants and insects.

Orchards, like wildflower meadows were once a common feature of our landscape and 90% have been lost since the 1950s. Twenty five native Irish apple, plum and pear trees were planted at Aldergrove to celebrate Her Majesty, the Late Queen Elizabeth II's Platinum Jubilee through the Queen's Green Canopy initiative. From the first tree she planted as Princess Elizabeth in 1949 it is a fitting and lasting tribute to the Queen's legacy from a lifetime of unparalleled public service and her deeply personal relationship with the armed forces.

Both the meadow and orchard contribute to other important objectives. The spring flowering orchard will provide a much needed local boost to pollinators early in the year. The meadow will provide food and shelter, particularly for pollinating insects throughout the rest of the year, contributing to the All-Ireland Pollinator Plan that DIO is a signatory to. Most importantly, the team hopes this area will provide a valuable recreational space for the community at Aldergrove, whether that is just an afternoon stroll in a tranquil setting, a picnic in the fresh air or picking and eating delicious fruit from the orchard – making life just that little bit better.

▶ Apples at Aldergrove orchard © Sadie Budgell

◂ HMS Eaglet's hover wind turbine installed on the roof © Hover Wind Turbine (TASK Contract Solutions)

Project Liverbird

greener refurbishment at HMS Eaglet

***by* WO1 Mark Barker**
Infrastructure Delivery and Asset Manager, Royal Navy

HMS Eaglet is a medium sized, three floor North-West Reserve Forces and Cadets Association (NW RFCA) owned establishment, managed through the Maritime Reserve estate. Located one mile south of Liverpool, it is a waterside unit and one of the most complex of all the Maritime Reserve establishments. It is home to 15 sub-units totalling 200 permanent staff and 1,000 regular, reservist and civilian personnel. HMS Eaglet itself is a 25-year-old establishment originally built for generic business use and adapted over the years to suit users' changing needs. It has increasingly required significant investment to improve energy efficiency, upgrade facilities to make it fit for purpose as a work and training facility for the 21st century reservist and other external users.

Project Liverbird saw the almost full refurbishment of HMS Eaglet with an emphasis on decarbonisation through cutting edge green energy efficient solutions. The project also demonstrated financial savings through the installation of renewable energy generation, and future proofing equipment. Funding was secured through the Royal Navy's Future Reserve 2020 Programme and approved by the Commander Maritime Reserves.

Relocating everyone in advance of Project Liverbird took two months, and work officially started in mid-January 2022. The main contractor, TASK Contract Solutions, were local to Merseyside and had previously worked with NW RFCA and Royal Navy Infrastructure. They also had the UK distribution licence for a pioneering hover technology system used in Silicon Valley. This system, combined with other more common, but nonetheless effective green energy systems, had the potential to deliver 70% off grid provision to HMS Eaglet and its users.

The electrical grid in Liverpool is the most fragile in the UK due to the legacy network, electrical architecture and its now overloaded nature.

◂ HMS Eaglet's hover wind turbine open in use © Hover Wind Turbine (TASK Contract Solutions)

Energy security and assurance was critical to enabling both internal and external activity, as HMS Eaglet is a centralised UK hub, used for logistical stopovers, as a hot desk location, and as a training and conference facility. This includes Military Aid to Civil Authorities support, as seen during the COVID-19 pandemic through the facilitation of testing teams and enabling a Local Resilience Forum, blue light and civic services. All these factors demand an assured level of energy supply, making the new systems vital to the future proofing of the site.

New installations included an air to air source heating system. This is a modern, inverter-driven heat pump compressor which converts free energy from the air and upgrades it to higher temperatures suitable for heating. The original boiler plant was inefficient, as it had to run at an elevated temperature to heat the hot water, as well as being run all summer at low load. An air to water heat pump was added too, which is much more efficient and reduces reliance on gas. Heat pumps were installed to heat and cool the building, again replacing gas. When combined with the heating controls for each room, this has resulted in greatly reduced CO_2 emissions.

LED and motion sensor lighting were installed in the refurbished areas. These changes again combine to create a huge reduction in carbon, energy and costs in an age of increasing gas and electric tariffs. A first in Europe, the hover wind turbine will deliver the bulk of these savings and on current data takes HMS Eaglet off grid by a forecasted baseline of 63%.

The main building works took 11 months, slightly longer than planned due to delays by various supply chain and labour pressures. The new look building – with break out areas, conjoined offices and conference corridors – has delivered a much more invested estate and has already optimised working practices. This has heightened HMS Eaglet's main user experience. The project has demonstrated the importance of pioneering greener energy implementation in Defence and at a Maritime Reserve establishment, which will hugely improve the use of a north-west regional hub for all.

The above works constituted phase one of three for Project Liverbird, and so there remains continuous infrastructure improvements towards the eventual aim of establishment carbon neutrality. Future projects to complement this system include optimised solar on various outbuildings, battery banks to store surplus wind and solar generated energy, and electric vehicle charging pods with battery sumps to maximise efficiency. There is also provision for an accommodation block for up to 80 personnel and wider facilities such as an additional magazine and armoury facilities for Royal Marine Commando Companies.

As news of this project spreads its aim to provide proof of concept is more tangible. The diligence, hard work and enthusiasm of the collaborative team of Royal Navy Infrastructure, Royal Marines, Civil Service, NW RFCA and contractors have made it a success. It is a project that reflects the needs of the service and wider society to respond to climate pressures.

▶ HMS Eaglet's air to air heat pumps
© Hover Wind Turbine (TASK Contract Solutions)

▲ Challenger 2 main battle tank during Ex Iron Storm © Crown

Sanctuary Feature

Exercise Iron Storm

delivering combat readiness in a complex environment

by **Oliver Howells**
Senior Ecologist,
Defence Infrastructure Organisation

Ex Iron Storm is a Battlegroup exercise that is an essential part of the Field Army training cycle to maintain combat readiness. A Battlegroup is one of the basic building blocks of the British Army, comprising of 600 to 1,000 soldiers. It includes live firing with the whole range of vehicles and weapons systems deployed as part of a ground assault. These range from small arms and mortars to Challenger 2 main battle tanks; AS-90 self-propelled artillery; armoured fighting and reconnaissance vehicles Warrior and Scimitar; and engineering vehicles Trojan, Terrier and Titan.

Up until 2020, Ex Iron Storm was conducted at the British Army Training Unit Suffield (BATUS) in Canada, which at 270,000ha is 17 times the size of Salisbury Plain Training Area in Wiltshire. In early 2021 the exercise was relocated back to the UK, partly due to international travel restrictions arising from COVID-19.

▼ Wildlife surveillance cameras overlooking Elegug Stack in June 2022 © Crown

Castlemartin Ranges was deemed the most suitable location and two separate four week exercises were scheduled to take place in September 2021 and June 2022.

At 2,395ha Castlemartin Ranges is small compared to BATUS and fitting Ex Iron Storm into the ranges was a major challenge for the exercising units and the Defence Training Estate Wales and West team. Much was done to optimise the space, including removing fences and extensive stands of dense scrub that would limit free movement of vehicles. Some new targets, including anti-armour pop up targets, were required and locations for mine ploughing and anti-tank ditch obstacles had to be found.

The exercise planning also needed to consider the array of habitats and species that form part of the statutory conservation designations. Castlemartin Ranges Site of Special Scientific Interest is designated for a host of biological features associated with the cliffs, stacks, caves, dunes, heathland and grassland. One of the most important is the large seabirds nesting population found on the cliffs and stacks in the spring and summer. Elegug Stack supports one of the largest guillemot colonies in Wales (Elegug is Welsh for guillemot) and affords spectacular views as several thousand birds whirl around overhead or fly to and from their feeding grounds, tending to their eggs and chicks.

Part of Castlemartin Ranges is also designated as Castlemartin Coast Special Protection Area, for its breeding chough population. These remarkable birds nest in inaccessible caves,

crags and ledges on the sea cliffs. They feed on invertebrates such as leatherjackets, spiders and ants, which they find in anthills and short grass on the clifftops, in the dunes at Brownslade Burrows or areas grazed by cattle and sheep further inland. This combination of undisturbed nest sites and abundance of food make the ranges an ideal site for breeding and it supported 14 nesting attempts in 2021.

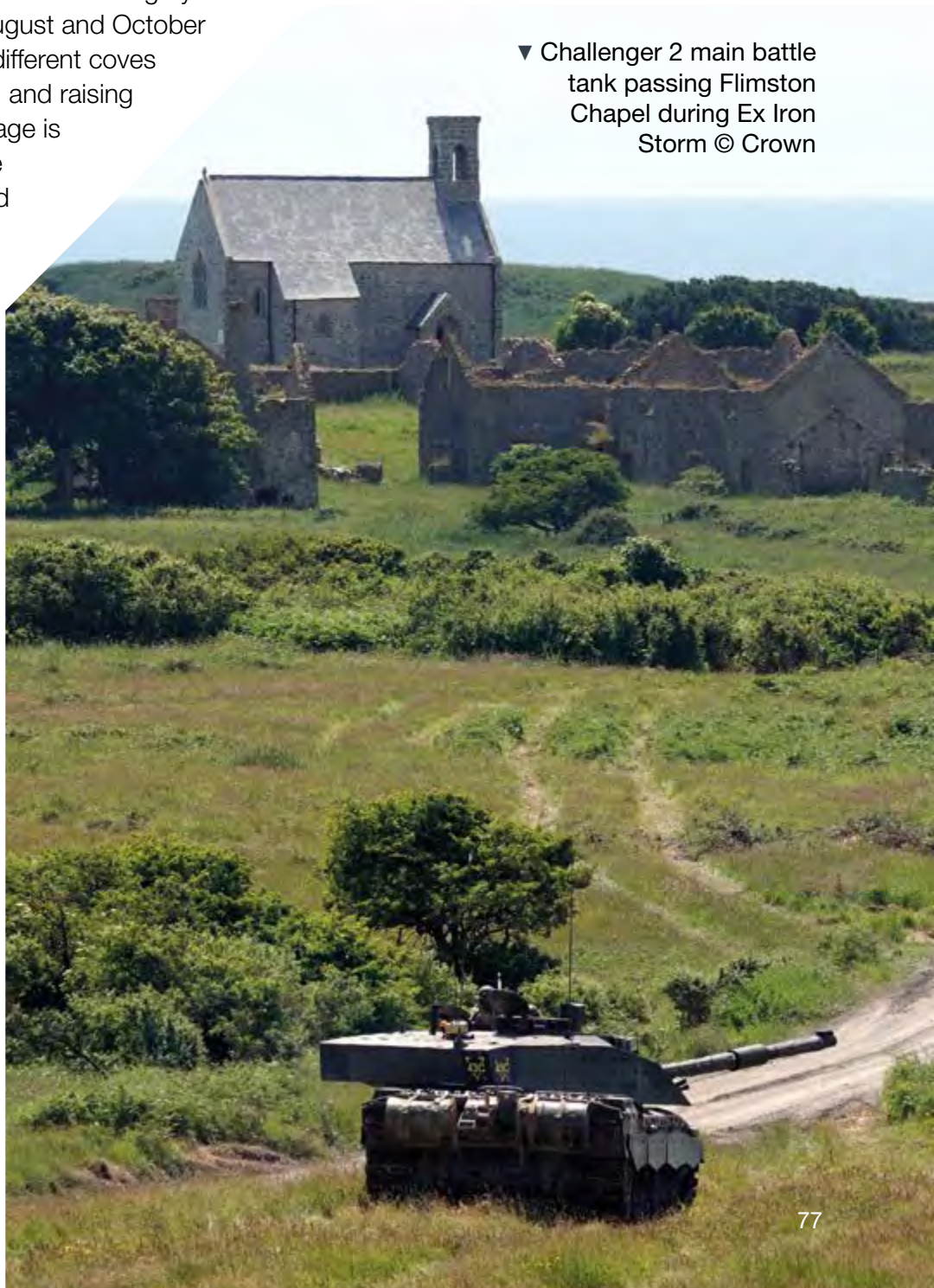
The abundance of wildlife extends to the marine environment and the Pembrokeshire Coast Marine Special Area for Conservation (SAC) includes the seas off Castlemartin Ranges. An important SAC feature is the resident grey seal population. Between August and October each year the seals use 16 different coves within the ranges for birthing and raising pups. Surviving to weening age is a perilous business on these rocky, tidal beaches exposed to strong south-westerly winds and fierce Atlantic storms, but each year most survive and the site makes a significant contribution to the west Wales population.

Exercise planning had to consider potential impacts on 95 features in total, ranging from the strandline beetle to peregrine falcon. A detailed Ecological Impact Assessment was undertaken, including extensive consultation with Natural Resources Wales and local specialists.

The 2021 exercise coincided with the peak period for grey seal pupping and the 2022 dates with the peak of the seabird and chough breeding seasons. The biggest consideration for both exercises became the impact that increased levels of gunfire noise could have on pupping seals and breeding birds. It was essential to demonstrate that none of these features would be adversely affected and put mitigation measures in place to avoid, reduce or minimise any impacts.

The first challenge was to model the levels and frequency of noise events associated with Challenger 2 and AS-90 firing. Detailed predictive modelling was undertaken, which suggested noise events would be louder and more frequent than normal activity.

▼ Challenger 2 main battle tank passing Flimston Chapel during Ex Iron Storm © Crown



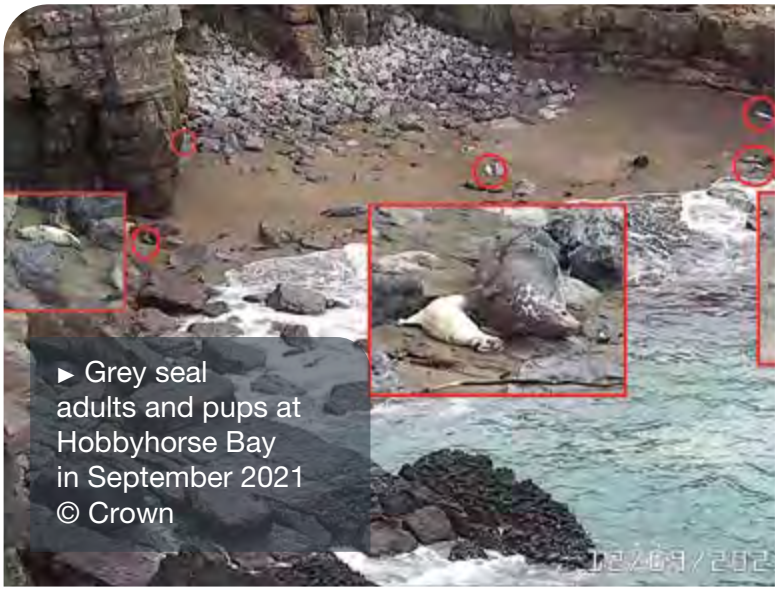
These results were reviewed against published studies to assess the impact they might have on seals and breeding birds. Unsurprisingly there was limited published data and no directly comparable studies. So, it was agreed that a precautionary approach would be adopted and a series of mitigation and adaptive management measures were put in place. These included a commitment to monitor grey seal, seabird and chough behaviour in real-time during the exercises and cease some live firing if animals were being disturbed in a way that could affect breeding outcomes. To do this, Defence Infrastructure Organisation (DIO) purchased two sets of remote cameras to deliver a live feed to experts in animal behaviour. For the 2021 exercise the Sea Mammal Research Unit at the University of St Andrews undertook seal surveillance. In 2022, DIO's own team of ecologists, with support from experienced local specialists, undertook surveillance of seabirds on Elegug Stack and one of the chough nesting sites. The cameras included infrared so behaviour could be observed day and night as much live firing took place during darkness.

To assess the impact of noise on behaviour the team also set up a real-time noise monitoring system to record gunfire events. A total of eight monitoring stations were installed close to sensitive features and camera stations with a live feed the surveillance teams could access. The challenges of recording noise levels became apparent when one inquisitive seal took an interest in the microphone that was dangled down the cliff to the beach below, but all noise events were captured with a small number of the loudest events exceeding 140dB, which validated the modelling.

The four weeks of camera surveillance provided an amazing insight into animal behaviour. The seals did respond to a handful of the loudest noise events, becoming more alert and in some cases moving down the beach or into the sea. However, none of the behavioural responses were deemed significant enough to impact breeding outcomes. In fact, 2021 recorded the highest number of seal pups born (77) and weened (57 survived) at Castlemartin Ranges since 2004.

Similarly, regular counts of seabirds on Elegug Stack showed numbers remained consistent before, during and after the exercise. The only discernible response was seen at night when the eye shine created by the infrared lights showed several thousand guillemot heads turning in unison in response to some of the loudest noise events. The pair of chough being observed also bred successfully and fledged two chicks, with no obvious impact from any part of the exercise.

As a study in animal behaviour the surveillance and monitoring undertaken as part of Ex Iron Storm was fascinating. It was also an essential part of supporting two of the British Army's highest priority military exercises and has generated a body of evidence that can be used to inform similar exercises in the future at Castlemartin Ranges, other UK training areas or indeed elsewhere worldwide.



► Grey seal adults and pups at Hobbyhorse Bay in September 2021 © Crown

► Guillemot on Elegug Stack in June 2022 with count sectors marked on © Crown

▲ Gary Beckett, Conservation Officer, by a newly restored pond © Dr Pascale Nicolet

Celebrating the Sanctuary Awards 2022

Aquatic habitat restoration, equine assisted interventions and volunteer beach cleans

The projects highlighted in this article have featured in previous editions of *Sanctuary* magazine. However, as they placed in the 2022 Sanctuary Awards, the editorial team were keen for readers to have the opportunity to learn more about the projects.

Project Neptune – creating clean water ponds at Bicester Garrison

Completed during Bicester Garrison's 80th anniversary year, Project Neptune is providing exceptional habitats for wildlife while supporting the wellbeing of garrison personnel. Project Neptune is a collaboration between the Newt Conservation Partnership (NCP) and Bicester Garrison Conservation Group. A community benefit society involving two conservation charities (Freshwater Habitats Trust and Amphibian and Reptile Conservation), NCP creates and restores aquatic and terrestrial habitat for great crested newts through NatureSpace's District Licensing scheme, which has funded most of Project Neptune.

Starting in 2020, the project involved restoring some of the site's existing ponds and creating new waterbodies. The following year, NCP created two new Jubilee ponds, providing additional high-quality habitat for wildlife. The surrounding area was transformed from an unused playing field into a wild nature reserve. More than 30 species of native trees and shrubs were planted to commemorate Her Majesty, the Late Queen Elizabeth II as part of the Queen's Green Canopy initiative, and to restore species-rich grasslands.

The site balances biodiversity benefits with providing a welcoming and attractive space for people to relax and enjoy being in nature. An interpretation board provides information on species inhabiting the site, while benches and viewing platforms create a relaxing and restorative environment.

▼ One of the restored Project Neptune ponds © Gary Beckett

◀ A veteran experiencing the power of human and horse connection © Paul Black

Through Project Neptune, the garrison continues to provide a home for rare species, including great crested newt (protected under UK and European law) and common toad (UK priority species for conservation). Project Neptune will continue to improve Bicester Garrison by creating and restoring habitats for great crested newt and making an outstanding contribution to wildlife conservation in this region.

The Armed Forces Equine Charity's HorsePower Project – equine assisted interventions to support veterans' recovery

The Armed Forces Equine Charity supports veterans with complex mental health challenges by delivering a mix of clinical and non-clinical interventions tailored to individual's needs. The journey starts with a referral from NHS Operation Courage. Having created conditions where the veteran feels they can attend an initial week-long residential course, equine assisted interventions are delivered by teams from HorseBack UK. This is not about riding horses, but about developing powerful connections.

The first residential phase assures four key relationships:

- **Equine relationship** – veterans experience how effective horses are at sensing anxieties and stresses. For the veteran to connect with their horse they must first learn how to gain its trust by managing their own emotions.
- **Facilitator relationships** – facilitation is delivered by therapists, recovery staff, horse experts and mentors. They help the veterans identify what they are feeling, what they want and areas where support is needed. The techniques, procedures and tools to help tackle challenges are provided.
- **Peer to peer relationships** – the residential course involves group living and communal eating. Veterans quickly relate, with great conversation and humour helping them to form strong one-to-one and group relationships. Providing an environment of trust and comradery is a key ingredient for success.
- **Opportunities relationships** – the course's afternoon sessions are all about introducing opportunities that are available through events, activities, other charities and organisations. One of these key relationships is with the value of volunteering and the benefits of conservation.

It is the latter opportunity where they first meet the Defence Infrastructure Organisation's Environmental Engagement team who highlight where the veterans can get involved in conservation projects. They spend an afternoon advising and guiding the veterans while they undertake a small conservation project. It further encourages them to get involved and out and about.

▶ Some of the Litter Picking Watch volunteers © Christopher McAuley

Sanctuary Awards 2022

Litter Picking Watch Romney Marsh's MOD Beach Clean Project at Lydd Ranges

Litter Picking Watch Romney Marsh's long-term project is to target marine debris on Lydd Ranges' foreshore, brought in by the prevailing winds and tides. In exposed areas such as Lydd Ranges, the litter builds up in the shingle dips and trenches where, unless collected, it would remain. The aim is to reduce the litter returning to the sea or blowing inland, preventing the contamination of the shingle and the nearby wildlife and bird reserves.

Having obtained the relevant permissions, the group first visited the ranges in January 2019 and this has continued, almost on a monthly basis, to the present day. To date 1,600 volunteer hours have been given by members of the group working towards keeping this unique shingle peninsular clear of damaging pollution.

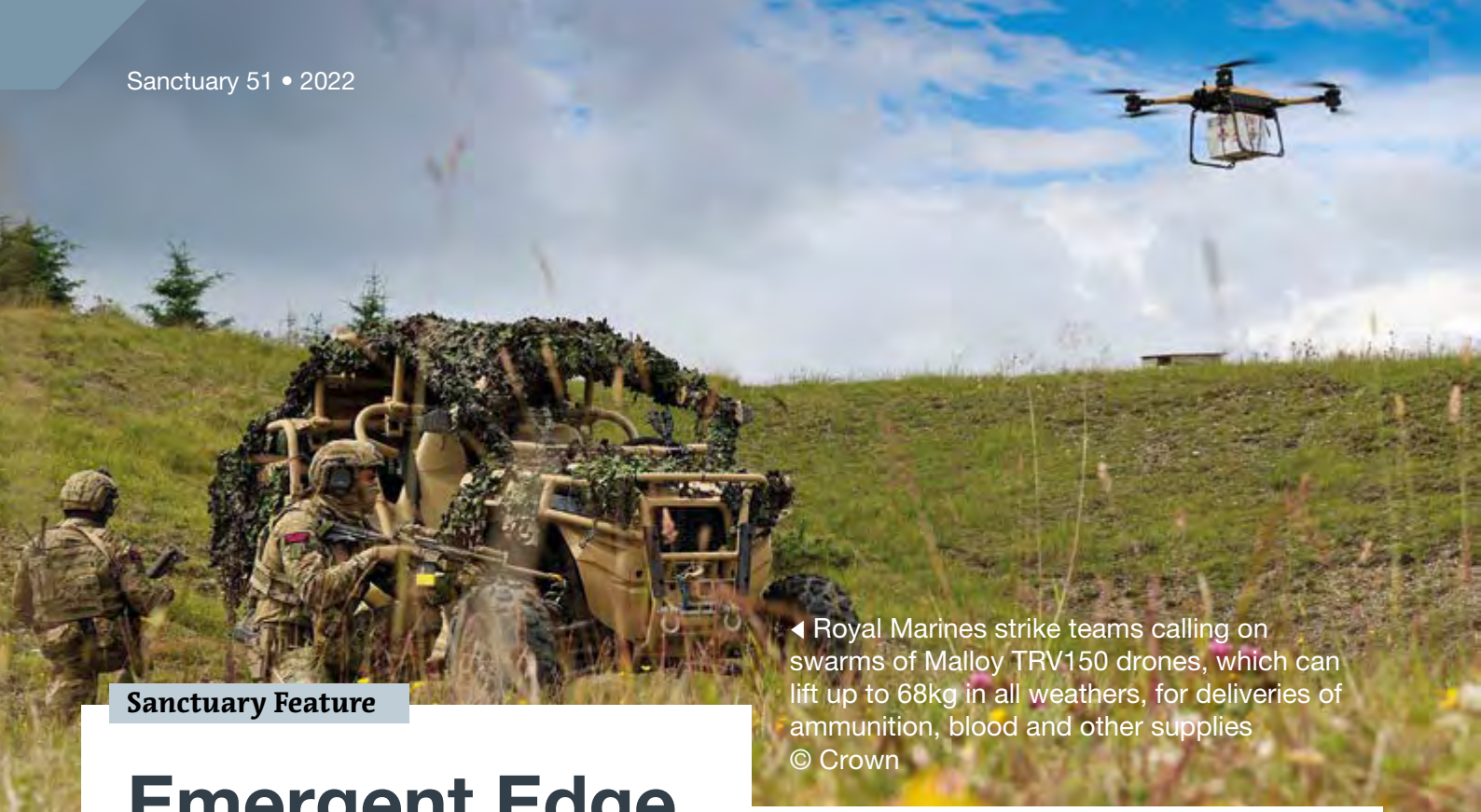
When a date has been agreed and arranged the volunteers set up on Rype Green in Lydd Town. All of those attending are registered, a health and safety briefing takes place and litter picking safety equipment is loaned to volunteers attending for the first time.

The volunteers have removed thousands of bags of rubbish that has washed up onto this foreshore, along with plastic containers, pallets, fishing nets and other debris. This is bagged, stacked and placed in pre-arranged pick-up points with the Lydd Camp Guardroom.

The rewards that the volunteers get from this project are numerous; the satisfaction of removing accumulated rubbish from the shore, feeling that they can make a difference and being privileged to have access to this unique place.

Further details of the above projects can be found in *Sanctuary* 50, 2021.

▼ Litter grabber and rubbish sack © Christopher McAuley



◀ Royal Marines strike teams calling on swarms of Malloy TRV150 drones, which can lift up to 68kg in all weathers, for deliveries of ammunition, blood and other supplies © Crown

Sanctuary Feature

Emergent Edge – a celebration of Defence wide innovation

This new feature in *Sanctuary* is designed to showcase some of the innovative work and early projects being driven around the services, across our estates and by our partners, which demonstrate Defence's ability to foster the new ways of thinking needed to meet the challenges of a changing world. The Climate Change and Sustainability Directorate look forward to seeing the progress of these projects over the coming years.

Achieving net zero by 2040 – the Perham Down study

Ronke Adeleke, Communications Manager, Aspire Defence Services Limited (ADSL)

A decarbonisation study at Perham Down has explored how different building classes could be adapted to deliver greater energy efficiency and make the switch to alternative, low carbon heating sources, supported by the generation of on-site renewable energy. Led by ADSL, with the support of Ricardo Energy and Environmental, the study took place between January and April 2022. It examined different measures that might be used to reduce and offset Perham Down's emissions, and the technologies capable of eliminating the camp's dependency on fossil fuels.

The project produced a detailed report and roadmap. It identified 30 energy measures to reduce and improve the use of energy at the camp. These included:

- **Heating** – proposals were created for both centralised and decentralised heating systems for various building asset classes, with consideration for future fuels such as hydrogen
- **Energy generation** – identified suitable sites for solar photovoltaic arrays and wind turbines, with options to ensure the provision of year-round renewable energy
- **Transport** – explored the impact of partial and full provision of electric vehicle charging on the electrical supply and consumption
- **Building efficiency upgrade** – proposed building fabric upgrades to reduce heat loss and measures to improve the controls systems for heating and lighting

- **Metering and controls** – identified buildings without suitable building management systems and effective utilities metering.

The British Army, working with ADSL, has now commissioned Perham Down as a case study for the implementation of sustainable solutions. This will support the longer-term examination of how decarbonisation efforts can be applied to the wider Army estates.

The Sustainable Support Strategy – a solution to competitive advantage and operational resilience

Sqn Ldr Jayne Lindley,
SO2 Sustainability Development,
UK Strategic Command (StratCom)

The world in which Defence operates is increasingly impacted by climate change. Defence needs to retain a competitive edge over our adversaries. However, operating and maintaining our equipment will become increasingly challenging in volatile and extreme conditions. There is a need to become more agile, more precise, and more self-sufficient on operations and able to deploy and re-aggregate quickly, decreasing our support tail by harnessing technology and innovation.

The Sustainable Support Strategy looks to the demands of future operations and sees sustainability as a key part of the solution for the Future Force. The strategy identifies six priority areas for action – equipment design and maintenance; energy; the global Strategic base; deployed food; deployed operational support; and commodities. It sets an ambitious roadmap for increasing resilience, reducing our environmental impact and seeking alternatives to fossil fuels.

The Sustainable Support Strategy is a first step on a long path. Its focus is delivering effective and efficient support across Defence to improve our capabilities, reducing our risk to environmental change and our impact on the world. Aligning with work across Commands, it will bring together our people, industry, academia, and our allies to deliver the best solutions and behaviours.

Navy Command – Environmental Management System upgrade and Environmental Impacts Register

Jasmine Bedford, Senior Sustainability and Environmental Consultant, BMT Global

BMT worked with directorates across Navy Command to deliver a common approach to assessing environmental impacts and to create a central register. The first phase was a gap analysis of the Environmental Management System and associated plans across Navy Command. The BMT Environmental Protection and Sustainability team identified several improvements needed to meet the International Organisation for Standardisation for Environmental Management Systems (ISO14001:2015). The team also found that different directorates had different approaches to their environmental management system and plans.

In the second phase, BMT ran a series of workshops to identify individual directorate's activities with an impact on the environment. Objectives and targets were developed with the representatives to mitigate, monitor, or manage any impacts that received a score of medium or high.

▶ HMS Diamond arriving back into Portsmouth following deployment © Crown

The interactive approach produced a completed Environmental Impacts Register with objectives and targets. These workshops and the deliverables have provided a common approach across all directorates involved in recording and assessing their environmental aspect, with objectives and targets agreed at a directorate level.

UK StratCom – transitioning fleet vehicles

Mik Foreman, Sustainable Road Transport Programme, StratComm

The Sustainable Road Transport programme, led by Defence Support StratComm is currently supporting the transition of fleet vehicles with two specific targets.

Firstly, for 25% of Defence owned or leased car fleets to be ultra low emission vehicles by the end of December 2022 (this was on track as *Sanctuary* went to press). Secondly, for 100% of Defence owned or leased car and van (sub 3,500kg) fleets to be zero emission vehicles by the end of December 2027.

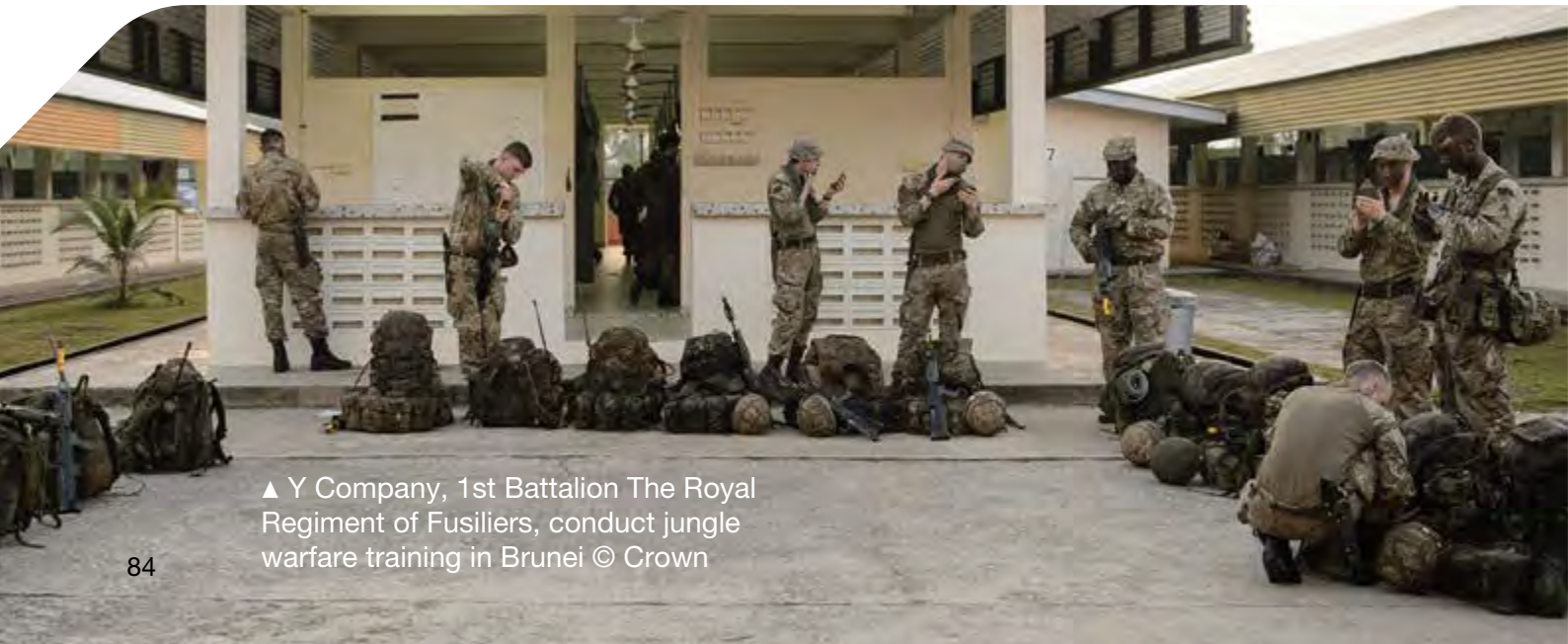
It is the first programme to be mandated by Chief of Defence Logistics Support, receiving full approval in May 2022. It is currently engaged in leading work with top level budget holders, Financial Military Capability (Infra) and the Defence Infrastructure Organisation (DIO) to ensure that future vehicle fleets are supported by associated charging or alternative fuelling infrastructure. The programme is also working with Defence Equipment and Support to create a new process for the next fleet vehicle contract to allow for a seamless transition. The team have been working closely with Support Transformation Innovation on alternative energy trials and leading on new ways of working to reduce demand to optimise fleet size.

Baselining Brunei – measuring the first full carbon footprint for an overseas garrison

Maj Simon Andrews, Garrison Engineer and Senior Estates Facilities Manager, Defence Infrastructure Organisation and **Simon Keller**, Co-Founder and Product Director, KommuniHub Co

In 2021, a team in Brunei began a study to analyse the greenhouse gas emissions of the British Forces in Brunei garrison, of around 1,250 personnel and dependants. Following the Army Estates Climate Change and Sustainability Directive and spurred on by COP26 in Glasgow, DIO (Brunei's) Maj Simon Andrews and Simon Keller, a consultant from local sustainability company Kommunihub Co, knew they needed to reduce emissions, but also required a robust baseline to measure against.

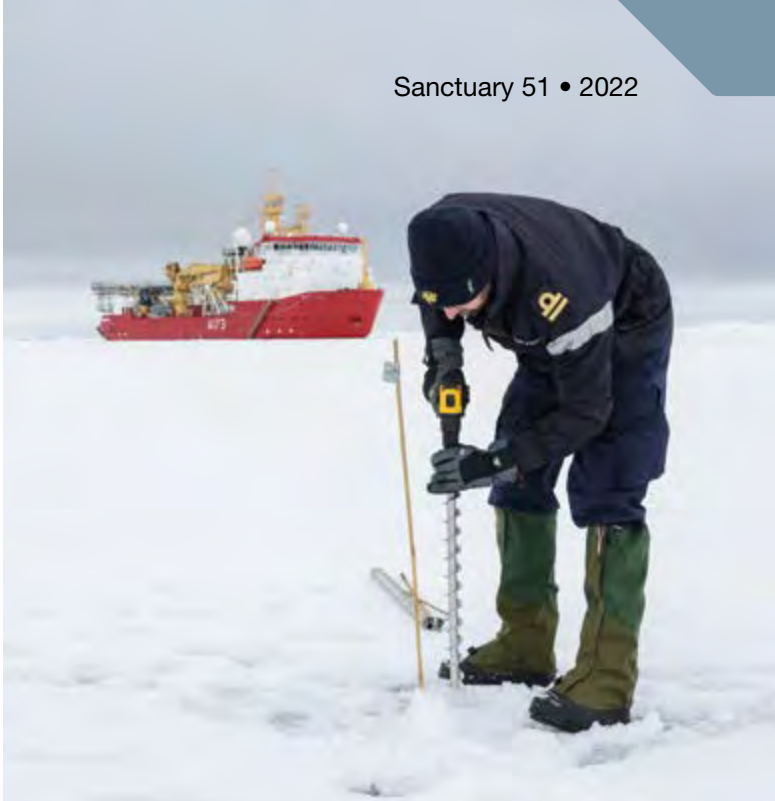
Utilising the Defence Carbon Baseline standard, team members measured the scope 1 (direct fossil fuel burning), scope 2 (electricity) and scope 3 (waste and travel) emissions generated



▲ Y Company, 1st Battalion The Royal Regiment of Fusiliers, conduct jungle warfare training in Brunei © Crown

during the 2021/22 financial year. The DIO team undertook investigations across all operations of the garrison, its support and residential units, while liaising with the host nation's utility providers and national Climate Change Council. In instances where primary data was not available, the team defined methodologies for estimating consumption.

The carbon footprint was calculated by summer 2022. The key finding was 68% of emissions were due to electricity consumption, primarily due to air conditioning running 24/7 across the estate. The next phase into 2023 is to determine how to reduce this usage, in conjunction with passive engineering solutions and looking at the role of human behaviour on the garrison's impact on global warming.



▲ Royal Navy Lt drills into the ice to obtain core samples as part of HMS Protector's Operational Sea Training package in the Arctic Circle following a re-fit. 'Ice Ramming Trials' ascertain the correct 'Polar Code' rating post refit © Crown

A green workforce transformation

Alan Darby, Corporate Partnerships Manager, Institute of Environmental Management and Assessment (IEMA)

Climate change, net zero, biodiversity, carbon emissions, scopes 1 2 and 3 – these are all common phrases if you work in an environment or sustainability role, but this is not the case for many working outside the profession. Whatever your understanding, there are two undeniable facts. Firstly, the impact of humanity continues to have a detrimental long-term effect on our planet. Secondly, we need to act urgently to prevent the worst potential effects of our changing climate. The second requires all of us to change.

If you have been involved in a change project you will know that one of the key ways to make change more effective is to empower people with knowledge, context and understanding as to why change is needed. With this insight people can make informed choices, which in turn leads to greater, faster adoption of any required changes. This is certainly true when it comes to climate change and, as things progress towards the UK's commitment to achieve net zero by 2050, there is a need to ensure that all parts of the economy have the knowledge and skills to deliver the targets that are being set.

A report created by IEMA and Deloitte, outlines both the need for this transformation to a green workforce, and the steps organisations can take to support this transition. Effectively, there will be a need to have the right green skills and jobs – which will ultimately lead to a green economy.

But what is meant by 'green'? Green skills is a term for the technical skills, knowledge and behaviours required to tackle environmental challenges. These skills will be needed in all parts of an organisation. Green jobs are the specialist roles that are dedicated to improving environmental outcomes for an organisation or the economy. Green economy is the potential future state of an economy, in which there is a fundamental change in the way the economy functions. It will be more holistic – consistently factoring people and planet alongside profit. This transformation will take time, but with the right context and tools, organisations will be able to build a green workforce where everyone understands the role they have to play.

Download the IEMA report and toolkit at: (www.iema.net/all-jobs-greener)

▲ Members of Commando Helicopter Force Nordic skiing on the training area for the Cold Weather Survival Course at Bardufoss, Norway © Crown

Sanctuary Feature

Climate Hit Parade – the Climate Resilience team's top picks...

by **Begonia Pedreira-Regueira**
Senior Climate Resilience Manager,
Defence Infrastructure Organisation

The Climate Resilience Team supports the MOD to manage climate risks across the UK and overseas. A busy team within the Defence Infrastructure Organisation (DIO), its remit includes helping sites to deliver a programme of Climate Impacts Risk Assessment Methodologies (CIRAM), aiding policy leads in developing climate resilience policy and strategy and advising on embedding climate resilience into plans and projects. The team also develops innovative tools and solutions, delivers training and raises awareness via methods such as the Climate Resilience newsletter. The eventual aim is to make climate resilience as mainstream as any other regulation. You might think that focusing all day on the impacts of climate change could dampen the team's spirits, but far from it. While the team recognise the message about resilience and adaptation is challenging, it is essential. Their enthusiasm is part of the day job, and below are some aspects of the work that keeps them fascinated and makes them tick.

Michael Winhall, Climate Resilience Manager

Working within an organisation at the forefront of the climate adaptation agenda is a great privilege as I have always enjoyed engineering and the outdoors. My work aligns with my love of our landscape; the MOD is a large landowner, and this includes many special and protected sites. A highlight of my job is in understanding the local area, and the history that we live and operate in.

Research is a large and fascinating part of the role and particularly the CIRAM process. I have studied chalk caverns near Corsham; Roman history lying across some of our airfields; Henry VIII's forts that are still used as storage facilities at Fort Blockhouse; and the wildlife and protected species that make our estate their home. For example, I learnt that the unusual flora of Ascension Island was a 19th century project to create a productive mountain cloud forest, but this has put fragile native habitats at risk. I have seen the challenges of living and working at 40°C+ in Cyprus; a region where climate change is going to be felt extremely hard.

It is all part of understanding the interesting balance we must reach to continue to use the estate, while also being responsible custodians with the foresight to adapt to the challenges the future will bring.

▲ Climate warming promotes extreme storms. RAF Wittering personnel provide help during Storm Emma © Crown

Helen Boston, Climate Resilience Manager

It has been difficult for me to pick one favourite part of the job, but like Michael, I knew it had to involve research, as I enjoy it so much. Particularly when using the data that we investigate and gather on climate projections for each establishment. This is at the core of the message around climate change and a vital part of the CIRAM process.

Embedding climate resilience into the MOD is the most rewarding. This involves looking at a range of future probabilistic projections for various greenhouse gas emission scenarios. We use the UK Climate Projections from the Met Office as they provide a robust statistical assessment. These link observations with projected data from several sets of computer models of how our climate, including sea level, is likely to change over the 21st century. Being able to drill down to a 25km grid square around a MOD establishment gives a degree of confidence for the range of projections, for example in precipitation, temperature or humidity.

For the MOD estate it means specific climatic data can be used when developing a risk register during a CIRAM workshop, equipping the establishment with sufficient information so that climate risk and adaptation can become part of the discussion – and it must.

Nigel (Will) Williams,
Climate Resilience Manager

I recently joined the team after 37 years in the British Army. For the past 13 years I was the Safety and Environmental Advisor at South Cerney Station in Gloucestershire. Here, service personnel, DIO colleagues, industry partners and external stakeholders have worked together using the CIRAM process to increase resilience ready for climate change. CIRAM helped identify risks and solutions, which enhanced energy security and adaptation of buildings so that operational capability and life support can be maintained.

My favourite elements were using science based information from the numerous government agencies and experts such as the Environment Agency, local resilience forums and the Met Office to research what effects climate change

◄ Soldiers from 2nd Battalion The Lancashire Regiment battle floods in York © Crown

► A RAF crew from 84 Sqn based out of RAF Akrotiri assist in controlling a wildfire northwest of Yermasoyia, Cyprus © Crown

will have on the site. I also enjoyed working with the local Farming and Wildlife Advisory Group to reinstate a water meadow and with farmers to clear drainage ditches, reducing flooding from field surface run off.

Climate change is the greatest threat facing humanity today. It will affect every part of Defence and national security and, without climate resilience and adaptation, our way of life cannot be insulated from its effects.

Sophie Smyth, Assistant Sustainability Manager

Like many of us, I have seen how the sustainability and climate change agendas have become more prominent over the years. I am passionate about these issues both at home and at work and I want to make a difference.

The best part of my role is finding ways of making climate resilience information more accessible. This involves supporting the team to deliver webinars and raising awareness of how to continue improving the resilience of our estate to climate related hazards.

My favourite site so far has to be RAF St Mawgan and their incredible work and dedication to monitor their CIRAM. Entries in their weather events diary within the Climate Resilience Risk Register are used to spot trends related to infrastructure to identify structural issues in buildings, enabling the team to mitigate any danger prior to an event. For example, following a few incidences of falling roof tiles, a detailed survey was carried out that supported the site to prepare for high winds. This success story is replicated across the estate thanks to tools, processes and work diligently completed by sites. However, with the current projections we need to continue our efforts to keep our estate resilient and safe through adaptation and mitigation, both now and in the long-term.

Begonia Pedreira-Regueira, Senior Climate Resilience Manager

I find both the MOD estate side of my role and leading on building climate resilience captivatingly rewarding. My personal favourite is raising awareness which is a key part of building climate resilience. It is the effect I can have on influencing others that drives me to continue this work and keeps me positive. I deeply enjoy presenting to colleagues, championing climate resilience and inspiring others to make a change. It is only together that we will innovate and drive the larger changes needed.

The collaboration with others is a really gratifying part of my job. This is especially the case working with my amazing internal customers such as the policy leads and the Top Level Budget climate resilience focal points. We face the challenges together and are better able to define, understand and find solutions to push the climate resilience agenda forward.

Working to build climate resilience means the team are constantly facing new challenges. I relish problem solving and finding innovative solutions is an additional satisfying element of my work. My favourite MOD site? I treasure them all. Although I am sharing a photo from Bardufoss, Norway to remind us of the global significance of the Arctic melting.

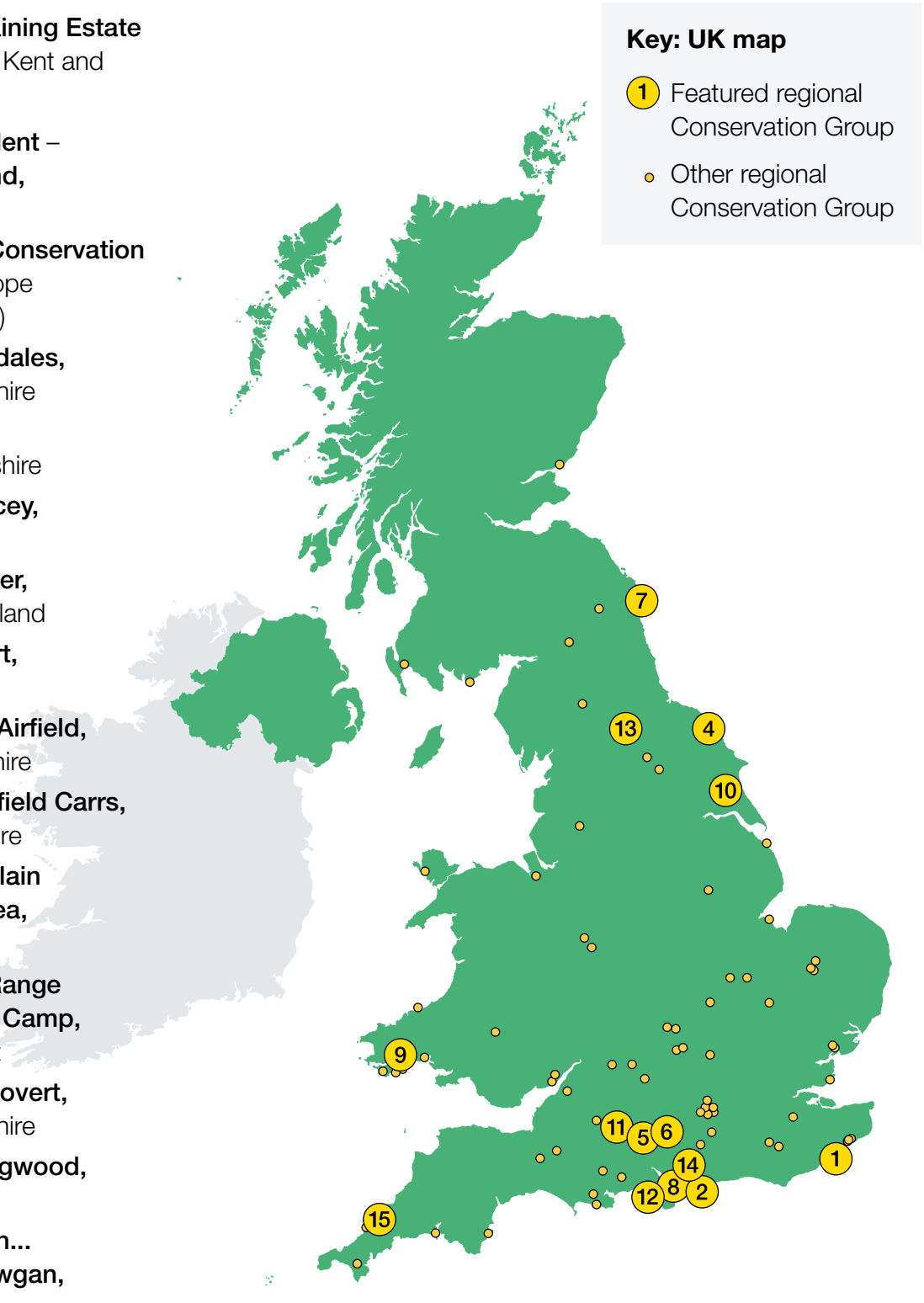
A note from the Editors:
We are delighted that Nigel was recognised in the Sanctuary Awards 2022, winning the Individual Achievement Award and Silver Otter Trophy. You can read more of his work on p.52.

▶ Aerial perspective of the Deployed Operating Base at RAF St Mawgan, Cornwall © Crown

Around the Regions with the Conservation Groups

As of December 2022 there are over 65 active MOD Conservation Groups. The following section provides an update on some of their activities over the past year.

1. **Defence Training Estate South East,** Kent and East Sussex
2. **HMS Excellent – Whale Island,** Hampshire
3. **European Conservation Group,** Europe (not on map)
4. **RAF Fylingdales,** North Yorkshire
5. **Dstl Porton Down,** Wiltshire
6. **Barton Stacey,** Hampshire
7. **RAF Boulmer,** Northumberland
8. **DM Gosport,** Hampshire
9. **Templeton Airfield,** Pembrokeshire
10. **DST Leconfield Carrs,** East Yorkshire
11. **Salisbury Plain Training Area,** Wiltshire
12. **Newtown Range and Jersey Camp,** Isle of Wight
13. **Foxglove Covert,** North Yorkshire
14. **HMS Collingwood,** Hampshire
15. **Spotlight on... RAF St Mawgan,** Cornwall



▲ Stone curlew monitoring © Crown

The 2022 MOD Conservation Group review

MOD Conservation Groups are stakeholder engagement forums used to facilitate conservation activities – they are mandatory under JSP850 for sites with statutory designations. The Defence Infrastructure Organisation's Environmental Engagement team (formerly the Sanctuary and Conservation Groups team) have responsibility for their co-ordination.

There are many types of group, with tasks including species monitoring; habitat creation; heritage preservation; maintaining public access routes; and wellbeing initiatives such as community allotments. Membership varies from small groups run by dedicated staff on-site, to medium and large groups of internal and external subject matter experts.

COVID-19 restrictions meant activities were prohibited or reduced for many months, especially for groups with external members. In 2022 the team conducted a Conservation Group health check – talking to subject matter experts, chairpersons and secretaries, in the UK and overseas. The Conservation Groups listed here, and on the map (p.89), are confirmed as operational. If your group does not appear do get in touch. We would be delighted to hear from you to explain how our team can provide access to specialist advice, support and funding. Equally, if you would like to reinvigorate your group, or start a new one, we would be pleased to help.

Conservation Group	County
Abbey Wood MOD DE&S	Avon
Aberporth MOD QinetiQ	Ceredigion
Barry Buddon Training Centre	Angus
Barton Stacey Training Area	Hampshire
Bicester Garrison	Oxfordshire
Blandford Garrison	Dorset
Boulmer RAF	Northumberland
Bourley and Long Valley Training Areas (includes Aldershot Training Area and Minley Training Area)	Hampshire
Bovington Training Area	Dorset
Browndown Camp	Hampshire
Caerwent Training Area and Rogiet Moor Range	Monmouthshire
Castlemartin Training Area (called the Nature Conservation Component Plan Group, which includes Penally Ranges, Manorbier Range and Templeton Training Area)	Pembrokeshire
Cinque Ports Training Area (includes Hythe Ranges, Hythe Roughs, Lydd Ranges, Shorncliffe)	Kent and Sussex
Coldhams Lane Army Reserves Centre Cambridge	Cambridgeshire
Collingwood HMS	Hampshire
Cosford RAF	Shropshire
Croughton RAF (USAF) (includes USAF Barford St John, RAF Alconbury and RAF Molesworth)	Northamptonshire, Oxfordshire and Cambridgeshire

Crowborough Training Area (includes Mereworth Woods Training Area and Pippingford Park Training Area)	Sussex and Kent
Donna Nook Air Weapons Range	Lincolnshire
Donnington MOD DE&S	Shropshire
Duke of Gloucester Barracks (South Cerney Station) (called the Sustainability Working Group)	Gloucestershire
East Anglia Training Areas (EATA) (includes Fingringhoe Ranges, Middlewick Ranges and Friday Woods Training Area)	Essex
European Support Group (Supreme Headquarters Allied Powers Europe) (pan Europe)	Overseas
Excellent HMS (includes Whale Island and Horsea Island)	Hampshire
Fairford RAF (USAF)	Gloucestershire
Falklands Islands	Overseas
Foxglove Covert (located on Catterick Garrison)	North Yorkshire
Fylingdales RAF	North Yorkshire
Gibraltar	Overseas
Gosport DM (includes Frater and Priddys Hard)	Hampshire
Halton RAF	Buckinghamshire
Hankley Common Training Area	Surrey
Holbeach Air Weapons Range	Lincolnshire
Holcombe Moor Training Area	Lancashire
Kirkcudbright Training Centre	Dumfries and Galloway
Leconfield DST	East Yorkshire
Leighton House Army Officer Selection Board	Wiltshire
Longmoor Training Area	Hampshire
Lulworth Ranges	Dorset
Merryfield RNAS and Yeovilton RNAS	Somerset
Newtown Range and Jersey Camp RFCA	Isle of Wight
Otmoor Range	Oxfordshire
Otterburn Training Area	Northumberland
Pendine MOD QinetiQ	Carmarthenshire
Penhale Training Area	Cornwall
Pirbright Ranges, Ash Ranges and Barossa Training Area	Surrey
Porton Down Dstl	Wiltshire
Portsmouth HMNB	Hampshire
Predannack RNAS (called Predannack Nature Conservation)	Cornwall
Ripon Training Area	North Yorkshire
Salisbury Plain Training Area (SPTA)	Wiltshire
Sealand Ranges	Flintshire
Sennybridge Training Area (SENTA)	Powys
Shoeburyness MOD QinetiQ	Essex
Spadeadam RAF	Cumbria
Stanford Training Area (STANTA) (includes Thetford Rifle Range and Barnham Training Area)	Norfolk
St Mawgan RAF (called the Environmental Action Group)	Cornwall
Strensall Training Area	North Yorkshire
Thorney Island (includes Baker Barracks and Pilsey Island)	West Sussex
Tregantle (includes Tregantle Ranges and Fort, Anthony Training Area and Scraesden Fort)	Cornwall
Valley RAF	Anglesey
Warcop Training Area	Cumbria
Welford RAF (USAF)	Berkshire
West Freugh MOD QinetiQ	Wigtownshire
West Moors DE&S	Dorset
Yardley Chase Training Area (includes Beckingham Ranges)	Northamptonshire

▲ Attendees at the dedication service for the FS Drew Memorial Orchard © Colin Welch

Around the Regions

Kent and East Sussex Defence Training Estate South East

by **Maj Rick Beven**
Senior Training Safety Officer,
Cinque Ports Training Area

During winter 2021/22, Cinque Port Training Area's (CPTA) Operation Hedgerow planted 1,000 metres of new hedgerow and laid 830 metres of existing hedgerow. For the Queen's Green Canopy, which celebrated Her Majesty, the Late Queen Elizabeth II's Platinum Jubilee, 70 half standards were planted along a track in Area B. These comprise of 35 oak and 35 horse chestnut – species that thrive on the training area. The new avenue will be called 6th Queen Elizabeth's Own Gurkha Rifles Avenue, to commemorate Her Late Majesty and the Regiment that proudly bore her name from 1959 to 1994.

On 8 June 2022, Matt Kirk led a conservation walk looking at nesting redstarts in Pippingford Park Training Area. This highlighted the recent success of redstart breeding, with Matt annually recording 15 to 20 nesting pairs.

On 29 July 2022, CPTA held a dedication service for the Flight Sergeant (FS) Drew Memorial Orchard, led by the Rev Deb Scoble, Assistant Curate of Elham Valley Benefice. Approximately 40 people attended including relatives of FS Drew, a representative of his Squadron, local RAF Air Cadets and parishioners. This was followed by a curry lunch provided by Eurorest Support Services. It was a wonderful way to remember a brave World War II fighter pilot who died during an anti-diver patrol against V1 flying bombs exactly 78 years before.

Very little rain fell between April and August 2022, resulting in the loss of many of the hedgerow whips mentioned above and two thirds of the Queen's Green Canopy standards. These will be replaced this winter.

On 12 October 2022, Crowborough Conservation Group members attended a fungi conservation walk, led by mycologist Mario Tortelli, at Mereworth Woods Training Area. Although too late for ceps, numerous other species were present.

This is my last report for *Sanctuary* as I retire from the Army in November 2022. I am extremely lucky to have spent nine years helping manage beautiful fragments of the Kent and Sussex countryside. CPTA has planted or laid approximately 10km of hedgerows during this time. If Op Hedgerow was expanded across the Defence Training Estate, it would greatly assist with carbon capture and provide new wildlife habitat.

A note from the Editors:
The Environmental Engagement team wish Maj Rick Beven the happiest of retirements. He was an exemplary Conservation Group Chairperson and his enthusiasm and hard work will be very much missed, as will his *Sanctuary* contributions.

▶ Female redstart on her nest, Pippingford Park Training Area © Matt Kirk

Around the Regions

Hampshire HMS Excellent – Whale Island

***by* Ian Mackfall**
Environmental Protection Advisor,
HMS Excellent Conservation Group

▲ Cdr Simon Turnbull, Commanding Officer and Ian Mackfall with their Britain in Bloom Award © Crown

The Britain in Bloom competition is part of the Royal Horticultural Society's programme of events to promote community spirit and to bring people together. Ian Mackfall, Environmental Protection Advisor, entered Whale Island this year. Assisted by skilled and energetic helpers from the establishment's Conservation Group, it was part funded by the Navy Infrastructure Conservation Grant Scheme. Judging focuses on flora and fauna, emphasising biodiversity and improving sites and areas for nature. We are delighted that HMS Excellent won the 2022 South and South-East Britain in Bloom competition for urban communities. We achieved the elusive Gold Award, reaching the highest standard and collected this at a ceremony in Farnham in September.

Throughout the year events included marking Her Majesty, the Late Queen Elizabeth II's Platinum Jubilee by planting many young saplings to grow into the Queen's Green Canopy; planting a natural hedgerow with indigenous bushes and fruiting trees; and creating a living natural pond. Nest boxes were put up for sparrows, swifts, robins, tits and other birds. Bat boxes, insect boxes and mason bee nests were strategically sited, plus a bug hotel was installed. Several hedgehogs have been released and thrive in their new surroundings.

Working closely with the grounds contractor, fallow areas of protected 'no mow' grass were established in the spring. Various new species not seen before on the island quickly grew. This included bee orchid, pyramidal orchid, hundreds of grasshoppers, and in and around the pond dragonflies, water boatmen, pond skaters, tadpoles and later frog and toadlets – plus mayflies and a myriad of natural pond life.

Surrounding the pond, in the upper rose garden, new ornamental trees enhance the established stock of 74 different tree species. These help to create a wellbeing and mindfulness area, to get away from the office and enjoy the beautiful, historic and natural surroundings. Some trees memorialise dear departed members of the Naval family and all commemorate and celebrate life in general, creating a protected, quiet wildlife refuge in areas hardly noticeable as being adjacent to busy industrial and motorway settings.

To put the icing on the cake, an Excellent Bee Club was established, in conjunction with Portsmouth and District Bee Club, to inspire and train budding apiarists each week throughout the season. Last but not least, a programme was established to grow native oysters for future release around the coast of the British Isles to recolonise the now depleted indigenous oyster beds.

▶ Volunteers assisting with the maintenance of the rose garden © Crown

▲ Sustainability welcome packs for service families © Melanie Anderson

Around the Regions

Europe – European Conservation Group

by **Melanie Anderson**
Volunteer,
European Conservation Group

The European Conservation Group has been engaging with military and civilian families in Belgium, Norway, Netherlands, Germany, Italy, Spain, Turkey and Portugal. Volunteers have spent 2021/22 welcoming new families to their Service Family Accommodation (SFA) with sustainability welcome packs. The initiative is derived from the tradition of neighbours welcoming new families to the military patch with a cup of sugar and information on the local area. It is also based on the formal 'Get You In Packs' of essential items that Defence Infrastructure Organisation (DIO) provide for families at move in.

The support of the DIO Overseas Stewardship Fund meant volunteers have been free to choose their favourite items for new families, which has had the additional benefit of engaging staff in sustainability issues. It has helped to keep the project interesting, varied and seasonally dependant as it has progressed.

▼ Bird boxes for SFA gardens © Melanie Anderson

Items chosen by DIO staff have included bird and bee boxes of various shapes and colours, native seeds and native bulbs.

Over 100 sustainability welcome packs have been delivered to new families in their SFA approximately six weeks after move in. During COVID-19, volunteers were also able to deliver items that were letter box friendly, and this was of comfort to families who arrived in location and went straight into isolation. Families were also provided with information on what to expect from their gardens and local environment, and a link to the DIO European Conservation email, so that they can contact DIO staff at any time during their tour with environmental queries.

The project has additional benefits of allowing staff to engage with families on a less formal basis to discuss their SFA gardens and environmental issues. Families have regularly emailed the group mailbox to relate their success stories. Of particular note were blue tits nesting within a week of receipt of the bird box.

The project is ad hoc, low cost and low impact on staff time. It has inspired both families and staff to think of other creative projects. These include offering packets of seeds alongside the bin bag distribution at DIO stores, engaging the children of SFA families in community seed shake abouts, running community competitions to win sustainability items and seeking permission from landlords to plant saplings in gardens. There have even been requests to change policy to allow for 10% of SFA garden space to be set aside for wildflowers and no mow areas.

◀ Taking part in the 2022 bird count © Alex Scott

Around the Regions

North Yorkshire RAF Fylingdales

by **Kevin Phillips**
Station HSE and Conservation Officer,
RAF Fylingdales

RAF Fylingdales is an Air Command Group Station which is part of UK Space Command – the Defence lead for space operations, workforce and capability. Located within the North York Moors, the Station occupies approximately 70ha, with the wider estate covering 800ha. It falls within internationally and nationally designated sites for nature conservation, including as a Site of Special Scientific Interest, Special Area of Conservation and Special Protection Area. RAF Fylingdales Conservation Group returned in 2022 following the COVID-19 pandemic. Wilf Norman, a licensed ringer with the team, has kindly provided a comparison report for bird counts and bird species across the estate in general, between 2019 and 2022:

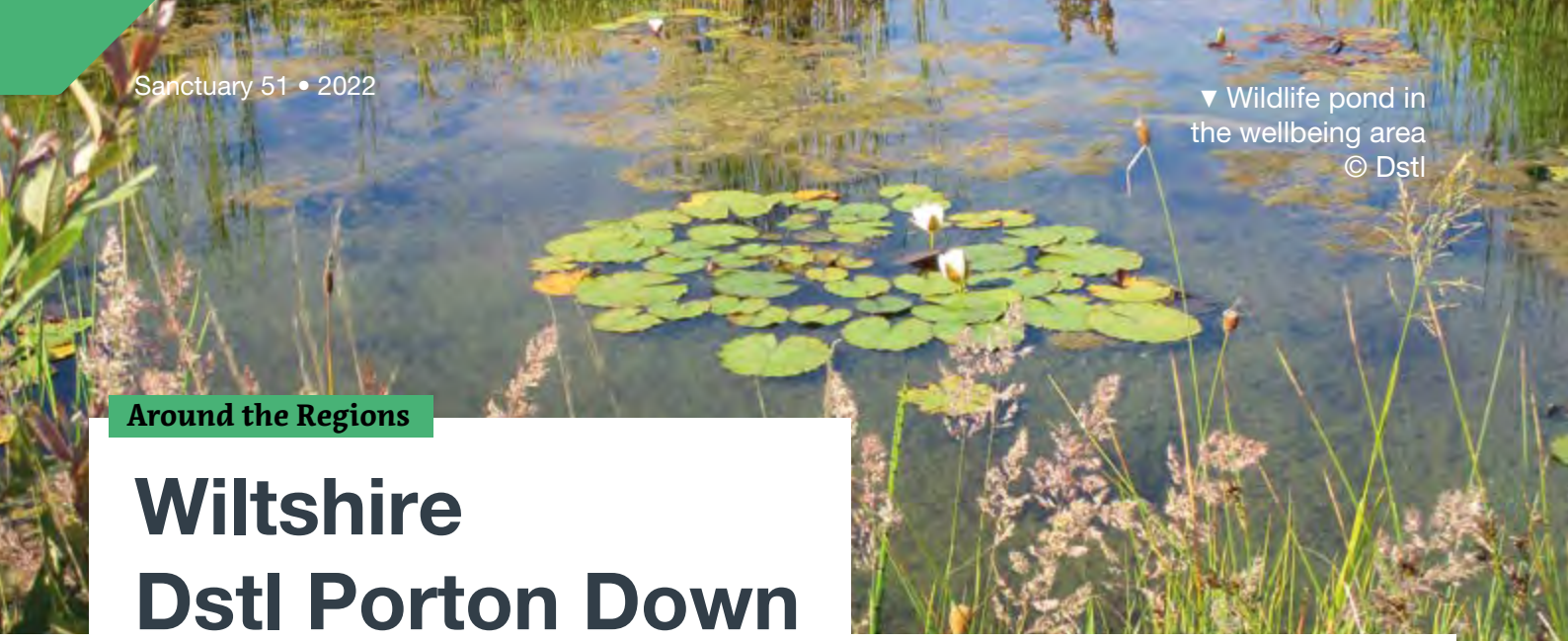
Annual spring bird counts are recorded at RAF Fylingdales by a trilogy of two-hour visits held between 08:00-10:00hrs at fortnightly intervals across the month of May. Comparison of 2019 counts against those for 2022 show remarkable parity of numbers and range of the species usually recorded. However, as the site is very exposed (surrounded by moorland), the weather plays a crucial role on bird activity and numbers recorded. Chilly, windy, wet weather depresses activity significantly.

Taking 2019 and 2022 counts at face value, most of the species have either increased or maintained their numbers, with none showing a significant decrease. Although, the consensus among site workers and Conservation Group members is that hirundines (swallows and house martins) have declined seriously over the past decade. House martins were formerly the most numerous passerine on the Station. This population crash mirrors the national picture.

Lapwing bird numbers have been maintained, although chick numbers in 2020-21 were well down compared to 2019, primarily due to cold, wet spring weather. Species focused nest boxes that were installed in 2016 have resulted in successful occupation annually by two pairs of redstarts. Spotted flycatchers nested in 2016-17 but have been absent since. A barn owl pair took up residence in a purpose-built box two years ago and have nested successfully both seasons. One breeding species that seems to have been consigned to history here is kestrel, last nesting in 2014.

A regular feature of the spring migration season in the past was the passage of both northern and Greenland wheatears through the site. The former used to precede the latter by several weeks. It is nearly ten years now since there were any significant numbers of either species making landfall at Fylingdales.

▶ Left image: curlew chick © Kevin Phillips, right image: Conservation Officer with a barn owlet © Wilf Norman



▼ Wildlife pond in the wellbeing area © Dstl

Around the Regions

Wiltshire
Dstl Porton Down

***by* Sarah Atkinson**
Ecological Officer, Dstl

A project was conceived in 2019 to create a wellbeing area for the staff at the Defence Science and Technology Laboratory (Dstl) Porton Down. The location chosen was the top half of a field that had recently been returned from arable production, only a five-minute walk from the offices. The site had a number of scheduled monuments, and this would afford additional protection from ploughing and development, as well as educating staff about the historic importance of the site. In addition, it is directly opposite the Site of Special Scientific Interest (SSSI), so staff members can have a closer view of the surrounding biodiversity and learn about its significance. The area was designed for staff to get out in the fresh air, be closer to nature and boost their wellbeing.

The area was sown with a chalk downland seed mixture, to increase biodiversity and support SSSI species. Six round beds were installed to mimic the shape of the round barrows for aesthetic reasons. Each bed was designated for a specific wildlife benefit. For example, one was planted up to support bees, another for birds, butterflies and invertebrates. Signs were placed beside each bed to provide information and education on the importance of each group. These beds not only boosted biodiversity, but also provided additional wellbeing opportunities such as gardening and getting hands dirty in the soil! One of the beds is for juniper, from which cuttings can be taken by the Conservation Group to be planted on. This will help to restock and restore the wider population.

A wildlife pond was also installed, which is not only a quiet place to sit and relax, but an opportunity to watch dragonflies and damselflies buzzing over the area, along with swallows and house martins swooping over the pond. This area provides stimulation for all the senses. Farmland birds have also benefitted by having a place to come and drink.

The area was opened in spring 2022 and was used by the staff throughout the summer. Mental health walks and talks have been supported, allowing people to enjoy the fresh air, engage with nature and meet with colleagues. The staff wellbeing area will continue to develop over the coming years, bringing benefits to both staff and biodiversity.

◀ Archaeology with an information sign in the staff wellbeing area © Dstl

▶ Little ringed plover on wet meadow
© Glynne Evans

Around the Regions

Hampshire Barton Stacey

by **Dean Howard**
Deputy Training Safety Officer,
Security and Public Access,
Defence Infrastructure Organisation

Barton Stacey has been inhabited since the Neolithic period, highlighted by the burial mounds on Moody's Down. The War Department purchased land around the village for use as military training areas and in October 1939 work began on a series of hutted camps in Barton Stacey parish. The first troops to use these camps were the survivors from the evacuation of Dunkirk. The camp was knocked down in the 1980s leaving parts of the training area with the remains of roads, building foundations and parade grounds.

This year the Conservation Group has monitored little ringed plover. There have been previous occasional sightings in Area 4, as they typically nest in gravel pits, near to water. On 3 May 2022, observations were being made for all bird species when a little ringed plover was spotted running and feeding among some damp patches. The bird sat down on what was clearly its nest, 30 metres away. A little ringed plover nest is merely a scrape in the gravel, so almost impossible to spot.

Contact was immediately made with the right people to request whether a large exercise, due to begin the next day, could be moved. With amazing speed, a ban was put on any military use in this area until further notice. Consequently, the breeding birds successfully had two hatchlings.

On 23 May 2022 a fluffy ball was spotted running at lightning speed between the weeds. By June, there were two well grown, but not yet fully fledged, juvenile birds, as well as their parents. The story did not end there. On the 5 July 2022 the juveniles were still present, but the adults were showing signs of preparing for a second nest. Unfortunately, it seems this attempt was abandoned in the exceptionally hot and dry weather. By the end of July all the birds had left, most likely in search of wetland habitat.

There are between 30 and 40 breeding pairs of little ringed plover in Hampshire, nesting mostly around water. It is therefore fascinating that an area of completely dry, unattractive tarmac and gravel should be in regular use by a relatively rare breeding bird.

Thanks to Glynne Evans (Hampshire British Trust for Ornithology's Regional Representative), 1 Regiment Royal Logistic Corps, 1 Medical Regiment and the Defence Infrastructure Organisation's Defence Training Estate staff Lee Pearce and Dean Howard (Deputy Training Safety Officers), who helped ensure the birds successfully bred.

▶ Adult little ringed plover at Barton Stacey
© Dean Howard

Around the Regions

Northumberland RAF Boulmer

***by* Katrin Stewart**
Station Environmental Protection Advisor,
RAF Boulmer Conservation Group

▲ Oystercatcher nest with eggs © Katrin Stewart

Built in 1953, RAF Boulmer is located close to the picturesque market town of Alnwick. It is a vibrant and dynamic 2 Group Station, which is home to 19 Squadron and 20 Squadron. The Station plays a key role in the homeland defence of the UK. RAF Boulmer also maintains remote sites under its responsibilities to the Air Surveillance and Control System. These are located on mainland Scotland, the Outer Hebrides and Shetland Islands as well as Northumberland, Cornwall, and Norfolk.

Since the easing of COVID-19 restrictions and the completion of an upgrade to the UK's Air Command and Control System, RAF Boulmer has re-established its Conservation Group. Although still in its infancy, the first phase of the project was to fix and improve the conservation areas that are already on-site, including the wildflower meadow, the woodland walk and the pond. Work undertaken by members of the Conservation Group, which is made up of RAF personnel and civil servants, and with the help of personnel from the Defence Infrastructure Organisation, VIVO and grounds maintenance team, has resulted in the operational site becoming a safe environment for oystercatchers to nest and rear their chicks.

The oystercatcher is a large, stocky, black and white wading bird. It has a long, orange-red bill and reddish-pink legs. In flight, it shows a wide, white wing stripe, a black tail, and a white rump. The population is vulnerable if cockle beds are overexploited because it feeds from them. Although the oystercatchers have no natural predators on the Station, they are ground nesting birds – hence their nests and eggs are easily missed. Therefore, the Conservation Group regularly monitor the adults and chicks to ensure that the land around the nesting areas remains undisturbed during breeding time. The project is a whole force effort; everyone at RAF Boulmer is working together to ensure they provide a safe space for the oystercatchers which has the UK conservation status of Amber and other birds of conservation concern that are already Red, or Amber Listed.

As RAF Boulmer is a unique station, near the coast with no flying activity, other bird species like the lapwing and yellowhammer have found a safe place to nest and breed. The population of both species have declined significantly making them Red Listed. Given the success of the oystercatchers it is the goal of the RAF Boulmer Conservation Group to increase each species' population.

▶ Oystercatcher chick © Katrin Stewart

▶ Stonechat perching on pipework © Gary Calderwood

Around the Regions

Hampshire Defence Munitions Gosport

by **Raffaele Turk**
Compliance Manager Environment,
Defence Munitions Gosport

Defence Munitions Gosport (DMG) is a 208ha armament depot with a primary function of supporting the frontline with weapons, ordnance, munitions and explosives. It is located in Gosport, on the western shore of Portsmouth harbour, an ecological treasure set against a contrasting industrial maritime backdrop. A diverse range of species and habitat are protected through conservation designations including a Site of Special Scientific Interest, with the saltmarsh connecting the harbour and site holding Ramsar status. Gosport is an urbanised environment, awarding DMG as a key wildlife site due to the interesting array of flora and fauna present across the seasons. The predominant site designation being Site of Importance for Nature Conservation, developing interest from wildlife groups.

To the north of DMG is a botanically diverse area of coastal grassland and woodland assigned as the 'butterfly glades'. Here you will find various species including grizzled skipper, white-letter hairstreak and small heath, all considered vulnerable under the International Union for Conservation of Nature criterion. There is also a hybrid elm project site to study disease resistant cultivars in support of the white-letter hairstreak, that is reliant on elm during its lifecycle.

The site is managing an ongoing enhancement project after substantial scrub development caused by previous management regimes led to habitat loss. Works were initiated in 2019 using £7,500 of Defence Infrastructure Organisation Conservation Stewardship Funding (CSF) to reduce the scrub coverage, increase floral diversity and provide sheltering areas for resident butterflies. In 2022, £15,000 was used for further scrub reduction, and project planning is underway to implement more works using both CSF and local funding. A butterfly survey programme with Butterfly Conservation has been developed to ensure effective methods of recording species data and strengthening stakeholder relationships.

Other initiatives have been implemented this year to support site-wide conservation efforts. A survey of the heronry was arranged with the Hampshire Ornithological Society, using a drone to capture aerial footage without disturbing the nesting grey herons and little egrets.

A previously implemented initiative which laid refugia, made of re-used waste material, by the site ponds has attracted great crested newts. These had not been identified for many years. A bat survey was conducted with new species including serotine and soprano pipistrelle.

The Conservation Group also arranged a shoreline litter pick and collected a substantial amount of general waste and recycling from the marine environment. All in all, another successful year for the Conservation Group!

▶ Peacock butterfly basking in the sunshine © Gary Calderwood

Around the Regions

Pembrokeshire Templeton Airfield

◀ Yellowhammer at Templeton Airfield © Graeme Flynn

by **Clare Flynn**
Conservation Group Volunteer, Templeton Airfield

Yellowhammers

Following last year's survey of yellowhammers on Templeton Airfield, volunteers further investigated this small but important population of a once common species that is now on the Red List of conservation concern in the UK, and a Species of Principal Importance under the Environment (Wales) Act 2016. The World War II runways provide convenient coverage of the 163ha site and 12 breeding territories were identified through observation of singing males.

Habitat surveys undertaken using the open access EarthTrack app, developed by the Living Wales team at Aberystwyth University, identified a range of habitat types, including species-rich semi-improved grassland, poor semi-improved grassland, marshy grassland, rush pasture and dense stands of marsh thistle. This habitat mosaic supports the yellowhammers, with the birds preferring the southerly and westerly areas of the airfield, where the wealth of scrub and open grassland provides excellent breeding habitat and readily available food resources.

Records indicate Templeton Airfield represents one of only two locations in Pembrokeshire now known to support a breeding population of more than 10 yellowhammer pairs. Elsewhere, in 2021 and 2022, only a handful of singing males were reported from scattered locations. As such, it is feasible that the current yellowhammer breeding population in Pembrokeshire numbers less than 100 pairs, a decline of more than 99.5% since 1988.

The current situation appears bleak but discussions with other Pembrokeshire yellowhammer supporters is evolving and there is an understanding that we could work together to try and reverse the species' fortunes. In Templeton, the question of where our local yellowhammers go to feed in the winter is critical. GPS tracking could provide concrete data on the birds' movements and identify their wintering locations. Encouraging people to submit sightings using iRecord (https://irecord.org.uk/) or BirdTrack (www.bto.org/our-science/projects/birdtrack) is also important. Galvanising support and raising awareness locally are key objectives for this precious population.

Waxcap wonders

An impromptu visit to Templeton Airfield, just days before the article deadline, revealed a tantalising glimpse into another potentially important highlight for the site. A short walk with David Harries, local waxcap fungi expert, revealed over a dozen species. The full list is being compiled and more visits are needed by local fungi recorders, but first indications bode well for these rather spectacular species, which are restricted to unimproved grasslands. The extent of this habitat remaining at Templeton could prove important for this much declined group of fungi. Watch this space!

▶ Ballerina waxcap at Templeton Airfield © Clare Flynn

◀ Terminal rosette gall caused by the *Rabdophaga rosaria* gall midge © Tim Cowley

Around the Regions

East Yorkshire DST Leconfield Carrs

by **Emma Jobling[1] and Tim Cowley[2]**
Chair[1] and Group Member[2]
Leconfield Carrs Conservation Group[1,2]

This has been a year of discovery for the Defence School of Transport (DST) Leconfield Carrs Conservation Group. Following the detection of a nightingale at DST during the 2021 British Trust for Ornithology Operation Turtle Dove, group member Tim Cowley suggested we collect more species data, with the aim of increasing our knowledge and contributing to national recording schemes.

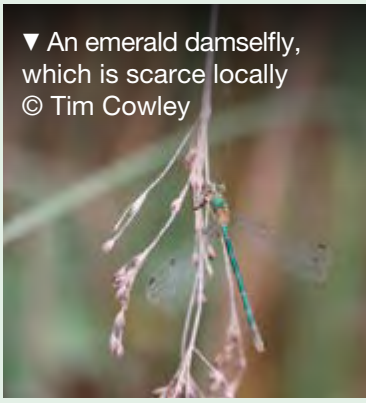
Emma Jobling, Chair, helped secure support to hold a series of BioBlitz weekends. In 2022 we conducted surveys in May, July and September, with the anticipation of surveying different months over five years. The intention is to cover all months between March and November, then review the data and develop a longer-term monitoring and public engagement plan for this 780 acre site, which includes a large driver training area. DST was a former World War II airfield and has been in MOD ownership since the mid-1930s. As a result, the site escaped intensive farming and agrochemicals. Visiting naturalists have recognized DST as important for once common species and as a new site for several species in the Hull Valley.

For those unfamiliar with the term BioBlitz, it is a biological survey that aims to identify as many species as possible. BioBlitzes can take many forms, from large public events to smaller, bespoke opportunities with experts. Our 2022 BioBlitzes focused on developing relationships with knowledgeable naturalists and enabling them to access this closed site. We have been extremely fortunate to have received assistance from both individuals and Hull Natural History Society. The knowledge the participants brought was impressive, finding 548 species over the six days.

The following numbers of species were found: 224 plants, 134 flies, 74 birds, 17 dragonflies, 17 butterflies, 15 moths, 15 bugs, 13 beetles, 8 bees and wasps, 6 mammals, 5 slugs and snails, 5 crickets and grasshoppers, 5 spiders, 4 fungi, 3 amphibians, 1 reptile, 1 gall mite and 1 lacewing. Highlights included locally scarce or rare greater spearwort, common cotton-grass, bristly-winged flesh fly, sharp-tipped tiger cranefly, small red-eyed damselfly, emerald damselfly, marbled white butterfly, brown argus butterfly, jay, green woodpecker, Cetti's warbler and long-winged conehead grasshopper.

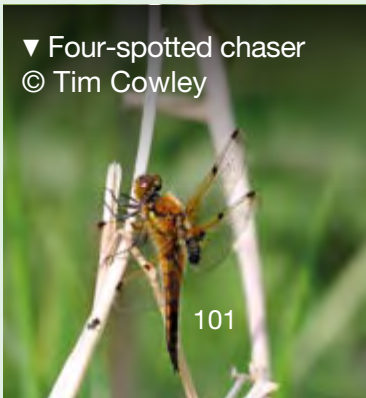
Looking forward, DST will hold four BioBlitzes in 2023, including moth surveys as these are under-recorded. The data will be used to develop the site dossier and gain a greater understanding about how we can better manage our estate, to support species while delivering vital driver training.

▼ Female long-winged conehead, a species colonising the UK © Tim Cowley



▼ An emerald damselfly, which is scarce locally © Tim Cowley

▼ A six-spot burnet moth on common knapweed © Tim Cowley



▼ Four-spotted chaser © Tim Cowley

Scabious-rich habitats on SPTA © Iain Perkins

Around the Regions

Wiltshire Salisbury Plain Training Area

by **Tilly Gregory**
Secretary, SPTA Conservation Group

Over the last 10 years the botany group on the east of Salisbury Plain Training Area (SPTA) have been collecting seeds for the Millennium Seed Bank. Last year seeds from basil thyme, dwarf spurge and broad-leaved helleborine were collected, and this year broad-leaved cudweed.

On the west, Penny Lee has been monitoring and recording species on areas disturbed by military training (dug outs) to see which species appear. Numerous visits later, a concise record of plant species, including photographs, was produced. Future studies may be taken to follow on from this research.

A tally of bee species shows that of the 105 species on SPTA, 40% are considered rare or species of conservation concern. The Bee-Where? Project assessed the status of five of our most threatened bees and provided us with distributional data to inform management and improve their prospects. The sainfoin bee, which is only found on SPTA and thought to have only a few strongholds, is far more distributed than originally believed. Among the UK's rarest and most threatened solitary bees are the scabious bees – the large scabious mining bee and its associated cuckoo, the armed nomad bee, and small scabious mining bee and its cuckoo, the silver-sided nomad bee. These are associated with scabious-rich habitats and SPTA remains a stronghold.

Planting of disease resistant elms was carried out in April 2021 (at Tidworth) and in April 2022 (at Perham Down). The elms were European white elm grown from seed taken from healthy mature trees at Hexagon Wood, Larkhill. The white elm has a degree of natural immunity from Dutch elm disease. It is usually unaffected due to a chemical in the bark which repels the scolytus beetle that spreads the disease. During October 2022, another six were planted in Imber churchyard. The aim is to plant resistant elm trees in the vicinity of known white-letter hairstreak colonies, providing an alternative foodplant if native elms are lost to Dutch elm disease.

The Owl and Raptor project started in 1986. Each year more nest boxes have been added, and after 36 years there is comparison data available on barn owls and kestrels nesting on SPTA. This year's dry weather has produced ideal hunting at night, helping owls produce their best nesting season in the last 10 years. Nationally kestrels are in decline, but nest boxes, good grassland and scrubby habitat support a good population on SPTA.

Sainfoin bee © Iain Perkins

Around the Regions

Isle of Wight Newtown Range and Jersey Camp

***by* Barry Angell**
Entomologist, Newtown Range and Jersey Camp Conservation Group

▸ Dave Maidment
© Judy Chappell

It is with great sadness that we report the death of Maj (Ret'd) Dave Maidment, Range Officer and Estates Manager at Newtown Range and Jersey Camp from 2004 to 2019. Before this he served in the British Army for 39 years in the Royal Army Service Corps, Royal Corps of Transport and Royal Logistic Corps, retiring as a Major.

Dave managed the 810 acre estate on the Isle of Wight, working with Tri-Service Regular, Reserves and Cadet units, tenant farmers and conservation organisations. Of great importance to Dave was the Conservation Group, for which he served as deputy chair. Dave came into the post with little appreciation of the unique challenges the area posed, but soon developed a real passion for the needs of the site. This included managing the designations of a Site of Special Scientific Interest, Area of Outstanding Natural Beauty, Ramsar, Special Protection Area and Special Area of Conservation. He was instrumental in the planning and implementation of many projects including bird ringing, moth and pond surveys, web counts and supporting osprey, peregrine falcon and nightingale species. He was keenly involved in woodland management and showed an ability to connect conservation matters seamlessly with military training. Dave had a genuine love of red squirrels native to the Island and fed them from his office window – reminding him of his youth with his sister in Dorset.

Dave acted as a custodian of the Isle of Wight Rifles Trust's silver and artefacts held at Carisbrooke Castle. He helped with the upkeep of the military cemetery in Newport too, where he now rests. Dave volunteered as a Coastguard watch overlooking The Needles until he could no longer climb the steps to the cliff watch. He lost his battle with motor neurone disease on 9 June 2022, but his memory is indelibly etched on the fabric of Newtown Range and Jersey Camp and the wider conservation family. A memorial bench, funded by the Defence Infrastructure Organisation's Conservation Group Grant, is now sited in his favourite squirrel feeding location on the range. It will be enjoyed for many years to come.

A note from the Editors:
We express our thanks to Dave, who dedicated many hours to making the Conservation Group such a success. He was a keen supporter of *Sanctuary*, penning numerous articles. Dave was a pleasure to work with and we consider ourselves very fortunate to have had his unwavering support.

▸ A red squirrel feeding from Dave's memorial bench
© Wes Woolcock

▶ Silver washed fritillary
© Chris Meek

Around the Regions

North Yorkshire Foxglove Covert

***by* Sophia Crease**
Senior Reserve Manager,
Foxglove Covert

It was a challenging start to the year with three named storms in the first two months, with a huge amount of damage left behind from Storm Arwen (October 2021). Ash dieback has also caused a lot of work and the removal of diseased trees will continue this winter to make them safe. Where possible, the largest specimens have been monolithed to leave as much standing wood as possible for wildlife.

Volunteers from both civilian and military backgrounds form the backbone of the 100 acre reserve's upkeep and this year a 'Battle Back' team from the Catterick Personnel Recovery Unit have made an important contribution. They have assisted with footpath repairs, hazel coppicing and forestry, and their help is greatly appreciated.

The reserve celebrated its 30th anniversary with a Bioblitz event in August 2022. The aim of the event was to try and identify 30 new species of wildlife. At the time of writing the total of newly discovered flora and fauna has already reached a staggering 77 species! Highlights include avocet and two new butterflies – silver washed fritillary and brown argus. Autumn 2022 proved to be a bumper season for fungi with four new species added to the list and the most spectacular display of fly agaric to date.

◀ Fly agaric © Hayley Land

Bird ringing has continued for the 30th year. Constant Effort Sites scheme ringing took place with 589 new birds ringed – almost half of these were bullfinches. In addition, 40 buzzard chicks were ringed on the Catterick Training Area. Tawny owls and barn owls had a slightly more successful breeding season than last year, but productivity remained low.

Throughout the year several VIPs have visited the reserve including Brig Bartholomew, Col Billings and Col Holden (from the Defence Training Estate) when they called in to discover more about the reserve and how it links to the local community. It was also a pleasure to welcome Paul Wilson and Richard Brooks (from the Defence Infrastructure Organisation's Safety, Health and Environmental Protection team). Earlier in the year the High Sheriff of North Yorkshire and Carol Malia of BBC Look North (North East and Cumbria) were also welcomed. The reserve featured on the local news when staff and volunteers were interviewed about the Queen's Award for Voluntary Service and its importance following the passing of Her Majesty, the Late Queen Elizabeth II. It was a great honour to receive the award.

Around the Regions

Hampshire HMS Collingwood

▸ Members of the Conservation Group © Crown

***by* Mark Powell**
Energy and Environmental Protection Advisor, HMS Collingwood

HMS Collingwood's orchard was commissioned by RAdm Paul Beattie, following an invite from the base's Commanding Officer, Capt Catherine Jordan. The opening included planting a time capsule beneath a semi-mature hornbeam tree, to be discovered by others in the future. It included information about a year of the COVID-19 pandemic and images from Capt Jordan, who uniquely followed her husband Cdre Andy Jordan, Deputy Director of Ships, into the post of HMS Collingwood's Commanding Officer.

The idea of an orchard came from the site's Conservation Group, which is led by Energy and Environmental Protection Advisor Mark 'Cozy' Powell, with a view to commemorating Her Majesty, the Late Queen Elizabeth II's Platinum Jubilee. In all seventy trees were planted, one for each year of Her Majesty's reign, including apple, pear, cherry and plum. Blossom and fruit from these trees will provide food and shelter for many important insects, including honeybees, birds and mammals that already call HMS Collingwood home. This year's bumper honey crop has been exceptional, no doubt due to the close proximity of the blossom from the fruit trees.

To create the orchard, staff and children from the onboard nursery, Woodentots, were invited to plant a tree. Many named their trees after loved ones, or to mark an important anniversary, although 'Twiggy' and 'Woody' also appeared on the list. Speaking at the opening, Capt Catherine Jordan urged staff to continue to support the orchard and visit their tree when appropriate.

It was a magnificent occasion and a privilege to establish a lasting memory for so many individuals. Spanning two years in the preparation, over 120 people were directly involved in the project. Some people go through an entire lifetime without planting a single tree – and many found the experience humbling. Younger generations are so in tune with sustainability these days and to be involved in conservation and helping the environment is very rewarding. When trees grow, so does society. A habitat should comprise all things, including trees, as we build our future for other generations to enjoy.

The occasion was marked with a fitting poem written by Mark Regen Powell, reflecting on how we are all connected to nature:

> ***"Collingwood orchard and you –***
> ***Stand here grounded with***
> ***deep roots and feel proud.***
> ***Listen to the leaves rustle,***
> ***talking out loud.***
> ***Like branches, reach out your arms***
> ***with ambition and all your dreams,***
> ***like fruit will come to fruition."***

▸ RAdm Paul Beattie with the team © Crown

Around the Regions

Spotlight on… RAF St Mawgan

▲ Buttercups became plentiful during No Mow May © Cpl Andy Morris

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

RAF St Mawgan is the only RAF Station in the south-west. It was established as a Coastal Command airfield during World War II and then as home to the Search and Rescue Force Headquarters and Sea King Operational Conversion Unit 203(R) Squadron. The Station is set amongst 188ha of land on the North Cornwall coast and is currently home to the Defence Survive, Evade, Resist and Extract Training Organisation; 505 (Wessex) Squadron; Robson Resilience Centre St Mawgan; RAF Air Cadets Regional Headquarters for Plymouth and Cornwall Wing; and the home for sport for RAF Surfing.

RAF St Mawgan has had an incredibly busy couple of years delivering environmental initiatives. The surge in activity started in October 2020 when Sarah Kretowicz, the Station Health, Safety and Environmental Protection Adviser contacted the Defence Infrastructure Organisation's (DIO) Conservation Groups team (now called the Environmental Engagement team) about the B-Lines project. It was arranged for representatives from Buglife and the National Wildflower Centre to visit. The standout issue highlighted was their concern over the aggressive grass cutting regime, so a vow was made by the Station Commander, Wg Cdr Marshall Kinnear, to reduce grass cutting across the site.

▼ Hedgehog release © Cpl Andy Morris

This initial collaboration led to the reinvigoration of the Environmental Action Group (EAG), with personnel wanting to get involved in projects to increase biodiversity, habitats and promote awareness of environmental issues. One of the first projects was the establishment of a wellbeing garden, providing a vital outdoor space during the recovery from the COVID-19 pandemic, enabling personnel to meet outside, relax and enjoy the proven benefits of nature.

The positive effects of the wellbeing garden were quickly realised, prompting discussions with the Eden Project and Newquay Orchard. Plans for the creation of a community garden were then set in motion. In the early stages, with limited funding, the team had to be innovative. ESS, the Station's catering, retail and leisure industry partner, invested in the project via a scheme called 'Incredible Edibles' enabling staff to grow their own produce for consumption on-site. While the Station provided Local Initiative Grant funding to procure a polytunnel, ESS funded a shed, soil and tools which got the club off to a great start. With environmental considerations at the heart of every project, the team used planks of wood recycled from trees that fell during Storm Eunice to create raised beds in the polytunnel and used wood chippings to create pathways to access the community garden. The same team

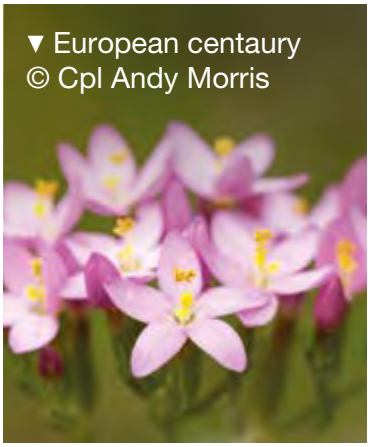
also designed and installed a drainage system to capture the rainwater, complementing the standpipe that was donated and installed by Ancala Water Services.

To deliver the vow made by the station commander, the EAG worked closely with VIVO and Gavin Jones to adjust the grounds maintenance plan. Following extensive engagement with DIO, the contractor agreed to temporarily curtail a series of tasks that would enable pollinators to thrive across the site. Adopting Plantlife's No Mow May initiative on a large scale allowed wildflowers to grow throughout the summer. This provided a critical food source for pollinators. Recognising the importance of bees, the EAG encouraged the resident beekeeper to increase the number of hives on the Station. VIVO reduced the amount of herbicide used, saving the application of over 100L a year. The grounds maintenance team spent their No Mow May time conducting coppicing and clearing invasive plants such as brambles, thereby improving the habitats for butterflies and encouraging the reintroduction of other plants.

A plethora of wildflowers emerged across the site and the number of butterflies and birds increased, with corn buntings and skylarks establishing nests among the long grass. All wildlife benefitted from the initiative, but the increase in habitats was particularly helpful for the hedgehog release site that the Station established in 2021. Working with Prickles and Paws, a hedgehog rescue centre for Cornwall and west Devon, the site was checked to ensure predators such as badgers did not frequent the area, and a total of 12 hedgehog boxes were constructed by a group of willing volunteers. These were strategically placed among an area of newly planted trees. Recently felled trees were also used to build bug hotels, as bugs are a sustainable food source for hedgehogs. Signage was produced and placed along the roads near to the release site, warning drivers that hedgehogs may be active in the area at night, and grass strimming is no longer conducted where the hedgehogs naturally roam, reducing the likelihood of catastrophic injuries. Prickles and Paws have released 36 hedgehogs on-site since 2021.

The final environmental project is dedicated to Her Majesty, the Late Queen Elizabeth II. The Station will plant a mixed fruit orchard consisting of some 370 trees as part of the Queen's Green Canopy, celebrating her 70-year reign.

▼ Grasses also flourished during No Mow May
© Cpl Andy Morris



▼ European centaury
© Cpl Andy Morris

▲ Marsh orchid
© Cpl Andy Morris

▲ The first produce growing in the polytunnel
© Cpl Andy Morris

Update – Defence Infrastructure Organisation's Environmental Engagement team

▲ Richard Brooks
© Guy Salkeld

***by* Richard Brooks**
Principal Environmental Advisor, Defence Infrastructure Organisation

It is impossible in today's world not to see, hear and experience the effects of climate change and recognise the associated challenges of net zero ambition and environmental rescue. *Sanctuary* 51, 2022 focuses on some of the sustainability work across Defence and how it is looking to make greater changes going forward. The urgency of this is hugely apparent and we must coherently focus activity to ensure efficient and focused outcomes.

There are amazing innovations and projects happening across our estate and activities. If you are involved in such delivery, then the *Sanctuary* Editors want to hear about it through submissions of synopses for articles and nominations for the Sanctuary Awards 2023. Tell us how you are making Defence more sustainable! The calling notice for articles and nominations will be published in late spring/early summer 2023.

Regular readers may have noticed some design changes to *Sanctuary* in this 51st edition. This is not a complete change to the format, which has been in use since 2017 and similar since 2011, but a response to updated accessibility guidance, corporate styling and feedback received from the *Sanctuary* 50, 2021 reader survey. Your feedback was hugely useful to the team and has enabled us to inform changes. Please let us know what you think of the new look by emailing DIO-Sanctuary@mod.gov.uk

As ever, my thanks go to everyone who has played a part in the delivery of the Sanctuary Awards and this 51st edition of *Sanctuary* magazine – it is a credit to all involved. Particular thanks to Holly Broomfield who has, once again, been the lynchpin of this edition; to Claire Lynch for providing support from the Climate Change and Sustainability Directorate; and to Melanie Worman for bringing some much needed innovation to the editorial and judging processes. Thank you Holly, Mel, Claire et al...

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Update – MOD's Climate Change and Sustainability Directorate

▲ Julia Powell
© Julia Powell

***by* Julia Powell**
Head of Policy, FMC Climate Change and Sustainability

I add my thanks to all those involved in producing this 51st edition of *Sanctuary*. The rich content reflects the quality and diversity of the submissions received and in the Sanctuary Awards winners. Both continue to evolve, showcasing the breadth of the MOD's response to the climate and sustainability challenge.

The MOD Climate Change and Sustainability (CC&S) Directorate, bolstered by the support of new CC&S teams across Defence, has made good progress in delivering initial actions in the MOD CC&S Strategic Approach:

- On *Decarbonisation* we have assigned responsibility for delivering change across sectors, including aviation, maritime and infrastructure. Our sector leads are identifying plans and opportunities to achieve further reductions.
- On *Adaptation and Resilience*, we are rolling out our departmental climate risk method and adaptation planning not just for our estate, but also for capabilities, supply chains and our response to transitional risks.

There is always more to do to deliver our three stated ambitions and catalysing change is a team endeavour. The increased capacity and capability bring massive benefit. From shaping our work from broad awareness training courses for all, to tailored senior packages; natural capital accounting to maximise benefit from our land use; to building understanding of security implications from climate change.

Our collaboration stretches beyond Defence to international Allies and partners, academia and Defence suppliers. This allows us to harness invaluable insights into innovation, explore alternative solutions and strengthen our approaches. To illustrate, I look to our participation in the Climate Change & (In)Security Project Conference; Climate Security: An Agenda for Future Research; and our engagement with the Defence Suppliers Forum on the critical role they play in our CC&S ambitions.

The enthusiasm and momentum from across the whole community inspires our future activities and *Sanctuary* continues to celebrate our collective achievements.

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.

SUBMISSIONS
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