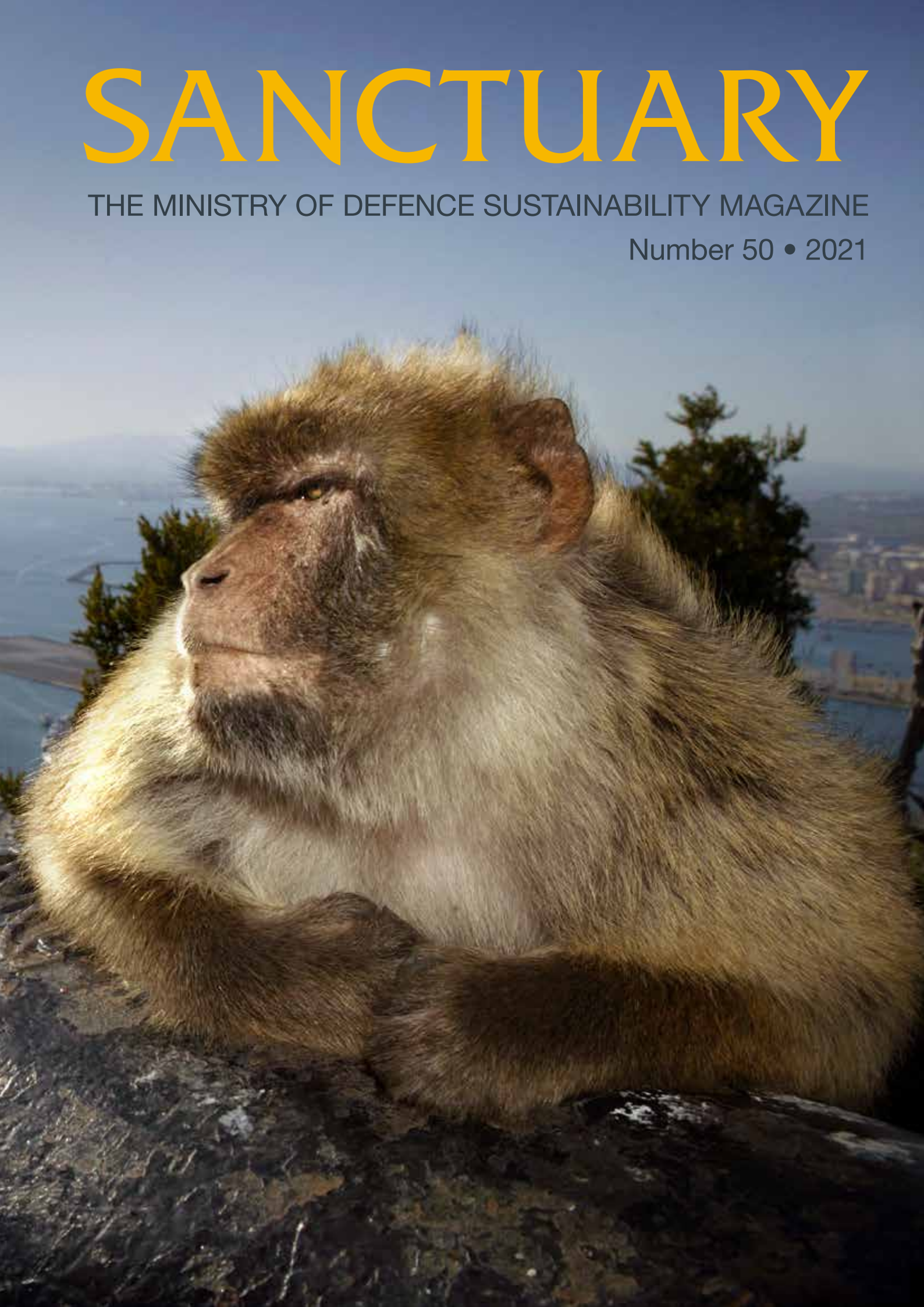
SANCTUARY

THE MINISTRY OF DEFENCE SUSTAINABILITY MAGAZINE

Number 50 • 2021



SANCTUARY

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Please note that due to Covid-19 the Sanctuary team have been working from home where possible. It is therefore recommended that contact be made via email, rather than via post, to ensure the quickest response time.

FRONT AND BACK COVER IMAGE:
A Barbary ape, Gibraltar © Crown

Some of the photographs featured in this year's magazine were taken before the Covid-19 pandemic. All photographs taken during Covid-19 complied with the social distancing requirements in place at that time.

The Sanctuary team would like to say a special thanks to Harvey Mills Photography for his ongoing support in the provision of images for use in the magazine and to Tilly Gregory of Army Publications for kindly sharing her technical expertise throughout the year.

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

***Sanctuary* is the Ministry of Defence's (MOD) annual sustainability publication**, which has been **in print since 1975**. It features articles about the MOD's sustainable development and conservation activities. The publication illustrates **how the MOD is undertaking its responsibility for stewardship** of the MOD estate in both the UK and overseas. It is designed for a wide audience, ranging from Serving Personnel, MOD civilian staff, MOD Conservation Group volunteers and the general public.

If you would like **to write an article** for *Sanctuary* magazine then please do get in touch with the Editors – we will be delighted to explain the process to you.

This year sees the production of the **50th edition of *Sanctuary* magazine** (in the 1970s and 1980s more than one edition was produced annually). Our longer term readers will know that **over the years the magazine has evolved.** Whilst *Sanctuary* continues to feature more traditional articles relating to environmental and heritage conservation, recreation and access, there has been a significant increase in sustainability content over the last decade. The magazine highlights topics such as the sustainable management of the MOD's built assets and procurement processes, as well as responses to climate change.

We are keen to ensure that the publication remains in print for many years to come, and with this in mind we would like to **gain our readers' views on the content of the magazine** and the future direction of travel. Whether you read the publication from cover to cover, or simply a select few articles, we are eager to hear your views.

We would be most grateful if you could take a few minutes to answer some questions in our **short online survey.**

The survey is available at: https://bit.ly/MODsanctuary or using the **QR code** below:

Alternatively, if you do not have access to the internet you can write to us at the Sanctuary Office and we will post you a copy of the questionnaire.

Thank you in advance to those of you who take the time to respond – your assistance is very much appreciated.

We hope you enjoy the 2021, 50th anniversary edition!

The Editors

Sponsors

The Sanctuary team would like to say a big thank you to our sponsors. As ever, we appreciate the continued support of our sponsors which allows limited copies of this iconic magazine to be printed and streamlines the Sanctuary Awards judging process.

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Foreword by Admiral Sir Tim Fraser KCB ADC

Vice Chief of Defence Staff

Admiral Sir Tim Fraser KCB ADC © Crown

It gives me great pleasure to introduce you to the 50th edition of *Sanctuary* magazine, which has been showcasing outstanding conservation and sustainability projects from across the Ministry of Defence (MOD) since 1975. The MOD's response to the challenges and the risks posed by climate change is well underway with our successes highlighted by the breadth and diversity of projects from the last year. We must continue with this focus, ensuring our contribution, innovation and ingenuity support our Armed Forces and our military capability to operate in a climate changed world.

As such, I am delighted to see the return of the 'Around the Services' feature (pp. 12 – 14), which was introduced last year to give the services an opportunity to discuss their sustainability initiatives and aspirations. This year's magazine includes projects at sea, in the air and on land. The Navy had great success with a project to reduce emissions from offshore patrol vessels (p. 58) and a pilot programme to monitor submarine biofouling, which is key to environmental protection of our oceans (p. 62). The RAF made history with the world's first successful flight using only Synthetic Aviation Fuel (p. 14) and the Army have contributed in Africa with Op CORDED, an anti-poaching operation to tackle the illegal wildlife trade (p. 24).

Several excellent social value initiatives are seen in this year's magazine which assist wounded, injured and sick Service Personnel and veterans with their recovery. Ex Roundhouse is an Op Nightingale project which uses the medium of archaeology (p. 16) and The Armed Forces Equine Charity utilises the restorative power of horses (p. 27). In addition, Op Kingfisher provides networking opportunities and practical skills to Service leavers who wish to pursue careers in areas such as ecology and conservation (p. 26).

Partnership working is much valued by the MOD and can be seen in many of this year's ecology articles. Meadow making is taking place at Cinque Ports Training Area with Natural England (p. 40) and the National Trust and Cornwall Wildlife Trust are helping us to manage the rare seasonal wetland habitats of Predannack Airfield (p. 70). Carbon sequestration is high on the discussion agenda, as seen through the investigation of peatland whitegrass camps in the Falkland Islands alongside Falklands Conservation, the UK Centre for Ecology and Hydrology and the Royal Botanical Gardens, Kew (p. 18).

I am pleased to see the wide range of sustainable construction projects that have taken place to support our Armed Forces – such as the new tri-service Headquarters for the Defence College for Logistics, Policing and Administration (p. 64) and the delivery of a defence-critical infrastructure and construction development at RAF Lakenheath to support F35 (p. 30). The Glen Mallan Northern Ammunition Jetty project in Scotland is the third and final jetty refurbishment to support the nationally critical £6bn Queen Elizabeth Class Aircraft Carrier programme (p. 22).

Many exciting heritage projects are featured, such as building preservation at The Parade, HMNB Portsmouth (p. 32), Ex Lidar Truth on Otterburn Ranges (p. 53), RAF High Wycombe's tours of the restored WW2 Bomber Command (p. 76) and RAF Linton-on-Ouse's hard work to re-home collections prior to site closure (p. 66). You can also read all about the MOD's new Historic Environment Record management system on p. 23.

'Around the Regions' has long been a feature of *Sanctuary* magazine, giving MOD Conservation Groups an opportunity to highlight the work they have undertaken in the past year. MOD Conservation Groups are stakeholder engagement forums for managing conservation on the MOD estate and are mandatory under JSP 850 to sites with statutory designations. You can read about their work from p. 84. I would especially like to pass on my thanks to the hundreds of Conservation Group volunteers who give up their time to protect the MOD estate for future generations. Without their hard work and dedication, we could not achieve anywhere near as much.

This year we are also celebrating the 30th anniversary of Sanctuary Awards, which have been recognising outstanding conservation efforts from Service Personnel, civilian staff, industry partners and volunteers since 1991. The level of competition was particularly high this year, meaning the judges had a very difficult task in determining the results. My warmest congratulations go to the 2021 winners and highly commended projects and I encourage you all to consider entering in 2022.

Sanctuary Awards 2021

The Sanctuary Awards have been recognising outstanding conservation efforts across the Ministry of Defence (MOD) since 1991. Thirty years ago this year, the Commandant of Otterburn Training Area donated the 'Silver Otter Trophy', to be awarded to the best Conservation Group led project, or best individual conservation effort, on MOD land. Whilst the Sanctuary Awards have expanded to recognise the wider sustainability agenda, the Silver Otter Trophy has continued to be awarded annually ever since.

The Sanctuary Awards 2021 invited entries to six categories, detailed below. The winners of each category were then considered for two further awards. The coveted Silver Otter Trophy is nowadays awarded to the Conservation Group, individual, or smaller scale MOD led project that is deemed most impressive by the judges. The Sustainable Business Award was introduced in 2014 and is presented to more commercial or larger scale projects, that have achieved a particular success in ensuring sustainable solutions that deliver against the commitment to the Armed Forces by enabling them to live, work or train. The latter is a custom made trophy which represents the three pillars of sustainability; social, environmental and economic, whilst incorporating military activity. This is symbolised by three brass precision caps from a 30mm round fired from a Scorpion armoured vehicle. The glass stands within a brick salvaged from Scraesdon Fort near the village of Antony, Cornwall from circa 1860, which represents sustainable buildings, infrastructure and longevity. The six categories for 2021 were:

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.

Social Value Award – projects focused on any of the social aspects of sustainability, including heritage, public access, community engagement and education.

Net Zero and Resource Efficiency Award – projects that contribute to the MOD's net zero carbon ambition, reduce energy, water or resource consumption, renewable energy or recycling.

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.

Environmental Enhancement Award – projects focused on wildlife and biodiversity, environmental research, or tackling pollution and contamination issues.

Entries for the 2022 Sanctuary Awards will open in spring 2022 and details will be listed online at www.gov.uk/guidance/ministry-of-defence-sanctuary-awards
For queries please email DIO-Sanctuary@mod.gov.uk

The Sanctuary Awards board for 2021 comprised of:

FINANCE AND MILITARY CAPABILITY (FMC)

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Head of Policy
FMC Climate Change
& Sustainability

Ray Dickinson
Assistant Head of Policy
FMC Climate Change
& Sustainability

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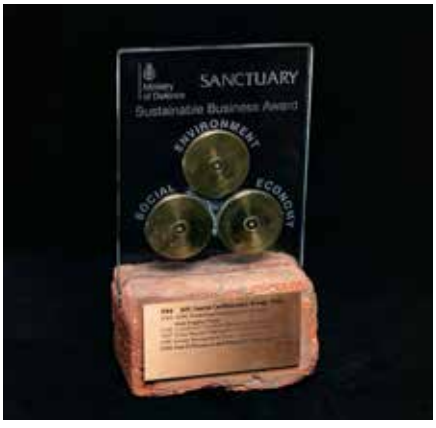
Helen Sawford
Head of Commercial
Strategic Supplier Management

EXTERNAL JUDGE

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

The judges would also like to thank Commerce Decisions, see page 4.

Silver Otter Trophy © Crown



Sustainable Business Award © Crown

SANCTUARY AWARDS 2021 – SUPPORTED BY AWARD®

Judging taking place in Award® © Guy Salkeld

Judging via AWARD®
Commerce Decisions are proud to support the Sanctuary Awards judging process for the fifth consecutive year with its AWARD® evaluation solution. AWARD® enabled the submissions to be assessed in a robust, controlled and objective manner, ensuring absolute integrity. Once nominees had submitted their entries a longlisting selection exercise took place in AWARD®. Longlisted entries for each category were then assessed individually in AWARD® by the judging panel. This was followed by a moderation process at the judges' board meeting to determine the results. AWARD® ensured an efficient, robust, transparent and auditable judging process took place even with a geographically dispersed judging team, tight timescales and many submission documents to manage.

Samantha Bevan-Talbot, Ministry of Defence (MOD) Account Director for Commerce Decisions comments *"We are proud that AWARD® was chosen to support the Sanctuary Awards judging for the fifth year running – with more nominations than ever, AWARD® has ensured that the Awards judging process ran successfully and efficiently during the Covid-19 pandemic, avoiding any delays".*

Supporting sustainability
Delivery of AWARD® via the Defence Sourcing Portal (DSP) enables MOD project stakeholders to access their procurement at a time and place to suit them. The ability for users to login to DSP AWARD® from any workstation results in time savings and reduces travel costs.

DSP AWARD® simplifies the management of large volumes of data on complex projects. Approximately 45 million pages are electronically submitted into AWARD® annually, saving 5,400 trees in printed paper.

About Commerce Decisions
AWARD® has supported the delivery of complex procurements across the MOD since 2001. Projects include the procurement of defence equipment, service and support contracts, construction, private finance initiatives, pubic-private partnerships, IT and communication systems. A corporate licence has been in place since 2013, and now as part of DSP, Commerce Decisions works alongside the MOD to ensure that procurement processes are standardised and efficiencies maximised, supporting the achievement of significant savings.

SUSTAINABLE PROCUREMENT & CONSTRUCTION AWARD WINNER

Defence College of Logistics, Policing and Administration © Skanska

Worthy Down Redevelopment Project
A sustainable approach has been taken throughout the redevelopment of Worthy Down military base, near Winchester in Hampshire. This large scale, £250m project was led by the Defence Infrastructure Organisation with the works carried out by Skanska. The redevelopment was extensive and involved the construction of a new tri-service Defence College of Logistics, Policing and Administration as well as a range of additional buildings and facilities, including accommodation.

Sustainability was at the heart of the redevelopment, with over 800 units of Single Living Accommodation created using a modular approach, together with off-site manufacturing. This meant key components of the build were created in a factory environment and then assembled on-site, which helped to cut carbon emissions, reduce waste and improve quality. The construction waste from the demolition of the original buildings at Worthy Down was also reused on-site, providing significant environmental benefits.

Special measures were taken to protect animals, birds and bats during the construction project. Areas of new woodland, grassland and scattered scrub were also planted, creating new habitats for wildlife and invertebrates. It is estimated that biodiversity has increased by 63% as a result.

See the full article on page 64.

SUSTAINABLE PROCUREMENT & CONSTRUCTION AWARD HIGHLY COMMENDED

British Gurkhas Pokhara © Crown

British Gurkhas Pokhara's (BGP) Solar Thermal and Air Source Heat Pump Installation Project
The concept of installing British Standard sustainable infrastructure within BGP, rather than conventional solutions, was first conceived when it was identified that the life cycle replacements of existing electrical and diesel fired boilers was approaching.

These replacements included installation of solar thermal panels and air source heat pumps in technical buildings, service family and Single Living Accommodation. As a result, military personnel and their dependants, civilian staff, Gurkha veterans and potential recruits all see the benefits of a more sustainable and reliable source of domestic hot water. Not only does this decision to implement a more sustainable solution provide economic savings through efficiency of use and payback periods, but also works towards the goals laid out in the Ministry of Defence's (MOD) sustainability and net zero carbon emission strategy.

All of the installation works have been delivered by Defence Infrastructure Organisation (Nepal) locally employed civilians which has helped to reduce the costs. It has also benefited the staff personally by way of enhancing their skills and developing their experience and knowledge in relatively new technologies and systems within Nepal. Moving forward, these skills can also be utilised to help to further reduce the carbon footprint at BGP.

This project has had a positive impact on the MOD's reputation in Nepal. British Gurkhas Nepal receive many high profile visits every year, many of which have already commended the site on its achievements to become more sustainable and environmentally friendly on a comparatively low budget.

See the full article on page 48.

SUSTAINABLE PROCUREMENT & CONSTRUCTION AWARD HIGHLY COMMENDED

HMS Tamar leaving HMNB Portsmouth © Crown

Offshore Patrol Vessel Acquisition Project
This project, led by Defence Equipment and Support (DE&S) and industry partner BAE Systems (BAES) provided the Royal Navy with additional River Class Offshore Patrol Vessels, specifically HMS Tamar and HMS Spey. The ships included a new piece of mechanical engineering – a catalytic converter, making them the greenest in the Fleet.

Obstacles included fitting the new system into what is, by Naval standards, a small ship. The normal number of engineers that would work on an exhaust system could not fit in the compartment due to the space the additional equipment took up, slowing the fitting process. In addition, the ships' staff required training on the use of the system. Although a challenging programme of work, its success was complemented by an excellent working relationship between DE&S, BAES and the Royal Navy and has produced even better results than expected.

The selective catalytic reduction system reduces emissions of nitrogen oxide from the ships by up to 97%. This provides the Royal Navy with an enhanced operating capability, as the ships are able to operate in waters with protected status. An added bonus of the technology is that the system has been designed so that it can also be fitted to other vessels already in service, which would further enhance the Royal Navy's green credentials.

See the full article on page 58.

SOCIAL VALUE AWARD JOINT WINNER

Providing servicing and safety checks for a local school's fleet of mountain bikes © Crown

RAF Lossiemouth's Re-Cycle Programme
The Re-Cycle Programme, instigated by RAF engineers CT Josey Wales & Sgt Chris Wallace, has removed over 200 abandoned bicycles from the RAF Lossiemouth estate in north-east Scotland, generating around 150 fully working bicycles for recreational use by Service Personnel. Selling a selection of the refurbished bicycles allowed the team to donate to the Moray Emergency Relief Fund, which was critically important in supporting low income families during Covid-19.

The ongoing restoration of unloved bicycles also enabled the team to become an accredited Mountain Bike Instructor Award Scheme (MIAS) maintenance and training facility. This accreditation is already being used to train up the next generation of bike mechanics for a fraction of the normal price and highlights the wider Station effort of reducing its carbon footprint by promoting green methods of travel.

Following the total clean-up of unwanted bikes from RAF Lossiemouth, the programme secured support from RAF Leuchars and the NAAFI Fund which donated 17 bikes and £13,500 respectively to form a new low cost hire fleet. The hire facility is available for use by all Service Personnel and their families, and the bikes are well maintained by the dedicated volunteers of the Re-Cycle team.

The programme has also supported the community by providing free maintenance and critical safety checks on bicycles owned by local schools and financially supporting the RAF Lossiemouth Junior Ranks Welfare Fund.

See the full article on page 72.

SOCIAL VALUE AWARD JOINT WINNER

Kier VolkerFitzpatrick (KVF35) joint venture at RAF Lakenheath
KVF35 are delivering the Defence Infrastructure Organisation's (DIO) major defence critical infrastructure and construction development at RAF Lakenheath, Suffolk. Work commenced in November 2018 and has seen over 600 people on-site each day during peak construction. KVF35 are supporting the F-35 Programme, creating the first permanent international site for US F-35As in Europe. The development includes construction of a flight simulator facility, maintenance unit, new hangars, storage facilities and supporting infrastructure.

The project team volunteered their time to enhance the local ecology © Kier/VolkerFitzpatrick

DIO and contractors KVF35 strongly felt the project should support the local community, delivering industry leading social impact. Through innovative, highly sustainable social value delivery, KVF35 have exceeded the social value objectives set out, prior to project completion. To date £83m of social value has been generated, surpassing the initial target of £1m. In addition, 42% of project costs have been directed to local small/medium enterprises. In the last year alone £53m of social value has been generated.

KVF35 provided innovative solutions, delivering social value activity throughout the Covid-19 pandemic. The team worked collaboratively with the wider project team to successfully implement activity within the unique security environment of a fully operational military base. The team provided sustainable growth whilst demonstrating dedication and best practice. KVF35 will leave a legacy on the local community, local economy and DIO's reputation, lasting well beyond project completion.

See the full article on page 30.

SOCIAL VALUE AWARD HIGHLY COMMENDED

RAF Leeming's Polytunnel Committee
Back in 2018 a small but very passionate team of personnel from RAF Leeming decided to build a community focussed polytunnel. The funds to purchase and build the 40m polytunnel were very kindly provided by the RAF Benevolent Fund.

Since then, the Leeming polytunnel team have gone from strength to strength. Membership has grown, especially during lockdown, as the polytunnel offered a critical space for Station personnel to escape to. Newcastle University are studying the polytunnel and its members to better understand the mental health benefits of this outside activity – whilst the study is ongoing, the benefits are undeniable.

Alongside rising membership, the team's ambitions have also swelled. The project now boasts a thriving growing community, beehives, pollinator park, mini orchard and chicken coop, all achieved through the determination and commitment of a few exceptional people.

The Station polytunnel © Crown

Not only does the Leeming 'homestead' continue to offer a superb refuge for the local community, it also provides an excellent opportunity to educate the next generation through the 'plot to plate' syllabus, delivered by the on base nursery and primary school.

The RAF Leeming Polytunnel Project is a brilliant success story. It has positively impacted the physical and mental health of all involved and has improved and increased the biodiversity on camp. It also offers a superb template for other RAF Stations to become more sustainable on the journey to a net zero future.

See the full article on page 20.

NET ZERO & RESOURCE EFFICIENCY AWARD WINNER


The new NetCAP buildings – powered by air source heat pumps and roof top solar panels © Reds10

Net-zero Carbon Accommodation Programme
Soldiers using the UK Defence Training Estate (DTE) are benefiting from new carbon efficient accommodation as part of the Ministry of Defence (MOD)'s Net-zero Carbon Accommodation Programme (NetCAP). This is delivered by the Defence Infrastructure Organisation in partnership with Landmarc Support Services and modular construction specialists Reds10.

NetCAP is part of a nationwide initiative to improve the lived experience for the Armed Forces whilst supporting the MOD's net zero carbon emissions goals. Powered by air source heat pumps and roof top solar panels, the accommodation is largely replacing old, inefficient buildings with modular blocks, each typically providing up to 46 bed spaces. These can be subdivided as necessary, with showers, ablutions and drying rooms.

Over 50 buildings will be delivered, providing around 2,500 new bed spaces across several locations including; Westdown, Knook and Rollestone Camps on Salisbury Plain, Castlemartin Camp in Wales, Brunswick Camp in the south-east, West Tofts Camp in East Anglia and Nesscliff Camp in Shropshire. The latest installations at Brunswick are double storey and have the capability for rainwater harvesting.

The programme has delivered the DTE's first carbon negative buildings, achieved by installing SMART technology. This monitors and adjusts energy usage, using data to drive down Energy Performance Certificate (EPC) ratings from 12 to -10. These buildings now generate more energy than they use, reducing electricity and maintenance costs.

See *Sanctuary* 49, 2020.

NET ZERO & RESOURCE EFFICIENCY AWARD HIGHLY COMMENDED

Shot blast ready for removal © Babcock

Giving it Another Shot Project
The Babcock team undertook a project to divert shot blast waste from landfill. Shot blasting is a method used to clean or polish metal prior to painting. The process is used extensively in the refit and maintenance periods of all craft worked on at HMNB Devonport in Plymouth, including for ships, submarines, landing craft and other associated infrastructure.

Across Babcock's operations at HMNB Devonport hundreds of tonnes of used shot blast are generated each year. The technical specifications this material takes on after use meant it was a single use product. Over time, various options for alternative re-usable media have been considered but the iron smelting slag (a by-product of steel production) remained the most viable product. The accepted disposal route for this waste was to send it to landfill sites around 50 miles away. Then in 2019, due to reducing capacities, increasing costs and social pressures the Babcock team sought alternative sustainable options for this waste product.

The primary objective was to divert waste from landfill. Consultation with the Environment Agency resulted in a successful challenge to the waste classification, opening up recycling options for the used shot blast.

The secondary objective was to reduce the frequency of Heavy Goods Vehicle travel to the disposal sites and manage waste disposal more efficiently. A back haul process was introduced whereby the used shot blast was removed by the same vehicles that brought new shot blast to site. The result – 4,897 tonnes of used shot blast was diverted from landfill between May 2019 and July 2021.

See the full article on page 78.

NET ZERO & RESOURCE EFFICIENCY AWARD HIGHLY COMMENDED

Capt Jenkins and Spr Creighton (Army Reserves) commissioning the water coolers © Capt Jenkins

Project Plastic Reduction – 517 Specialist Team Royal Engineers (Works)
Project Plastic Reduction is a sustainability initiative aimed at reducing the use of single use plastic while deployed in the United Arab Emirates. 517 Specialist Team Royal Engineers (Works) took over as UK Specialist Team Royal Engineers (Middle East) (UK STRE (ME)) in May 2021 and identified an opportunity to promote sustainability and reduce the environmental footprint of UK personnel whilst in the country.

The STRE identified that UK Ministry of Defence (MOD) personnel were consuming an average of 18,000L of water per month. This required the procurement and disposal of 36,000 500ml single-use plastic bottles.

They led two military headquarters and civilian contractors to reduce the environmental footprint by replacing the single-use plastic bottles with 19L reusable water containers which are distributed from portable water cooling stations. The UK STRE (ME) are infrastructure specialists and so were uniquely placed to initiate the sustainability initiative.

The project was designed to be scalable with a future aim to be implemented across four other countries the STRE are deployed across. It is intended to practically deliver in line with the Sustainable MOD Strategy, of which resource management and supply chain issues sit at the top of the second priority list. In addition, the project will also help to enhance the MOD's reputation as it has the potential to reduce the UK MOD's environmental footprint at its core.

The delivery of this project has been supported by KBR civilian contractors, the UK Civil Service, tri-service personnel and Reservist soldiers.

See the full article on page 38.

HERITAGE AWARD WINNER

The finished roundhouse © Harvey Mills Photography

Operation Nightingale – Exercise Roundhouse
In 2020 a team of archaeologists and military veterans started an archaeological excavation at Dunch Hill on Salisbury Plain, Wiltshire. Their target was to locate the remains of a Late Bronze Age settlement and investigate if it still survived. Over a period of three weeks the group unearthed a series of features and assessed the effects that military training had had on them over many years. Being able to work in an open and magical landscape had a raft of benefits for participants, not least as the fieldwork alleviated some of the stresses built up during the Covid-19 pandemic lockdowns.

The findings were such that the archaeology could lay the foundations for another plan. Thanks to an Armed Forces Covenant Grant, the veterans spent much of 2021 at Butser Ancient Farm building a reconstruction of one of the prehistoric houses discovered, imitating what it may have looked like and setting it within a suitable farming landscape. In so doing, they learned craft skills from thatching to clunch walling, and from bronze smelting to wood carving. Consequently, some now act as volunteer guides for the public at this site – and others aim to use their newfound skills on other projects and also in the maintenance of the new building. The house was opened by Prof Alice Roberts in October 2021.

From a wellbeing perspective, this project was a colossal success – combining ranges of different skills and challenges for the beneficiaries (both physical and mental) and resulting in a tangible outcome that all could be incredibly proud of.

See the full article on page 16.

HERITAGE AWARD HIGHLY COMMENDED

The eight foot Avro propeller © Ron Blenkinsop

RAF Linton-on-Ouse's Draw Down to Closure Project
After 83 years of flying at RAF Linton-on-Ouse in North Yorkshire, it was announced in Parliament in the spring of 2021 that the Station had ceased flying operations and was now put forward to the Defence Infrastructure Organisation for 'Options for Disposal'.

On departure of the last Fast Jet Pilot Training aircraft in late 2019 (the Tucano), work started in drawing down buildings, resources and manpower. One work strand of many included the relocation and redesignation of all 'heritage' items. This started a journey of discovery for the dedicated team of both internal and external members, ranging from some keen amateur historians to those with more specialist backgrounds; the Air Historical Branch, Northolt Heritage and Yorkshire Air Museum to name a few.

The work involved painstaking and often time-consuming research, with many items 'unearthed'. This ranged from the relocation of a gate guardian, moving an extremely weighty memorial stone to the local community via the Parish Council, the re-dedication of an eight foot Avro propeller and of a Royal Canadian Air Force classical mini-organ found under wraps in a dim and dusty corner of a room, to many pieces of art dotted around the estate.

Whilst most items have found new homes the process is ongoing, relocating two Georgian Officers' Mess ship canons on trolleys and with many pieces of silverware still available for redesignation! All those involved agree they have found the work extremely rewarding and know they have saved a bit of RAF history for future generations to enjoy.

See the full article on page 66.

INDIVIDUAL ACHIEVEMENT AWARD WINNER

SILVER OTTER TROPHY WINNER

Nigel installing some new bridleway signs on the Imber Range Perimeter Path © Dale Wyatt

Nigel Linge
For 15 years Nigel Linge has been an unstoppable, positive force supporting the balance of military training requirements with public access provision across Salisbury Plain Training Area (SPTA), under the moniker Project Ubique.

Nigel retired from the Ministry of Defence (MOD) in 2014 after many years in service. In his later years as SPTA Range Safety Officer, Nigel significantly reduced conflict between public rights of way (PROW) and military training. He aligned contractual maintenance with PROW management, making savings and increasing efficiency.

Nigel masterminded Project Ubique with the aim to improve the working balance of military training with public access across SPTA. As part of the project he championed the mantra 'Certainty, Clarity and Consistency', bringing these essential principles to play across SPTA. This ensures the public are certain where and when public access is available, provides clarity where appropriate and legitimate public access lies and guarantees a consistent management approach to public access provision.

Regarded as phase one of the project, an ambitious plan was made to stop PROW within Larkhill impact area and in turn improve the surrounding PROW network. Success was down to Nigel forming amicable relationships with a wide range of stakeholders, including circa 20 Parish Councils.

In recent years the Imber Range Perimeter Path has been updated. This is thanks largely to Nigel's engagement with stakeholders and volunteers. Refusing to rest, Nigel continues to devise and support new plans to improve access management, organising volunteers to carry out numerous path signing and clearance tasks.

It is clear that Nigel will remain a highly active MOD ally for years to come.

See the full article on page 35.

INDIVIDUAL ACHIEVEMENT AWARD HIGHLY COMMENDED

Capt William Bruce Martin Robinson
Capt Robinson has instigated a range of eco projects since arriving as Operations Officer within the Northern Ireland Garrison Support Unit. This includes the rejuvenation of a disused mountain bike trail in Palace Barracks, Belfast, the creation of a children's plant, play and progress nursery garden in Thiepval Barracks, Lisburn, and raising £30,000 from various sources for a mobile garrison cinema.

The Defence Infrastructure Organisation recently made 55 acres of land available to enhance the lived experience of the remaining Service Personnel and their dependents, following the demolition of 283 houses on two sites at Aldergrove Flying Station. Capt Robinson was given the task of developing the vision to transform both sites. The overarching strategy was based on the need for the development to be sustainable, with projects developed that worked in harmony with the environment. The aspirations of the end users had to be balanced with financial limitations in order to dramatically improve the quality of life for those working and living at the isolated location.

The concept caught the imagination of stakeholders, with a range of external funding bodies allocating well over £150,000 to the projects, with the greater part coming from The Armed Forces Covenant Fund Trust (TAFCFT). The Wellness Allotments project was the first to complete during summer 2021, thanks to £20,000 from the TAFCFT's 'Removing Barriers to Family Life' programme. Alongside this, the Ashes to Gold charity acted as a Defence Gardens Scheme hub to the Aldergrove spoke providing mentoring, and wider support came from the Northern Ireland Veterans' Support Office. Future plans include a wildflower meadow and bee apiary.

See the full article on page 54.

Capt Robinson © Crown

ENVIRONMENTAL ENHANCEMENT AWARD WINNER

SUSTAINABLE BUSINESS AWARD WINNER

Working with giants – an elephant in camp © British Army

Operation CORDED with special commendation to deployment 7, the 1st Battalion Irish Guards

The Illegal Wildlife Trade (IWT) is driving many of our most iconic wildlife species towards extinction. Estimated to be worth $7 – 23 billion per year and involving a network of national and international organised criminal groups, the trade is a threat not only to wildlife, but to security as well. A central component of the fight to Counter the Illegal Wildlife Trade (CIWT) are the wildlife rangers who serve on the frontline of wildlife conservation. However, with few financial resources available, rangers have only basic equipment and training yet must protect massive National Parks. It is a dangerous job – on average two rangers are killed every week.

The British Army developed Op CORDED to support rangers' CIWT efforts in Sub-Saharan Africa, deploying infantry, medics and military police to provide training and partner patrolling. This helps to enhance the rangers' tactical and leadership skills to make arrests and improve battlefield casualty drills to save lives. Reservist CIWT specialists from the Military Intelligence Corps have also deployed to provide expert analysis to understand and start to address the root causes of poaching. They deliver a Conservation Data Analysis Course to help rangers identify poaching patterns and pro-actively deploy patrols in the most at risk areas. This helps to maximise the impact of their limited resources.

Op CORDED is a great example of how the unique skills of the British Army can be deployed to solve a wide range of problems, and the operation forms a core pillar of the Department for Environment, Food and Rural Affairs' response to the growing environmental security threats posed by climate change.

See the full article on page 24.

ENVIRONMENTAL ENHANCEMENT AWARD HIGHLY COMMENDED

The Green Shores Project

Low-lying coasts face increasing threats from flooding and erosion due to climate change and rising sea levels. Saltmarshes are rare coastal habitats that are globally recognised for the natural buffer they can provide against these threats to coastal infrastructure. Unfortunately, saltmarshes are themselves under mounting pressure from climate change and adjacent land use pressures.

The Green Shores Project, in collaboration with Leuchars Station and the University of St Andrews, has pioneered saltmarsh regeneration along degraded shorelines in the Eden Estuary, on the east coast of Scotland, which is a Local Nature Reserve of high national and international ecological value. The planting trials have served to demonstrate the effectiveness of natural flood and erosion control methods and provided a working example of how it is possible to adapt our coasts to withstand rising sea levels, at relatively low cost.

The ongoing restoration strategy has restored approximately 2.5 linear km of shoreline in the estuary and extended to the Firth of Tay and the Dornoch Firth. Although the methods and know how were supplied by scientific application, the mostly cold and muddy hard labour would not have been possible without volunteers from local schools and communities working alongside students, researchers, MOD personnel and green keepers. Thanks is given to the funders who championed this vital work; the Defence Infrastructure Organisation, Fife Council, Fife Leader (EU Rural Development Fund), Royal Dornoch Golf Club and St Andrews Links Trust.

See *Sanctuary* 49, 2020.

A team effort – planting saltmarsh on the Leuchars Station shoreline © Leuchars Station

Around the Services
Royal Navy

HMS Glasgow under construction in Glasgow © Crown

A range of environmental measures have been embodied into the design process for recently constructed and future warships. This article outlines the imperative for doing this and what technologies are being implemented and investigated for the future.

National and international imperative
There is UK Government intent to address climate change and deliver net zero carbon across Government by 2050 (NZ50), outlined in policy and through events such as COP26. Allied with international intent from countries, organisations and worldwide industry, this will result in a much changed design and support landscape for our ships in the next 30 years.

Operational imperative
The drive for NZ50 will change the types of fuel and equipment in use across the maritime sector. As a global Navy, we require global supply chains and support availability. Relying on outdated and unsupported equipment will cause our operational capability to diminish and become more expensive at the same time! This will be most readily seen in reduced availability of traditional fossil fuels as commercial marine moves to alternatives, but also in the types of equipment, from control systems to pumps, that broader industry both invests in and continues to support. Also, our operational landscape is changing, requiring equipment able to operate in a broader and harsher set of environmental conditions. Finally, we need to be a responsible employer if we are to recruit and retain our workforce as environmental issues become increasingly important to society.

Operational benefit
Newer, more energy efficient equipment will improve availability and increase our endurance on task. Ultimately, it will increase our ability to carry out independent operations, unreliant on logistics stops for evolutions such as refuelling.

Implementation
The most recently constructed ships for the Royal Navy, the Tide Class Fleet tankers and Batch 2 River Class Offshore Patrol Vessels, as well as the T26 and T31 frigates currently under construction, incorporate improved hydrodynamic design to increase efficiency and scrubbing systems to reduce NOx emissions. Simple improvements such as the use of LED lighting are also incorporated. The Royal Navy and Defence Equipment and Support (DE&S) are working with industry and NATO to understand how low/no CO_2 emission fuel and propulsion systems could be incorporated into future ships such as the T32 Frigate and the Multi-Role Support Shipping. Better collection and use of data to accurately determine energy and efficiency across a platform and understand equipment degradation, will allow targeted operation and maintenance, reducing the carbon impact of the platform and the supply chain. Future platforms are being designed with a net zero lifecycle and supply chain in mind.

Adapting green technology for use in warships is no small challenge, with current low emission fuels and systems such as hydrogen or methanol being introduced in the commercial market not compatible with the requirement for a warship to place itself in harms way and maintain a level of operational safety. However, the net zero 2050 headmark sets a common goal for the Ministry of Defence and industry, which should see a substantial acceleration in the adoption of these technologies.

RAdm Paul Beattie
Director Naval Staff & Royal Navy 2*
Sustainability Champion
Royal Navy

RFA Tidesurge photographed in Cornwall © Crown

Around the Services
British Army

Foxhound (rear), Jackal (front) and MAN Support Vehicle © Crown

The British Army is investing £200m over the next 10 years specifically on initiatives that will help to achieve its ambition to have a net zero carbon emitting estate by 2050, in line with the UK Government's target. The British Army is a major user of the Ministry of Defence (MOD) estate. Nearly 2% of the UK is owned or leased to the MOD and more than 80% of that are training areas or ranges. Many are designated for their biodiversity value, ranging from internationally important wetland habitats on the Lincolnshire coast, to the highly designated landscape of Salisbury Plain.

Showcasing a firm commitment to tackling the effects of climate change by harnessing renewable energy, in September 2021, the British Army's first photovoltaic solar farm was opened at the Defence School of Transport in Leconfield. Part of Project Prometheus, this is the first of four pilot sites that will enable the delivery of a further 76 solar farms across the MOD estate.

Similarly, at British Army Headquarters, a trial funded by the Defence Innovation Fund will deliver a car park with solar charging for up to 40 Ultra Low Emission Vehicles in February 2022. As well as providing power for military vehicles (white fleet), personnel can charge their private vehicles using the SWARCO payment system. A second phase is planned for six further solar carports across the UK.

On the Defence Training Estate, Nesscliff Camp, Shropshire is a great example of environmentally friendly building practices. The roof mounted solar panels, air source heat pumps and a heat recovery system in the showers and drying rooms generate power for the site. Employing SMART technology allows energy use to be monitored, reducing running costs.

The British Army is also pioneering solutions for increased power demand on the battlefield. The MAN Support Vehicle, the Foxhound infantry patrol vehicle and the Jackal reconnaissance vehicle are now designed with a low carbon future in mind. The large removable batteries allow power flexibility and vehicles can supply up to 500kW of power, the equivalent of nine diesel generators. Three British Army trucks will be able to power a full field hospital, running on electric power only.

Outside the UK, British soldiers in Mali have been testing portable power banks, methanol generators and lithium-ion batteries paired with solar panels to supplement power for a patrol base. Using renewable energy lessens the weight carried by personnel and reduces the impact on the local environment. In Belize, a British Army training unit has been working with a conservation charity to help protect endangered wildlife, and recent deployments to Africa have provided an opportunity for British soldiers to work alongside Game Wardens on the front line, protecting animals from poachers.

As green technology rapidly grows, there is more work to do. The British Army is pursuing a 'fast follower' approach, exploiting opportunities to provide an estate that is sustained in a modernised condition, supporting the delivery of operational capability, whilst meeting the needs of its people and complying with environmental needs and legislative requirements.

Maj Gen R. M. Clements CBE
Director Basing and Infrastructure &
Army Sustainability Champion
British Army

Solar farm at the Defence School of Transport, Leconfield © Crown

Around the Services
Royal Air Force

World's first flight using Synthetic Aviation Fuel © Crown

This year the RAF firmly signalled its commitment to environmental protection and sustainability with a number of bold initiatives and globally leading innovations that deliver exciting advances in defence aviation and environmental technology. Not least, the RAF has taken its first strategic steps on its journey towards net zero 2040. The following are but a handful of examples of significant achievements the RAF is immensely proud to share this year:

The world's first flight using Synthetic Aviation Fuel
The RAF, in collaboration with Zero Petroleum, won a Guinness World Record for the world's first successful flight using only Synthetic Aviation Fuel. Project Martin explored the use of Synthetic Aviation Fuel as a possible solution to reducing the use of fossil fuels. Gp Capt Hackett successfully flew the Ikarus C42 microlight aircraft, powered by synthetic UL91 gasoline, at Cotswold Airport to test the theory.

The synthetic fuel is manufactured by extracting hydrogen from water and carbon from atmospheric carbon dioxide, which is then combined using energy generated from renewable sources. It has the potential to save between 80% – 90% of carbon per flight without compromising the aircraft's performance.

First formal military flight to be re-fuelled by Sustainable Aviation Fuel
In November 2021, the Vespina took onboard a total of 43,000L of fuel prior to departure on the first leg of the Autumn Royal Tour. Of this, 15,000L were pre-blended Synthetic Aviation Fuel, leading to an overall Synthetic Aviation Fuel content of 13.4%. The Vespina departed RAF Brize Norton and arrived as scheduled at King Hussein International Airport.

The RAF Air Command's first annual environmental awards
Despite the challenges of the last 12 to 24 months, teams and individuals across the RAF have worked hard to deliver some exciting projects in the field of environmental protection and sustainability. The RAF recognised these inspirational efforts through the first annual Air Command Environmental Awards, commissioned by Deputy Commander of Operations, Air Mshl Gerry Mayhew, and passionately coordinated by the RAF Safety Centre's (CESO) Environmental Protection team. These exciting new accolades were awarded to winners in May 2021. RAF Air Command looks forward to launching the next successive environmental awards to honour excellence and a culture committed to environmental protection.

Project Vital at RAF Leeming
RAF Leeming is growing a 'living laboratory' to tackle carbon emissions and explore technologies that will help to address our environmental challenges. RAF whole-force personnel are working alongside academics and industry specialists as part of Project Vital, to find ways of reducing and recapturing carbon from the atmosphere with experimental solutions including moss walls, soil carbon sequestration, geothermal and solar energy. The initiative then explores how these technologies can be exploited across the RAF estate, to further drive net zero 2040.

Other projects include decarbonising the electric, heating and hot water supplies and replacing diesel vehicles with non-fossil fuel equivalents. Enhancing the wellbeing of the service family community by growing and nurturing crops, beehives and chickens, the Station is also growing its own food in polytunnels (see p. 20).

AVM Paul Lloyd CBE
Chief of Staff Support and Chief Engineer (RAF)
Royal Air Force

First Synthetic Aviation Fuel deliveries © Crown

Introducing the Directorate for Climate Change and Sustainability

The British Challenger 2 MBT of the 1st Royal Tank Regiment during Exercise Saif Sareea 3 in Oman © Crown

This year's Sanctuary Awards coincide with a period of extraordinary engagement on the climate change agenda. COP 26 kept the goal of limiting global warming to 1.5 degrees in sight and raised awareness around the consequences of a warming planet. Domestically, the UK Government published its overarching Net Zero Strategy and its key sector strategies (several of which will affect Defence), as well as its established 25 Year Environment Plan.

All this vividly underscores the Government's ambition *"to be the first generation to leave the natural environment in a better state than it inherited"*. Indeed, the new Environment Act is designed to tackle the biggest environmental priorities of our time. It puts in place historic steps to tackle air and water quality, plastic pollution and the restoration of habitat through legally binding targets.

We will need to embrace dramatic change to meet this ambition and to rise to the scale of the challenge. For the Ministry of Defence (MOD) this powerful shift will need all of our support, at every level of the department and across the entire force. Through the Directorate of Climate Change and Sustainability we will work to embed sustainability and climate in strategy, policy and process. We will support and enable all stakeholders to ensure that Defence plays a full role in contributing to the net zero commitment.

Driving net zero will require a broad and rapid commitment from across all sections of the MOD and this year's Sanctuary Awards reflect the already high levels of commitment from staff. The construction of new carbon neutral training accommodation across the UK (p. 7), demonstrates how the consideration of Defence's impact on the environment is already being embedded. While efforts to tackle illegal wildlife trades in Malawi, Sierra Leone, Gabon and Zambia (p. 24) show this is a truly global effort.

Outside of reducing emissions and nature recovery, Defence also needs to adapt its capabilities to a climate changed world. Global warming is already amplifying global instability and the causes of conflict. Increased climate variability and extreme weather events such as heatwaves, flooding, and droughts, will all have implications on our force structure as well as on the nature and frequency of Defence activity across the globe. It is clear that failing to act now risks our future effectiveness and resilience.

I congratulate this year's Sanctuary Awards winners and look forward to working with you in the future as we move towards this critical goal.

James Clare
Director Climate Change
and Sustainability
Ministry of Defence

James Clare, Director Climate Change and Sustainability © Crown

Little House on the Prairie – building a Bronze Age roundhouse

An armoured personnel carrier passes the excavation site during recording © Harvey Mills Photography

Dunch Hill on Salisbury Plain Training Area is a busy place. The tracks across it lead directly to the driver training area and the growl of Warrior, Challenger and Trojan tanks. Furthermore, during the training for campaigns in Afghanistan and Iraq, this area was a small centre of population – with ISO container buildings, fences, and villagers. This location had indeed once been a thriving settlement – though this was some 3,000 years ago.

When the Ministry of Defence (MOD) decided to upgrade the track network on the Plain in 1995, Wessex Archaeology were employed to investigate the area to check for any archaeological elements that might be affected. Directly below the tracks were a series of postholes – all that was left from timber uprights that had been driven into the ground. These formed a number of circles and represented the remains of Late Bronze Age roundhouses – some 3,000 years old. In addition to the postholes, a human cremation was found, along with a great deal of pottery and the remains of a midden. This information added hugely to our understanding of the prehistoric landscape at this point. Not only was there a Bronze Age midden and (at least) four houses, there were field systems and huge linear ditches which demarcated tracts of land. This was a thriving farming area and was incredibly well-preserved; certainly worthy of the protection afforded it by Historic England, as this is one of the larger scheduled monuments on Salisbury Plain.

In the 25 years since the archaeological fieldwork, much farm ploughing and military training has taken place nearby and so the site was deemed perfect to assess the MOD's curatorial regimes and to see if the Bronze Age village was more extensive than simply the four houses below the road. Dunch Hill thus became the 2020 focus for Operation Nightingale excavations and the work of military veterans as a part of their recovery process. Op Nightingale is an initiative to assist the recovery of wounded, injured and sick military personnel and veterans by getting them involved in archaeological investigations.

The team stripped an area not covered by nature conservation legislation that lay between the designated monuments. Much to our delight, this revealed a series of postholes standing out as brown circles against the white chalk in much the same way as the fur of a Dalmatian dog. In fact, there were so many features that it was difficult to work out the patterns of any structures. What was immediately clear however, is that military training had not had any effect on the buried archaeology, though farm ploughing (stopped around 10 years ago) had removed traces of the midden area. As the veterans and

Adding the first lintel to the posts of the roundhouse © Harvey Mills Photography

archaeologists excavated the site, they found a great deal of Late Bronze Age pottery associated with the presumed farmstead. There was almost nothing by way of military detritus on the dig, but a small military position did yield the find of the year – a bronze disc-headed pin, around 3,000 years old and recovered by Chris, a former Fusilier.

The excavation leader, Phil Andrews spent a good deal of time looking at the site plans and was eventually able to pick out some features including a series of what are called 'four-post structures'. Found in the Late Bronze and Iron Ages these structures represent elements like granaries, with the four timbers holding up a platform for grain, which restrict the access of pests like rats, in much the same style as staddle stones on later barns. Finally, Phil could see an arrangement of postholes that ran in a circle, and which had a central post too. This was the house the team had been searching for – of a diameter around 7m. The Bronze Age settlement was thus definitely more extensive than a simple ribbon development picked out, by fortune, under the military track. But what did these houses on the Plain look like? The simple answer is that nobody knows and this is where the second phase of the project came in.

Thanks to an Armed Forces Covenant grant made to the Step Together charity, and in partnership with Breaking Ground Heritage, the veterans were able to work at Butser Ancient Farm in Hampshire to build a roundhouse. They took the floorplan of the excavated structure and tried various techniques to see what the house may have looked like, using materials available on the Plain and the tools available in the Bronze Age, from antler picks to bronze axes. Whilst it was informative to try these methods, it has to be said that more modern tools always won out in their selection by the veterans in the end.

Prof Alice Roberts holding the Bronze Age memories urn in front of the roundhouse – with veterans Jackie, Richard, Elaine, and John © Harvey Mills Photography

The house floor was stripped of turf under the supervision of Time Team's Dr Phil Harding and this material was used to create one of the walls. Others were made simply of earth, clunch (a mixture of chalk, earth, water and straw) or of wattle holding similar materials and even sheep wool. All were perfectly consistent with what had remained on-site and should provide really useful data to specialists of this time period on what might have been the chosen building styles on the Plain. All of which were decidedly sustainable.

The team also smelted and cast bronze, made cord to tie rafters and learned to thatch the structure, which was officially opened by Prof Alice Roberts in October 2021. The team had gone from starting the investigation to producing a workable impression of the building in just over a year – and the veterans had learnt new skills and enjoyed each other's company in a particularly testing year at the same time. Some have been so inspired by the programme that they have now started archaeology courses at university or are volunteering as guides at heritage sites.

What of Dunch Hill now? Well the excavation was carefully covered over by a JCB, and the field restored for use in military training serials – safe in the knowledge that the archaeology is protected. We will never know how many Service Personnel realise that they are driving across such an astonishing site.

Veteran Kevin pours liquid bronze into an axe mould © Harvey Mills Photography

Richard Osgood
Senior Archaeologist
Defence Infrastructure Organisation

Livestock and the carbon stocks of **Falkland Islands whitegrass camps**

Whitegrass is the dominant grass species across the Falkland Islands camps © David Higgins

The Falkland Islands hold the highest proportion of peat-wetland cover of any part of the United Kingdom (UK), including the UK Overseas Territories, with carbon storage estimates of 934 million tonnes. As well as holding huge carbon stores these peatlands support valuable habitats containing globally important fauna and flora. The ecosystem benefits from these habitats include soil erosion protection, carbon storage, visually stunning landscapes as well as providing the major water catchments for the Islands. The Falklands Conservation (FC) Darwin Plus Peat-Wetland Project is working alongside the UK Centre for Ecology and Hydrology (CEH) and Royal Botanical Gardens, Kew, to develop deeper awareness of these habitats.

As part of the wider project the Department of Business, Energy and Industrial Strategy provided match funding to explore the potential for above ground carbon storage in whitegrass *Cortaderia pilosa* camps (large open pastures). Whitegrass is the dominant habitat across large swathes of the Falkland Islands and is most likely a climax vegetation. There are locations where whitegrass tussocks reach over one metre, offering potential for inclusion in future carbon offsetting schemes with additional benefits for biodiversity and reduced impacts to soils from wind-drying.

There have been suggestions that ungrazed tussock whitegrass could hold over 10 times the carbon stock of heavily grazed whitegrass camps. However, studies also point to a reduced standing crop of whitegrass under intensive grazing leading to the loss of large tussocks and the potential for habitat change, soil erosion and biodiversity impacts.

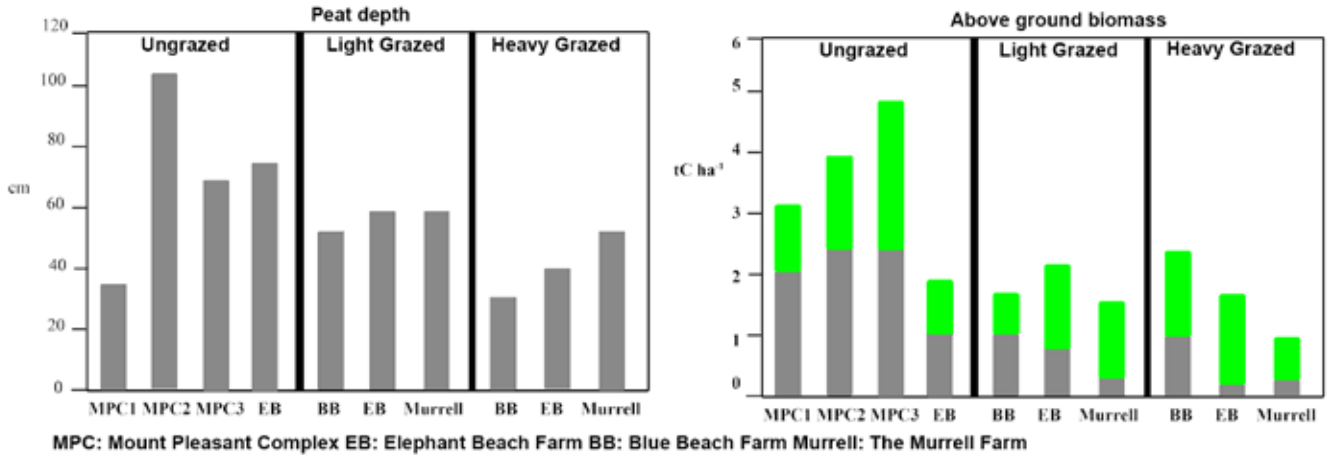
The whitegrass camps at the British Forces South Atlantic Islands (BFSAI) Mount Pleasant Complex (MPC) hold some of the densest whitegrass in the Falkland Islands. Many have been ungrazed for at least thirty years, offering opportunities to develop understanding of vegetation and soil trajectories when grazing is removed.

The hypothesis is that both above and below ground carbon will increase, with increased soil moisture and reduced soil erosion, if whitegrass camps are destocked. The MPC camps offer a window to this. Due to the absence of grazing, the whitegrass vegetation at MPC has developed a thick sward with an associated community of dwarf shrubs including fachine, Christmas bush, diddle-dee, mountainberry and teaberry, and an understory of more delicate species such as Antarctic bedstraw, small fern and emerald bog. In conjunction with these changes, it can be expected that peat soil development will be enhanced due to raised water tables, as well as decreased erosion risk and elevated carbon levels. If such patterns exist it would allow understanding of how the Falkland Islands peat-wetlands may change if left ungrazed over decadal periods.

To develop this understanding the project team needed to survey camps under a range of grazing pressures including highly grazed, low grazed and ungrazed to determine above ground carbon stocks and peat soil properties. While many of the Falkland Islands farms contain high and low grazed whitegrass camps, not all hold ungrazed camps. Due to this it was essential that the team worked directly with BFSAI at MPC. During the project

Site	Peat Depth	Biomass		
		Whitegrass	Other species	Total
	cm	t c ha $^{-1}$	t c ha $^{-1}$	t c ha $^{-2}$
MPC Ungrazed 1	30	1.98	1.32	3.30
MPC Ungrazed 2	>110	2.42	1.35	3.77
MPC Ungrazed 3	70	2.37	2.47	4.84
Elephant Beach Ungrazed	75	1.18	0.85	2.03
Blue Beach light grazed	50	0.95	0.78	1.73
Elephant Beach light grazed	55	0.76	1.41	2.17
Murrell light grazed	54	0.40	1.12	1.52
Blue Beach heavy grazed	30	0.98	1.57	2.55
Elephant Beach heavy grazed	41	0.34	1.32	1.66
Murrell heavy grazed	56	0.37	0.66	1.03

Mean peat depth and above ground biomass by grazing intensity © Chris Evans



Peat depth and estimated tC ha^{-1} for the survey sites. In the right hand chart the grey represents whitegrass and the green all other vegetation types © Chris Evans

the team worked on 13 camps based on five farms as well as Falkland Islands Government (FIG) common land and three ungrazed camps at MPC. As one of the few locations where the absence of grazing could be measured in decades, working at MPC enabled the team to meet their objectives.

The MPC field visit was facilitated and hosted by Kevin Lane, Theatre Environmental Protection Officer, who further assisted by volunteering during the surveys. At each camp four sample sites were identified at which all plant species were recorded within a 4m^2 quadrat. At the centre of the quadrat a smaller 50 x 50cm quadrat was created where all the vegetation was harvested down to soil level. The harvested vegetation was then separated into two components. The first fraction was whitegrass only with all other vegetation making up the second fraction. Measurements of average sward height and soil depth were then taken while a simple penetrometer was deployed to identify the depth of any soil compaction. Finally, soil samples were taken from the centre of the quadrats for soil bulk density, carbon and pH analysis.

The samples where later analysed at the FIG Department of Agriculture laboratories in Stanley. Both the whitegrass and all other vegetation fractions were sieved through a 2mm sieve to remove any soil present. Both sample types were dried at 60°C for 23 hours and then at 100°C for 1 hour to remove all water from the samples. The dried samples were weighed to provide an assessment of above ground biomass and then multiplied by 0.52 – a standard for calculating the carbon content of dried vegetation. The project provided understanding of soil properties under the different grazing regimes as well as an extrapolation of above ground biomass per hectare.

The most striking feature of the results is the higher biomass and carbon stock (accompanied by changes in other species present) at the MPC sites. As these sites have been ungrazed for over 30 years they appear a good indicator of the likely trajectory of vegetation change if grazing is ceased. The team noted other benefits at ungrazed sites e.g. both sward height and soil moisture levels increased, suggesting higher vegetation offers a buffer against the almost constant wind-drying impacts found in the Falkland Islands. With increased soil moisture comes a greater potential for peat formation and so the benefits of grazing stock removal cascade from vegetation growth to soil formation, offering a two step benefit for carbon accrual.

There are also benefits to biodiversity. At the MPC sites a shrubby layer of plant species had developed with good stands of fachine and other species including Christmas bush, teaberry and mountainberry. While the team did not record bird or invertebrate species it seems likely that increased habitat structure will benefit wildlife through heightened niche availability. This would offer potential for wider functional groups such as detritivores, predators and prey species enhancing ecological relationships at ungrazed sites and suggesting that management for carbon storage will also benefit wildlife.

David Higgins[1] & Chris Evans[2]
Peatland Biodiversity Project Manager[1] & Biogeochemist[2]
Falklands Conservation[1] & CEH[2]

Landscape towards MPC overlooking Tumbledown, Mt Challenger, Mt Kent & the Two Sisters © David Higgins

RAF Leeming's **polytunnel** homestead

A thriving polytunnel at RAF Leeming © Gp Capt B. Crawford

Beginning its journey to a sustainable future, RAF Leeming based in North Yorkshire, sought to repurpose a piece of land into a Station allotment. After some lobbying, the RAF Benevolent Fund very generously offered to fund the initial outlay of £18,000 to purchase a 40m long polytunnel.

Once the polytunnel was constructed, the team built 57 internal raised beds and a number of adjoining potato bins. Most of the materials used to build the plots were sourced from local adverts, local tips and unwanted materials, reducing waste and keeping costs down to a minimum. Since its build in 2018, the Station allotment has gone from strength to strength. Although still in its infancy, the benefits of this community allotment are without doubt.

During lockdown the need for a mental and physical focus was found in the refuge of growing plots and the allotment community tripled. Produce was in abundance and the sense of achievement when members took home their first bounty was palpable. Members swapped growing tips, traded vegetables and shared the upkeep of the allotment. Word spread and the waiting list for plots began to grow. As the number of members grew so did the membership fund, which allowed the community to buy more tools, seeds and materials.

As everyone experienced, the pandemic severely restricted our routine social interaction. The impact of this is arguably not yet understood, but throughout RAF Leeming's allotment provided a safe place. It offered a physical and mental lifeline for everyone involved, especially those who were unaccompanied on base. We truly believe the polytunnel offered a critical escape from the all-consuming pandemic and its therapeutic effects were immeasurable.

In addition to the Station community, the polytunnel also provided the on base nursery with a large plot which allowed its children to continue their 'plot to plate' education. The joy and excitement of the pre-school children learning and playing in the polytunnel was not only inspirational but also a legacy that will reap generational benefit. The authors will always chuckle at the sight of clean children entering the polytunnel, only to leave 20 minutes later covered head to toe in topsoil and compost, much to the frustration of the exceptionally patient and brave teachers.

Bees are a fundamental part of growing fruit and vegetables. In mid-2020, the community beekeeper successfully located an area surrounding the polytunnel to safely home some incoming bees. The unused land between the polytunnel and the hives was also identified for a wildflower meadow and small orchard. These would enable the bees and other insects to improve the immediate polytunnel biodiversity. In October

2020, the community welcomed their first hive and by spring 2021 this had grown to three highly productive hives, providing the community with deliciously rich honey. The beekeeping initiative also offered the opportunity to educate both children and adults on the importance of pollinators. For those braver souls, beekeeping suits were made available, enabling active participation in the care of the bees.

As the community grew so did its ambition. Not content with its beehives, wildflower meadow and orchard, the community set its sights on converting an adjoining decommissioned weather station into the perfect chicken home. In true 'Ground Force' style, the team quickly cleared the area and levelled the ground in preparation for some rescued hens. Wood chippings sourced from felled trees on base were used as a floor covering, in addition to repurposed slabs, paving and refuge bins. The coop was forged from recycled pallets and fencing and a drinking water system was installed.

The community came together to volunteer on the chicken rota, which involved feeding and completing daily health checks. Once the girls moved in the team were contacted by a local farmer who was looking to rehome his cockerel 'Chisel'. Nine girls and one feisty boy later, our allotment was complete. In the following weeks it was realised that the team had accidentally created our own Leeming ecosystem, providing vegetable cuttings to the chickens, collecting eggs and then using chicken manure to support our growing vegetables. Used chicken bedding and the manure were both added to the three stage composting system, designed to provide the community with fresh and free compost – a remarkable but glorious accident.

Sgt Mckinnel instructs another service person on the handling of bees © Gp Capt B. Crawford

The polytunnel team at RAF Leeming have created a wonderful space which not only improves the lives of all those involved, but also significantly enhances the local biodiversity. It is a truly remarkable achievement delivered by a handful of exceptionally passionate individuals. The Station polytunnel has turned into RAF Leeming's 'homestead' and it will not stop there.

The passion and ambition of the Leeming team have not wavered and the desire to expand into the wider community remains. The team are in initial talks for further polytunnels and are actively recruiting new members. A secure water source has been financed and the team hope to grow the 'pollinator park' with further investments of seeds and seating areas. With community activities planned, such as pumpkin patch competitions and allotment barbecues, the RAF Leeming team continues to build a superb template for sustainable community cohesion – mission success.

Vegetables grown at RAF Leeming © Gp Capt B. Crawford

Sgt Ross Mckinnel[1] &
Sqn Ldr Ant Casson[2]
Instructor JFACTSU[1] & OC 34 Sqn
RAF Regiment[2]
RAF

Refurbishment of the Glen Mallan Northern Ammunition Jetty

Marine piling early in the construction of the new jetty © VolkerStevin

The Glen Mallan Northern Ammunition Jetty on Loch Long in Scotland is the third and final jetty refurbishment to support the nationally critical £6bn Queen Elizabeth Class Aircraft Carrier programme. The Defence Infrastructure Organisation (DIO) worked with VolkerStevin, their designer Arch Henderson and other specialist suppliers to deliver an asset that will help keep the UK safe for decades. Jacobs acted as DIO's principal support provider.

As the scale of HMS Queen Elizabeth's first planned deployment ramped up, alternative on board ammunition storage methods became increasingly impractical and so earlier rearmaments were required. The DIO's project team were therefore challenged with bringing Glen Mallan's critical in-service date forward by nine months to March 2021.

The previous jetty, which was last upgraded in 1970, had reached the end of its natural life. The team jointly assessed whether it could be repaired and expanded. Instead, a complete rebuild option was selected as it provided additional operational availability to meet not just the carriers' needs but those of other Royal Navy vessels and NATO allies using the facility. An innovative three stage procurement process was developed to quickly progress from concept to construction, with the scope defined, design progressed and target cost agreed all whilst the DIO secured the necessary funding.

The team designed and built a new 135m long jetty comprising of 127 tubular piles that support the jetty's reinforced concrete deck. A continuous berthing face was created by placing 20 fender panels along the front, providing the flexibility for the Royal Navy's entire surface fleet to safely berth. Two huge specialist pedestal cranes were installed to load ammunition onto the vessels safely and efficiently. A fire fighting system, back-up generators and prefabricated modular buildings were also installed.

The team worked hard to develop innovative, cost effective and sustainable solutions with a 3D model of the below seabed rockhead informing the design. This meant the team could put overlength and rock shoes on piles to overcome large variances in the rockhead level, and drilling rock sockets through the pile sections improved the jetty's structural integrity. A hydraulic piling gate, which utilised already installed piles and the jack-up barge's mounted frame to hold 12 piles simultaneously, also saved multiple costly and time consuming vessel movements.

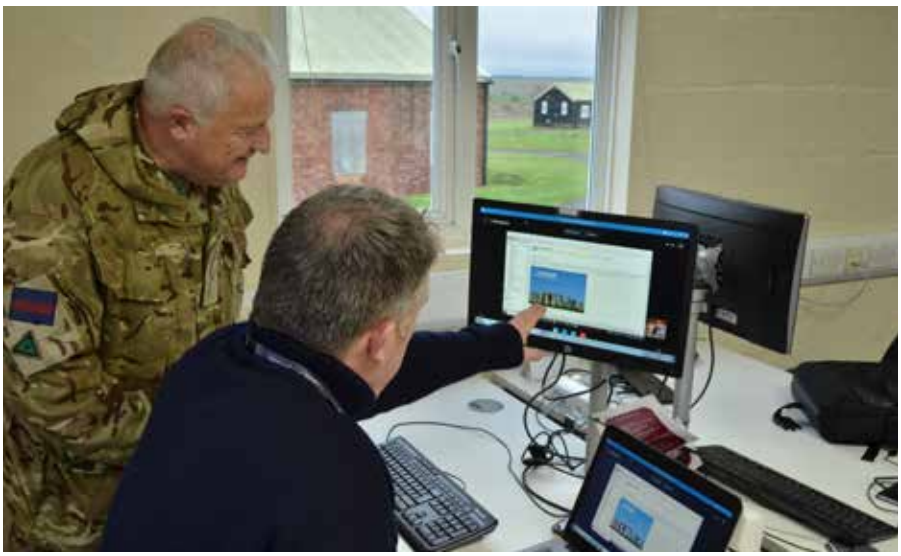
Protecting Loch Long's pristine environment was a top priority during construction. When demolishing the old jetty structure, capture blankets spread between pontoons prevented material or residue entering the water and all waste was then transported to a licenced recycling facility. Two marine mammal observers used underwater listening devices and visual inspections before allowing noisy piling works to proceed and work was halted if any mammals were spotted, allowing them the time to move safely away. The loch's new navigation markers are solar powered, which negated the need to lay new electric cables across the seabed.

HMS Queen Elizabeth sailed onto Loch Long for the first time on the 15 March 2021. Facility operators were trained during week-long dress rehearsals and a simple 3D model helped the Navy's logistics team and counter-terrorism police visualise the jetty and plan the berthing operation, which ran like clockwork.

Craig MacDonald
Project Manager
Defence Infrastructure Organisation

HMS Queen Elizabeth visits Glen Mallan © Crown

Creating the MOD's **Historic Environment Record**



Examining the new HER © Guy Salkeld

The Ministry of Defence (MOD) estate is vast and contains many thousands of historic buildings and archaeological sites. Understanding the significance of this resource is crucial and stewardship cannot be effective without good data strategies.

The estate is home to a wide range of heritage. Salisbury Plain Training Area, Wiltshire has produced a Palaeolithic bifaced axe, an Early Iron Age to Late Bronze Age midden with feasting debris up to 3m deep, a collection of Roman villages in the artillery impact area and is the site of a Battle of Britain Spitfire crash. Otterburn Training Area, Northumberland is home to a shrine to the Romano-British God Cocidius, which is carved into rock high above a vale. A First World War Anti-Aircraft Battery at DM Crombie, West Fife is one of only a handful of similar sites across the UK and the St Kilda historic landscape in the Outer Hebrides dates from prehistory to the 1930s, with mixed natural and cultural World Heritage Site designations. There is a Norman church on Stanford Training Area, Norfolk and Thor Cold War Missile sites at North Luffenham, East Midlands. Prehistoric 'cup and ring' marks swirl over rocks at Feldom Ranges, North Yorkshire, whilst RAF Spadeadam in Cumbria contains an historic Blue Streak Rocket. Gosport Oil Fuel Depot, Hampshire dates to 1907 and is an early example of the storage of fuel oil, and the Atomic Weapons Research Establishment storage area at MOD Shoeburyness, Essex bears the marks of hands that built the first British nuclear weapon, leaving their patina on surviving door handles, presses, tools and instruments. The smallest monument is a War Boundary marker, also in Gosport which got lost in long grass!

The Historic Environment Team (HET) provides expertise to help the MOD fulfil its responsibilities under the Protocol for the Care of the Government Historic Estate and Joint Service Publication 850. The team is small and responds to a huge number of queries relating to military operations, development control, infrastructure projects, environmental stewardship, sustainability appraisals, grounds and facilities maintenance, disposals, climate change, natural capital and recreation, and many more besides.

Information management is crucial in making the most of HET resources, delivering cost-effective advice and monitoring the performance of historic environment management strategies. The creation of a MOD Historic Environment Record (HER) is based on the Exegesis SDM Historic Buildings, Sites and Monuments Record database which has been purchased this year. The database combines text records with a mapping system and a digital library. The system incorporates MIDAS Heritage which is the UK Historic Environment Data Standard for recording information on buildings, archaeological sites, shipwrecks, parks and gardens, battlefields, areas of interest and artefacts. MIDAS is controlled by the UK Forum on Information Standards in Heritage and states what information should be recorded to support effective sharing and long-term preservation of the knowledge of the historic environment.

The HER records the extent, location and character of buildings and monuments. Records are held for activities such as condition surveys or excavations, and the archive they produce, for example photographs and reports. The records are compatible with the Infrastructure Management System allowing reporting into other MOD systems and dashboards. The HER also records consultations and their outcomes, helping to recycle information from project to project. Gathering the key intelligence, detective style, will enable the right decisions to be made to secure the MOD's incredible heritage for those who live, work and train on the MOD estate.

Guy Salkeld
Archaeology Advisor
Defence Infrastructure Organisation

A montage of heritage sources © Guy Salkeld

Op CORDED – 1st Battalion Irish Guards tackle poaching in Zambia

Training Zambians to use models to support patrol planning © British Army

Operation CORDED is the code name for the British Army's contribution to the fight against the illegal wildlife trade in Sub-Saharan Africa. Funded by the Department for Environment, Food and Rural Affairs (Defra), the operation focuses upon training and supporting park rangers who are responsible for the maintenance of the parks and protection of their wildlife. First launched in 2018 at Liwonde National Park in Malawi, Op CORDED has recently extended to Zambia.

Elements of Number One Company, 1st Battalion Irish Guards (1IG) deployed on Op CORDED 7 at the beginning of April 2021 and returned in early July. The mission was twofold; to deliver a training programme for members of the Zambian National Anti-Poaching Task Force (NAPTF), and to follow this up by stepping out on partnered patrols with Zambian Anti-Poaching Units. The relationship built between Irish Guardsmen and their Zambian counterparts was naturally symbiotic – what expertise the former could offer in the way of patrol skills and low-level infantry tactics was balanced by their remarkable bushcraft and affinity with the land. It was a privilege to teach and learn from them.

Op CORDED 7 was the second iteration of the British Army's contribution to anti-poaching in Zambia. Based out of Hook Bridge Camp, in Kafue National Park, Irish Guardsmen delivered a six week training programme for Department of National Parks and Wildlife (DNPW), and NAPTF rangers. As alluded to above, this course revolved around basic infantry skills, with the intention being to develop more effective counter poaching patrols on the ground. The course material covered, but was not limited to; navigation, patrolling skills, hand signals, formations and contact drills, evidence handling, emergency first aid, tracking, orders and planning processes. The end of this tuition period saw both 1IG patrol teams take to the bush accompanied by members of Zambia's Special Anti-Poaching Unit (SAPU). They deployed onto the ground for three day stints in search of poacher activity. The patrols turned out to be quiet, barring the finding of a few snares that were promptly dismantled and a previously used poacher camp site.

Nevertheless, these fleeting excursions were not an accurate reflection of the state of the poaching problem in Kafue. Bound by strict medical timelines and a lack of rotary assets, any intention or ability to punch deep into the bush away from the main roads was severely hamstrung. The Kafue National Park is a vast area of pristine wilderness – it covers some 22,400km^2, making it Africa's second largest National Park. Despite this,

Students on the Conservation Data Analysis Course © Stephen Vinall

its density of game is thinner than in comparable parks such as the Kruger in South Africa or Masai Mara in Kenya. It was plagued by heavy poaching throughout the 1980s and 1990s which set it back many years, and it has taken a titanic effort in the last couple of decades on the part of the DNPW, local tourist lodges and various Non-Governmental Organisations (NGOs) to turn the tide.

Poachers in the park can be split into two camps; high value species poachers, funded by international actors who mainly target ivory to be smuggled abroad and local 'bush meat' poachers targeting antelope species for subsistence. The former are more organised and better armed, but it is the scale of damage caused by the latter which has been problematic for the Kafue. Plains game are needed in high numbers to support prestige species, and it is these whose numbers are noticeably low in the Park.

DNPW research suggests that an estimated 4,000 – 6,000 poachers live in the Game Management Areas (GMAs) that surround the park. These are areas where the controlled culling of animals by licensed hunters is legal, however without fencing around the park there exists a porous border between GMA and the National Park across which poachers can move fluidly. It is against the backdrop of these problems that the DNPW, supported by NGOs such as Game Rangers International and private interests like Mukambi Safaris, have poured resources and funding into increasing the footprint of anti-poaching patrols across Kafue. Aerial surveys show that in the last decade alone numbers of red lechwe have increased by 487%, puku by 103%, Lichtenstein's hartebeest by 78% and blue wildebeest by 113%.

Delivering an Intelligence lesson © Stephen Vinall

Op CORDED's effort in Zambia have been focussed on equipping the dedicated teams of the DNPW and NAPTF with the skills to more effectively counter poachers in the Kafue. Feedback from the students was overwhelmingly positive, but as mentioned the flow of information worked both ways. This was nowhere more apparent than in the tuition of tracking, in which the seemingly innate ability of the rangers to follow human spoor, when to all British eyes it had dried up, was astounding. It was inspiring to see these awesome skills of bushcraft at work.

Op CORDED 7 represented an incredible opportunity for Irish Guardsmen and attached arms to live and work in one of the few untouched wildernesses left on the planet. To say it was a privilege does not do it justice, and to have experienced it alongside some inspirational characters in the DNPW and NAPTF was an honour. Their commitment to the preservation of the Kafue and its wildlife was humbling. On a continent in which the friction between these priceless sanctuaries and an increasing human population is only going to grow, the emphasis now must be on education and convincing all parties that the future existence of these habitats is in everyone's best interests. It is to this that conservation must turn its efforts.

At the time of writing, Op CORDED 8 has deployed to, and returned from, Zambia under the stewardship of the Royal Irish. Defra's stated intent is to create a 'green corridor' of protected parks across Sub-Saharan Africa, allowing animals to transit more safely across national boundaries. With its sights set on a deployment to Botswana at the back end of 2022, the next turn of the wheel for Op CORDED will undoubtedly be an important step in the realisation of this aim.


A herd of elephants in Kafue National Park © British Army

Lt Hugo Brewer
Platoon Commander
1 Irish Guards

Op Kingfisher – assisting service leavers with networking in nature

Floating *Ranunculus aquatilis* down the Avon © Fiona Galbraith

Inspired by the work of Operation Nightingale, Operation Kingfisher was devised by Oliver Howells, the Defence Infrastructure Organisation's (DIO) Senior Ecologist, and is now in its second year. Aimed principally at service leavers considering a follow on career in environmental conservation, land management or ecology, each event is designed around the concept of 'Do – Learn – Connect'.

Do

At the heart of each activity is a volunteer project hosted by a third party but run on the Ministry of Defence (MOD) estate. For example, in 2021 the Wiltshire Wildlife Trust's Water team hosted the project on three different events, all on the River Avon within or close to Salisbury Plain Training Area. On the first the volunteers planted trees and hedgerow plants to help consolidate a river restoration project near Tank Crossing Alpha. On the second they transplanted water crowfoot *Ranunculus aquatilis* to restore aquatic vegetation, restore natural flows and reduce the risk of erosion. On the third the group did some in river habitat restoration by working with a tree surgeon to harvest bankside trees and install them in the river. This created permeable woody dams and shoulders in order to capture silt, vary the flow rate and provide habitat and feeding grounds for various fish and bird species.

Learn

On each day-long event an ecologist, project manager or other qualified person provides a short talk on the reasons for the conservation activity, some background to the organisation and planning of the event and its conservation and ecological context. This helps attendees gain an insight into roles which might potentially suit them in their follow-on career. Attendees have the chance to ask questions as a group and to benefit from the input of other attendees' experience as well.

Connect

Working alongside each other, in teams comprising serving military personnel, recent service leavers, a career change coach and the project management team, naturally promotes rich conversation. Personnel of all ranks from across the services have reported that they discussed career options, built professional relationships, heard of forthcoming job opportunities and received invites to other conservation groups through the contacts made on Op Kingfisher. This is networking at its most natural and it works! Previous participants said *"I've met some really interesting people", "What a wonderful way to spend a day" and "I have had so many useful conversations".*

The project will continue into 2022 and beyond with events already planned for south-west and north-east England. On behalf of the participants all those involved in the project would like to thank the volunteer managers and others who had the imagination and determination to start the project.

Anyone interested in participating in a future event is invited to visit ruralink.org.uk/building-experience or contact the author directly via email fiona@ruralink.org.uk

Fiona Galbraith
Director
Ruralink

Volunteers and Wiltshire Water team project members pause on a tree planting day © Fiona Galbraith

The Armed Forces Equine Charity – working together and rebuilding lives

The team of veterans and their 'Bee & Bee' bug hotel © Paul Black

It is sometimes said that the hardest battles are saved for the strongest soldiers. But very often, these battles are fought in silence and isolation, and even the strongest can falter. The demand for the services of Tedworth Equestrian, The Armed Forces Equine Charity, has soared over the last two years largely due to repeated Covid-19 lockdowns and more recently, the triggering emotions of the Afghanistan withdrawal.

Tedworth Equestrian works with the Armed Forces Community around the UK. Beneficiaries include those currently serving and their dependants, veterans and those who have been bereaved, as well as the local community around where the Armed Forces are based. There are several equine centres in the UK created or supported by the charity. These are vital community welfare hubs where individuals will share experiences and develop friendships. This is particularly important for a community where so many are away on high risk military duty or are constantly moving locations to meet the needs of service.

The healing power of horses is becoming more and more widely appreciated. The Armed Forces Equine Charity has partnered with Warrior Equine, Horseback UK and the NHS 'Op Courage' scheme to provide therapy courses to veterans suffering from severe mental health issues. However, it is not just the connection with the horses that is important. On the most recent course participants were tasked with creating insect habitats using old pallets – a resource that is never in short supply around stables! Their teamwork culminated in the creation of the 'Bee & Bee' bug hotel.

Conservation activities and working with the horses have given the veterans a completely new lease of life. It is no exaggeration to say that these courses can be lifesaving. All the participants rated the improvement in their wellbeing from the lowest possible before the course to feeling almost as good as they can remember. The course was regarded by some as the absolute best week they have had in years. In the participants own words

"I believe this course would exceed anybody's expectations, in ways that are hard to explain until you have been in the deep dark places... I feel like I can breathe again".

"I wish I had been given the opportunity to do this course 20 years ago… You have made a huge difference in me, I am better, stronger and looking forward to what the future might now bring".

Tedworth Equestrian, The Armed Forces Equine Charity is doing incredible work for the Armed Forces community which is needed now more than ever. To learn more about their current projects or to get involved please visit their website www.tedworthequestrian.com

Amanda Smith
Media & Marketing
Tedworth Equestrian
The Armed Forces Equine Charity

A quiet moment for one course participant and his horse © Paul Black

Clean water ponds for great crested newts at Bicester Garrison

Garrison Commander Lt Col Alex Atherton was the first to break ground for Project Neptune © Gary Beckett

The value of ponds in the British countryside far outweighs their small size. At a landscape level they collectively support a greater diversity of freshwater plants, animals and more uncommon species than larger waterbodies like rivers or lakes. Approximately half of our ponds have been lost over the last century and an estimated 90% of remaining lowland waterbodies are degraded, often due to poor water quality and management.

Ponds provide a habitat for many plants and animals and recent research by the Freshwater Habitats Trust (FHT) has shown that landscape scale biodiversity in lowland agricultural landscapes can increase by 26% when clean water ponds are created. Ponds are not only important for aquatic biodiversity but also for terrestrial species, including pollinators and bats.

The role of ponds and other small waters in stemming wildlife declines is increasingly being recognised and regional and national policymakers are starting to address the historic neglect of ponds. Creating clean water ponds is relatively easy, cheap and provides a cost effective solution to reversing the decline of freshwater wildlife in the short term. As a result of the decrease in the number and quality of ponds, amphibians and other freshwater species have suffered, including great crested newts, which rely on ponds for breeding in the spring. Great crested newts are a European and nationally protected species, and a Priority species for conservation in the UK.

Bicester Garrison is an 1,000 acre site in Oxfordshire with an exceptional mosaic of natural habitats and matching diversity of species. It is a rare example in our present day countryside as it supports a large network of high quality, clean water ponds. The site is a stronghold for great crested newts, but many of the ponds are becoming overgrown or over shaded, reducing their value as breeding habitat and potentially threatening the long-term viability of newt populations.

Project Neptune was initiated in 2020 to enhance aquatic and terrestrial habitats for great crested newts and where possible the wellbeing of garrison personnel. The garrison, like many other Ministry of Defence (MOD) sites, is key for protecting freshwater wildlife in the area and the positive impacts of the project for nature conservation will reach well beyond the fence line.

Project Neptune is a collaboration between Newt Conservation Partnership (NCP) and Bicester Garrison Conservation Group. NCP is a non-profit, community benefit society and the delivery arm of NatureSpace's great crested newt District Licensing Scheme, which was developed in partnership with Amphibian and Reptile Conservation

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

Plant diversity has increased in the pond only eight months after restoration © Gary Beckett

(ARC) and the FHT. The aim of this innovative scheme is to improve the conservation status of great crested newts by charging developers for their impacts on newts and then compensating off-site. For every pond occupied by newts that is lost through development, NCP create or restore at least four high quality ponds and associated terrestrial habitat and seek to improve connectivity at the landscape scale. Compensation sites are monitored and managed for at least 25 years.

Phase one of Project Neptune began in October 2020 when two ponds were created and two existing ponds restored. All creation and restoration activities followed best practice guidance from ARC's Amphibian Habitat Management Handbook and FHT's Million Ponds Project Toolkit. Ponds selected for restoration had become silted up and dominated by dense stands of bulrush and sedges. Restoration focused on sediment and vegetation removal to create open water areas, which are required by newts for courtship displays during the mating season.

The new ponds were created in areas which increased connectivity between existing ponds, were close to current newt populations to promote natural colonisation and had a clean water source. The ponds were designed to have extensive shallow margins and wide drawdown zones, which are critical for freshwater wildlife.

Ensuring that ponds have a clean water source, free from pollutants such as agricultural chemicals and road run-off, is hugely beneficial for people and wildlife. Clean water ponds also provide a range of ecosystem services, for example ongoing research suggests they may play an important role as nature based solutions to climate change adaptation by sequestering carbon.

The new and restored ponds are surrounded by a mosaic of scrub, grassland and woodland. This habitat provides good foraging opportunities and shelter for newts, which are land based for approximately three quarters of the year. Ensuring ponds in the landscape are connected by good quality terrestrial habitat is vital for newt populations to enable the migration and dispersal essential for both maintaining genetic diversity and allowing expansion of their range.

Results from monitoring performed only six months after creation and restoration were very positive. Great crested newts were recorded in all ponds and crucially breeding populations were confirmed in three. Tadpoles of common toad, also a Priority species for conservation, and adult common frog were recorded in both new ponds. It will be exciting to see how the amphibian populations develop during future monitoring.

Phase two of Project Neptune began in September 2021 and saw the creation of two more clean water ponds, one of which will include an educational dipping area for use by MOD personnel and their families, local schools, and cadets. Around the ponds a mosaic of trees and flower rich grassland will be planted to complement the new ponds and provide a relaxing, wildlife rich space to be enjoyed by MOD personnel across Bicester Garrison.

Project Neptune is a fantastic example of how Bicester Garrison is actively contributing to the Government's goal of supporting nature's recovery, as detailed in the 25 Year Environment Plan, by restoring and creating Priority habitat for wildlife. The project has also helped to raise awareness of the importance of sustainable development and nature conservation within the garrison.

Additional pond creation and restoration is planned for the future, which will help to ensure Bicester Garrison remains an exceptional site for biodiversity in the long-term. Many thanks to Bicester Garrison's Conservation Officer, Gary Beckett, and the Garrison Commander, Lt Col Alex Atherton, for their outstanding support and enthusiasm for Project Neptune. For further information or references please contact Holly Williams at NCP via email hwilliams@newtpartnership.org.uk

Holly Williams
Project Officer
Newt Conservation Partnership

Holly Williams, NCP Officer for Oxfordshire, clearly pleased to have caught a great crested newt in a new pond! © Gary Beckett

Generating £83m of social value at RAF Lakenheath

KVF35 bird and bat box donations © Kier VolkerFitzpatrick

Kier VolkerFitzpatrick joint venture (KVF35) are working to deliver a large scale defence critical infrastructure and construction development at RAF Lakenheath, Suffolk. The project commenced in November 2018 and is supporting the programme to create the first permanent international site for US F-35As in Europe. The development includes construction of a flight simulator facility, maintenance unit, new hangars, storage facilities and supporting infrastructure. The Defence Infrastructure Organisation (DIO) and contractors KVF35 felt the project should also strengthen and support the local community. To date £83m of social value has been generated, far surpassing the initial target of £1m. Social value generation forms a key part of Government policy, with the pandemic having exacerbated existing economic and social challenges. Fully supported by its supply chain, KVF35 has achieved outstanding results aligned to the Government's PPN06/20: Social Value Model.

To date the team have organised nine volunteering days with local charities, generating over £9,000 of social impact. KVF35 also donated £3,000 of surplus lighting to the nearby East Anglian Military Museum.

Over an initial target of 30%, 42% of project costs have been directed to local small and mid-size enterprises, helping to tackle economic inequality. To date £61m of social value has been generated to the local economy, providing sustainable growth and demonstrating dedication and best practice. Over 130 local suppliers attended KVF35 meet the buyer events and the team also hosted supply chain training events, to support suppliers new to working in a secure environment.

KVF35 hosted one day virtual work placements and mentoring to 230 students from Nene Park Academy and eight virtual careers sessions were delivered to Mildenhall Academy, including the provision of C.V. writing workshops. The sessions have been well received by students and teachers and the team's innovative approach enabled continued student engagement and training throughout the Covid-19 pandemic.

To help fight climate change KVF35 installed three X-solar hybrid tower lights across the site. In five months the units have not required refuelling, saving over 4,800 litres of diesel and preventing greenhouse gas and particulate emissions. Project team volunteers planted 360 trees in Thetford, enhancing the local ecology. At Thetford Cemetery 14 bird and bat boxes were donated and installed, with existing boxes around the estate also being repaired and upgraded.

Promoting equal opportunity is important and the project has employed 65 apprentices, as well as providing 12 work placements to date for final year university students, military leavers (through Buildforce) and women (through Women in Construction). Six mentors are signed up with VETS, a mentoring programme for Service Personnel looking to begin a career in construction. Adam Hill, a military service leader said *"I felt a real sense of willingness to help and offer advice from everyone I spoke with – this is key for someone in my position looking to break into this industry"*. Multiple events were delivered to showcase career opportunities for women, breaking down stigma across the construction industry, including attendance at West Suffolk College career fair and the University of East Anglia #SheCan event in Norwich.

To aid wellbeing the team have trained 17 Mental Health Champions and three Mental Health First Aiders, driving a programme of initiatives including suicide awareness and prevention, tea and talk, stress awareness and resilience training for all staff.

Through innovative and sustainable methods of social value delivery, KVF35 will leave a legacy in the local community and on the local economy, lasting well beyond project completion. The outstanding social value results are testament to the hard work, collaboration and commitment of Rachel Newell, Social Value Manager and the KVF35 team.

Louise Bowyer
Bid Writer
Kier Group Plc

Hazel dormouse monitoring at Caerwent Training Area

Torpid adult dormouse © Gwent Wildlife Trust

Caerwent Training Area, Monmouthshire has played a significant role in the lives of the local community for almost a century. The human population are used to the sounds of explosions and gunfire, however there are also some much smaller residents who take just as little interest – hazel dormice. These tiny mammals weigh no more than 30 grams (the weight of an average light bulb) and are thriving in the woodland on-site.

Dormice are charismatic creatures, with orange-brown fur, big black eyes and an endearing habit of sleeping curled up, with their tail wrapped over their nose and paws. Sadly, they are now locally extinct in some parts of Britain, with their woodland homes lost to changing land management and recent wet winters making it challenging for them to survive ground level hibernation. This is reflected in their conservation status – assessed as 'Vulnerable' in both Wales and the rest of Britain, they are considered to be at high risk of extinction in the near future.

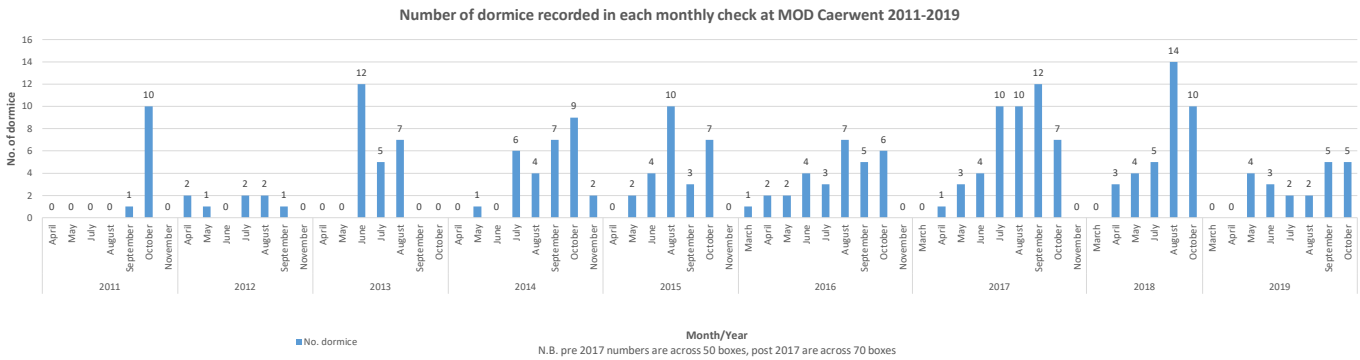
In partnership with the Defence Infrastructure Organisation (DIO), Gwent Wildlife Trust (GWT) has been monitoring the dormouse population on-site since 2011. GWT installed 70 nest boxes and when dormice are encountered, careful measurements of their weight, age, sex and breeding status are taken, to help monitor the health of this local population. GWT submit the data to the People's Trust for Endangered Species' National Dormouse Monitoring Programme, contributing to wider knowledge and understanding of the species at a national scale, with hopes it can help inform conservation strategies that will reverse the decline.

Dormouse numbers in much of Monmouthshire have been declining in recent years – probably because of wet winters. In the Caerwent Training Area they have been doing relatively well, with numbers in nest boxes steadily increasing, to a peak in 2017. This bumper year saw a total of 47 dormice recorded, of which 24 were juveniles/ babies – a positive sign of successful breeding in a healthy population.

The dormice are clearly not deterred by the military activity and may even get some protection from predators such as cats, but it is probably the underlying geology which makes it such a great place for them. The land is free draining and there are plenty of their food plants available in the woodland around the site perimeter. In recent years, DIO has provided support for this important population, carrying out coppicing works to enhance the woodland habitat. In 2019, GWT was awarded a grant through the DIO's Conservation Stewardship Fund to purchase additional nest boxes, allowing them to expand the monitoring round and replace old and damaged boxes elsewhere.

While Covid-19 has made it more challenging to monitor the population, GWT has continued to record live dormice and nests in their limited visits and looks forward to seeing how the population fares in the future.

Lowri Watkins[1] & Marilyn Lewis[2]
Evidence Officer[1] &
Volunteer Surveyor[2]
Gwent Wildlife Trust[1, 2]



Graph showing the number of dormice encountered, 2011 – 2019 © Gwent Wildlife Trust

Breathing new life into **HMNB Portsmouth's oldest buildings**

The Parade – failing exterior © Crown

The Parade, formerly known as Long Row, lies at the heart of HMNB Portsmouth, Hampshire. It comprises a terrace of nine houses built from 1715 – 1719 and is the second oldest surviving building on the site. One of the very earliest examples of a Georgian terrace, pre-dating the Royal Terrace at Bath by 40 years, it was built to house the senior dockyard officials and master craftsmen and is a Grade II* listed structure. Much developed in the Victorian era, it was largely converted to offices through the 20th century. By the turn of the millennium the structure was deteriorating rapidly, to the extent that only No 1 and 9 remained viable for use. Further deterioration of the roof, front and rear elevations combined with an unstable northern gable end, had led to widespread weather ingress and increasing structural instability.

In 2018, a full recovery and restoration project was initiated by the base infrastructure team in consultation with Historic England and Portsmouth City Council. The objectives of the initial phase of the project (2018 – 2021) were to stabilise the structure, recover weatherproofing through complete replacement of the roof structure, the repair of almost 300 sash windows, to restore power and drainage services and completely refurbish No 1 end terrace to occupancy close to its original Georgian design.

The project was managed by BAE Systems under the MSDF contract, with design by HLM Architects and delivery primed by Bryburns. Further phases of the project will restore the remaining seven houses and outbuildings to residences and planning suites in support of the adjacent Carrier Strike HQ.

This project is the first historic restoration across more than 70 listed structures at the base for almost 20 years. Pivotal to its success was the passion of the core project delivery team, the architects and artisans drawn in to undertake the skilled restorations. Although all work on buildings of this age brings unique challenges, the early establishment of a set of wider heritage stakeholders ensured the widest possible experience skillset was available, lessons could be shared, emerging problems could be swiftly addressed and project momentum maintained.

The first challenge lay in safeguarding the structure itself during the stabilisation and roof replacement phases. Although full scaffolding and cover were originally proposed, early and significant cost savings were achieved through the design of a sliding roof cover, allowing up to 20% of the roof to be worked on at one time.

Historic records showed that the north end of the building, No 1 and 2, had been built over a filled-in medieval pond. More recent survey had identified subsidence at this end of the building, but the early intrusive survey established that the northern gable

Weather ingress © Crown

end was now separating from the rest of the structure by up to 1.5mm a year. To rectify this, the project team developed a recovery method that involved removing the original stone floor slabs of the basement and driving 30 needle piles in that confined space, prior to the slab floor being re-laid.

All restoration activity has been faithfully documented in writing and through photographic records, in keeping with the building's national importance and for sharing with suitable historic bodies. Despite spanning all Covid-19 lockdowns, adjusted ways of working were rapidly developed, and this entire project phase was delivered on schedule and within budget, providing critical confidence in the affordability and deliverability of the remainder of the recovery work.

A key principle for the project was to ensure delivery of long-term sustainable outcomes – to make this a once in a generation investment that extends and enhances the building's long history. To that end, and working in conjunction with Historic England, the local council and maritime heritage groups, material selection and construction techniques sensitive to the original design were adopted wherever practical from the beginning. For the roof replacement, 90% of the existing timbers were recycled back into the new structure, with new seasoned oak for the essential new infills. The original slates came from Spain but were in a poor state overall and full replacement was necessary. Spanish slate was again procured for the new roof. Once the originals were stripped off, 20% were found to have some residual thickness and were subsequently used in a parallel re-roofing project on another, smaller, historic building.

The restored Georgian style living areas © Crown

During the restoration of No 1 to its Georgian style, almost all 19th and 20th century structural works were removed, lath and plaster were reintroduced and internal fittings, such as newel posts and balustrades, were salvaged from across the wider structure. Where invasive works disrupted original features, such as ceiling mouldings, all were restored to their original design. One such intervention, whilst rebuilding the north porch, unearthed a 17th century brick built culvert, predating the building itself. After suitable recording, it was covered in a layer of protective sand and the foundation rebuilt around it using lightweight 'flowcrete' concrete.

The Parade is a historic building of national significance. By 2018, its declining material state was of serious concern to national heritage bodies and it had been placed at Category A on Historic England's Heritage at Risk Register. Its location at the heart of the base means that handover to the Portsmouth Naval Base Property Trust cannot be achieved without substantial disruption to the base's operational role. However, by working closely with these heritage bodies and in recognition of both the quality of the restoration and the path to full sustainable use again, the building has been reduced to Category F and will be removed altogether as the follow-on projects mature.

Committing to full restoration of No 1 to its Georgian design has opened up greater freedoms in the development of the remainder of the terrace. This sympathetic restoration after many years of disinvestment, along with wider work on the nearby No 25 Store and Block Mills, has also significantly bolstered Navy Command's reputation in the care of its unique maritime heritage.

The Parade – restored front elevation © Crown

Iain Greenlees
Infrastructure Superintendent
HM Naval Base Portsmouth

Litter Picking Watch – targeting marine debris at Lydd Ranges

Debris regurgitated by the English Channel © Eric Brown

Litter Picking Watch Romney Marsh formed in 2016, when its founder Eric Brown was forced into early retirement due to ill health. Whilst walking his dogs across the Kent countryside and coastline, Eric became aware of the discarded litter strewn along pathways, roadsides and the beach. The sight of this litter propelled Eric into action. He began by simply picking the litter as he walked and posted progress on social media. Others then joined in, picking in their areas across the Romney Marsh, posting progress and commenting on the social media posts. The numbers swiftly grew, with quite an online following too and that is when the organised litter picks began.

This started with beach cleans, which drew fairly large numbers of locals who were keen to join in, and later expanded onto the roadsides for the more hardened crew, now referred to as the 'Hit Squad'. Over the past five years, the voluntary group has grown to 1,400 members, with a team of core pickers that clear their area daily. In 2020 alone 9,000 bags of litter were cleared from the Romney Marsh through the combined efforts of the group.

One area of the Romney Marsh that Litter Picking Watch have made a difference to is the foreshore of Lydd Ranges, a military firing range south of Lydd in Kent, which has been used for military training for over 150 years. Eric contacted the MOD at Lydd after the group noticed vast amounts of debris on the range foreshore, which due to its position jutting out into the English Channel, is a catch point for marine litter carried inland by strong westerly winds. Large volumes of historic marine litter lay inland, piling up some 300m from the high tide point, so deep that you could not see the pebbles.

In January 2019, having obtained the relevant permissions, Litter Picking Watch visited the ranges for their first litter pick. To date the group have carried out 23 picks, with an average of 18 volunteers per visit, clearing approximately 2,000 bags of litter as well as bulkier items such as pallets and five-gallon containers. Some of the items had travelled thousands of miles across the oceans from the other side of the world.

The aim is to stop the litter returning to the sea and further polluting the oceans or blowing inland and contaminating the nearby wildlife bird reserve. It is a cold, harsh, windblown cusp of foreshore during the winter, turning to a sun baked, parched, pebbled outcrop during summer. At first sight there does not seem to be any signs of wildlife taking up residence here, but when you look a little closer there are moths, bees, beetles, spiders and small rodents living amongst the gorse, sea kale and other vegetation that grows in the shingle. The group have even encountered a badger whilst clearing and quite often see rabbits scurrying into their burrows under the prickly gorse bushes.

Litter Picking Watch continues its fight against litter on the Romney Marsh and beyond, with growing numbers of dedicated volunteers out every day, picking litter and raising awareness. Further information can be found at litterpickingwatch.weebly.com

Eric Brown
Founder & volunteer
Litter Picking Watch Romney Marsh

Eric Brown receiving a citation from Brig Bartholomew, Head Overseas and Training, in recognition of the group's work to remove marine litter from the foreshore at Lydd Ranges © Crown

Nigel Linge – Project Ubique, Salisbury Plain Training Area

Nigel discusses the day's plans with volunteers Scott and Derek © Dale Wyatt

Since stepping into the role of Salisbury Plain Range Training Safety Officer in 2006, Nigel Linge has been an unstoppable, positive force supporting the balance of Ministry of Defence (MOD) training requirements with public access provision across Salisbury Plain Training Area (SPTA). This work has taken place under the moniker Project Ubique. 'Ubique', means 'everywhere' and is the battle honour of the Royal Artillery and the Royal Engineers.

In 2006 Nigel quickly witnessed the increasing blur between legitimate public access against the military training boundaries of SPTA. A multitude of paths and tracks lacked adequate signage to clearly define where the public could go, be they simply walking or venturing out in a 4x4. Nigel masterminded Project Ubique with the aim to improve the working balance of military training with public access, championing the mantra 'Certainty, Clarity and Consistency'. This means the public are certain where and when public access is available, ensures civilians and MOD personnel are clear where appropriate and legitimate public access lies and guarantees a consistent management approach to the provision of public access. In the project's early stages Nigel made fast steps to forge long lasting relationships with stakeholders such as Treadlightly and Wiltshire Council. These continue to support public access management.

Regarded as phase one of the project, an ambitious plan was made to stop 27 public rights of way within Larkhill impact area to improve safety and efficiency of use. In turn the outer permissive access and formal public rights of way were improved to create a better, joined up access network. Success was fundamentally down to Nigel forming amicable relationships with a wide range of stakeholders, including circa 20 Parish Councils. Nigel's dedication ensured this highly contentious phase was delivered without long lasting impacts on MOD reputation or costly intervention by the Planning Inspectorate.

Despite retiring in 2014, Nigel remains a highly active ally to the MOD. The Imber Perimeter Path has been upgraded to the minimum status of bridleway, allowing the public to enjoy this incredible landscape on foot, horse and bicycle, an achievement largely down to Nigel's persistence and engagement with stakeholders and volunteers. Nigel continues to devise and support new plans to improve SPTA access management under Ubique. He has at his fingertips a dedicated and enthusiastic volunteer force, offering their skills and time to carry out numerous path signing and clearance tasks across SPTA, using materials supplied through the Defence Infrastructure Organisation's (DIO) Conservation Stewardship Fund. Nigel encourages renovation and reuse of existing materials to ensure the work is as sustainable as possible, reducing purchasing costs and minimising unnecessary resource use.

Working partnerships have also benefited DIO in informing the public away from the Plain. The Green Laning Association (GLASS) has inputted into, endorsed and promoted the SPTA Green Laning Good Practice Guide. GLASS also produced a superb advisory video, promoting it via their web pages and YouTube, which is available at https://youtu.be/sDBFn6BMmcA

Nigel is a crucial part of public access management across SPTA and DIO look forward to many more years of his enthusiasm and support in what can often be a challenging area of environmental management.

James Nevitt
Senior Access & Recreation Advisor
Defence Infrastructure Organisation

Nigel oversees a signing task on Salisbury Plain Training Area © Dale Wyatt

Using **drones for marsh fritillary conservation** on the Lizard

A drone traversing a marsh fritillary site © Robin Curtis

Mention the word ‘drone’ within the Ministry of Defence (MOD) and immediately our thoughts are of high-resolution imagery which can be a major asset when used in surveillance. Advances in technology means that drones are becoming smaller, with longer flight times and better cameras, including radiometric cameras which are being increasingly used to detect the thermal profiles of objects which would remain invisible to a standard camera. Drones are increasingly being used in conservation. Ecologists from the Environment and Sustainability Institute at the University of Exeter are collaborating with 700X Naval Air Squadron (NAS) at RNAS Culdrose, Cornwall to undertake research on one of Britain’s most attractive and rapidly declining butterflies – the marsh fritillary *Euphydryas aurinia*.

Marsh fritillaries can usually be seen flying between mid-May and early July. Emergence dates are dependent on the warmth of the preceding months and like most butterflies, are being seen earlier due to climate warming.

Marsh fritillaries only lay eggs once a year and are restricted to damp grasslands where their sole host plant, the devil’s-bit scabious, flourishes. The females lay their distinctive batches of yellow eggs in suitably warm, sheltered locations which hatch after a few weeks. The gregarious larvae immediately create a silken web around the devil’s-bit scabious in which they feed until the autumn when they hibernate.

The larvae re-emerge early the following February and March and spin distinctive silken webs over the scabious plants, providing a platform for communal basking. At this time of year, when the silken webs are at their most conspicuous, larval web surveys are conducted to obtain population counts. The webs are easy enough to find but the terrain of many marsh fritillary sites are often extremely difficult to traverse. It is nearly impossible to undertake a survey without taking a tumble over a purple moor-grass tussock or going calf deep

A marsh fritillary larval web © Robin Curtis

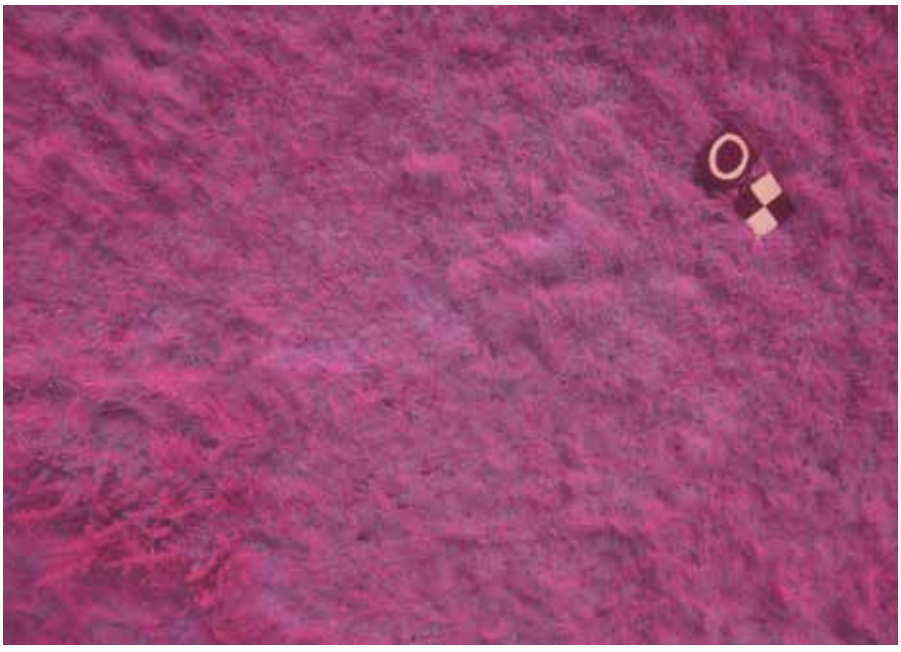
in a bog, much to the delight of any accompanying students or Kernow Conservation volunteers!

Work has been undertaken whereby a drone is flown in a grid across a site, taking photographs every few seconds. The many hundreds of images are then stitched together to create a 3D model which can be exported into mapping software to calculate aspect, slope and solar radiation properties. However, it is difficult to spot larval webs using a drone equipped with a standard camera, and researchers are currently using both thermal and multispectral cameras for surveys.

A freshly emerged female marsh fritillary © Josh Clarke

Marsh fritillary larvae are particularly suited to thermal imaging as when basking they are considerably warmer than the surrounding vegetation. Being black, they absorb a large amount of solar radiation, but reflect very little. The larvae need to maximise the absorption of radiation from the sun so they can raise their body temperature to activate a gut enzyme to digest the scabious leaves, and they align themselves within neat rows along their specially created silken veins, which are constructed perpendicular to the morning sun. Most larval webs occur within more southerly aspects and areas receiving higher amounts of sun.

Modelling from the drone images has identified that most larval webs occur in shorter turf, where ground temperatures are higher during February and March. This is a crucial time in the marsh fritillary life cycle when the larvae emerge from hibernation and develop rapidly before entering pupation in April. Actively managing sites is thus crucial to the survival of marsh fritillaries at the landscape level, with the creation of a mosaic vegetation structure with a mixture of sward heights being a paramount management objective. One way of achieving this is by burning small patches of heathland dominated by gorse (for example on a tenant farm at Hayle Kimbro approximately 400m north-east of the top of main runway) which restores a mixture of age structures and encourages the recolonisation of devil's-bit scabious.



A multi-spectral drone camera image. Larvae can be seen at 8 o'clock from the aerial target examples circled © Dave Luscombe

The original aim of the project was to collaborate on-site with 700X NAS, who use drones with thermal cameras, to help find marsh fritillary webs. Unfortunately this was curtailed due to Covid-19. However, as 700X NAS regularly fly over Predannack Airfield they have provided the team with imagery to use. Ecologists from the University of Exeter will continue to work with the MOD to identify the best cameras and drones to estimate population levels of marsh fritillaries and use the results to continue to advise land managers on conservation management. In the near future it is also hoped that closer collaboration will take place with 700X NAS, as using drones in conservation is such an exciting area of research.

Thank you to Predannack Conservation Committee, the MOD, Alexanda Recorders Fund and Cornwall Butterfly and Moth Society for providing funding for this project.

Robin Curtis
Researcher
Environment and Sustainability Institute
University of Exeter

Reducing single-use plastic from water consumption in the Middle East

The project's reusable metal water bottle © Capt Bob Jenkins

The UK armed forces have resided at a multinational coalition base owned by the United Arab Emirate (UAE) since 2013. The current contingency includes 906 Expeditionary Air Wing, Joint Force Support Middle East ((JFSp (ME)) and the UK Specialist Team Royal Engineers (Middle East) (UK STRE (ME)), who maintain and deliver operational infrastructure on behalf of JFSp (ME).

In June 2021, 517 Specialist Team Royal Engineers (Works) (STRE (Wks)) initiated a sustainability initiative whilst deployed as UK STRE (ME) in the UAE. It considered low cost sustainability projects within the base and selected a project to reduce the use of single-use plastic. The aim was to convert from using single-use plastic bottled drinking water to reusable containers, dispensed using water cooling stations. On average, deployed personnel consumed 18,000L of bottled water per month which used 36,000 500ml single-use plastic bottles per month, or 432,000 bottles per year. By converting two thirds of the supply within a six month period, it would save 273,600 bottles per year.

517 STRE (Wks) flexibly changed the Facilities Management Service Overseas (FMS(O)) contract with the contract provider (KBR) and requested a change for the drinkable water supply mechanism. This saved the Ministry of Defence (MOD) £479 per month (£5,748 per year) by switching to bulk, reusable water dispensers and included the free installation of 10 water cooling stations. Funding was secured to provide reusable unit branded water bottles which were granted to incentivise project adoption and encourage team cohesion. Key to the business case was the cost saving as a result of the bulk water transfer. A water station location survey was completed and management processes implemented. Cognisant of the challenges to change, stakeholder meetings were held to form a 'guiding coalition'. An influence campaign, including a video brief and posters, was used to communicate a vision for the project and to educate MOD personnel regarding sustainability. The quantified reduction in plastic was then communicated to reinforce the project's success.

MOD personnel received a reusable metal water bottle during site induction briefs, complete with hygiene information leaflets. A total of 400 metal water bottles were purchased (costing £4.42 per bottle, totalling £1,768) which was estimated to sustain manning at the base for a 12 month period. Sustainability and cost savings were the key drivers of the business case for the metal water bottles receiving approval – purchasing the bottles cost roughly a third of the annual savings made from implementing the project. The project has been fully adopted by MOD personnel on the base and is regarded a success.

The STRE launched this project as part of a scalable sustainability initiative for future STREs to use as a platform to deliver wider sustainability initiatives across the Middle East. It has several benefits incorporating the pillars of sustainability. Plastic waste and the associated carbon emissions from its production and logistics chain have benefited environmentally and the MOD has gained financially through the Contract Change Notification of the FMS(O) contract fees for water. In addition, the project had engendered social improvements through the education of MOD personnel regarding sustainability. It demonstrates quantifiable benefits by delivering a sustainability project and reducing the use of single-use plastic.

Capt Bob Jenkins
Garrison Engineer
517 STRE (Wks)

SSgt Binod Rai with the project's reusable metal water bottle © Capt Bob Jenkins

Watching the skies – the First World War AA battery at DM Crombie

Upstanding remains – the concrete gun emplacement and brick built troop shelter/ammo store © Tom Adie

DM Crombie is an armament depot on the upper Firth of Forth in West Fife, Scotland. It was originally built in 1910 to support the Naval dockyards at Rosyth, three miles down-river. The depot saw huge activity throughout the First World War, including in 1916 whilst arming Royal Navy ships during the Battle of Jutland. Due to the depot's importance, three Anti-Aircraft (AA) batteries were built to protect the site against possible Zeppelin air raids, some of which targeted the nearby Forth Bridge and Edinburgh. The actual dates of construction of the AA batteries are unknown, but they were in use by 1916, as indicated by a map of the defences from that year. A fourth AA battery was also built during the Second World War.

Only one of the AA batteries now remains and in 2018 it was designated as a scheduled monument by Historic Environment Scotland (HES). The remains consist of two circular gun emplacements made from concrete, along with two concrete and brick magazines or shelters and a smaller circular concrete feature, which may have been used for rangefinder or detection equipment to stand on. Documentary evidence about the battery does not exist but the size of the structures would indicate that it housed a light AA gun, the survivability of which is rare across the UK. The position of the remaining battery enabled it to cover the Firth of Forth and the associated Naval facilities at Rosyth as well as DM Crombie itself. By the Second World War the AA battery appears to have had a brick surround added, possibly for increased protection for the crew.

The historic importance of the remaining battery is underlined by the fact that of the 39 AA batteries built in Scotland during the First World War, only three now exist, including the example at DM Crombie. Furthermore, only an additional four are known to exist across the rest of the UK. Scheduling the site ensures that it will be protected from damage for the future and in 2021 money was raised through the Defence Infrastructure Organisation's Conservation Stewardship Fund to clear the site of scrub and other plants, to mitigate possible damage to the monument. This will be carried out in early 2022 in consultation with HES, to ensure that it complies with the scheduling conditions and demonstrates the MOD's commitment to the protection of the estate's historic environment.

In a wider context, the AA battery at DM Crombie is indicative of one of the largest construction efforts in British history, during the development of defences in the First and Second World Wars. Not only did this have an impact on the landscape, but on the local population as well, bringing the home front into direct correlation with the front lines. The AA battery at DM Crombie is testament to the rapid development of the war in the air during the First World War, and the threat to the home front, as well as the army in the field, from strategic bombing campaigns.

Alex Sotheran
Archaeology Advisor
Defence Infrastructure Organisation

A brick troop shelter/ammo store covered with a concrete cap and earth © Tom Adie

Meadow making at Cinque Ports Training Area

Pyramidal orchids colonising 'wildflower-seeded' arable reversion © Dan Tuson

Cinque Ports Training Area (CPTA) supports some of the finest chalk grasslands in the North Downs of Kent, home to a diverse array of flora and invertebrate life. The charismatic orchid species and the family of blue butterflies occupy centre stage as symbols of these cherished downs, showpieces for a rich community of species that retains a uniquely continental flavour amongst the family of English downlands.

A new approach

Decades of conservation work has focused on the protection and sensitive management of these fragmented grasslands, the last relics of a once wider network of unimproved grasslands. In more recent times an additional focus of conservation effort has been afoot, laying the foundations for the creation of a new generation of wildflower-rich grasslands.

Working in partnership with Defence Training Estate South East (CPTA) and the estate's tenant farmers, the local Natural England Land Management team have been busy on a long-term programme of wildflower grassland creation. Much of this is focused on the landholdings around the downland villages of Lydden, Temple Ewell and Swingfield on the East Kent Training Area, creating meadows from scratch on arable land and restoring species-poor grasslands. The aim is simple – to re-build, field by field, a network of new wildflower grasslands across the landscape.

The work has been undertaken over the last 15 – 20 years through the mechanism of agri-environment schemes, which have been integral to the enterprises of many of the tenant farmers on the estate. The grasslands are created and developed on each farm through a combination of natural regeneration, green hay spreading and native provenance wildflower seeding. The focus is on an opportunity based approach to allow the network of grasslands to evolve organically, field by field rather than to any premeditated or optimum target site based approach.

Since the early 2000s a rolling annual seeding programme has treated over 73ha of arable reversion and species-poor pastures through native provenance wildflower seeding and green hay spreading. Working with eight farms on the estate land and another 10 farms in the neighbouring wider countryside, this long-term work is now beginning to connect up large, contiguous networks of wildflower diverse grasslands amongst a mosaic of ancient woodlands, hedgerows and shaws. The native provenance wildflower seeded areas, which range from 1ha to 19ha in size, are complemented by another 68ha of grasslands and arable reversion on the estate that are developing through natural regeneration/colonisation. On the neighbouring farms outside of the

Green hairstreak © Dan Tuson

Small copper © Dan Tuson

Freshly emerged common blue © Dan Tuson

training estate, an additional 105ha of long-term arable reversion and grassland restoration work is in place. The grasslands are managed through a combination of grazing with cattle or sheep and hay cutting.

The native wildflower mixes typically include 12 – 15 perennial wildflowers able to tolerate a range of different soil types, creating a mosaic of grasslands across both chalk and clay soils. The annual 'meadow-maker', yellow rattle, is a key component where its role in suppressing grass dominance is critical to success of the early development of the grasslands. Integral to the success of the project is the close working between the Natural England adviser and each farmer on a 1 – 1 basis, so that adaptive management can be undertaken as and when required. This close working also fosters a relationship based on compromise and pragmatism, where existing species-rich grasslands may be used to accommodate occasional heavier grazing pressure in order to ensure that the developing grasslands are given every chance of success in the critical early years of establishment.

Funding

The capital funding for the native provenance wildflower mixes and the annual management payments are normally made available through the stewardship schemes. In 2020 the work programme was boosted with two additional sites and with funding for the wildflower seed cost being made available through the Defence Infrastructure Organisation's Conservation Stewardship Fund and for a separate area through Landmarc Support Service's Forestry Reinvestment Fund.

Whilst grassland habitat creation remains the critical key focus of all the schemes, many farms also take up the wider range of typical stewardship options, such as legume/herbal leys and hedge planting work to help add further links across the landscape. In recent years the hedge planting work has been spearheaded by an impressive Defence Training Estate initiative, using Forestry Reinvestments funding to undertake an ambitious annual programme of native species hedgerow planting. Combined with the Defence Training Estate's long-standing programme of annual coppicing on the area's ancient woodlands, these joint efforts are delivering a truly landscape-scale approach to conservation.

Skippers, blues and bats

Many of the grasslands are now developing a good range of flora and other wildlife seems to be responding well. Butterfly species such as dingy skipper, green hairstreak, wall and small copper are present on many of the arable reversion grasslands, whilst scarcer species such as Adonis blue, chalk hill blue and silver-spotted skipper are now being found in new sites within the wider landscape.

Working with Kent Bat Group, a monitoring project across the wider project area has provided a full season's worth of bat activity on the grasslands. The month by month record of bat activity over two seasons is revealing an impressive range of bats that have been recorded across arable reversion grasslands. Serotine, noctule and myotis species are present across all the sites as well as common pipistrelle and brown long-eared bats, all taking advantage of the increase in insect abundance across the landscape.

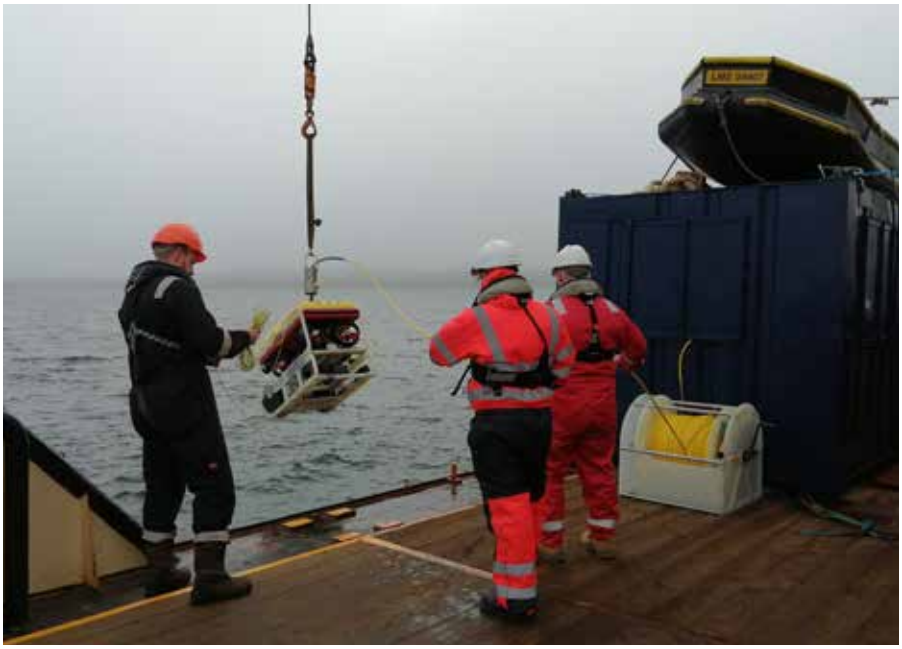
Yellowhammer, linnet, corn bunting, barn owl and grey partridge number amongst the breeding bird species on the estate.

The success of the project is no better exemplified than in the Warren and Upper Dour valley in the heart of the East Kent Training Area. Here a contiguous corridor of created wildflower grasslands has been built field by field over the last 15 years, linking the few fragments of ancient downland and a matrix of managed ancient woodlands to create a five mile long corridor of restored habitats. A short film to showcase the work has been produced by Natural England, with grateful assistance from the Defence Training Estate, available at https://youtu.be/0VRzUFfp_jE

Dan Tuson
Land Management Adviser
Natural England

Kent Bat Group downloading data from static bat detectors © Dan Tuson

The Ministry of Defence's **Wreck Management Programme**



The Falcon ROV being deployed over the side of the work boat © Crown

In the early hours of 14 October 1939, the battleship HMS Royal Oak was at anchor in Scapa Flow in the Orkney Islands when a German submarine U-47 snuck past the block-ships, entered Scapa Flow and fired a salvo of torpedoes at HMS Royal Oak's port side. U-47 then repositioned itself at close range and fired a further three torpedoes down the battleship's starboard side. Despite it being Scotland in October, it had been fine weather and so all the hatches were open. The ship took on water very quickly and sunk in just 13 minutes, with the loss of 833 men.

HMS Royal Oak lies inverted on her starboard side in about 30m of water, with the shallowest part three to four metres below the sea surface. The ship was fully loaded with 3,500m^3 of diesel and heavy fuel oil when she was attacked. An estimated 485 – 735 tonnes of oil was released during the sinking and more was washed out during the subsequent war years. This leakage stopped in circa 1945, but a gradual corrosion of rivets and seams by 1960 led to a slow but increasing leak of fuel from the wreck. Initially this was at a rate easily assimilated by the environment, however by the mid-1990s, local anxiety about the increasing leakage, together with growing concern about the stability of the wreck and the potential for a significant sudden release of oil, led to increasing pressure for action to be taken to protect Scapa Flow.

In February 1995, the then Defence Minister accepted that as the owners of the wreck, the Ministry of Defence (MOD) had a moral responsibility to intervene. In October 1996, as a short term measure, a patch was placed over the area of the worst leakage while longer term options were explored. In January 1999 an oil-collection canopy was fitted over the worst leak, but it was ripped off in storms several weeks later, taking the patch with it. At this stage it was accepted that the MOD had no choice but to remove the oil.

In 2001, a team of salvage engineering divers from Salvage and Marine Operations (SALMO), along with contractors from Briggs Marine, undertook a pilot operation to prove the practicality of hot-tapping HMS Royal Oak's tanks. Hot tapping involves attaching a valve to the tank boundary and hollow cutting a hole concentric with the valve, making sure that the boundary is sealed throughout, so that oil is not released. A hose can then be attached to the valve and the tank contents pumped out into another vessel.

About 604m^3 of oil was recovered during the first two years of hot tapping operations. The oil was transported by barge to Flotta, 16 miles away on the other side of Scapa Flow, for recycling at the oil terminal there. The design of HMS Royal Oak changed mid-build which led to a strange tank

A sediment core sample collected during the environmental survey of the wreck of the tanker SS Prudentia in Scapa Flow, Orkney, looking for evidence of hydrocarbon contamination © Crown

arrangement and internal complexity. This means that although a tank can be pumped free of oil, over time more migrates through the connecting pipes and internal cracks and resettles in those same tanks. Consequently, a SALMO salvage diving team returned several times over the following seven years and removed another 711m^3 of oil from the ship.

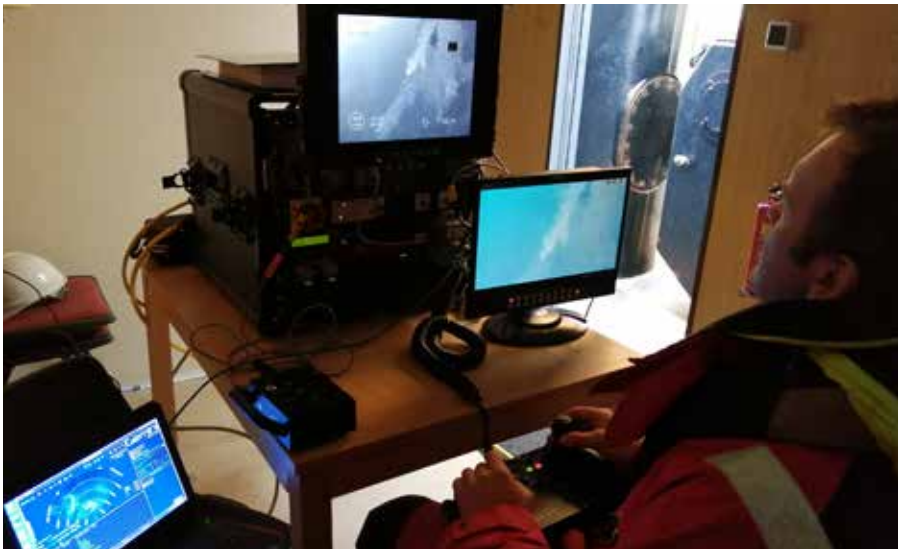
The pollution from HMS Royal Oak forced the MOD to face the environmental legacy of naval warfare and in 2009 the Wreck Management Programme was born to proactively manage the environmental and safety risks associated with its remaining wreck inventory. The Wreck Management Programme proactively seeks wrecks that still contain significant quantities of oil, using various tools and techniques, so that the remaining oil can be removed in a controlled operation, as with HMS Royal Oak. This process began with the prioritisation of the MOD's entire post-1870 shipwreck inventory, based on criteria such as ship size and location. The prioritisation, using easily accessible information, identified several hundred priority one wrecks, including tankers and large warships, that had been lost with significant quantities of oil.

Archival research is an useful starting point to determine what fuel and cargo a wreck might have sunk with, how much damage was caused at the time of sinking and where the wreck now lies.

Live colour video imagery of the wreck of the SS Prudentia being collected by the Falcon ROV © Crown

The team use the information from the archives, coupled with environmental data, to predict when a wreck might begin to leak oil. The rate at which these wrecks corrode is affected by environmental variables including seawater temperature, salinity and dissolved oxygen concentration, wreck topography, depth and epifauna. Corrosion rates are likely to increase as the seas warm and acidify in response to increasing atmospheric carbon dioxide concentrations, making the proactive management of oil spill risks ever more urgent.

In the field the team use a variety of techniques such as sonar imagery and Remotely Operated Vehicle (ROV) video surveys to determine the condition of a wreck. Tank contents can be assessed invasively by drilling into each tank or non-invasively using a technique called neutron backscatter, which detects the type of liquid on the other side of the hull. Seawater and sediment samples collected from around the wreck and analysed for hydrocarbon content can indicate whether the wreck has released oil or is currently leaking oil, and the amount of pollution that remains in the vicinity. The key questions the team want to answer are; is the wreck leaking oil, how much oil remains in each tank and will that oil leak in the future?



ROV survey to inspect the condition of the wreck of the tanker SS Prudentia in Scapa Flow, Orkney. The bottom left screen shows the output from the sonar and the other screens show the video output in black and white (top) and colour (bottom) © Crown

When requesting funding to remove oil from a wreck it is also important to know what the environmental and ecological impacts of an oil spill from the wreck will be. Computational oil spill modelling can predict the fate of potential oil spills which, when combined with geographical sensitivity data, can predict potential environmental and ecological impacts.

The Wreck Management Programme is managed by two full-time staff, Wreck Manager Matt Skelhorn and Wreck Environmental Scientist Dr Polly Hill, supported by the wider SALMO team. If you are interested in learning more about the Wreck Management Programme, then please get in touch!

Polly Hill[1] & Matthew Skelhorn[2]
Wreck Environmental Scientist[1] &
Wreck Manager[2]
Salvage and Marine Operations
Defence Equipment & Support

RNAS Merryfield's helicopters protect an **irreplaceable wildlife legacy**

RNAS Merryfield in south Somerset was involved in the D-Day operations and is still in regular military use today. It is now the satellite of RNAS Yeovilton.

The name comes from the moated Merryfield House, which once stood 500 metres south of the current runway 03. In the first decade of the 17th century this was the home of Nicholas and Dorothy Wadham, founders of Wadham College, Oxford. When the Second World War started the area that is now the airfield was, as it had been for hundreds of years, rural Somerset farmland. The wildlife was as rich as it had been since the days of Nicholas and Dorothy.

In 1942 it was decided to build an airfield on the site to assist with the forthcoming invasion of Europe. Initially known as RAF Isle Abbots, the name soon changed to Merryfield. Just before midnight on the 5 June 1944, 97 Douglas C47 aircraft of the 441st Troop Carrier Group of the United States Air Force took off for Normandy with paratroopers of the 101st and 82nd US Airborne Divisions, towing their Waco Hadrian gliders. Over three days 3,000 troops were inserted into the Cherbourg peninsular with the loss of three C47s and two CG-4A gliders.

Barn owl chicks at Merryfield © Roger Dickey

Bee orchid near the old fuel dump © Sue Sherry

After the War the site was used sporadically by the RAF, the Fleet Air Arm and Westland Helicopters (now Leonardo) from Yeovil. By the late 1960s the old bomb dump in the north-west corner, and the old fuel dump in the south-west corner, had become disused and thus havens for wildlife. At this time the airfield became more accessible as a pre-war road across the site was reinstated. However, whilst not in immediate jeopardy, the wildlife had no real protection from anyone intent on shooting, picking or collecting.

In 1972 the Ministry of Defence (MOD) decided that Merryfield would make a useful satellite training airfield for helicopters from nearby RNAS Yeovilton. The public road was again closed and only one or two civilian activities, such as the local model aeroplane club that had been flying there since the early 1960s, continued.

The Navy moving in was a real game changer from a wildlife protection point of view. Apart from the land within the perimeter track, very little of the remainder was used on a regular basis. Some rough and confined landing areas were required, but this only took a small percentage of the total and even these activities had little impact on the flora and fauna inhabiting such parts.

There were, from time to time, some quite successful attempts at monitoring the wildlife. The most significant of these was led by Tom Marlow, a conservationist working for the MOD. In the first years of this century a conservation committee was formed, led by the Navy with significant civilian input. However in 2014 this became dormant, apart from the Ornithology Group, due to admin requirements.

In 2017 the author, who has knowledge of the site going back to the early 1960s, started some survey work with small teams of specialist volunteers from the Somerset Wildlife Trust (SWT). This was made possible by the positive encouragement and

support of the Officer in Charge, his staff, and the civilian administrator.

Since the grass area within the perimeter track is regularly cut as a flight safety requirement, there are few species of note in that part of the airfield. That said, skylarks are common in the spring and summer and brown hares are seen throughout the year. However in the margins outside the perimeter track it is a totally different story. The local farmer does cut some of the outer parts, but readily complies with the request not to do so until after mid-July (allowing the deposition of the summer's crop of wildflower seeds).

Yellow hammer about to be released after ringing © Roger Dickey

The lack of agricultural improvement for over 80 years makes these areas a botanist's dream and recent surveys have confirmed the existence of seven orchid types. As well as the more common early purple, common spotted, pyramidal and twayblade orchids, bee orchids, greater butterfly orchids and southern marsh orchids have been found.

The richest single area, due to its size, is the old bomb dump. Here in spring one grassy section is a mass of cowslips. In other parts two of the author's favourite flowers, the delicate grass vetchling and viper's bugloss, abound. Other interesting species of flora include red bartsia, elecampane and corky-fruited water-dropwort.

One section, known as 'the sloping ground' is host to Dyer's greenweed. Its use by man in preindustrial days is obvious from the name. This is the food plant of two rare moths, one of which, *Grapholita lathyrana*, is only known to exist on two other sites in the UK.

Viper's bugloss © Mike Bird

Greater butterfly orchid © Sue Sherry

Although not noted for rare butterflies, marbled whites breed in two areas and the Butterfly Group of the SWT rate the airfield as one of the top two Somerset sites for the brown hairstreak. Both large and small skippers are abundant and grizzled skippers also appear from time to time.

The Ornithology Group regularly records in excess of eight pairs of nightingales breeding and they consider Merryfield to have the greatest concentration of this species in south-west England. The site is also renowned for its resident population of bullfinches and breeding barn owls.

Clearly not only is Merryfield a very important site for a significant number of rare flora and fauna species, it is also a secure haven for much of the more common wildlife. Although protection of the common species is an aspect that is often overlooked, it is far easier to keep a strong population flourishing than to struggle to revive a weak one.

So, to protect the ongoing richness of Somerset's wildlife, it is to be hoped that the Fleet Air Arm will remain at Merryfield and protect its wildlife heritage for many years to come.

David Bailey
Volunteer
Somerset Wildlife Trust

Landing Craft Tank 7074 – resurrecting a D-Day veteran

LCT 7074 moving to Southsea in August 2020 © Amy Savage

On 6 June 1944, Landing Craft Tank (LCT) 7074 took part in the D-Day Landings. She is now the sole remaining LCT seen at this action and is one of the last three known ships of this type in the world.

Over three exciting, and somewhat demanding years, The National Museum of the Royal Navy (a non-departmental public body sponsored by the Ministry of Defence), in partnership with Portsmouth City Council, undertook a conservation project to guarantee LCT 7074's survival for future generations. This culminated in August 2020 when she was put on public display outside the D-Day Story museum in Portsmouth.

LCT 7074 was originally launched in April 1944 by Hawthorn Leslie at their Hebburn Yard on the Tyne. She had a crew of two officers and 10 ratings as she sailed down the east coast of the UK with the 17th LCT Flotilla. The ship was under the command of Sub Lt John Baggot of the Royal Naval Volunteer Reserve. He was a 20 year old trainee solicitor from Swindon and his deputy was the equally youthful Sub Lt Philip Stephens. The 17th Flotilla were part of H Squadron and carried tanks from the British 7th Armoured Division – the famous 'Desert Rats'.

LCT 7074 arrived off the coast of Normandy on the night of 6 June 1944 but bad weather and congestion meant she did not unload her tanks until early on 7 June 1944. Sub Lt Philip Stephens described 7074's arrival in his diary *"With daylight we saw the Bay of the Seine packed with ships as densely as traffic in Piccadilly Circus. Cruisers, destroyers, troopships, LSTs, LCTs, MGBs, every type of ship in the Navy was there – at least 4,000 of them. On the bridge we had the nightmare task of steering 7074 through this mass of shipping, colliding only with one, which ripped away our port guardrails".*

After the D-Day Landings, LCT 7074 was constantly engaged in ferrying troops, vehicles and ammunition to ports across the Channel in support of the Allied Forces advancement; a role that continued well into 1945.

Sub Lt John Baggott RNVR © Steve Baggott

One of her last cargoes were a pair of mobile cranes, which were delivered to Antwerp in March of that year to assist with bridge building over the River Rhine.

Later in 1945, the ship was one of only three LCTs converted into a Naval Service Craft (Large) and chosen to join the war in the Far East. For this, her tank deck was fully enclosed to contain the workshops and machinery required to repair and maintain other small naval vessels. However, the war with Japan finished before she could be used.

In 1947, LCT 7074 was saved from the scrapheap by the Merseyside Master Mariners Association who turned it into their social club in Liverpool. It soon became known as 'Clubship Landfall', and reading rooms, stewards' living quarters, a bar and restaurant were created by building over the ship's tank deck.

Dwindling membership forced the Association to sell the ship to local businessmen George Evans and Colin Peers in 1971 and although the Merseyside Master Mariners still gathered there at lunchtimes, in the evening it was turned into a nightclub. The new owners created a light up dance floor, complete with stage for local bands to play on, and there were three function rooms. To improve the delivery of beer they even cut a hatch in the front of the ship!

Patching a hole in 2019 © Maritime Films UK

Re-floating LCT 7074 in Liverpool in 2014 © Nick Hewitt

LCT 7074 continued to operate as a nightclub throughout the 1970s and 1980s but repeated location changes made her harder to run and by the 1990s she had reached the end of her life as a business. She was acquired for the Independent Warships Preservation Trust who began the slow process of converting the ship back to its Second World War appearance, removing much of the additional superstructure, stripping out fittings from the nightclub era and repainting it. Sadly, the Trust folded in 2006 and by 2010 LCT 7074 had sank at her moorings.

In 2014, National Historic Ships UK and The National Museum of the Royal Navy hatched a plan to move LCT 7074 to Portsmouth, as the old ship could not survive for much longer in its current state. The ship was floated into a heavy-lift vessel, MV Condock V, at the Liverpool end of the operation, and rolled off into the Shipbuilding Hall in Portsmouth using a remote controlled 'self-propelled modular transporter' wheeled system.

Thanks to funding from The National Lottery Heritage Fund, conservation work began at the beginning of 2019. The ship was initially blasted with ultra high pressure water to flush corrosive salts out of the steel. The hull was then thoroughly dried and grit blasted. As the ship dried out, the team moved onto patching the many holes which had appeared since 1944.

Some of the original features which had been removed during the ship's many conversions were rebuilt. These included the octagonal 'Zareba' gun shields, ammunition lockers and a water tank. Perhaps the most significant addition was a new working bow ramp, replacing the corroded shorter version from her days as a Naval Service Craft in 1945. The ship was then repainted in her Admiralty Pattern camouflage scheme, reproduced from analysis of microscopic traces which had survived since 1944. Finishing touches included the 20mm Oerlikon anti-aircraft guns, the compass, chart table and wheel, replica food for the tiny galley and hammocks for the mess decks.

In August 2020, LCT 7074 faced perhaps the riskiest episode of her long life since taking part in the D-Day Landings – moving from Portsmouth Naval Base to her new home in Southsea. As was the case then, the entire operation depended on good weather and exceptionally high tides. After some delays, the ship was successfully loaded onto a barge, brought round by sea and landed on a nearby beach. She was then transported by road to the D-Day Story museum, where the amazing and varied history of this D-Day veteran will be enjoyed for years to come.

Kate Braun
Curator
National Museum of the Royal Navy

Sustainable net zero water heating systems at DIO (Nepal)

Solar panels being installed by a DIO (Nepal) engineer © Crown

British Gurkhas Nepal (BGN) was formally established in 1960 at Dharan, as a result of the Government of Nepal agreeing to move Gurkha recruitment from India. British Gurkhas Pokhara (BGP) was later established in 1978. BGN's mission is to enable Gurkha recruitment, provide support to Gurkha soldiers (past and present) and maintain disaster relief preparedness in order to support firm base activity in Nepal, in accordance with UK Defence Strategy.

Since 2010, as assets have approached Life Cycle Replacement (LCR), Defence Infrastructure Organisation (Nepal) (DIO (N)) have been replacing existing electric/diesel fired boilers with solar thermal systems and Air Source Heat Pumps. The project had three primary aims; to reduce electricity consumption and carbon emissions, to achieve payback within 5 – 10 years, and to ensure compliance with appropriate British Standards.

Solar thermal systems use heat from the sun to heat water, replacing non-renewable energy sources such as gas, oil and electricity. In order to heat water to a higher required temperature, or when solar energy is unavailable, an additional energy source is required, in this instance Air Source Heat Pumps. Kathmandu and Pokhara have irradiation levels of approximately 1753 kWh/y/m^2, that means a single 2m x 1m solar panel (collector) gives up to 9.61kWh heat energy in a day, equivalent to a 3kW electric immersion heater running for more than three hours.

A heat pump transfers low temperature heat from the atmosphere, water or ground and increases the temperature of the water using refrigeration gases as a heat transfer medium. Every 1kW heat pump has a heating capacity of between 3 – 4kW. When comparing this system to a traditional gas boiler, an electric powered heat pump can result in a carbon reduction of up to 30%.

BGP produces an astonishing 287MWh heat energy per year from its 164m^2 solar thermal collectors, thus reducing electrical consumption for domestic hot water to an almost negligible level. All installed Air Source Heat Pumps have the capacity to provide 115kW of heat energy from only 33kW electrical input, scheming a Coefficient of Performance value of 3.48.

This project has been funded within existing budgets as and when traditional water heating systems required LCR. Importantly it helps to meet the MOD's strategy of sustainability and net zero carbon emissions, by reducing electrical consumption and utilising renewable energy sources. All design and installations are being conducted by DIO(N) and their in-house civilian staff.

Although the initial capital cost is slightly higher when compared with traditional electric/diesel/gas fired boilers, calculations estimate a payback period of six to nine years with an estimated life cycle of 15 years (depending upon model and size of systems installed).

When considering traditional water boilers over solar thermal systems combined with Air Source Heat Pumps, immediate capital cost savings may prove to be a false economy. This sustainable and compliant hot water system provides civilians, military personnel and their families at BGP with a reliable hot water source, at a reduced cost and with a reduced carbon footprint.

Ram Sharan Thapa
Executive Officer (L) Technical
DIO (N) BGN

Energy class 'A' Air Source Heat Pump domestic hot water installation at Service Family Accommodation © Crown

Rediscovering the great fox-spider on Hankley Common

Hankley Common's Drop Zone – a vast site for re-finding a rare spider © Mike Waite

Hankley Common is a vast site, which spans the Surrey – Hampshire border and is part of the wider Longmoor Defence Training Estate. Most of this land contributes to the Wealden Heaths Special Protection Area, composed of several Sites of Special Scientific Interest notified for their lowland heathland, which supports a wealth of specialist wildlife. Hankley's biodiversity responsibilities are managed in partnership with Amphibian and Reptile Conservation and the lowland heathland is celebrated for its diverse spider fauna, which is as a result of the wide structural range within this predominantly open habitat.

Spider lists from heathland sites can be long and include many of our rarest species. One of these is the great fox-spider. First recognised as a British species at Bloxworth, Dorset in around 1900, it has been recorded since only at neighbouring Morden Common and at Hankley in Surrey. This rarity, combined with a lack of recent records, acquired it Priority status in the national Biodiversity Action Plan and an assessment as Critically Endangered in the 2017 Red Data List. The largest of four *Alopecosa* species in Britain and at almost 20mm long it is unlikely to remain hidden if present. Publication of 'The State of Surrey's Nature' by Surrey's Local Nature Partnership in 2016, exposed a need for refreshed data on many of the county's rarities in order to be confident of their true present status, so in 2018 new attention on the great fox-spider began.

The great fox-spider was last recorded near to the military training base in Hankley's northern 'Drop Zone'. This extensive central basin dominates the site and is used for logistics and minor infantry manoeuvres. The unique aspect of the site suggests a continuous wilderness, making it a popular filming location for movies such as James Bond.

Nocturnal torchlight surveys were conducted, but these initial random searches proved negative, so another technique was needed. Like most wolf-spiders, the great fox is largely terrestrial and so pitfall traps seemed appropriate. Some low-key trapping was undertaken in 2019, which focussed on the area where the spider was last recorded. This early pitfalling produced spiders, but not the great fox. It is likely this original area has now lost the species as former slit-trenches have re-vegetated, reducing the exposed sand faces that hosted the spider.

In 2020, Covid-19 and the furlough scheme allowed more time for surveys. Reconnaissance for further places to use pitfalls turned up an immature spiderling suspected as the great fox (only sexually mature spiders can be confidently identified) and further traps deployed there immediately paid off. The first mature male was caught in early September 2020 – which was the first site record for the great fox-spider in nearly thirty years.

The spider's optimal sub-habitat on heathland is now clear; south-facing, bare stony sand alongside areas encrusted with lichens and mosses, amongst scattered mature heather. In 2021 efforts have been made to locate further sub-populations elsewhere on-site and also beyond it. The first objective is achieved, with an apparently strong population recently discovered. But as yet, Hankley remains the only known site in the UK for the spectacular great fox-spider.

Mike Waite
Policy & Research Manager
Surrey Wildlife Trust

A female great fox-spider – the only free-roaming mature female found in 2020 © Mike Waite

What does **natural capital mean for the MOD?**

Trees as an example of natural capital assets on the MOD estate © Forestry Commission

What is natural capital?
Natural capital is the sum of our ecosystems, species, freshwater, land, soils, minerals, air and seas. These are all elements of nature that either directly or indirectly bring value to the Ministry of Defence (MOD) and wider communities. Value is derived from ecosystem services and includes food, clean air and water, wildlife, energy, wood, recreation, protection from hazards and a safe place to train.

In early 2018, the UK Government's 25 Year Environment Plan pledged the Government's continued support for the development of UK natural capital accounts and the use of a natural capital approach as a tool to help make key choices and inform long-term decision making. The MOD's rural estate is already recognised as a beacon of nature conservation with 38% of the estate designated as Sites of Special Scientific Interest, a significant natural capital asset. Applying a natural capital approach will further help to balance environmental values whilst ensuring the MOD estate is fit for purpose and future proofed, increasing resilience to climate change impacts.

What will natural capital provide for the MOD?
Applying a natural capital approach to decision making enables the MOD to:

- Help deliver a sustainable estate to live, work and train
- Manage and safeguard estate operations and mitigate future risks of changing climates
- Inform priorities for use during estate rationalisation
- Build better business cases for investment and capital works
- Position the MOD as a key contributor to the UK Government's net zero and other strategic objectives
- Understand nature as a key asset that provides services to MOD personnel and wider communities.

Who are the MOD's new Natural Capital team?
The Natural Capital team within the Defence Infrastructure Organisation's (DIO) Technical Services division was created in 2021 and provides the MOD with subject matter experts (SME) on delivery of natural capital and ecosystem services. The team includes, Simon Smart, Senior Natural Capital Adviser, Tim Brooks, Natural Capital Ecologist and Daniel Haslam, Woodland Creation Advisor.

Prior to joining DIO, Simon ran a small environmental consultancy providing conservation and sustainable agriculture advice to farmers, landowners and organisations, including to DIO on Salisbury Plain Training Area (SPTA). Simon has been involved in the development of natural capital asset registers and carbon accounting and is based at Westdown Camp, Wiltshire. Tim has a background in catchment

Guided Multiple Launch Rocket System moving to a firing position at Kirkcudbright Ranges © Crown

management and river restoration as well as experience of peatland management, having previously worked for the Environment Agency for nine years, firstly as a Biodiversity Technical Officer and then in Catchment Coordination. Tim is based at Whittington Barracks, Staffordshire. Dan joined DIO from a forestry company based in Scotland where he was a Forestry Manager. Prior to this he worked in British Columbia, Canada as a Forest Technician. Dan is based at Okehampton Camp, Devon and is the SME for woodland creation in the south.

What natural capital projects have already begun?

In 2020 – 21 DIO commissioned Cranfield University to complete the phase one Inventory of Carbon Stocks on the MOD's rural estate in the UK. This work also reviewed the greenhouse gas emissions from the dominant land types and outlined opportunities to reduce emissions across the rural estate.

To estimate carbon stocks in vegetation, the areas of land cover types on the rural estate were derived from the 2019 land cover map produced by the UK Centre of Ecology and Hydrology. The dominant land cover on the rural estate is grassland (including acid and other grassland, heather, bog, fen, and saltmarsh) (60.7%), with a significant area of water, rock, and sediment (12.3%), woodland (11.0%), and arable land (9.2%). The remaining area (6.8%) comprises urban and sub-urban areas. The results show that areas of woodland, on average, contain the highest carbon stock in vegetation per hectare (see table one).

Soldiers training on Sennybridge Training Area © Crown

Soil carbon was also calculated for each land cover type as shown in table two. Although acid and other grassland covers only 31% of the total land area, they store 64% of the soil carbon (at 30 – 100cm) on the MOD estate. This demonstrates just how important grasslands are for preserving soil carbon stocks.

To further complement this work the Army Basing and Infrastructure's Sustainability, Efficiencies and Exploitation team commissioned Exeter University to use Lidar (Light detection and ranging) to model the extent of woody vegetation and carbon stored at Otterburn Training Area and SPTA. Lidar is a remote sensing technique that enables the creation of a 3D representation of the surveyed environment. This tree, hedgerow and woodland data will provide the key input to calculate carbon stored in the vegetation. The model provides an additional third dimension to improve the accuracy of carbon calculations because canopy height and landscape features can be included along with extent.

Additional projects are planned for 2022 including a full natural capital inventory of the MOD estate with a spatially linked decision support tool, plus guidelines for woodland creation to balance biodiversity and carbon sequestration. For more information on these projects or for any advice regarding natural capital, please contact the team (see p. 104).

Land cover type	Area (ha)	Total carbon stock (kt C)	Carbon per hectare (t C/ha)
Woodland	24,512	1,814	74
Arable	20,433	45	2
Acid grassland	63,503	309	5
Other grassland	66,265	186	3
Saltmarsh	5,581	0	0
Settlement (urban areas)	15,231	42	3
Water, rock, sediment	27,519	0	0
Total	223,044	2,396	87

Table one: land cover types and carbon stocks stored in vegetation on the MOD rural estate

Land cover type	% Area	Soil carbon (kt C) (0 – 30cm)	Soil carbon (kt C) (30 – 100cm)
Woodland	11%	2,319 (12.7%)	2,099 (15.2%)
Arable	9%	1,551 (8.5%)	645 (4.7%)
Acid grassland	28%	7,228 (39.6%)	8,744 (63.2%)
Other grassland	3%	202 (1.1%)	107 (0.8%)
Saltmarsh	30%	5,646 (30.9%)	1,622 (11.7%)
Settlement (urban areas)	7%	868 (4.8%)	390 (2.8%)
Water, rock, sediment	12%	438 (2.4%)	219 (1.6%)
Total	100%	18,252 kt C	13,826 kt C

Table two: total soil carbon at 0 – 30cm and 30 – 100cm depths on the MOD estate for different land covers

Heather Webb
Ecology & Natural Capital Manager
Defence Infrastructure Organisation

Introducing the Defence Infrastructure Organisation's **new sustainable HQ**

The building and the oak tree © Crown

In August 2021, following 17 months of construction, the new £12m Defence Infrastructure Organisation (DIO) headquarters opened its doors at Whittington Barracks, near Lichfield, Staffordshire. The headquarters are part of a £4.3 billion investment in modern, greener, and more sustainable facilities that are being delivered by the Defence Estate Optimisation (DEO) Portfolio over the next decade.

The new headquarters was built using modern methods of construction, with a modular build technique. Using 42 build modules mitigated site risks and accelerated the overall construction process. There is 2,700m of floor space providing a modern office for 300 people, sitting predominantly over two storeys, as well as additional meeting rooms on the third floor. The design aligns with smarter working principles to give more flexibility and offers a diverse range of individual workstations, private meeting rooms and larger open workspaces for collaborative working.

In addition to the modern methods of construction, digital construction tools were also utilised to add efficiencies. In line with the Ministry of Defence's commitment to best practice sustainability standards and to meet the Government's intent of net zero carbon by 2050, the project team worked towards a Defence Related Environmental Assessment Method (DREAM) score of 'Excellent'.

The most visible evidence of this is the retention of an ancient oak tree, which is over 200 years old, growing next to the building that the contractors worked around during construction. It now provides a fantastic view alongside the atrium and conservatory and is a focal point for biodiversity and sustainability.

The building boasts a variety of new features that will help it be as sustainable as possible. The construction materials were all selected to reduce energy consumption and running costs, from high quality insulation to the air tightness and solar film on the 5,500m^2 of glazing panels. Low water usage systems were chosen to reduce the overall water consumption of the building's occupants and renewable energy sources were incorporated into the project.

The build included 143 photovoltaic cells (located on the neighbouring building, the Harden Centre) that provide enough energy to power five average sized houses, while LED lights provide a 50% reduction in lighting energy consumption. A special wildflower mixture, with six types of grass designed to attract wildlife, has been used across the landscaping.

These sustainable features will result in carbon emissions being reduced by nearly 50% compared to the notional building $C0_2$ emission and the actual emission for the building. Additionally, with the energy produced by the photovoltaic cells there will be a reduction of 28,810kg of CO_2 emitted over a five year period – the equivalent of flying 28,614 miles in an aeroplane or driving 78,038 miles in a car.

These features, combined with the building's advanced building management system, which ensures everything within the building is working as efficiently as possible, means the new headquarters is forecast to provide financial savings of £17.7m over 25 years. This is compared to the Resource Departmental Expenditure Limit for the previous headquarters at Sutton Coldfield.

George Nott
DEO Business Management Officer
Defence Estate Optimisation Portfolio

One of the new collaborative workspaces © Crown

Exercise Lidar Truth – community archaeology at Otterburn Ranges

Keith Cooper, a member of the Revitalising Redesdale team and a former serving soldier, points out some of the key features of the site © Wessex Archaeology

Exercise Lidar Truth investigated two circular earthworks discovered on Lidar (Light Detection and Ranging) images of the Otterburn Ranges, Northumberland in 2018 and aimed to establish what exactly they were. The first excavation in 2020 confirmed that the circular banks were constructed of stone covered in grass. No bullets, concrete or barbed wire were found, so a military use could be discounted.

In 2021 the team sampled the internal area of the two features and discovered more about their purpose. The smaller of the two rings was probably a burial cairn, but because of the acidic soil conditions the burial itself had not survived. A shallow pit in the centre of the circle was likely to have been the grave cut into the natural bedrock. The larger ring, some 50m to the south, was an altogether different affair. The stone bank, rather than being continuous, was a series of short stone segments with narrow gaps between each. Two large stones were situated within the western quadrant of the circle. Although fallen today it was almost certainly the case that they had originally stood upright just inside the stone bank. A small indentation pecked into the surface of one of the stones was an example of a cup mark – Bronze Age rock art.

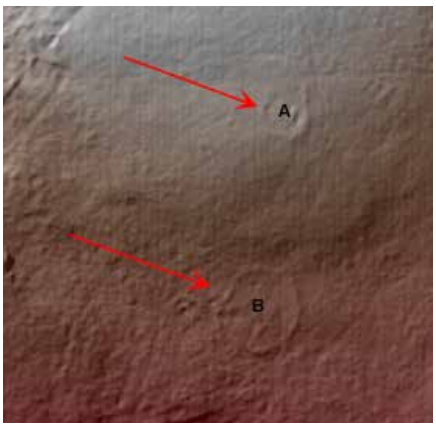
The two sites would have been important components of the prehistoric landscape – in the case of the smaller ring a burial monument under a stone cairn and the larger ring a ceremonial site with upright megaliths within an interrupted stone bank.

Alongside the actual archaeology, the main success story of Ex Lidar Truth were the participants themselves. Under the direction of staff from Wessex Archaeology, veterans and local community volunteers came together through the Operation Nightingale and Revitalising Redesdale initiatives respectively. The successful integration of the two groups produced a relaxed and enjoyable working environment which contributed towards the wellbeing of all those taking part. Applying archaeology to achieve this outcome is a result with which the Ministry of Defence can be rightly proud.

Ex Lidar Truth could not have been undertaken without the assistance of Maj Frank O'Kane and the range staff, the Landmarc Support Services' team at Otterburn, Caroline Hunter who permitted us access to her land, Ben Saunders and the Wessex Archaeology staff, Karen Collins of Revitalising Redesdale and Dickie Bennett of Breaking Ground Heritage. Last, but certainly not least, a massive thank you to all of the volunteers who made the dig such a worthwhile, enjoyable and interesting experience.

It is, however, with great sadness that I must also report on the tragic loss of one of our Op Nightingale team members. Alec Mitchell, known to the team members as 'Mitch' joined us on a recce to the shrine of the Romano-British God Cocidius on the Otterburn Ranges. Mitch suffered a heart attack and sadly died on the site. Mitch was a valued member of the team and had previously dug at Otterburn and on the Waterloo Uncovered project. Our heartfelt condolences are offered to his widow Philippa, to his family and to his friends.

Phil Abramson
Archaeology Advisor
Defence Infrastructure Organisation



Lidar image of the two circular features on the Otterburn Ranges © Environment Agency

Capt Robinson – horticultural therapy and community spirit at Aldergrove

Aldergrove Allotments stakeholder engagement meeting © Maj J. W. Swanson

Aldergrove Flying Station, formerly RAF Aldergrove, opened in 1918 and was designated as an operational RAF Station in 1925. It played an important role in World War Two during the Battle of the Atlantic and subsequently provided key air support during Operation Banner, where at peak it was base to over 2,500 RAF personnel and 1,500 civilians. However, as part of the peace dividend in Northern Ireland the Station saw a dramatic reduction in numbers which resulted in substantial infrastructure changes.

The demolition of 283 houses at two sites on Aldergrove Flying Station resulted in the Defence Infrastructure Organisation (DIO) making 55 acres of land available to enhance the lived experience of those who continue to serve there. Cross sections of the local service community were consulted on what they would like to see happening on-site and several initiatives were combined to form an overarching strategy to breathe new life into the garrison.

The first completed project on the demolition sites has been the construction of the Aldergrove Allotments, project managed by Capt Robinson, the Operations Officer for the Northern Ireland Garrison Support Unit. The land was allocated and a community 'wish list' was drawn up. The next parts of the puzzle were working with key stakeholders to determine what was achievable and to get on the hunt for funding. Discussions took place with DIO to confirm that they were able to assist with progress and ensure that due process was followed, which sometimes meant having to rework parts of the plan and revisit timelines. Patience proved worthwhile and to maintain momentum, as well as increase confidence with the funding bodies, most notably The Armed Forces Covenant Fund Trust, victories were celebrated along the way. Of these, the Defence Gardens Scheme was pivotal in enabling the whole project to be pushed forward, with Sally Coulthard, Founder and Managing Director, being both enthusiastic and supportive from the beginning.

The strength of the Army Reserve should never be underestimated and Capt Robinson was able to draw on skills from the local Reserve contingents. On a previous project support had been provided by 591 Royal Engineers and here with the allotments, 206 (Ulster) Battery, Royal Artillery came to the rescue. One of their soldiers runs Sam Butler Joinery and Construction, which was successful in bidding for and subsequently delivering a timely, cost effective and quality piece of work. Capt Robinson was conscious that delivering the product was however just the beginning of the project, as

The Commanding Officer engaging with the community © Capt W. B. M. Robinson

success would ultimately be measured in terms of its long-term sustainability and its proven worth.

Capt Robinson went to great lengths to assess why some allotment projects were successful, while others that had shown potential were not. He made a point of visiting allotment projects in Northern Ireland, and particularly those at Brooke House in County Fermanagh, The Duchess of Abercorn's Veterans' Garden Project in County Tyrone and Ashes to Gold in County Londonderry. They advised the keys to success were the importance of forming a positive, like-minded committee, that ideally should be limited in number and with a strong decision maker at the helm, alongside forging a community spirit as opposed to individuals tending to individual plots. Conscious that the project was based upon a campaign mentality, Capt Robinson arranged for potential members of the committee to meet the stakeholders of the other allotment projects, enabling them to gauge for themselves what success looked like.

These visits, the high delivery standards and the ever present support of the Defence Gardens Scheme's Regional Coordinator Charlie Marno, enabled Aldergrove to become a spoke of the Ashes to Gold hub. This resulted in the Defence Gardens Scheme allocating additional funding to provide a facilitator, Deborah McDonald, to deliver a series of practical horticultural sessions. The first programme of these sessions succeeded in getting Aldergrove Allotments up and running and established a core of 25 allotment workers. During the Halloween programme around 150 members of the local community took part in some fun and friendly events where children and adults were taught skills such as pumpkin decoration and flower arranging.

Success in practice, growing the bonds between hub and spoke © Capt W. B. M. Robinson

There is also a deeper aspect to the project. Allotment gardening promotes social capital, helping with the reduction in feelings of loneliness and depression, as well as increasing mental wellbeing through a sense of achievement and connection with nature. Ashes to Gold run a horticultural therapy programme that promotes good mental health among the veteran community, and Aldergrove is seen as a vital link in connecting with veterans who may initially be reluctant to join civilians outside the wire. This ties in with a role of the Northern Ireland Veterans' Support Office to coordinate, develop and deliver additional capacity in Northern Ireland to support veterans. Their original piloting of the Defence Gardens Scheme, that has since expanded nationally, is an excellent example of this delivery.


Life in the tunnel – learning flower arranging skills © Deborah McDonald

The allotment project is off to a flying start and is already showing some of the potential that Maj Gen Southall, Director of Army Basing and Infrastructure, spoke about when he visited during construction. It is hoped that this success will assist with the momentum of additional projects that are already teed up, funded and ready to go, including a wildflower meadow, an orchard and a bee apiary. All it will take is for those with the ability to assist, to lean in and add a little support so as these initiatives can positively promote improved mental wellbeing and enhance the Ministry of Defence's reputation.

Maj Billy Swanson
Regimental Administrative Officer
Northern Ireland Garrison
Support Unit

Respect the Range campaign

Headphones to hazard social media post © Crown

The Defence Training Estate (DTE) has always been admired for its amazing variety of stunning and often wild landscapes. Changing military training requirements have seen our Armed Forces utilise different landscapes to provide challenging realism to Service Personnel's training experience.

When not being used for military training the Ministry of Defence (MOD) estate offers opportunities for the public to experience a multitude of recreational activities. These sites are also home to some of the UK's most impressive wildlife and beautiful landscapes. The public are welcome and encouraged to enjoy these spaces when military training is not taking place, but there are dangers that they need to be aware of.

A new campaign

In 2020 a unique, public facing campaign was launched, aimed at engaging directly with the many thousands of visitors to the estate. Called 'Respect the Range', the campaign messages are three-fold; it reminds people that the primary purpose of MOD land is to provide realistic military training environments and facilities that enable our Armed Forces to be ready for operations and deployments across the world, that the use of land changes by the hour and can be incredibly dangerous, and that visitors risk their own life and the lives of others by ignoring signs and information to access MOD land when the Armed Forces are training.

The sudden rise in visitor numbers to the estate due to Covid-19, including those who were unfamiliar with the countryside, showed that not everyone was aware of how the land is used, nor the types of danger this land use brings. Pre-campaign research prior to Covid-19 showed that even regular visitors can become complacent and

Armoured Support Group firing mortars on Salisbury Plain Training Area © Crown

underestimate the risk of being on the land when it is in use.

In its first year the campaign has used radio, print, online and social media platforms to provide information and links. The campaign aims to raise the public's awareness and understanding of the very real risks to personal safety when using military land. Whilst the focus was initially on Salisbury Plain and Aldershot Training Areas, the messaging is relevant to the whole estate.

BBQ to battlefield social media post © Crown

To support the information being driven from GOV.UK the campaign extended out to key national organisations, who provided a unique voice and position to help reach and influence people who are likely to visit the military training estate. A key aim was to develop partnerships that would complement the campaign's key messages and extend the reach to a wealth of different user and interest groups. Having reached out to over 20 different organisations including; the Ramblers, the British Horse Society, the British Mountaineering Council, The Green Laning Association and Ordnance Survey Ltd the campaign team were overwhelmed by the resounding positive support received.

An unprecedented challenge

The Covid-19 pandemic has highlighted the essential role that the MOD estate plays in offering greenspace to the nation. Restricted to local surroundings during periods of lockdown, thousands of people have sought opportunities for positive physical and mental wellbeing on their doorstep. This evolved from the confines of a single hour of exercise in the early stages of the pandemic in 2020, through to new, regular outdoor habits as lockdown restrictions eased in 2021.

The Defence Infrastructure Organisation (DIO) recognised the importance of the rural estate for Service Personnel, their families and the wider community and so pledged to ensure the estate would remain open. During this unprecedented period DIO kept up to date with the changing rules and restrictions and engaged with external working groups, bringing together other Government organisations and key national stakeholders. National messaging to support consistent Covid-19 secure messaging was communicated through the regions.


Parachute Regiment conducting a live fire Company attack on Salisbury Plain Training Area © Crown

As Covid-19 restrictions began to ease for the first time in 2020 it was apparent that land managers across the country would face a new challenge. The countryside was seeing a wave of new visitors who were experiencing the outdoors for the first time. DIO, along with other key land management agencies, had the challenge of informing visitors on where they could go, what they could legitimately do and the importance of conservation. The timing of the Respect the Range campaign could not have been better.

Next steps

Due to the success of the Respect the Range campaign this year, it is hoped that additional sites will be added in 2022/23. The campaign forms an important part of our wider public information strategy. It will continue to raise public awareness about the dangers associated with accessing military land when it is in use, in order to drive positive behavioural change so that people can continue to enjoy these areas safely for many years to come.

Kirsty Williams[1] & James Nevitt[2]
Communications Officer[1] & Senior Access and Recreation Advisor[2]
Defence Infrastructure Organisation

Introducing the **Royal Navy's greenest ships**

HMS Spey and HMS Tamar together prior to leaving HMNB Portsmouth © Crown

Defence Equipment and Support's (DE&S) Ships Acquisition team have worked with industry partner BAE Systems (BAES) to provide the Royal Navy with two new ships, which are the 'greenest' in the fleet to date. The River Class Offshore Patrol Vessels HMS Tamar and HMS Spey have been fitted with a pioneering piece of mechanical engineering to ensure impeccable emission credentials.

The selective catalytic reduction system works to reduce emissions of nitrogen oxide, which causes damage to the ozone layer and is also a key component of acid rain, by up to 97%. It works by converting urea to ammonia on board, which is then injected into catalysts in the exhaust system where harmful emissions are broken down and converted into simple diatomic nitrogen and water.

The build of the ships took place at the BAES shipyards in Glasgow, Scotland. This ensured the retention of key shipbuilding skills and safeguarded jobs in the shipbuilding industry. The process of fitting the catalytic converter systems to HMS Tamar and HMS Spey was challenging but successful, and yielded results far greater than anticipated by the designers. Another advantage can be seen when the ships come alongside into port, with the ships activating the system to reduce emissions. As ports are based close to where people live and work this has a clear benefit.

In the months leading up to the hand over the DE&S delivery team spent a considerable amount of time working with BAES to make certain that the ships' staff had the technical knowledge required. This ensured that personnel could effectively maintain the system whilst at sea and operate the vessels in the correct way to realise the benefits of the exhaust system.

The technology developed for HMS Tamar and HMS Spey was designed to be a 'bolt on part' which means there is potential to retrofit the kit to other ships in the fleet. This would further enhance the Royal Navy's green credentials and operational capability, future proofing the fleet whilst providing a more sustainable Navy. Supporting the system in the future is likely to drive efficiencies too, as when new ships are built it is probable that similar systems will be implemented into the builds. Where the systems are the same, common parts and consumables for the catalytic converter system are planned to be procured holistically, which will drive efficiencies across the supply chain and ensure that the cost of running this new technology is kept to a minimum.

The vessels were commissioned into service on 18 June 2021 after five years of hard work and collaboration between the Royal Navy, DE&S, BAES and the Ministry of Defence. V Adm Chris Gardener KBE, DE&S Director General Ships said *"This innovative project is an excellent example of how DE&S are working with partners to reduce the carbon footprint of the equipment solutions we deliver to support Defence in achieving their net zero targets".*

Defence Equipment and Support's Ships Secretariat
Defence Equipment and Support

HMS Spey in the Pacific Ocean © Crown

Unlikely heroes provide a boost to conservation on Woolmer Forest

Cattle grazing at Woolmer Forest © Steph Horn

Longmoor Range and Training Area is an important live firing range and dry training area within the Defence Training Estate South East (DTE SE). Woolmer Forest is part of the site and sits within the boundary of the South Downs National Park, straddling the Hampshire/West Sussex border. It is a Site of Special Scientific Interest, a Special Area of Conservation and part of the Wealden Heaths Phase II Special Protection Area, as well as being one of the most important areas of heathland in the Weald. Uniquely it is home to 12 of the 13 native species of amphibians and reptiles. The Ministry of Defence, Hampshire and Isle of Wight Wildlife Trust (HIWWT) and Amphibian and Reptile Conservation (ARC) work in partnership, with the support of Landmarc Support Services, to manage this fascinating site.

In 2016 an ambitious project was launched with the aim to restore, reconnect and recreate the isolated areas of lowland heath in and around the South Downs National Park. The Heathlands Reunited project is a partnership of 11 organisations led by the South Downs National Park Authority (SDNPA) and funded by the National Lottery Heritage Fund. At Woolmer Forest, the project builds on many years of positive conservation work by the Defence Infrastructure Organisation (DIO), HIWWT and ARC to provide a financial boost to practical management works on-site. Between 2017 – 2021 the project has helped to restore and recreate heathland habitat to support a variety of rare and threatened species. In addition since 2019 new agri-environment schemes, with much improved habitat management delivery, have been in place.

In 2017 the Natural England condition assessment was for favourable condition over a considerable part of the site and for flora and fauna features, with further works needed to achieve such condition over the whole area. The Heathlands Reunited monies have helped to increase the favourable condition proportion. During the project, 275ha of heathland management work has been funded by Heathlands Reunited at Woolmer Forest, including the clearance of dense scrub and bracken control.

Grazing plays a key role in maintaining rare habitats like heathland by controlling aggressive species, which would otherwise dominate areas through scrub encroachment. In the past the countryside would have been grazed by wild animals or through traditional farming and common land grazing practices. Many landowners are now seeking to replicate these kinds of grazing systems to maintain and increase biodiversity. Grazing removes plant material more gradually than cutting or burning, so is a very natural and sustainable way to manage a landscape.

The project has funded infrastructure for grazing cattle, such as the repair of fencing and has supported the introduction of longhorn cattle across 220ha, adding to HIWWT's existing herd of Shetland cattle at Longmoor. In 2020 the project also supported ARC with the relocation of a small herd of pedigree longhorn cattle from the Isle of Wight to Blackmoor. The open heathland habitat obtained through the management works and grazing cattle will help the variety of rare species that live at Woolmer Forest to thrive.

Woolmer Forest is also host to the last of the original inland heathland population of natterjack toads in the UK, as the network of shallow pools found on-site makes for the perfect habitat. ARC, with support from the project, have been working to reintroduce natterjack toads to the other side of the A325 on Blackmoor, where the species have not been recorded since the 1970s. They aim to recreate suitable habitat for the reintroduction, which is scheduled for summer 2022.

Special thanks to David Boddy, HIWWT, Dean Howard, DIO and Anju Sarpal, ARC for their assistance in producing this article.

Olivia French
Heathlands Reunited Communication and Engagement Officer
South Downs National Park Authority

Post-war nuclear independency – the Blue Streak Rocket

The Blue Streak Rocket at RAF Spadeadam © Crown

It is not often that you find a ballistic missile dating from 1959, situated in a car park, at the entrance to a RAF base. However, this is one of the first things that greets you upon entering RAF Spadeadam in the northern extremities of Cumbria. It is the Blue Streak Rocket, a missile which is 59 foot in length and weighs over six tons.

In the 1950s Britain's nuclear deterrent was based on free-fall bombs delivered by the V Bomber (such as the Vickers Valiant). Improvements in nuclear based missiles by the USSR and the USA during this time raised serious questions about the long-term effectiveness of our country's nuclear capabilities. There was also a political need for Britain to have an independent missile capability, ensuring that the country maintained its position as a global superpower in the post Second World War world.

In 1955, the open and largely uninhabited moorland to the north of Gilsland, Cumbria, was selected as the site for the Spadeadam Rocket Establishment (SRE). Its role was to support the development of the Intermediate Range Ballistic Missile (IRBM), known as 'Blue Streak'. Based on the American Atlas missile it was to be British built and operated, creating an independent nuclear deterrent. Blue Streak was a liquid fuelled missile tipped with a one megaton nuclear warhead with a range of around 1,500 nautical miles (2,414km), sufficient to reach Moscow from the UK. The missile was constructed from stainless steel that was less than 0.635mm thick – it was only the internal pressurisation of the missile that prevented Blue Streak from collapsing like a wet paper bag.

To support the testing and firing of the missile, a large training area with associated infrastructure was required. The SRE occupied approximately 3,240ha, a large proportion of which remained open moorland to provide safe distances between facilities. Construction work began in 1957, which represented a major civil engineering undertaking, with an extensive road network across the boggy ground which connected the various test areas. The establishment was designed and managed for the Ministry of Aviation by the project's principal contractors, de Havilland, who were responsible for the missile's airframe, and Rolls-Royce, who designed the engines.

The split in responsibilities between the various contractors and their different roles is reflected in the layout of the facilities at Spadeadam, ranging from administration areas to test areas. Of these facilities, the test stands on Greymare Hill are the most distinctive, with large concrete platforms for the missile which exploit the contours and are set into the natural scarp of the hills.

The test facilities were initially designed to assist in the development of the missile. They would then act as a proof facility, testing each of the 60 missiles which were destined to be placed in silos in eastern England. All flight testing for the Blue Streak was to be based at Woomera in Australia. In its heyday the

SRE represented a world class rocket test facility and the most advanced in Europe at the time. Despite this, the main problem with Blue Streak was that it was launched from fixed sites, which took up to 30 minutes to prepare for launch, making them vulnerable to potential Soviet attacks.

After significant expenditure on the project by the late 1950s, both in the UK and Australia, the Government began to doubt the ongoing efficiency and suitability of Blue Streak as the prime nuclear deterrent. Advances in guidance technology, air and sea launched nuclear weapons, the ongoing costs and the vulnerability of the launch sites all contributed to the eventual cancellation of Blue Streak in April 1960, in favour of the American Skybolt missiles. Britain's nuclear deterrent moved from Skybolt to the Polaris system (1968 to 1996), to the current Trident system. The responsibility also passed from the RAF to the Royal Navy.

The story of Blue Streak did not end there though. Given the level of investment and knowledge, it was assigned to the European Launcher Development Organisation (ELDO) project, the forerunner of the present-day European Space Agency (ESA). The project combined Blue Streak as the first stage of launcher, with a French second stage, a German third stage and an Italian satellite. However, by December 1971 Britain withdrew from the ELDO and the project was eventually cancelled in April 1972. The facilities at Spadeadam were closed and the site was largely dismantled but the concrete structures remained. These, together with the bleak moorland, form an atmospheric and almost apocalyptic landscape which is ironically akin to a Soviet headquarters out of a James Bond movie.

The launch testing area for the Blue Streak Rocket © Crown

The Blue Streak Rocket situated at RAF Spadeadam was constructed around 1959 and is supported on its original carrying frame (unique to each rocket), which was also constructed at Spadeadam. It was statutorily listed by Historic England in 2013, which is unusual given it is technically a mobile structure that can be moved. The surviving Blue Streak Rocket serves as a striking reminder of just how close Britain came to deploy a nuclear weapon during the Cold War. It is thought to be one of only two remaining missiles from the 18 originally constructed and signifies the substantial contribution the Blue Streak programme made in the development of nuclear weapons on a global scale. The structure forms a symbol of Britain's independent nuclear deterrent and its aspirations to maintain its force on the global stage. The rocket forms a tangible and haunting reminder of the tensions of the Cold War.

An alternative view of the Blue Streak Rocket © Crown

The Ministry of Defence (MOD) are seeking to conserve the Blue Streak Rocket. A collaborative project with the Defence Infrastructure Organisation (DIO) and Landmarc Support Services, funded by DIO's Conservation Stewardship Fund, has involved the completion of a condition report by a specialist industrial conservator with the aim of repairing the structure and providing greater heritage interpretation. It is hoped that MOD personnel can become involved to ensure the rocket is conserved for future generations.

Jack Haw
Historic Building Advisor
Defence Infrastructure Organisation

Surveying submarines for biofouling

Biofouling assemblage showing desiccated ascidians, tubeworms, barnacles, scallops and urchins © Babcock

Biofouling is the accumulation of biological material on submerged surfaces. It can heavily build up on areas of vessels exposed to seawater, such as the hull, ballast tanks, grilles and intakes. This can cause a myriad of problems including transportation of Invasive Non-Native Species (INNS) around the world via shipping. INNS can subsequently colonise areas they would not naturally be able to access, out competing local species, causing damage to ecosystems that are not adapted to accommodate them and reducing biodiversity.

A complex problem for the Royal Navy

As a global service, with unique operating profiles, biofouling poses a complex problem for the Royal Navy, as operating areas, speeds and timelines may not be easily predicted or managed. Furthermore, introducing INNS into the UK is prohibited and an increasing number of countries are implementing stringent biofouling regulations which could impact port access if vessels cannot prove biofouling is managed. Dedicated teams therefore manage, research and advise on Royal Navy biofouling.

A unique problem for submarines

The risk associated with submarines is similar to that for surface ships, in that they may be accumulating INNS at sea and transporting them back to UK. However, precisely what biofouling accumulates on deployed submarines has still to be fully understood.

Physical inspections are required to identify biofouling species and to more accurately assess the risk of introducing INNS. Post deployment biofouling surveys to identify the species present, and subsequent specialist advice, will allow operators to cross reference operating profile with the associated risk of INNS. Appropriate mitigation measures can then be employed if INNS are found.

A pilot submarine biofouling survey

In recognition of this need, Navy Command and the Submarine Delivery Agency commissioned Plymouth Marine Laboratories (PML) Applications Ltd to conduct a series of surveys to identify submarine biofouling species. The pilot was undertaken in March 2021, beginning data collection to inform the submarine biofouling risk assessment and subsequent methodology. The survey team consisted of two PML Applications Ltd's scientists and Navy Command's Maritime Environmental Protection Adviser, with logistical assistance from environmental managers at HMNB Clyde.

Methodology

The team photographed port and starboard grilles of each void, the hatch rims and the voids themselves. Detailed notes were taken of the location, species, abundance and size ranges. Representative samples were removed using paint scrapers and buckets and were then taken to a makeshift laboratory set up on-site.

Samples were emptied into large shallow trays and submerged in water where assemblages were sorted into smaller taxonomic groups, depending on the composition and volume. The species were identified in situ, and ascidian (sea squirt) dissection and species identification were notably difficult, requiring experience, patience, a steady hand and a high-quality microscope. Some specimens were chemically 'relaxed' which prevents soft bodied organisms from contracting and contorting before being preserved, which would inhibit identification.

This process was repeated for each void, allowing comparison between spaces and between port and starboard. Accessible areas on top of the submarine and around the hull were also assessed.

The external hull had been cleaned prior to the survey commencing, so

little could be gleaned with certainty, however some fouling was present above the waterline.

Assemblage quantification
Assemblages were quantified using the SACFORP scale (Superabundant, Abundant, Common, Frequent, Occasional, Rare, Present), often employed to denote density/cover scales for rocky shore and benthic communities. Protocols for particular organism groups reflect the differing nature and abundances of various species. For example, it would not be uncommon to have several hundred barnacles in a 30cm^2 quadrat but only five limpets – both could be described as 'Abundant' due to their individual sizes and normal distribution levels.

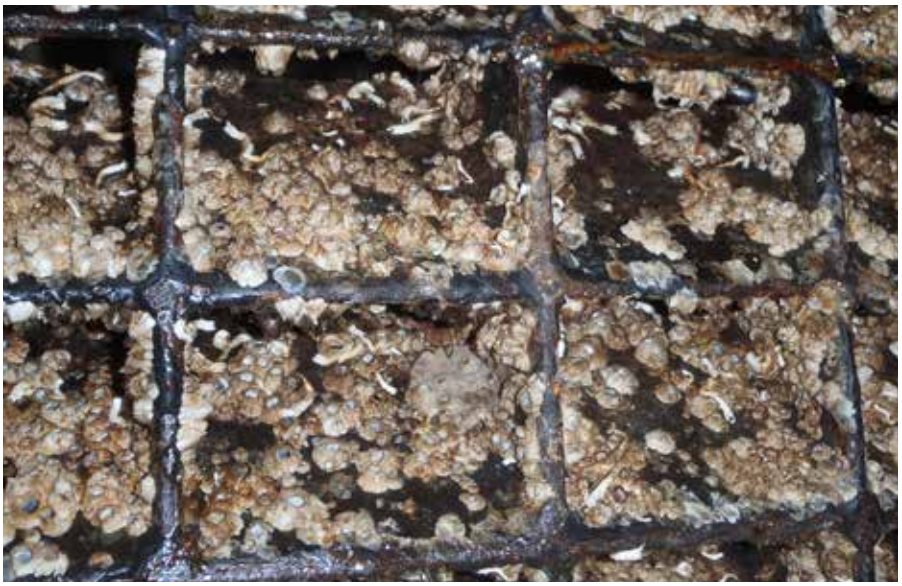
Findings
The report concluded that no INNS were present on the first submarine sampled. One non-native was found but it is already established in the UK and therefore is not considered to be of concern. This is the Australian barnacle *Austrominius modestus* which can be found on rocky shores around the UK.

Much of the biofouling was typical of that found on ships and included tubeworms, barnacles, mussels, ascidians, bryozoans, hydroids, urchins, scallops and anemones, amongst others.

The grilles were particularly heavily fouled which is also commonly found on surface ships. Grilles provide sheltered niches with good waterflow which are desirable conditions for colonisation of filter feeding organisms such as mussels, barnacles and tubeworms. The ballast tanks were fouled with predominantly tubeworms on the bottom and sides of the voids, up to the internal waterline.


Anemones relaxing before preservation © Babcock

Challenges
An aim of the pilot survey was to determine important points for future methodology. These included that the hull had been cleaned and the submarine had been out of the water for 10 days prior to the survey. Little could therefore be gleaned in terms of what species had been colonising the hull. Furthermore, many soft bodied species were significantly degraded which hindered robust conclusions as accurate identification of such severely desiccated samples is nigh on impossible.


Typical grille biofouling consisted of barnacles, mussels and tubeworms © Babcock

Future intent
Navy Command and the Submarine Delivery Agency will continue to collaborate by commissioning PML Applications Ltd to undertake a series of these post deployment surveys, with the intent of capturing all classes of boat. The Submarine Delivery Agency's in-service maintenance team have already scheduled time in the maintenance programme to undertake more surveys.

The intention is also to survey the hulls in the water before they are cleaned. This will then give a whole-boat picture of whether submarines are likely to be carrying INNS. This data will be coupled with the pilot survey and used to inform appropriate submarine biofouling risk assessments.

Conclusion
The pilot biofouling survey proved the survey methodology, commenced data collection and concluded that no INNS of concern were encountered on the first vessel. This study is thought to be the first of its kind and is paving the way for submarine biofouling management as well as showing the Royal Navy's commitment to environmental protection.

Harriet Rushton
Maritime Environmental Protection Adviser
Navy Command

Worthy Down – **a sustainable approach** to redevelopment

The Worthy Down site © Skanska

Worthy Down is a major training centre near Winchester in Hampshire. The Royal Navy, British Army and RAF all have a presence there and it is home to the Army's Adjutant General's Corps and the Royal Logistic Corps. The Defence Infrastructure Organisation (DIO) led a major £250 million construction project to redevelop the site, and in partnership with a wide range of organisations, improved sustainability and reduced carbon emissions.

The work was part of Project Wellesley, which included the creation of Mindenhurst village (to replace the Princess Royal Barracks at Deepcut in Surrey) and the construction of a new tri-service Defence College of Logistics, Policing and Administration. The whole project was very complex, both in terms of engineering and logistics, partly as Worthy Down is a huge and varied site, with everything from buildings, roads and infrastructure to grass fields, areas of trees and other natural habitats. More than 50 existing buildings had to be demolished followed by the construction and fit out of over 26 buildings, including accommodation.

This work was carried out by Skanska, who were keen to use their expertise to support the sustainability goals of the Ministry of Defence.

A key requirement for the project was to reuse as much demolished material as possible. Subsequently, when the old buildings were knocked down all of the rubble was reused during the construction process. This led to a significant reduction in the environmental impact, minimising the amount of new materials needed and eliminating the carbon emissions produced by the lorries which would otherwise have been required to transport the material off-site. Overall, around 11,800 cubic metres of crushed bricks and concrete were used on the project and if any construction waste was generated, it was also crushed and reused.

Historically asbestos was used in a range of buildings and infrastructure. This can cause many issues, including soil contamination and some areas of concern were identified at an early stage of the project. Moving soil contaminated with asbestos off-site for disposal is a complex operation and while highly contaminated areas were removed, an innovative approach was taken with the remaining areas which helped to protect the environment and human health. An estimated 150,000 cubic metres of contaminated soil (about 1.5x the size of the Royal Albert Hall) was excavated and put in specially identified sections on-site under a break layer. This removed the need to transport a sizeable amount of

The site during construction © Skanska

material off-site, further helping to reduce carbon emissions.

Modular construction methods coupled with off-site manufacturing were used extensively. In modular construction the components are built in a factory which improves quality and creates less waste. This meant that less people and materials were brought to site and helped to minimise any environmental impacts. This approach was used to build just over 800 Single Living Accommodation units, two energy centres and several plant rooms. Pre-cast concrete lift shafts were also used in some of the buildings and pipework was manufactured and welded off-site. All of these aspects combined to deliver environmental and quality gains.

Defence College of Logistics, Policing and Administration © Skanska

A green approach was taken towards energy, with solar panels installed on three buildings, including the main college. In total these produce around 325,000kWh of electricity and the panels on the college building alone will help to reduce the site's annual energy bill by around £50,000.

Protecting and preserving wildlife was a key priority during the construction project. Around 80 smooth newts and 30 frogs were discovered in a water obstacle on the assault course. A purpose built pond was constructed, and a team of specially qualified experts moved them into their new home. A large variety of birds live at Worthy Down too. The campus is surrounded by trees and is home to blackbirds, robins, rooks, wood pigeons, tawny owls and little owls, to name a few. During the construction project each nest was protected by an exclusion zone and was regularly checked by ecologists. If there was any doubt about whether a nest was empty or if the chicks had fledged, a camera was set up to record it for several days, ensuring that any occupants were not disturbed.

A range of wildlife habitats were improved as part of a sensitive and carefully planned approach and it is estimated that the completed project achieved a biodiversity gain of around 63%. Just over one hectare of woodland was planted with broadleaved trees, providing habitats for bats, birds, invertebrates and other species. The creation of four hectares of grassland and scattered scrub provides an ideal home for reptiles, with a further three hectares of new grassland planted, which will help to support pollinators too. Other steps taken to improve the environment included the creation of twenty log piles in different locations across the site, with the dead and decaying wood making the perfect homes for invertebrates.

Using modular construction methods © Skanska

Roger Williams from Skanska was responsible for delivering this major construction project. He adds *"early engagement is really the key to delivering sustainable solutions. I am very proud of our work and contribution to sustainability. It is a fantastic site. One of our key goals was to protect the ecology of the place and where possible enhance it. We worked hard to look after what was around us. One of the really great things that helped to protect the environment was that we were able to retain lots of mature trees, so even though it has just been built, it looks like it has been there forever".*

Richard Saw
Communications Business Partner
Skanska

The end of an era – preserving heritage from RAF Linton-on-Ouse

Up and away – moving the Station's 'Gate Guardian' Tucano aircraft to RAF Syerston © Ron Blenkinsop

In the 1930s the Air Ministry embarked on a massive programme of expansion for the RAF, prompted by the aggressive policies of Adolf Hitler. This included a swathe of new airfields with Linton-on-Ouse, York being built in 1937. In a remarkable feat the whole site was operational within 18 months at a total cost of £750,000. During the next 80+ years a variety of aircraft have served; the Whitley, Halifax and Lancaster in bomber roles, succeeded by more sporty types such as the Mosquito and Hornet. In the 1950s more capable jets took over such as the Meteor, Sabre, and finally the mighty Hunter. In the mid-1950s the runways were extended to accommodate the all-weather Javelin before, just as the Cold War reached its height, everything stopped.

The No 1 Flying Training School (FTS) arrived next – the oldest flying training school in the world having formed in 1919 using Piston Provosts, Vampires supplanted by Jet Provosts, until the Tucano arrived in the 1990s. All had the aim of producing brevetted fast-jet pilots for the RAF and Royal Navy as well as international partners of the day. However, in December 2019, following a review of the Ministry of Defence (MOD) estate, the flying training task was relocated to RAF Valley, Anglesey, leaving only the Yorkshire Universities Air Squadron, who subsequently moved in December 2020 to RAF Leeming. Left without a flying role, the remainder of the Station began to draw down.

Under the lead of Air Support Programme 2 and working in partnership with the Defence Infrastructure Organisation on draw down, the Station developed several workstreams, one of which was heritage. The team generated included RAF personnel, Civil Servants and two local amateur historians who knew the unit's history (lesson – engage specialists early). Starting with the Station's Memorial Room, the dedicated band of sleuths set about photographing, logging and boxing up items (lesson – always catalogue on receipt of an item to ensure provenance at a later date, rather than having to rely on hearsay).

Heave ho – moving a memorial stone to the local community © Ron Blenkinsop

The next stage was twofold and proved both painstaking and time consuming. Research was required to track down previous owners who had 'gifted' items, followed by finding these alternative homes. Whilst the majority of items have now been redesignated the process continues to this day as more items are unearthed (lesson – ensure the team is dedicated to the task to avoid churn and recruit volunteers during the peaks and troughs of draw down work to support the task). What proved interesting was that themes started to appear in the thousands of flying artefacts that had been acquired over the years. These included pewter in the 1960s, pictures in the 1970s, glassware in the 1980s and from the 1990s onwards 'tat' (a good Yorkshire word) that frustrated the property members involved (lesson – do not hoard, re-evaluate your property books regularly and then declutter/recycle).

Moving on from the Memorial Room, the team widened its scope. Tasks involved the Joint Aircraft Recovery and Transportation Squadron (JARTS), more commonly known as 'Crash and Smash'. The Station's 'Gate Guardian' Tucano aircraft was relocated to RAF Syerston. Two memorial stones were moved to the local community via Parish Councils, which required 21 Royal Engineers' heavy lifting equipment (lesson – seek training opportunities for others to engage). The range of items were vast, from a Royal Canadian Air Force musical organ hidden under a dusty cloth in the corner of a room to a commemorative plate donated to the Station after the 'Great Fire' of York Minster in 1984. The latter was rehomed to a church in London whose priest is a Padre of a local Air Training Corps squadron (lesson – be creative, think outside the box when redesignating items and for audit purposes always keep a list of where things have gone. Similarly, liaise with your logistics team and maintain a database of contacts for dispatch).

A Royal Canadian Air Force musical organ, found under a cloth © Ron Blenkinsop

The 'heave ho' team © Ron Blenkinsop

All told, thousands of items have found their way to RAF stations; Digby, Leeming, Marham, Northolt, No 1 FTS at Shawbury and No 72 Squadron, Valley. Other agencies tapped into included; the Air Historical Branch, Yorkshire Air Museum and Beningbrough Hall, National Trust to name just three. Parish Councils bordering the Station's estate accepted notice boards depicting names of Station Commanders and notable aviators of bygone ages. The local primary school and nursery received history books, old RAF articles and data purged iPads. Those mugs that could be recycled were donated to the local hospice – not quite heritage but a means of reducing our waste to the minimum. The team have also supported families wishing to take away plaques assigned to those departed – another aspect not necessarily thought of when drawing down a Station. All items, however great or small, were gratefully received.

One serendipitous moment that everyone will remember was with the redesignation of our eight foot Avro propeller. Where possible the team tried to contact relatives of artefacts that may have personal or sentimental value, but in the case of the propeller there was no provenance. Then by extraordinary coincidence the grandson of the man who gifted the propeller just happened to bump into a member of the RAF and AIR's Heritage Branch on his beach holiday! The two started talking, ascertained they had friends/colleagues in York, past contacts with the RAF and then low and behold Linton-on-Ouse, at which point the Avro propeller, along with a set of his grandfather's wings, came to the fore (lesson – be prepared to expect the unexpected). The rest they say is history, and with the rightful owners now identified the family have since kindly redesignated the propeller and wings to RAF Leeming – so keeping them in Yorkshire.

What was perceived as a straightforward workstream proved us all wrong, with much collective effort, painstaking research and engagement required to relocate and redesignate the diverse range of items. However, the gratitude of those receiving them was both overwhelming and truly uplifting (lesson – the smallest of workstreams can be time consuming and be prepared to be emotionally involved). This all goes to prove that relocating heritage items is not about forgetting the past, but rather learning from it.

Sqn Ldr David Hicks
Chief of Staff
RAF Linton-on-Ouse

The new **Garden of Reflection** at Swinton Barracks

Swinton Barracks' Garden of Reflection © Madeleine Hudson

In 2019, 26 Engineer Regiment created the Optimising Human Performance Taskforce. This team was set up to improve the lived experience of our people, develop support networks and improve mental resilience. Wellbeing and the importance of looking after our minds has never been more significant, and the team have delivered numerous projects and initiatives, all making real and positive changes to our culture and our environment.

The Covid-19 restrictions have taken a toll on the mental health of many, and our regiment has also been affected, with a marked deterioration in the mental wellbeing of our soldiers and officers.

Maj John Buckley is the architect of one of our most successful projects – the Garden of Reflection. Maj Buckley aimed to utilise a vacant area on the barracks, which was provided courtesy of the Garrison Management team, to create a harmonious and reflective space for Service Personnel to escape to. The majority of the funding for the project was raised directly by Maj Buckley. A keen distance runner, he raised over £3,000 by running every day in May 2020 – 1km on the first day, 2km on the second building up to a 31km run on 31 May. He would often have to run twice a day in order to complete the total distance of 496km, alongside his day job as the Regimental Quartermaster.

Construction on the garden was completed by a team of serving military personnel with support from industry partners. The team created numerous seating areas and a more secluded area for individuals wanting to reflect alone. The centre piece is a beautiful sun dial with the words *"Solace in Solitude"* etched into the stone.

Despite delays due to the national lockdowns, the garden was finally opened on 26 March 2021 by Lt Gen Ivan Jones CB, Commander Field Army, with all contributors invited to attend the event. The beautifully landscaped garden delivers a green space where soldiers and officers can take some time for themselves or meet with colleagues for a coffee. It is a community space providing for almost 2,000 personnel – open to all four units at Swinton Barracks.

The garden came into its own during the Covid-19 pandemic, as the camp was dispersed leaving 200+ Service Personnel on camp with very little access to facilities. The Garden of Reflection therefore provided a much needed refuge, to take time away from the living accommodation.

This project has truly been a community effort, with soldiers across the Regiment volunteering to contribute to the construction effort and civilian companies donating resources and labour, including Aspire Defence Services Ltd, Aspire Defence Capital Works, Dyer & Butler and Gavin Jones. However, none of it would have been possible without the drive and commitment of Maj Buckley and everyone is extremely grateful for his efforts to create such a beautiful area to relax in.

Capt Madeleine Hudson
Intelligence Officer
26 Engineer Regiment
Royal Engineers

The sundial © John Buckley

Shingle recharge on Pewit Island

Lifting the bags off the mexeflote © Chris Lycett

Pewit Island is a small nature reserve located in the north-west corner of Portsmouth Harbour. Owned by the Hampshire and Isle of Wight Wildlife Trust (HIWWT), the harbour is part of a complex of three harbours around the City of Portsmouth. It is often overlooked in terms of wildlife as it is much busier than Chichester or Langstone, with a heavy Naval presence as well as cross channel ferries and container ports.

Portsmouth Harbour is critically important for overwintering wildfowl and waders. The harbour sees several thousand dunlin, brent geese and other species that travel down from the Arctic to feed in the calm conditions. Pewit Island is the central hub of most activity for these birds, providing a safe refuge for them to rest and recuperate during the high tide, with curlew and oyster catcher gathering in especially large numbers. Due to the nature of the activities within the harbour, these secure roost sites are at a premium.

There have been a lack of breeding birds on Pewit Island, in part due to the change in habitat of the site, as well as increased disturbance. Therefore, in 2018 HIWWT cleared the site of vegetation, followed by the development of a much more ambitious plan – to move 60 tonnes of aggregate onto the island. This would dramatically increase the suitability of the island for roosting waders, as well as breeding birds such as the common tern, who nest directly onto fine shingle. However, it was soon discovered that moving that amount of shingle onto an island that is surrounded by both shallow water and deep mud, is logistically very complex.

HIWWT were initially approached by Army logistics, based at Marchwood, who attempted to reach the island in 2019. However, the water was too shallow for their craft to land. At the start of 2021 the RAF were approached for the use of a chinook helicopter to airlift the shingle, and a plan was put together to combine the project with a training exercise.

In April 2021 60 tonnes of shingle, which was donated to HIWWT by Tarmac and Day Aggregates, was delivered to Marchwood Military Port, on the western shore of Southampton Water. The bags were then shipped as close to Pewit Island as possible, mooring a mexeflote in a channel about 250m offshore. The bags were subsequently lifted by helicopter onto the island – taking 10 trips to deliver all of the aggregate. HIWWT staff and a group of volunteers then spread the shingle out over an area of approximately 200m^2.

The whole project was an outstanding piece of collaborative working, with eight organisations working together, including the Army, RAF, HIWWT, RSPB, Boatfolk, Tarmac, Day Aggregates and Natural England. It is unlikely that the project would have been achieved without the help of the Ministry of Defence. The project has expanded the potential safe areas in the Solent for declining species such as the common tern, and it is now hoped that seabirds will occupy the site and breed successfully.

Chris Lycett
Senior Reserve Officer
HIWWT

Pewit Island post shingle recharge © Chris Lycett

Managing the **rare seasonal wetland habitats** of Predannack Airfield

Digging ponds © Seth Jackson

Predannack Airfield, on the Lizard peninsula, opened in 1941 and was one of many RAF airfields hastily constructed in Cornwall during World War Two (WW2). Beaufighters, Mosquitoes and Spitfires took to the skies from the airfield to defend the south-west's ports, towns and Allied trans-Atlantic shipping convoys. Post WW2 saw a period of experimentation on swing wing aircraft by Vickers Armstrong under the supervision of Barnes Wallis, of which some concrete trackway reminders remain. Since the late 1950s Predannack has been a satellite to RNAS Culdrose, only five miles distant, which opened just after WW2 ended. Today Predannack is used by the Royal Navy School of Flight Deck Operations and 700X Naval Air Squadron operating unmanned flight systems, as well as a volunteer gliding squadron, rifle range and model flying club.

Historical maps show the airfield was constructed on Predannack Downs (here 'Downs' referring to heathland) on The Lizard with its unique Cornish heath *Erica vagans*. Of course, the loss under tarmac runways of what would today be classed as prime Priority habitat is to be mourned. That said, there is plenty to celebrate regarding nature at Predannack and much wildlife happily exists alongside the continuing military activity. In fact, military use in some ways stopped the clock in 1941, certainly when it came to the march of agricultural progress. The grasslands in the central part of the airfield between the runways have been spared fertiliser and herbicide use, and so are recognised as some of the most botanically diverse grassland in the area. These parts have in recent years been cut for hay in late summer. As such, they are being considered as donor grasslands from which seed can be collected to support restoration of species-rich grasslands across the wider area.

The earth movements to construct Predannack Airfield inadvertently created a version of one of the Lizard's most revered habitats – Mediterranean temporary ponds, also known as puddles! Much of the Lizard, airfield included, is on poorly draining windblown clay, called loess, overlying serpentine and other unusual geologies. Shallow seasonal water bodies, for example formed in ruts in cart tracks, boast a long list of rarities, from aquatic beetles to ferns and rushes. A peripheral area that aerial photos show was scraped bare at the time of construction has been a sporadic site ever since for one of England's rarest plants – pygmy rush, a tiny annual no more than an inch high, which needs areas of bare, open, and seasonally flooded ground. It is only found on the Lizard in Britain, and here only on a handful of sites.

Ruts in the perimeter firebreak and bridleway are home to scarce plants like lesser water plantain, and good quantities of frogspawn. West Cornwall, with its mild climate, has the earliest breeding frogs in Britain, with spawn seen regularly as early as November, there being a trade-off between chasing early breeding success,

Species rich runway margins © Tony Blunden

froglets being independent before their puddles dry out in spring, and the risks of an icy snap killing spawn.

Mediterranean temporary ponds are an early successional habitat and left entirely undisturbed will close in and grow over, with the loss of their rare species. Without tanks or live firing, the Ministry of Defence (MOD) is not in this case able to provide the necessary disturbance through its own activities. So this element is carried out by nature conservation management, arranged in partnership. Land management is complex with a variety of tenures, but essentially the southern half of the airfield is owned by the National Trust (NT) and leased to the MOD, and the northern half is owned by the MOD, with non-operational areas let to Cornwall Wildlife Trust (CWT). All parties work with a number of graziers and farmers with mowing licences and some of this management is supported by Government funded agri-environment schemes through Natural England (NE) Higher Level Stewardship. The airfield is nestled within, and virtually surrounded by land in the Lizard National Nature Reserve, managed by CWT, NT and NE, and is of equivalent quality for wildlife. Close partnership working and cooperation is key across the wider area to give a joined up approach, with connection to the MOD through six monthly nature conservation committee meetings.

The Defence Infrastructure Organisation's Conservation Stewardship Fund (CSF) has kindly supported a number of CWT and NT coordinated projects in the last three years, focussed on practical

Common frog © Tony Blunden

management and survey work on the airfield. An assessment of the internal grasslands (mainly hay cut) and heathlands (occasionally cut or burned) was undertaken through a consultancy, confirming them to be high quality meadow, acid grassland and heath habitats. Interestingly, some of the short repeatedly mown areas (the 'glider strips' parallel to the tarmac) have the greatest interest, effectively resembling a tightly grazed species-rich acid grass and heathland mix. Here can be found fragrant chamomile, lawns of tiny eyebrights, pale heath violet and green winged orchid, right in the thick of Royal Navy flying and training activities.

In the more peripheral areas, the CSF has funded work to enhance and create seasonal wetland habitats – with 'fake' wheel ruts on a less used section of perimeter firebreak for example, and revisiting historic pygmy rush sites to ensure some gentle scraping to expose bare loess, and hopefully revive a viable seedbank. Although pygmy rush has not yet responded to the most recent work, previous scrape creation undertaken by the NT a decade ago has shown huge wider benefits, with large populations of two speciality 'puddle gang' plants. These are pillwort, a grass-like fern, and yellow centaury, a beautiful, delicate, upright flower, which put on a grand show in 2021. A little disturbance every three or five years somewhere on the airfield is key to maintaining bare and early successional habitats. The CSF has also supported ride side management of the perimeter public bridleway, creating scalloped edges and cutting back willows to reduce shading of the seasonal ponds and puddles.

Much has been achieved through partnership in the last twenty years, and the approach is expected to continue to be fruitful in securing further gains for wildlife at Predannack.

Rachel Holder
Lead Ranger
National Trust

Pygmy rush © Tony Blunden

Pillwort © Tony Blunden

Yellow centaury © Tony Blunden

RAF Lossiemouth – Re-Cycling its way to a greener future

Sgt Wallace training up another Re-Cycle volunteer © Crown

The RAF Lossiemouth Re-Cycle Programme started during the first Covid-19 lockdown, when CT Wales and Sgt Wallace noted that their newly found spare time could be utilised dealing with the high number of abandoned bicycles across the Lossiemouth estate in north-east Scotland. Instead of scrapping the bikes or burdening a local charity shop with hundreds of unserviceable machines, the Re-Cycle team aimed to fix the bicycles and sell them to Station personnel for a small fee. This in turn would raise money for the newly created Moray Emergency Relief Fund and support those wishing to commute in a more sustainable manner. The Moray Emergency Relief Fund, championed by the Lord-Lieutenants of Moray and Banffshire, has provided critical financial support to low income families during the pandemic.

The programme also took the opportunity to develop its small team of hardworking volunteers. Having gained Mountain bike Instructors Award Scheme (MIAS) accredited maintenance qualifications, CT Wales and Sgt Wallace offered to train others to become bike mechanics, with the aim of further supporting the programme and wider community. The scheme soon became self-sufficient despite the usual turnover in personnel due to postings and overseas deployments. Re-Cycle's core policy of 'refurbish where possible' flourished and it quickly enacted its virtuous and sustainable cycle; remove abandoned bicycles from the Ministry of Defence (MOD) estate, recycle them to a usable condition, upskill more people to do the same and sell the bikes for the benefit of a local fund or charity.

Over 200 unwanted or abandoned bicycles have since been removed from the Lossiemouth estate and around 150 serviceable machines have been generated. By selling and hiring the bikes to Station personnel and their families over £4,500 has been raised and donated to the Moray Emergency Relief Fund. The scheme has also directly impacted the local community, with a variety of serviced children's bikes donated to the RAF Lossiemouth Child Care Centre and a local high school's fleet of mountain bikes fully serviced and safety checked. These achievements were formally recognised in 2020 when Maj Gen Seymour Monro awarded the team with a Lord-Lieutenant's commendation.

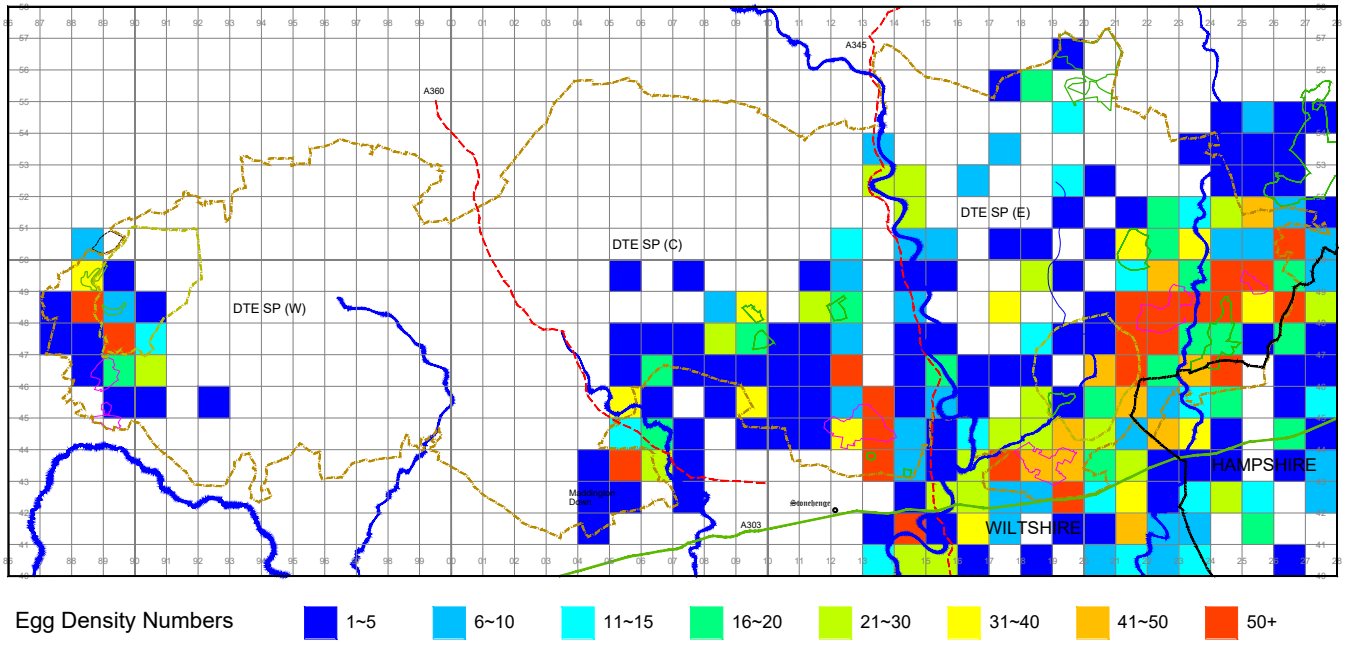
In spring 2021 the team obtained a fleet of 15 retired mountain bikes from an adventure training centre in Grantown-on-Spey, supporting the aim of setting up a long-term hire option. In addition, a £13,500 NAAFI Fund Grant, generously provided by the Armed Forces Covenant Fund Trust, was secured to support the programme's growth. This financial support will be used to purchase a fleet of road bikes, providing greater choice and further training opportunities for RAF Lossiemouth personnel.

Ultimately, the Re-Cycle Programme has inspired future generations of cyclists and mechanics, reduced the need to purchase more bikes, prevented hundreds of bicycles being disposed of and highlighted the dedication and selflessness of RAF personnel to the local community. The Re-Cycle Programme continues to grow, and with trained volunteers due to be posted to other RAF Stations, it is hoped they will initiate similar projects across the wider MOD estate.

Flt Lt Joshua Smullen
OC Engineering Operations Flight
RAF Lossiemouth

CT Wales tinkering with a bike over lunch © Crown

The brown hairstreak on SPTA



The distribution of the brown hairstreak across Salisbury Plain Training Area between 2012 – 2021 © Mike Lockwood

Set on a chalk plateau in Wiltshire, Salisbury Plain Training Area (SPTA) covers almost 150 square miles and is the most extensive area of unimproved grassland in western Europe. From 1897 much of the land was acquired by the Ministry of Defence (MOD) for training. It is rich in wildlife, with colonies of the nationally rare marsh fritillary and Duke of Burgundy butterflies. It is also home to another vulnerable butterfly, the brown hairstreak.

Early 19th century writers mentioned the brown hairstreak (which inhabits open scrubland and hedgerows) at Kimpton, but the first recorded evidence on SPTA was in 1954 near Tidworth. Further reports came from this area over the next two decades – in the late 1960s the butterfly began to flourish due to scrub encroachment following the reduction in the rabbit population from myxomatosis. In 1987 the butterfly was reported at Beacon Hill and at Perham Down the following year. The 'Butterflies of Wiltshire', published in 1995, concluded the butterfly was widespread around Tidworth and Bulford, being part of a larger population extending into Hampshire.

Three MOD Conservation Groups were formed between 1977 and 1980, covering the west, centre and east of SPTA. Members recorded the diverse nature, including brown hairstreak, and their work proved influential in the decision by English Nature to designate parts of SPTA a Site of Special Scientific Interest in 1993. These groups recently amalgamated to form the SPTA Conservation Group.

The first commissioned study of brown hairstreak on SPTA was in 1997 by the ecologist Dominic Ash and concentrated on their known range in the east. A random sighting in 1998 led to the discovery of an isolated population on SPTA west, where scattered pockets of blackthorn occur in valley bottoms. Annual egg searches focussing on the east, led by Conservation Group member Mervyn Grist, began in 2006 and continue today. A second survey, by ecologist Fay Martin in 2007, discovered sites further north at Everleigh Ashes. Both Dominic and Fay searched for eggs laid on blackthorn and the results were used to develop the crucial Scrub Management Plan.

Subsequent fieldwork, including joint searches in 2014 and 2019 by Defence Infrastructure Organisation (DIO) staff and Conservation Group members, revealed the brown hairstreak to be widespread in sheltered valleys across Imber Ranges. Since 2012 the author has conducted mapping of the main population in south Wiltshire which has resulted in a significant expansion of the recorded range on SPTA, including on Maddington Down in 2019.

Ash dieback is spreading across SPTA with circa 14,000 trees felled. This may adversely affect brown hairstreak through loss of 'assembly trees', where butterflies congregate at the start of their flight period. DIO are key participants in the new Nature Recovery Partnership which aims to link grassland habitats between Porton Down and Salisbury Plain, promoting field margins and hedgerows. This should bring significant benefit to local wildlife, including the brown hairstreak.

Mike Lockwood
SPTA Conservation Group

A brown hairstreak at Tidworth © Mike Lockwood

Building RAF Akrotiri's new **Water Sports and Communities Centre**

RAF Aktrotiri Water Sports and Communities Centre © Mitie

RAF Akrotiri's Water Sports and Communities Centre in Cyprus was conceived following the demolition of previous water sports facilities. Located along the eastern foreshore of the Station, the old buildings had fallen into disrepair, whilst others were in a now 'out of bounds' security area.

The aim was to consolidate new water sports facilities into one multi activity centre, combining the benefits of a learning and development training facility with a social hub for Service Personnel and their families in a strategic, safe and secure location. The facility also needed to be accredited and compliant for use by all the water sports clubs; water skiing, wakeboarding, triathlon, sea angling, sailing, windsurfing, power boating and sub-aqua.

The delivery of the €3m RAF Akrotiri Water Sports and Communities Centre presented the project teams with a variety of opportunities and challenges. These included a constraint in the permissions from Seashore Ordinance and the Sovereign Base Area Authorities that only a single story building would be permitted along the foreshore. The team worked with the Republic of Cyprus Department of Antiquities (DoA) to protect a scheduled archaeological site, plus a Habitats Regulation Assessment (HRA) was required as the project was located within the boundaries of the Akrotiri Special Area of Conservation (SAC).

The facilities were built in two phases. Phase A commenced in 2018 and completed in January 2021 and included the main Community and Water Sports Club, designed by ACPS Engineering Services and delivered by Mitie and their sub-contractors C&A Toumazis (Construction). In September 2020 phase B started with an anticipated completion in early 2022. This provided the supporting infrastructure of boat sheds, clubhouses and slipway, designed and constructed by the Royal Engineers on Exercise PINESTICK.

A Construction Environmental Management Plan (CEMP) was developed for both phases, which included a Traffic Management Plan, a Waste Management Plan, Pollution Control Plan, Archaeological and Nature Conservation Plan, alongside a detailed toolbox talk which was presented to the contractors and Royal Engineers working on the project.

The Station foreshore forms part of a parabolic dune formation which is designated as a SAC, as well as being one of the most important turtle nesting sites within the Sovereign Base Areas of Akrotiri. The approved 2019 HRA concluded that by consolidating all the water sports clubs in one designated area (a brownfield site) and returning the previous sites to nature, the project would have a positive effect on the conservation objectives and the integrity of the SAC. These

There are beautiful views from the centre across the bay © Mitie

were recorded as 'habitat banking' for future development needs.

The new facility was built adjacent to the scheduled Roman archaeological site of Vromonera. All excavation works were supervised by the DoA or a licenced archaeologist, with Roman remains being found under the footprint of the old sailing club, along with an amphora. However, Covid-19 restrictions prevented the DoA archaeologist attending phase B. Fortunately Sgt Graham Moore, the Akrotiri Station Archaeological Liaison Officer, was approved by DoA to supervise the Royal Engineers' excavation works, avoiding significant delays to the Ex PINESTICK deployment. All the discoveries were fully recorded, and the amphora is now in the care of a local museum.

RAF Akrotiri Water Sports and Communities Centre has built in sustainability considerations throughout, including incorporating a grid connected photovoltaic system with the incoming power supply metered. Solar thermal collectors were installed on the flat roof space, and these produce renewable energy for most of the year to heat the domestic hot water in the main building. The installation of LED lighting offers the maximum required lighting levels for each function of the building whilst reducing energy consumption.

Pottery finds from Ex PINESTICK © Mitie

Solar panels on the roof of the new centre © Mitie

Energy recovery ventilation was adopted where applicable along with the fitting of high performance, high efficiency, variable output air conditioning units. These combine to reduce heat waste from the facility and enhance the comfort and safety of the building's users whilst reducing power consumption, positively contributing to improving the overall energy performance of the building.

Low water use shower heads, motion detecting taps and mixers and low capacity dual flush WC cisterns enhance water conservation, whilst secure and sufficient space is provided on-site for the collection and storage of recyclable and compostable materials. This will reduce the amount of waste sent to landfill as more materials can be recycled and reused. Technologies with low global warming potential were designed into the specifications. Materials with A+ rated environmental profiles were specified throughout and all products, equipment and electrical appliances were procured following the UK Government buying standards, or equivalent for Cyprus.

The environmental considerations went beyond the building itself. The topsoil from the construction works was deemed contaminated with the seeds from an invasive species *Acacia saligna* and so it was agreed with the regulatory authority that the material could be taken for incineration and reused through industry. Around the building, planting programmes were agreed with the Ministry of Defence Competent Authority so that only endemic flora were incorporated, ensuring that palm trees and other non-endemic flora cannot negatively impact the SAC.

Ex PINESTICK found the project challenging with all trades having to work around the site constraints. The plans had to be altered to avoid archaeological interest as it was discovered, and the designs for the new slipway and fuel/oil separators had to take into consideration both terrestrial and environmental constraints to avoid negative impacts on dune formations, turtles and marine Neptune grass *Posidonia ociania*. However, the rewards have outweighed the challenges with the Ex PINESTICK Royal Engineers regularly going above and beyond. This has included helping the Akrotiri turtle watch by providing details of sightings of new tracks, as well as installing turtle friendly amber lighting to the outside of the building to reduce the disruption that artificial light can have on the turtles' behaviour and physiology.

These considerations have produced a sustainable building, with the project recently achieving a DREAM (Defence Related Environmental Assessment Method) 'Excellent' score of 98%.

David Reynolds[1] & Mark Wootten[2]
Environmental Officer[1] & Senior Project Manager[2]
Defence Infrastructure Organisation[1] & Defence International Mitie[2]

Heritage at RAF High Wycombe – **home to WW2 Bomber Command**

Recreating ACM Arthur 'Bomber' Harris' office in building 2 (now Lancaster Block) © Sqn Ldr Hannaford

RAF High Wycombe is home to the RAF's AIR Command, formerly Strike Command (1968 to 2007) and Bomber Command (1936 to 1968). It is also home to UK Space Command, the European Air Group and is the liaison between the RAF and United States Visiting Forces (USVF).

The Station has its origins in the mid-1930s, following the renewed threat of war from Nazi Germany. The RAF introduced a new organisational structure which concentrated resources in a series of 'Commands', each with specific roles; Bomber, Fighter, Coastal and Training. A suitable location was needed for a secret headquarters for Bomber Command and the thick local beechwoods in the Chiltern Hills, Buckinghamshire, were considered ideal. It was Wg Cdr Alan Oakeshott, a local son of an Army Major and a town councillor, who suggested the areas of Naphill, Walter's Ash and Lacey Green and work building a new camp started in November 1938. The trees provided much needed cover from enemy eyes in the sky and it was decided to build the camp to look like a small village, with winding roads, a country manor house style Officers' Mess and a fire station disguised as a church. Wg Cdr Oakeshott has been credited with the location of HQ Bomber Command and was awarded the Distinguished Flying Cross in 1940 for intelligence gathering. He made the ultimate sacrifice when his Mosquito was shot down in 1942.

Marshall of the Royal Air Force Sir Arthur Harris was Air Officer Commanding-in-Chief of Bomber Command from 1942 to 1945 and led the successful and controversial bombing campaigns against the Nazi regime. He subsequently became known as 'Bomber' Harris and he worked tirelessly from his two offices at RAF High Wycombe, one above ground and the other beneath it, connected by a network of tunnels still in use today.

The RAF's bombing campaigns during the Second World War have been an enduring and often emotive topic and RAF High Wycombe remains a place of great interest for the avid aviation historian and the mildly curious alike. The Station has been able to recreate the office spaces of 'Bomber' Harris and made them open for viewing.

Dave Brown BEM, a local historian and former RAF Steward, had previously worked at RAF High Wycombe as the Officers' Mess Manager from August 1989 to December 1995. He became a MOD Civil Servant in January 1996 and continues to work in the General Duties Flight on the Station. His knowledge and enthusiasm are invaluable, and he is responsible for the

continued preservation and education of RAF High Wycombe's heritage.

In 2013, under Dave's lead, work began to recreate 'Bomber' Harris' office above ground to that of the Second World War, as famously seen in the 1955 film 'The Dam Busters'. A series of guided tours have been established which incorporate a visit to the office and a tour of the network of tunnels beneath, attracting a broad cross-section of local interest groups, youth organisations, professional historians, veterans of RAF High Wycombe and even The Princess Royal in 2015.

The value of the personal experience cannot be overstated. Physically sitting at a replica of 'Bomber' Harris' desk, or walking through the dank tunnels really cements the compelling narrative in the mind and the fact that visits frequently take place during the working day at a busy headquarters, makes any visitor appreciate the unique nature of the site. The visits are delivered entirely voluntarily and are free of charge, however donations from the 5,114 (and counting) visitors have added up to over £1,700 so far, which will go to the RAF Association and the RAF Benevolent fund. Dave is also responsible for the impressive Gate Guardians at RAF High Wycombe, a Spitfire and a Hurricane. High Wycombe is the only RAF station to have two Gate Guardians.

View of the tunnel system underneath Bomber Harris' old offices, which link to other buildings © Sqn Ldr Hannaford

Hurricane Gate Guardian outside RAF High Wycombe's No 1 Site Main Entrance © Sqn Ldr Hannaford

The rich history of RAF High Wycombe, Bomber Command and the wider Air Force itself, is encapsulated in the Station Heritage Room which is an ongoing project to house artefacts and information to engage the RAF family stationed here, and the wider community. Although only a small room, there are several glass display cabinets, various paintings and posters, silverware and a collection of model aircraft to see, along with information on key characters including Wg Cdr Oakeshott. The Station Heritage Room is headed by Fg Off Kathryn Duncan, the Station Training Officer, and she has been working hard over the past year to renovate the room and its collection, seeking more items for display and creating interpretation boards.

The room is also used for courses and conferences and is the current meeting place of RAF High Wycombe's Commissioning Club – here serving members of the Armed Forces, who aspire to Commission as Officers in the RAF, meet to discuss progress, experiences and take part in activities in preparation for Officer Selection. The Station Heritage Room has also welcomed visitors from the public and local historical groups including a National Trust team from nearby Hughenden Manor, which also played a crucial role in the Second World War. Dave and Kathryn work closely together to ensure the heritage is treasured and available to as many people as possible.

RAF High Wycombe's heritage team enhances the reputation of the Service and the wider Ministry of Defence with its keen focus on preserving some unique facilities and iconic assets, whilst delivering its quietly understated but compelling narrative. By enabling frequent and well attended visits from a broad spectrum of the public, academia and the wider military family, members of the heritage team have been able to inform, educate and occasionally myth bust with their engaging, enthusiastic story telling. By going out of their way as volunteers to arrange access to otherwise closed venues and giving their time to share the history of the site, visitors are wiser and more able advocates of the RAF's enduring legacy.

Fg Off Kathryn Duncan
Station Training Officer
Royal Air Force

Giving it another shot – recycling at HMNB Devonport

Delivery of new and removal of used shot © Babcock

Babcock uses shot blast extensively in the refit and maintenance periods of all craft worked on at its HMNB Devonport site in Plymouth, including ships, submarines, landing craft and associated infrastructure. The technical specifications that the material took on after use meant it could only be used once as, partly due to its high heavy metals content, the material is usually classified as hazardous waste.

The Babcock team initially conducted a review of various reusable blast media with the customer, warships' painting teams and supplier. Alternative solutions considered included different blast media, on-site recycling, other options for paint removal such as innovative laser ablation and ultra-high pressure water blasting. However, this investigation confirmed that the iron smelting slag remained the most viable option and so the focus had to be on identifying a sustainable disposal route.

The team consulted with the Environment Agency, building a robust and ultimately successful case to challenge the waste classification. They supported this by a thorough sampling regime and laboratory analysis to classify the waste as non-hazardous and therefore suitable for recycling by the blast media provider. This classification change means that when the spent shot blast arrives at a reprocessing site holding the appropriate environmental permit for this type of waste, it can now be placed in a bulk-holding bay before being dried, crushed/screened and filtered. Where necessary for its end use it can also be blended with other materials, as an aggregate waste might be.

This revitalised product can then be reused in a variety of applications. For example:

- **Refractory:** The waste can be used as a slag conditioning material for use as a flux during the steel making process
- **Asphalt production:** After use as above, the resulting flux is crushed to form fly ash, which can be used in the production of asphalt, further delaying final disposal. Alternatively, 'poor' quality single use shot blast can be used immediately after processing in concrete or asphalt mixes
- **Industrial flooring:** The waste can also be used in resin bound flooring, making it extremely hard wearing but attractive with the 'sparkle' effect of black stone
- **Ballast:** The waste can be repurposed as ballast in a range of applications. This varies from large scale (e.g. shipping) to small scale (e.g. gym equipment), as it is heavy and absorbs shock.

All the diverted waste material goes for reuse. The reprocessing also opens up further recycling opportunities (e.g. asphalt recycling), which vastly extends the operational 'life' of the shot blast waste. It is helping to move towards a true a circular economy with the hope that at some point HMNB Devonport may receive the recycled media back for another use, keeping more of the waste within our 'loop'.

The project team also investigated the options for a more sustainable transport solution for the reprocessing of shot blast waste material. The majority of the end users are in Sheffield where the reprocessing plant is located. This meant the most economical solution was to arrange a 'back haul' process – where vehicles deliver new shot blast media but also collect the spent waste and take it back for reprocessing, which in turn cuts down transport mileage.

Between May 2019 and July 2021 4,897 tonnes of used shot blast was diverted from landfill. The success of the project has also allowed the site to reduce waste to landfill to just 3% (2020 – 2021) and ways to reduce this further continue to be sought.

Jennifer Kirkwood
Head of Sustainability
Babcock International

Recycled shot blast as a resin bound flooring material © Babcock

Falkland Islands – **planting tussac**

Healthy tussac grass © John Gajdus

Throughout the winter months a local charity, Falklands Conservation, works hard to return barren stretches of Falkland Islands coastline back to its original, lush, state. The endemic tussac grass is a hardy plant that grows in large clumps and once covered the littoral landscape throughout the archipelago. The introduction of sheep to the islands meant the sweet and nutritious tussac grass was marked for destruction. A combination of over-grazing and man-made fires pushes the tussac coverage past a critical point where it begins to die back. Falklands Conservation travel to various islands where this has happened and attempt to reverse the decline. When tussac cover is removed it exposes the peat underneath, which is quickly dried by the incessant winds, turning it to a coarse, barren dust. The same winds pick up this dust, which chokes all nearby plant life, further weakening the regional ecosystem.

Throughout September 2021 more than 25 people from Mount Pleasant Complex, including the Deputy Commander, Gp Capt Jamie Grindlay, joined the effort to replant tussac. Defence Infrastructure Organisation attendees were Lt Col Andy Plackett and his wife Sally, Capt John Gajdus, SSgt Phil Cozens and Debbie Thornton. Each morning a launch was boarded by 12 volunteers, who spent the morning 'pulling tillers'. A 'tiller' is a section of tussac grass that can survive independently and can be safely removed from the larger clump without damage. This is easier said than done and many a volunteer could be found lying flat on their back having been unable to keep their feet after either they or the tiller gave way from the pull! The Falkland Islands is famous for cooperation and collaboration, so it is no surprise that the sacks in which these tillers were stored came from local fishing companies. The team filled 60 of these sacks.

Moving from the collection site to the planting location meant either carrying the sacks across country by foot, on a quad bike, or putting them onto the boat to move to a different island. Planting the tillers is preferably a two person job, one lifting the soil with a spade (not digging a hole, as that takes too long) and the other slotting the tiller into the space underneath. The ground is then stamped down to secure the new plant and a little tug ensures it will not come out any time soon.

Each day an area of approximately 200 x 50 metres was planted and in previous years success rates have been well over 80%. If that is matched it means that over a kilometre of coastline will soon be protected against further erosion and set on the path to re-establish an ecosystem that supports a wide range of native species, from the sea lion, to the endemic Cobb's wren. The human inhabitants of the Falkland Islands were responsible for this loss of habitat and so it is current occupiers, whether permanent or temporary, who have the responsibility to reverse the decline.

Capt John Gajdus
SO3 Soft Facility Management
Defence Infrastructure Organisation

Replanted tussac grass © John Gajdus

Access Hit Parade – the MOD Access and Recreation Advisory team's top sites

Looking out to Warbarrow Tout on the Lulworth Range coast © Harvey Mills Photography

The Defence Infrastructure Organisation's (DIO) Access and Recreation Advisory team supports the Ministry of Defence (MOD) in managing public access across the MOD estate. The breadth of landscapes and locations across the country makes for a wide variety of recreation opportunities, some of which can be found in remarkable locations such as the wild landscape of Cape Wrath in north-west Scotland or more accessible, but no less captivating sites such as the shores of Penhale in Cornwall. The Access and Recreation team, along with guest contributor Richard Brooks, Principal – Environmental Support and Compliance (ES&C) share some of their favourite sites.

Lulworth Ranges (James Nevitt, Senior Access and Recreation Advisor)

As I am from Dorset, Lulworth Range always has a special resonance. The site is close to my roots, has lots to offer visitors and perfectly captures the county – with its beautiful, rolling countryside, dashes of heathland, pockets of history and the idyllic coastal villages.

Like much of the MOD estate, history is a strong feature at Lulworth. At its most extreme, visitors can find the 140 million year old fossilised remains of a Jurassic forest, tucked in the south-west corner and accessible thanks to a successful multi-agency partnership project that reopened the plateau in 2020 (see *Sanctuary* 49, 2020). For more recent history you can visit the village of Tyneham and get an insight into rural life in the early 1900s.

Public access to Lulworth Range has also made a mark in history and was hard fought for. The Lulworth Range walks were formally opened in 1975 by Col Sir Joseph Weld and remain extremely popular, linking Lulworth Cove and Kimmeridge as part of the South West Coast Path, as well as offering a series of circular walks on the southern coastal edge of the range. All continue to be managed by DIO and are clearly marked using yellow topped posts to ensure visitors do not stray into potentially dangerous areas.

Lulworth circular walk map (not to scale) © Crown

The coastal walk between Lulworth Cove and Kimmeridge is not for the faint hearted – a six mile trek that rises and falls along the rolling Dorset coast. For those seeking a shorter, albeit relatively challenging circular walk, a wonderful four mile circuit can be found from Lulworth Cove, climbing to the top of the ridge line to enjoy fabulous views. Walkers then drop down where they can carefully explore Mupe Bay, paying heed to the warning signs. Leaving the bay walkers continue west, visiting the Fossil Forest before leaving the range and returning to the village either via Pepler's Point and the cove if the tide is right or over the neighbouring hill.

Public access to the Lulworth Range walks, the range coast line and Tyneham is only permitted when the ranges are not live so always check firing times online at www.gov.uk/government/publications/lulworth-firing-notice before your visit. Also check tide times if you want to return to the car park via the beach at Lulworth Cove. Use the Ordnance Survey App to find this MOD route at Lulworth Range.

Castlelaw and Dreghorn Training Area (Scott Ashworth, Access and Recreation Advisor)

Based in Scotland, I have some of the most stunning areas of the MOD estate within my patch. I could quite easily have chosen to spotlight the untamed wilderness of the Cape Wrath Training Area, but for sheer 'bang for your buck' in terms of accessibility and the most wonderful panorama, I have chosen to highlight Castlelaw and Dreghorn Training Area on the outskirts of Edinburgh.

Earth house subterrain, Castlelaw © Scott Ashworth

Striking views across Castlelaw Hill Fort Ranges and Glencorse Reservoir © Scott Ashworth

Castlelaw and Dreghorn sits immediately south of the Edinburgh bypass, within the Pentland Hills Regional Park, and essentially acts as a backdoor training area for Edinburgh Garrison, being so close to Redford, Dreghorn and Glencorse Barracks. It consists of a large dry training area, made up of woodland blocks and large open areas of moorland, and also a live firing range at Castlelaw that is managed through the use of red flags and lights when the range is active.

The proximity to Edinburgh means that the site sees large numbers of recreational users, but the open expanses of moorland, together with an extensive path network available to walkers, cyclists and horse riders, stops it seeming crowded. There is an informal parking area at the Dreghorn side of the site, where vehicular access is possible but users should be aware that there is a height restriction barrier in place. There is a more formal car park at the Castlelaw side of the site which offers almost immediate access to the remains of Castlelaw Hill Fort, an extremely interesting site of cultural heritage managed by Historic Environment Scotland, complete with a 'subterrain', or underground chamber.

Utilising the path network from either parking area, you can make your way to the highest points on the training area such as Allermuir, Capelaw, and Castlelaw Hills, which will then offer (Scottish weather dependant of course) the most incredible panoramic views across the rest of the Pentland Hills, virtually the whole of Edinburgh and beyond across the Firth of Forth to the Kingdom of Fife.

The path network links up with routes outside of the MOD estate, so there are opportunities to take access further into the Pentland Hills Regional Park.

The site has a number of public access information panels that highlight the path network and offer both advice and useful contact numbers for visitors. These also explain about some of the military activity that takes place across the site. You can use the Ordnance Survey App to find MOD routes at Castlelaw and Dreghorn.

Sand dunes at Braunton Burrows © James Nevitt

Braunton Burrows (Mark Sumner, Access and Recreation Advisor)
The dramatic landscape of Braunton Burrows, with its staggering sand dunes and beautiful beach brings back waves of nostalgia from holidays with my mum and dad, a million miles from the hustle and bustle of heady school days. Every time I visit the Burrows I am taken back to those carefree days, making it one of my favourite places to visit. There is also an eerie tranquillity that I feel when walking across the area, not surprising when you realise what the site was used for.

Braunton Burrows in North Devon is one of the largest sand dune systems in the UK and lies within the North Devon Area of Outstanding Natural Beauty. At approximately 1,000ha it is a haven for many types of animals and plants, some quite rare like the petalwort *Petalophyllum ralfsii*, all of which have helped make the area a designated Special Area of Conservation. The area is owned and managed by the Christie Devon Estate in partnership with Natural England and the MOD.

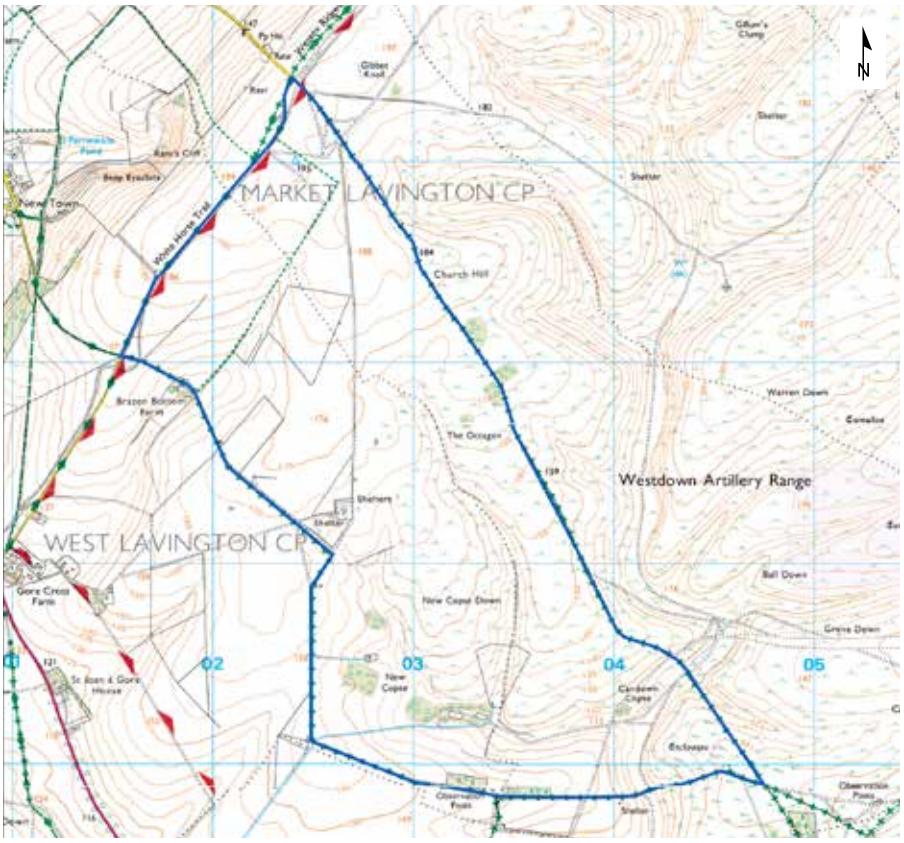
Like many parts of the estate across the UK, the Burrows is steeped in military history and played a key role in the Second World War. The landscape of extreme dunes and flat, level beach made it a perfect practice area for the D-Day landings in 1944, a defining moment leading to the end of the war. There were approximately 15,000 American troops based here to carry out essential training before D-Day. When walking across the dunes look out for the concrete landing craft that they used for practising onloading and offloading, and the stone wall used to practise rifle grenade marksmanship, with the holes simulating an enemy pillbox.

There is one public right of way through the site – a bridleway making up part of the South West Coast Path and forming part of the Tarka Trail. The bridleway forms the eastern boundary of the Burrows and follows the eastern track known as American Road. It joins Crow Point car park to the south and Sandy Lane car park to the north. There is permissive access on foot across the whole site to the west of American Road and it is easily accessible from both car parks. There are information panels at each key access point giving a site overview and these are well worth a look before entering the Burrows. Once in there are tracks you can follow, many of them enticing the visitor to see what is 'just around the corner'.

If the soft sand is a little hard on your legs then head slightly further west to the long expanse of flat beach known as Saunton Sands. When the weather is clear you can look out over the Celtic Sea towards Lundy Island, or north along the beach towards Saunton, a mecca for surfers.

The area is still an active military training area so please be vigilant and avoid any training you may see. Use the Ordnance Survey App to find MOD routes at Braunton Burrows.

Idyllic shoreline at Braunton Burrows © James Nevitt



Salisbury Plain circular walk map (not to scale) © Crown

Salisbury Plain Training Area (Richard Brooks, Principal, ES&C)
I have lived on the northern edge of Salisbury Plain Training Area for 15 years and I am lucky enough to be able to access the 'Wessex Ridgeway', which runs adjacent to the main impact area, directly from rights of way which run past my garden. The Ridgeway route gives amazing views into the central area of Salisbury Plain which is one of the largest areas of chalk grassland in northern Europe.

The Ridgeway also gives extensive views of the MOD estate and across north Wiltshire. At times on this route there is a 360 degree vista and because of this the route can feel quite exposed to the weather – be prepared for it being windy and if it is wet the rain often seems to come sideways. The Ridgeway certainly gives the feeling that an adventure is underway even though the route itself is reasonably easy going. This is especially true if the Army are active in the area and are live firing, as you will definitely hear, and often see, artillery fire, mortars and machine guns in action. The danger area is clearly marked and fenced, and the Ridgeway route is very obvious, but as with any training area do not pick up any military debris or approach military vehicles or personnel.

Parking is available at the Vedette huts (sentry posts) above Market Lavington and at Redhorn Hill. If you want to add some extra calorific burn then use the linking rights of way to form circular routes into the Lavingtons, Easterton or Urchfont villages where suitable refreshment can be found! Be warned though – the routes up to the Ridgeway can be pretty steep. Alternatively, on non-firing days the map above provides a circular route deeper into the Salisbury Plain landscape. Do not use this route when the red flags are displayed or the barriers are down.

In the spring the grassland is at its best with a fantastic floristic display harbouring endless pollinators and bird species – keep your eye out for barn owls in the evenings and early mornings. I am always particularly delighted to spot the canary like yellowhammers. In spring they are often seen individually perched high on the scrub on the edge of the track shouting their instantly recognisable call... *"a little bit of bread and no cheese"*. In the winter months these colourful birds are seen in feeding flocks moving hastily over the scrub. During the autumn and winter months masses of starlings gather and spectacular murmurations can often be seen.

I regularly use the Ridgeway and have done so on foot, on bike and on horseback – it gives an amazing opportunity to immerse yourself in the great expanse of Salisbury Plain. Please note that this route is often used by transiting military vehicles. Whilst this adds to the whole experience please ensure that you move off the track as they approach. Use the Ordnance Survey App to find MOD routes and check the range times before your visit at www.gov.uk/government/publications/salisbury-plain-training-area-spta-firing-times

Access & Recreation Advisory team
Defence Infrastructure Organisation

A beacon on the edge of Salisbury Plain © James Nevitt

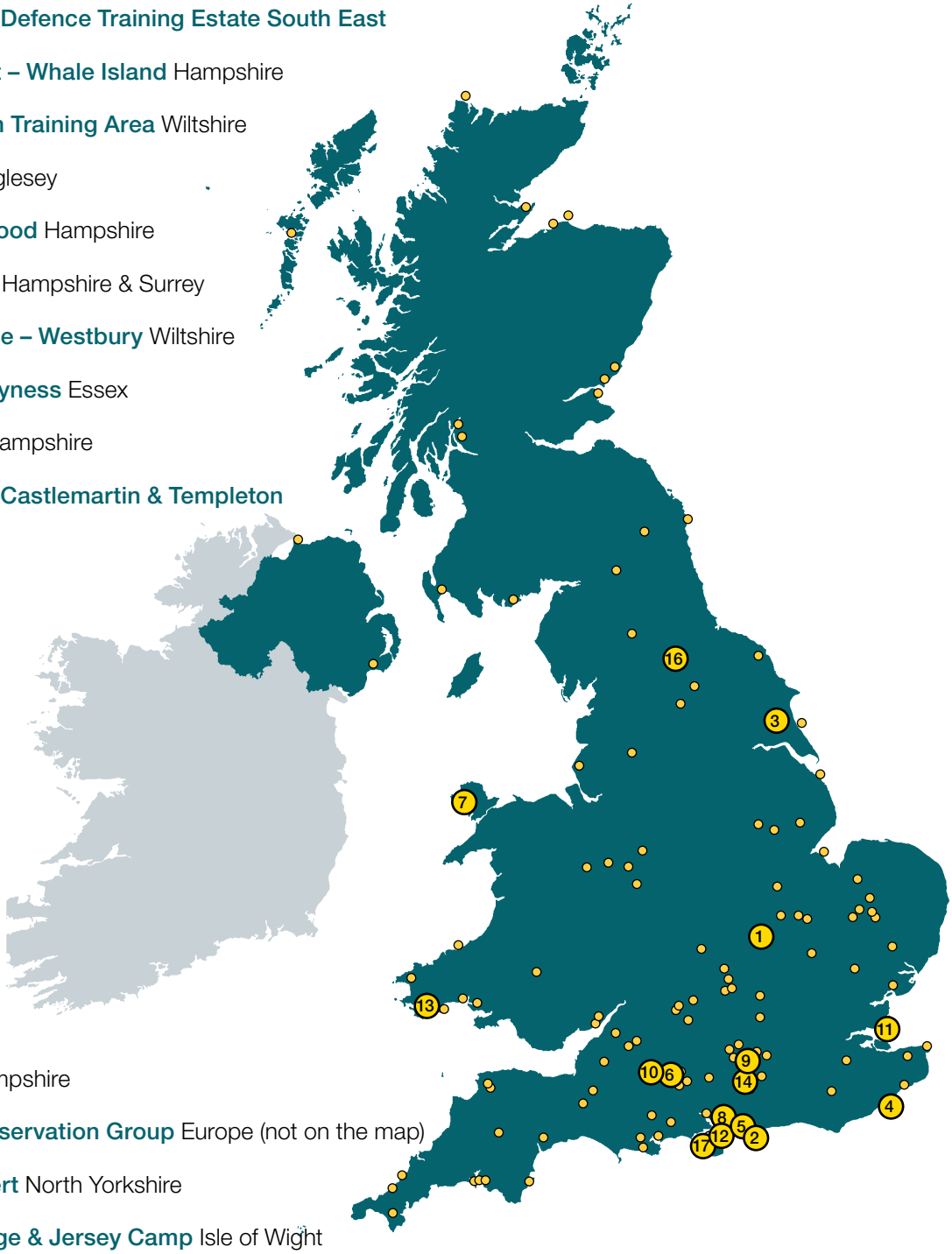
Around the Regions with the Conservation Groups

There are over 125 Conservation Groups operating across the MOD.
The following section provides an update on the dedicated work of some of these groups.

KEY: UK MAP

- 1 Featured Regional Conservation Group
- Other Regional Conservation Group

1. **Yardley Chase Training Area** Northamptonshire
2. **HMNB Portsmouth** Hampshire
3. **DST Leconfield Carrs** East Yorkshire
4. **Spotlight on... Defence Training Estate South East**
5. **HMS Excellent – Whale Island** Hampshire
6. **Salisbury Plain Training Area** Wiltshire
7. **RAF Valley** Anglesey
8. **HMS Collingwood** Hampshire
9. **Bourley & Ash** Hampshire & Surrey
10. **Leighton House – Westbury** Wiltshire
11. **MOD Shoeburyness** Essex
12. **DM Gosport** Hampshire
13. **Spotlight on... Castlemartin & Templeton**



14. **Longmoor** Hampshire
15. **European Conservation Group** Europe (not on the map)
16. **Foxglove Covert** North Yorkshire
17. **Newtown Range & Jersey Camp** Isle of Wight

Northamptonshire
Yardley Chase Training Area






Clockwise from top left; Ornate Brigadier *Odontomyia ornate* © Jeff Blincow, barred snout *Nemotelus uliginosus* © Bob Gill, black-rimmed hunchback *Ogcodes pallipes, Ormyrus nitidulus,* hornet rove beetle *Velleius dilatatus* and *Cheiropachus quadrum* all © Jeff Blincow

There are a handful of wildlife species, either furry or feathered, that seem to drive conservation efforts. This bias is not seen on Yardley Chase Training Area, as the invertebrates steal the limelight. These gems are some of the superb insects that are quietly going about their business in the training area and which reflect the quality of the site's biodiversity. Rather than focus on one or two flagship species, the conservation efforts at Yardley are aimed at preserving the mosaic of interlinked habitats that create conditions for a wide range of species. Above are six of the notable, rare or fascinating species that are part of our invertebrate assemblage. Few people have ever heard of these fabulous creatures, but each is just as important in its own way as an avocet.

Ornate Brigadier *Odontomyia ornata*
This attractive soldierfly is largely confined to coastal grazing levels, though there are small populations inland where suitable wet habitats exist. Their larvae use ditches and ponds with a rich floating vegetation. This can be displaced by dense emergent vegetation and regular clearance of emergents helps to sustain floating populations to support the larvae.

Barred snout *Nemotelus uliginosus*
Another soldierfly, but this one is normally associated with saltmarsh habitat. However, it does occur at a few inland localities which may have some saline influence. The larvae develop under algal mats in dried up ponds or similar habitat.

Black-rimmed hunchback *Ogcodes pallipes*
This fly is a parasitoid of spiders. After the fly's eggs have hatched, the larvae await the passing of a spider, climb on board and enter the spider through a leg joint. The larva overwinters in the spider before killing it and pupating in the spring. Adults cannot feed so only fly for a very short time.

Ormyrus nitidulus
A parasite of a parasite of an oak tree. This is a small (5mm) but stunning blue/green, metallic hunchback wasp. It keeps the oak gall wasps under control by parasitising their larvae. *O. nitidulus* lays its egg on an oak gall wasp larva hidden away inside a gall. The predated larva remains alive long enough for the *O. nitidulus* egg to hatch and then provides it with food to develop. It performs a great function for the Yardley Chase oak trees and is often overlooked by recorders – with only five records on the National Biodiversity Network (NBN) Gateway.

Hornet rove beetle *Velleius dilatatus*
The largest of the *staphylinidae* beetles, it associates with the hornet *Vespa crabro*. It spends most of its life inside a hornet's nest and so is rarely seen, presumably feeding on detritus that falls to the bottom of the nest. As the hornet's range expands, so should this beetle's. Due to its unusual life cycle it is likely to remain poorly recorded.

Cheiropachus quadrum
A chalcid wasp that parasitises bark beetles, particularly the *Scolytidae*. Yardley Chase Training Area has many species of bark beetles that are suitable for this wasp to utilise, but even here the species is uncommon. Its rare status is also true on a national scale, with only two NBN Gateway records.

These are just a few of the species seen this year that help to create the complex ecosystem at Yardley Chase. We need to carefully protect what we have, as our web of life is far too intricate to recreate.

Jeff Blincow, Bob Gill, Kevin Rowley & John Showers
Yardley Chase conservation team

Hampshire
HMNB Portsmouth

Launch of Portsmouth Naval Base Conservation Group – volunteers and Cdre Bailey © Crown

Portsmouth Naval Base is the oldest of the three operating Naval Bases. It is sandwiched between the urban city of Portsmouth and Portsmouth Harbour, which is a large industrial estuary with tidal creeks, saltmarshes and mudflats, the latter of which are also within the site and a Priority habitat. Portsmouth Harbour is registered under the Ramsar Convention, a Site of Special Scientific Interest and Special Protection Area. It is also home to species such as wintering dark bellied brent geese, a feature of the designations. Furthermore, the Naval Base contains 18th century architecture, with listed buildings and scheduled ancient monuments. These features mean there are a wealth of exciting and important projects a Conservation Group could get stuck into.

With a real focus on net zero carbon, preserving the internationally important estate and wider conservation, it was time to set up our very own Portsmouth Naval Base Conservation Group. The idea was conceived during the pandemic and a call was put out to ask for volunteers. There was an amazing response, with over 50 members from across the widest organisations and lodger units that reside on-site, both civilian and military. The group launched by planting seed bombs amongst the existing summer plants in 'The Green', with the hope that after winter it will be full of spring blooms to encourage wildlife and pollinators.

Starting a group from scratch, during a pandemic and in such a uniquely situated area proved the most difficult part – with so many ideas and volunteers, mindful of the history and its operational activity, it was hard to know where and what to start doing. The members of the group have all contributed ideas of what they would like to see happen on the base, activities they would like to be a part of, and areas of personal interest.

Using this the group have started gathering data of marine life, birds and trees. The logging of these sightings will allow a better understanding of the ecology of the surrounding area, enable a link in with external groups and will inform the next activities. There have been sightings of black redstarts which are on the Red List of Birds of Conservation Concern and so we have linked with Hampshire Ornithological Society for data, advice and assistance to locate ideal nesting spots.

Funding has been secured from the Defence Infrastructure Organisation's Conservation Group Grant for tools and seeds to start various garden projects, utilising breakout spots as well as unused areas, with a focus on mainly coastal hardy perennials and annuals, and nectar rich UK native wildflowers, to create both structured gardens and small wildflower meadows.

There is much to be done – building on the collated data and the enthusiasm of our volunteers. The Portsmouth Naval Base Conservation Group is underway and making way, and with a following wind will have a solid foundation to start a busy schedule in 2022.

Cdre JJ Bailey
Naval Base Commander Portsmouth
HMNB Portsmouth

Volunteers scattering 'Beebombs' at The Green on Sunny Walk © Crown

East Yorkshire
DST Leconfield Carrs

Beverley Beekeepers Association hosting a talk to volunteers © Tom Bishop

Based on a World War Two airfield, the Defence School of Transport (DST) is located in East Yorkshire. Covering over 750 acres, DST boasts 16kms of driver training circuits and 26kms of cross-country circuits – providing driver and transport management training to Defence personnel.

Leconfield Carrs successfully balances military training with forestry and conservation. In order to develop a suitable training environment, tonnes of rock and earth have been manipulated, resulting in the creation of five conservation lakes and numerous pools. The planted woodland used for training simulation has developed into a superb habitat for wildlife. Through one of these planted woodlands a 'Leaf Trail' has been newly created. This provides an opportunity for staff to get out and boost their mental wellbeing. The trail encompasses the natural beauty of the estate and leads to a nature lake, orchard and beehives. Another route leads walkers through a woodland walk and by the fishing lake.

Honeybees
In September 2020 we welcomed over 50,000 bees to DST. In partnership with Beverley Beekeepers Association, this project aims to work towards neutralising carbon emissions by enhancing the bee habitat through meadow restoration, with the introduction of wildflower meadow seeds and plug planting. Despite having a successful spring forage, the bees struggled in summer and so plans are now in place to improve on summer forage for 2022.

Operation turtle dove
In Spring 2021 Leconfield Carrs' Maj (Ret'd) Tim Cowley assisted the British Trust for Ornithology in a survey to establish the status of turtle doves at DST. This was part of a nationwide survey for this red-listed species, which has declined 93% in its population since 1994. As a former turtle dove site, this survey involved three visits to DST during quiet hours through May to July. The first visit logged almost 60 bird varieties, around 1/10th of the total number of species found in GB – not bad for a 3km^2 site survey! Notable entries included locally scarce species such as the little ringed plover, green woodpecker, jay and Cetti's warblers. Sadly, despite visiting all of the turtle doves' former territories, none were found. The team remains hopeful that they appear next year.

Solar farm eco enhancements
On 29 October 2021, the Army's first ever solar farm was unveiled at DST by Minister for Defence Procurement, Jeremy Quin MP. The farm, which spans the size of around eight football pitches and consists of over 4,000 solar photovoltaic panels, was built in partnership with Centrica. This is the first of 76 farms planned for construction over the next 10 years and aims to help reach the Army's ambition of net zero by 2050.

Centrica are also providing DST with several ecological enhancements. To encourage spotted flycatcher, robin and pied wagtail, open fronted nest boxes have been installed in the trees around the perimeter of the site. Sand martin nesting boxes will also be fitted on the sandbanks surrounding the fishing lake and a floating raft will be installed to encourage nesting birds.

A herpetology rockery on the north and west of the development will also provide the perfect basking sites for grass snakes and viviparous lizards.

Emma Jobling
Conservation Officer
Leconfield Carrs

A fox at the start of the Leaf Trail © Chris Rodgers

Spotlight on...
Defence Training Estate South East

A nightingale in Old Park Training Area, Canterbury © Prof John MacKinnon, University of Kent

The Covid-19 pandemic disrupted most Cinque Ports Training Area (CPTA) Conservation Group activities in 2020 – with only one conservation walk taking place between the lockdowns. However, despite everything Defence Infrastructure Organisation (DIO) and Landmarc Support Services (Landmarc) staff still managed to conduct much important conservation work throughout the year.

Planting hedgerows

Over the winter CPTA planted another 500m of hedgerow in the north-east of the East Kent Training Area at Lydden and laid 800m of hedgerow near Park Farm as part of Operation Hedgerow. Over the last four years approximately 4km of new hedgerows have been planted and 1.2km of existing hedgerows have been laid utilising Ministry of Defence (MOD) forestry funding. This makes the training area more complex for military training, but will also hugely benefit local wildlife and assist with carbon offset.

On 30 July 2020 Dan Tuson, from Natural England, led a CPTA conservation walk to look at hedgerows planted on the East Kent Training Area (Areas N & M). The group also looked at a bat detector – an electronic listening device set at a particular frequency for different bat species, which had been set up in a hedgerow oak tree to check if the great horseshoe bat *Rhinolophus ferrumequinum* had returned to the Dover area. Dan explained how our new hedgerows provide homes for insects and act as flight lines for bats using echolocation to hunt their prey on the training area.

Sea defence works

The winter storms in early 2020 caused severe damage to the sea defences and flooding at Lydd Ranges. This forced the Environment Agency to conduct emergency sea defence works at the western end of Lydd Ranges in summer 2020, although nesting avocets delayed work for a number of months. The Environment Agency also completed the Hythe Ranges sea defences between April and December 2020,

Flt Sgt Anthony Drew, 56 Squadron RAF, after whom the orchard is named © Toni Knight

continuing to work throughout the lockdowns. Work on the Lydd Ranges sea defences started in April 2021, with actual construction works beginning in July and these are expected to last two to three years.

The memorial orchard

On 19 April 2021, DIO and Landmarc staff joined forces to plant 96 fruit trees in memory of a World War Two RAF fighter pilot who died on 29 July 1944 at Acrise, Kent, whilst on an anti-diver patrol against V-1 flying bombs. The Flight Sergeant Drew Memorial Orchard, situated in an abandoned walled garden behind the Landmarc Rural team base at Acrise, has been planted with traditional varieties of Kentish apples and cobnuts. Apple varieties planted include; Beauty of Kent, Orange Goff, Colonel Vaughan, Flower of Kent, Gascoyne's Scarlett and Smart's Prince Arthur. The memorial orchard is a unique conservation project, preserving traditional varieties of Kentish fruit trees and providing a habitat for insects and birds to thrive in.

Recognising Litter Picking Watch

On 25 August 2021 Brig Bartholomew, Head Overseas and Training (Hd OS & Trg), presented Eric Brown with a Hd OS & Trg commendation during his visit to CPTA. Since January 2019 Litter Picking Watch Romney Marsh, a group set up by Eric who is a local resident, have been collecting marine litter along the foreshore between Denge Marsh lookout and the old Galloway's lookout at Lydd Ranges. Over a period of 18 months Litter Picking Watch conducted 23 visits to the foreshore at Lydd Ranges and picked up over 2,000 bags of marine litter, which were later disposed of by Landmarc staff.

A turtle dove in Old Park Training Area, Canterbury © Prof John MacKinnon, University of Kent

Conservation Stewardship Fund

Following discussions with Conservation Group members over recent years, the DIO Conservation Stewardship Fund has paid for several projects to benefit Sites of Special Scientific Interest (SSSI), Special Areas of Conservation, and Special Protection Area designated features and other notable species.

For example on Lydd Ranges; the ongoing management of scrub regeneration to protect lichen heath, rabbit control to protect the unique hollies, rotational ditch management to benefit invertebrates, flora and water voles, scrub management and de-silting at great crested newt ponds and fencing repairs as part of support to the Sussex emerald moth project. Some of Scene Pond at Dibgate was partly de-silted with some tree management to benefit another meta population of great crested newts, with further planting of saplings for long term landscape continuity at Acrise Parkland Local Wildlife Site.

At Hythe Ranges a new pond and scrub management will hopefully help the return of turtle dove, a species whose population has dramatically declined in the UK. The MOD continues to support Himalayan balsam control along Seabrook Stream SSSI to protect the wet carr woodland flora.

Future plans include planting an avenue of 70 trees as part of Her Majesty the Queen's Green Canopy initiative to commemorate her Platinum Jubilee in 2022. We look forward to the resumption of normal Conservation Group activities with the lifting of Covid-19 restrictions.

Maj Rick Beven
Senior Training Safety Officer
Cinque Ports Training Area

Maj Beven and the Landmarc Rural team at Acrise who planted the orchard © Landmarc Support Services

Hampshire
HMS Excellent – Whale Island

Planted saplings © Crown

Her Majesty Queen Elizabeth II will celebrate her Platinum Jubilee in 2022. To celebrate this event, people from across the UK are invited to *"plant a tree for the Jubilee"*. The emphasis is on quality not quantity, using sustainable species resistant to disease and planting healthy trees in line with recommendations so that they thrive and grow to maturity.

HMS Excellent has embraced the initiative by planting a Queen's Green Canopy adjacent to the crèche, as well as designating the area for conservation. The focus is on planting sustainably, so in conjunction with the Woodland Trust a range of species of native tree whips were planted in the spring of 2021.

This will create a legacy in honour of Her Majesty's leadership of the nation and benefit future generations. The Queen's Green Canopy will encourage people to learn more about the care of trees to enable them to survive, flourish and enhance biodiversity. Trees strengthen the community, help the economy to grow and will protect all of our futures. This initiative will provide health benefits to not only those involved in the planting and upkeep of the areas, but to all individuals on-site. The environment will also benefit as the trees should boost and promote wildlife.

Each canopy planted will be annotated on the Queen's Green Canopy website and a plaque produced and erected. Our planting registration has now been uploaded onto the interactive map on the website, which shows a green canopy of projects across the country and helps to inspire others.

Wildlife conservation area © Crown

A focus for the canopy is on the benefits of urban trees. An urban woodland will commonly; take in carbon dioxide from the air, provide stormwater regulation to prevent flooding and help to mitigate against noise. Research increasingly shows that being close to nature is positive for mental health and provides areas for education.

Non-native trees can also be planted, however it is very important to make sure to plant the right trees in the right places. HMS Excellent has so far planted 150 trees and hedgerow species, and there are plans to plant a further 50. More information can be found online at www.queengreencanopy.org

Ian Mackfall
Environmental Protection Advisor
Ministry of Defence

Liquidambar, a deciduous sweet gum tree © Crown

Wiltshire
Salisbury Plain Training Area

Pine hawk-moth © Ken Cservenka

Green-winged orchid © John Moon

Once again, the global Covid-19 pandemic resulted in a delayed start to the survey season. Highlights from 2021 on Salisbury Plain Training Area (SPTA) East (E) include Mervyn Grist recording the nationally scarce, day-flying broad-bordered bee hawk-moth in June and John Moon reporting a remarkable population of green-winged orchids (estimated numbers were more than 100,000). In October a satellite-tagged hen harrier was seen on SPTA West (W).

Moth trapping
Monthly moth trapping sessions on SPTA(W) were held by Mike Smith. The total catch for the year was 1,932 moths of 180 species. Particular highlights were scarce forester and oblique striped, with these two rare species being the local specialities, while a single pine hawk-moth caused a stir in July, considering that trapping was conducted in open downland with mostly deciduous trees nearby. The most numerous moths were surprisingly 127 feathered gothic and 126 green carpet.

Butterfly monitoring
Long-term butterfly monitoring continued. Mervyn Grist undertook marsh fritillary transects on SPTA(E) and found that the early hatching population feeding on small scabious is thriving. Mike Lockwood continued to expand the detailed knowledge of brown hairstreak butterfly across SPTA. Summer 2021's unusual weather suited wild basil and 75 brimstone butterflies were recorded at a dense patch of this species in mid-August.

Bee survey
A two day survey was undertaken by SPTA Conservation Group, Defence Infrastructure Organisation (DIO) ecologists and the Bumblebee Conservation Trust at various sites across SPTA in September, targeted at the shrill carder bee. Unfortunately this species was not recorded, however attendees were thrilled to find thriving populations of broken-belted bumblebee alongside other notable species including brown-banded carder bee.

Juniper tagging
Conservation Group members led by John Moon and supported by DIO ecologists have undertaken a project to tag juniper seedlings. Funding for tags was provided by the DIO Conservation Group Grant. Salisbury Plain supports the best remaining example in the UK of lowland juniper scrub on chalk. Conservation of this juniper population has been of concern for decades due to lack of natural regeneration. However 250 seedlings and young plants were tagged in 2021, including in previously unrecorded areas, which is hopeful for the future of the population. In subsequent years volunteers will identify and tag any new seedlings and monitor survival rate and growth/condition of the tagged plants.

Bat and beetle monitoring
A Wiltshire Bat Group project was launched in 2021, delivered on the ground by Gareth Harris (County Recorder for bats) and Marc Arbuckle (County Recorder for Coleoptera). The work was funded by the DIO Conservation Stewardship Fund with additional DIO Conservation Group Grant funding for the purchase of two song meter mini bat detectors. The project involved paired dung beetle and bat surveys undertaken across SPTA. Exciting results were recorded from the bat surveys with locations for greater horseshoe bat plus significant numbers of barbastelle, noctule, serotine and Leisler's bat. Beetle samples are still being identified and analysed – watch this space! Excitingly, new locations were recorded for hornet robberfly. The results from the project will feed into liaison with farmers on stock management practices across SPTA.

Jenny Bennett
Ecologist
Defence Infrastructure Organisation

Broken-belted bumblebee © Marc Arbuckle

Anglesey
RAF Valley

The constellation of The Plough being eroded by the lights from RAF Valley © Dani Robertson

Light pollution in the UK has increased significantly in recent years – up 24% between 1993 and 2000. Over 90% of the UK population now live under a highly light polluted sky. As light pollution increases, the opportunities to enjoy the night sky and its stars decline.

Excessive or inappropriate lighting can have multiple adverse impacts on both humans and the natural environment. Sleep deprivation and stress are shown to increase amongst people who have light intrusion into their homes, and prolonged exposure to high levels of artificial light can impact our melatonin levels. The use of inefficient and excessive lighting also increases energy bills.

Light pollution has various adverse impacts on nocturnal wildlife too, including species of mammals, invertebrates and birds. These include disturbance to the migratory routes of bats, including the 12 species thought to be residing in Snowdonia. Research has shown light pollution leads to increased mortality in moth populations, and a decreased ability to mate amongst certain bird species such as blackbirds. Light pollution also impairs the enjoyment of the night time landscape for both star gazers and others who undertake outdoor activities at night.

The Dark Skies Reserve is a designation that aims to conserve and enhance the natural beauty and wildlife of that area. We firmly believe that these principles should be applied to the night time environment as well as what we see during daylight, giving people a sense of place and wellbeing whenever they choose to enjoy the outdoors.

During recent months RAF Valley has worked alongside project officers from the Dark Skies Project, local authority and industry partners to identify how on the Station we can significantly reduce light pollution. This is especially important as the site is so close to the award winning International Dark Sky Reserve in Snowdonia, plus being surrounded by Sites of Special Scientific Interest and adjoining Anglesey's designated Area of Outstanding Natural Beauty.

Welsh Government funding (Sustainable Landscapes, Sustainable Places) via the Isle of Anglesey County Council was allocated for a specialist lighting surveyor (Cundall Light4) to visit the Station for a full day to evaluate all buildings. They then produced a detailed report of how and where we can improve, with a remit that our lighting review had to ensure that any changes would not compromise the security of our buildings. Some quick wins included the repositioning of lights on some of our hangers utilising a cherry picker. Other improvements recommended were to replace lighting on some of our key offending buildings, including the Station Gymnasium and Moran Hangar, with specialist downward lighting equipped with hoods.

RAF Valley will continue to work with and promote the Dark Skies Project through actioning further recommendations from the lighting report. Several works have already been completed, with new lighting installed on some of our buildings. Going forward, any new infrastructure projects or refurbishments that occur on-site will be fully impact considered for the Dark Skies Project's benefit. More information can be found at www.darksky.org

Aled Rowlands
Station Environmental Adviser
RAF Valley

The pole light emits 30% of the light into the night sky and is very inefficient © Andrew Bisnell

Hampshire
HMS Collingwood

The finished pond has both a shingle and log margin © Mark Powell

Anything worth doing properly is not easy, but navigating red tape, funding and planning permission can all be achieved with patience and a willingness to succeed. So finally, after three years of planning, HMS Collingwood has a pond! Created by our energetic Conservation Group this new habitat has instantly become a magnet for wildlife.

The need for a pond was first realised in the summer of 2017 after several animals were found accidentally drowned in the man-made obstacle course water bodies. In desperate need of water to survive they had climbed in the tanks, but sadly could not get themselves back out again. So, in order to prevent harm to the site's wildlife, a water hole needed to be established. A purpose built pond was created with different levels allowing access for hedgehogs, badgers and deer. Now there are water beetles, pond skaters, water boatmen, mayfly, damselfly and dragonfly. It has made a huge improvement to the diversity of Collingwood's ecosystem with new bird species and hopefully tadpoles, toads, frogs and newts to follow come spring.

Getting started was troublesome. Funding was awarded for the project in 2019/20 but because of Covid-19 the work could not be completed in year. Unfortunately, the funds could not be carried over to the new financial year, so the project was back to square one. In addition, the local authority determined that planning permission was needed, which created another challenge. After much debate with the Conservation Group a new plan was drawn up. An appeal against the requirement for planning permission was lodged and the work would be carried out for free due to the lack of funding. The defence against the requirement for planning permission under 'development' was set out – there was no intention to build anything, no contractors were being employed and all work was being carried out by volunteers. In addition, there was no intention to change the use of the land, as in the winter the site flooded anyway. The appeal was won because the project had not *"changed the primary use of land or buildings, where the before and after use falls within the same use class"*.

The year 2021 dawned with new hope, however the scale of the task had been underestimated! It was not possible to do the work with spades and shovels alone and so help was needed. Luckily a local contractor already involved on-site, JRC Ltd, were keen to support the environment and stepped in to assist free of charge. Within a week a whole new habitat was born. What a difference it has made! The margins have already been enhanced, a shingle bank has been provided with lilies and irises, alongside old logs for habitat. This project cost nothing but has already enriched the working environment and society, creating interest in a place of work.

Mark Powell
Energy & Environmental Protection Advisor
HMS Collingwood

The new lily plants in flower © Mark Powell

Hampshire & Surrey
Bourley & Ash

High quality wetlands for odonata in wet heath at Aldershot © HIWWT

Bourley and Ash Conservation Group (B&ACG) have not met during 2020/21 due to Covid-19. However members have continued to survey for flora and fauna and undertake habitat management works when safe to do so. Bat surveys continue to gather interesting data as to species using the Defence Training Estate for roosting, foraging and commuting.

The annual Thames Basin Heaths Special Protection Area heathland breeding bird survey reported good results for 2020 and 2021. Such data, along with herptile surveys via the Surrey Amphibian Reptile Group and invertebrate and flora surveys by other B&ACG members help to inform habitat management via the agri-environment schemes run by Hampshire and Isle of Wight Wildlife Trust (HIWWT), Surrey Wildlife Trust (SWT) and the Ministry of Defence (MOD). For example, scrub management can be tweaked to avoid or enhance adder hibernacula sites, which are sensitive to disturbance and like long-term stability. Following a survey by the Species Recovery Trust (SRT) for marsh clubmoss during 2020, their suggestions for altering bare ground management to give a rougher micro texture to benefit the associated mycelium have been undertaken on some of the additional new/rotational scrapes.

Bare to semi bare ground of different substrate, hydrological and aspect characteristics is a valuable habitat for uncommon species such as common cudweed, soil nesting wasps and other invertebrates. The interchange of survey, monitoring and research data from other MOD Conservation Groups and wider heathlands in southern England helps improve our understanding as to the likely ecological requirements of species and habitat management techniques. For example cattle browsed, scruffy topped young birch or willow scrub is a valuable component for invertebrates and thus the wider food chain. Heather turves, which are often used by golf clubs to enhance their biodiversity, help provide diverse micro scale habitats to encourage species such as the heath tiger beetle to move around and improve population genetics and robustness.

Conservation Group members also found some interesting social history. They reported that common cudweed juice was recommended as a cure for mumps in Roman times. In Scotland it is called ‘son-afore-the-father’ from its description by the 16th century herbalist John Gerrard, who said its young flowers *“overtop those that come first as many wicked children do to their parents”*. That is one to remember! Common dodder, sometimes seen on the ling heather on Aldershot Defence Training Estates, has folk names such as ‘hell weed’ and ‘Devil’s guts’ probably due to their entwining nature.

Lots of hard work is put in by Conservation Group members to help manage the Defence Training Estate for wildlife, whilst ensuring a high quality landscape for military training. All parties had useful virtual meetings to enhance integrated fire resilience and management measures and natural flood management techniques. These, along with initiatives on carbon budgets, ecosystem services and climate change adaptations are also being integrated into estate wide forestry management.

Sarah Jupp
Ecologist
Defence Infrastructure Organisation

Wiltshire
Leighton House – Westbury

Shoring up the lake bank with logs and pickets © Carl Ronald

Leighton House at Westbury is home to the Army Officer Selection Board, assessing candidates' suitability for officer training at Royal Military Academy Sandhurst. The site of 44 acres of mature parkland is attractive and worth preserving both for its heritage and conservation value, with over 600 trees, some of which are more than 200 years old. Despite being far from expert on the subject, staff have been helped to understand how to protect and enhance the biodiversity on their doorstep with webinars from the local Wildlife Trusts, supplemented with specialist advice.

At the start of the year 30 new bird boxes replaced ones which had rotted or been damaged. Some appear to be in use already and this will be confirmed when they are checked and cleaned in the winter.

Roads border the whole perimeter of the site and a significant amount of litter had accumulated, which a small band of volunteers set about collecting. The origin of debris such as a traffic bollard, water pistol and large numbers of glass milk bottles remains a mystery.

An effort was also made to consolidate numerous piles of pruned material which had been abandoned in the undergrowth, becoming unsightly and of little ecological value. The cleared areas will be used for deliberately sited log piles for insects including beetles. There is evidence that a giant redwood trunk, which had been left standing, is well used by a woodpecker. As work on other large trees is planned consideration is being given to whether standing deadwood can be left for the benefit of woodpeckers, treecreepers and nuthatches in preference to complete removal.

Logs from the site have also been used to shore up the banks of the lake. Sited at the foot of the White Horse Hill, water levels fluctuate quickly with run-off causing erosion both directly and indirectly. To prevent this, energetic individuals undertook the strenuous task of pile-driving pickets into the shallows to pin logs firmly against the bank. Subsequently, voids between the irregular edge of the bank and the straight edge of the woodwork were backfilled with stone and soil from around the site. In the bare soil, willow saplings have been planted in the hope that the roots will further help to bind the bank together. Flag iris rhizomes have been transplanted and divided to provide cover, increase food for pollinators and also brighten the area. The riverfly initiative allows the health of the local River Biss to be monitored by sampling invertebrate populations. Healthy populations have in turn supported numerous dragonflies this year as well as the resident bats.

Pruning the fruit trees during lockdown yielded much new growth and blossom during the spring. This supported four hives of bees and the solitary bees nesting in the ground and in the masonry of the walled garden. Although a significant proportion of the site's grass needs to remain mown for its primary defence purpose, an area was identified for the 'No Mow May' initiative and options for increasing its pollen value are being investigated.

Capt Carl Ronald
Assessor, Army Officer Selection
AOSB Westbury

Bee enjoying the heat and blossom of the walled garden © Carl Ronald

Essex
MOD Shoeburyness

Tern rafts on New England Creek, Shoeburyness © RSPB

RSPB, QinetiQ and the Defence Infrastructure Organisation (DIO) have been working together to improve the fortunes of some important breeding bird species at Ministry of Defence (MOD) Shoeburyness.

DIO funded an RSPB staff member to carry out a breeding bird survey in 2021 to look at avocet, lapwing, redshank, ringed plover, oystercatcher, little tern and common tern. One key area the survey concentrated on was the cockle bank located in the north-east corner of Foulness. The RSPB, with QinetiQ staff help, put out lures and decoys of little terns to try to encourage them back to the area, having not nested on the site for about 20 years. Although one did fly past our trail camera in April 2021, none tried to settle.

Whilst monitoring ringed plover and oystercatcher nests in that area, it was found that fox predation was high and nearly all eggs were eaten prior to hatching. As shown in the adjacent photo, one ringed plover nest was spotted with the eggs hatching whilst the surveyor was there!

These birds have decreased in number along the Essex coast in recent years, in part due to increased disturbance from human activity. Places like MOD Shoeburyness can provide important undisturbed habitat for them, but predation from mammals remains an issue. The team would still like to encourage little terns and ringed plovers to breed on the cockle bank and are exploring options to reduce the predation risk with QinetiQ and DIO.

Avocets also used to breed on Foulness in larger numbers than now, although there remains about 20 pairs. Half of these nest were found where a borrowdyke widens out and small islands emerge, which provides good nesting habitat for avocet and other species. The area shows how important water levels are for providing breeding wader birds with habitat. In winter the water level rises in the borrowdyke, flooding the small islands and killing off vegetation. In spring, as the sluice keeper drops the water level, the islands appear with plenty of bare ground for nesting and muddy edges for feeding birds.

DIO also funded the materials for RSPB volunteers to make and install tern rafts, for use by common terns. They were not put out until late in May 2021, however six pairs of common terns still nested. Next year the team intends to put the rafts out in early May and so there should be many more pairs.

Areas at Shoeburyness are also well known for breeding turtle doves, with excellent scrub habitat for nesting. The RSPB, QinetiQ and DIO have been working to implement scrub management to further benefit turtle doves. A tenant farmer has also helped by providing feeding habitat for turtle doves and supplementary feeding plots have been established across the site for the last three years. Camera traps have provided evidence of turtle doves using these plots and confirmed breeding territories were found this year during surveys.

The RSPB wishes to thank DIO and QinetiQ for funding and spending time to support these projects, as well as the local tenant farmers for their help.

Rachel Fancy
Wallasea Island Site Manager
RSPB

Newly hatched ringed plover chicks at Shoeburyness © RSPB

Hampshire
Defence Munitions Gosport

Barn swallow © Gary Calderwood

Defence Munitions Gosport (DMG) is a 208ha explosive armament depot located within Hampshire on the Gosport peninsula. The main function is to provide frontline operations with complex weapons, small arms and equipment through a process of receipt, storage, maintenance and distribution. The site has upper tier Major Accident Control Regulations status, demanding strict access controls and a closed fence line with no public right of access. The site is situated in a mainly urbanised town and as such provides some of the most ecologically interesting species and habitats found within Gosport. This is due to many areas of habitat found within the fence line having limited human interference.

The main conservation designation of DMG is a Site of Importance for Nature Conservation with saline lagoons designated as Special Protection Areas and a small inlet from Portsmouth Harbour that holds Site of Special Scientific Interest (SSSI) status. The eastern fence line of the site is also located on the SSSI and Ramsar designated saltmarsh with wetland habitats of international importance. There are a range of key features internal to the site. These include classified ancient woodland, semi natural grasslands with floral diversity, butterfly glades, a heronry located in a scheduled monument and artificial ponds developed in 2011 that have now matured into valuable freshwater habitats.

In early 2021, £7,500 of additional scrub clearance works were initiated at the site's butterfly glades to improve the habitat for the resident species, including grizzled skipper, white-letter hairstreak and small heath. The funding was granted by the Defence Infrastructure Organisation's (DIO) Conservation Stewardship Fund and a further £10,000 of work is currently being planned.

As well as butterflies, DMG is a favourable spot for birds with many species residing on-site and a diverse range of migrating visitors. Whinchats, wheatears, cuckoos and much more can all be seen on migration in either spring or autumn. The winter birds that arrive at DMG include brent geese, wigeon and teal. The wintering waders swell in numbers each year with black-tailed godwits sometimes reaching over 200 individuals. During the night time sky, redwings can be heard calling as they fly overhead.

Initiatives previously implemented at DMG have started to successfully develop. Corrugated sheeting laid down for reptile benefit was inspected by Conservation Group members throughout the summer with grass snakes and slow worms being identified, and other sheeting locations hiding families of field voles. The site also has red mason bee nests erected in collaboration with Praise Bee and these continue to provide a nesting location for the species. Inspections also showed nine of the 25 on-site bird nest boxes as being used by blue tits and great tits.

The impacts of Covid-19 have unfortunately restricted the ability to undertake some of the projects that had been planned by the DMG Conservation Group. Once the climatic conditions allow, a coastline clean-up will be arranged as well as the creation of a wildflower meadow and additional scrub management using local volunteer action at the various locations.

Raffaele Turk
Compliance Manager Environment
Defence Munitions Gosport

Bee orchid © Gary Calderwood

Spotlight on...
Castlemartin & Templeton

Choughs – an adult and a recently fledged juvenile in Range West © Bob Haycock

Bumblebee blitz at Castlemartin
As part of the Skills for Bees Cymru Project delivered by the Bumblebee Conservation Trust, a group of staff and enthusiastic Pembrokeshire Coast National Park volunteers spent two days surveying the Castlemartin peninsular for rare bumblebees. Wales is home to 23 out of the 24 UK species of bumblebee and several of our rarest species may be found in the diverse, species-rich grasslands of this coastal military range.

The team were aiming to obtain records of the shrill carder bee *Bombus sylvarum*, one of the UK's most threatened bumblebee species. It exists in only five isolated populations in the UK with the Castlemartin Range being one of them. Others sought were Welsh species of conservation concern (Section 7), such as the brown-banded carder bee *Bombus humilis* and moss carder bee *Bombus muscorum*. As these species tend to be on the wing relatively late in the year, our surveys were conducted in August on fine clear days, perfect for bumblebee recording!

Brown-banded carder bees were found in relatively good numbers across the range, reflecting the positive picture seen for this species in south Wales in recent years. Moss carders were much harder to find, with only three individuals spotted. The shrill carder was present in only two areas, concentrated mostly in a very dense patch of one of its preferred flowers, red bartsia.

Regular monitoring will be essential to track the ongoing status of these bumblebee populations and inform decisions with regards to suitable habitat management. Sufficient monitoring is almost impossible without the help of local volunteers, Ministry of Defence (MOD) and National Park staff.

Shrill carder bee © Bob Haycock

Progress in chough protection
Surveillance of the important chough population within the Castlemartin Coast Special Protection Area (SPA) continued this year – a project that has been undertaken annually for some 33 years.

The choughs had a mixed season in 2021, not helped by variable spring weather conditions. April was dry and sunny but cold, whereas May was mainly wet and increasingly stormy. According to the Meteorological Office, Wales had its wettest May since records began in 1862! The poor weather could have directly impacted more exposed nest crevices and particularly food provision for nestlings at some sites. It was pleasing that the number of occupied chough territories within the SPA had increased to 18 this year (two more than in 2020) – the highest number here for 12 years. However, the number of successful breeding pairs was poorer than last year, although at least 31 young fledged from 13 successful nests, an average total for the area.

The number of non-breeding choughs (mainly young 1 – 3 year old birds) observed in spring at Castlemartin

A volunteer studies a shrill carder bee © Clare Flynn

Volunteers and MOD staff surveying for rare bumblebees at Castlemartin Range © Clare Flynn

was noticeably higher than in recent years, with up to 35 recorded between late March and mid-May. Later in the year, feeding flocks of 40+ were seen in the daytime during August and September, and up to 46 in the evening at communal roosts. The numbers of choughs recorded in late summer suggested that local post-fledging survival was quite good this year. It is also likely that young birds, dispersing from elsewhere within the Pembrokeshire Coast National Park, were attracted to the area, perhaps by good soil invertebrate food resources at this time.

Marsh fritillary larval web counts

Marsh fritillary butterflies were confirmed breeding on the Castlemartin Ranges in the early 2000s and have spread westwards. Annual counts have been made of larval webs along several transect routes in Range West since 2017. The transects have been established through areas where the larval foodplant (devil's-bit scabious *Succisa pratensis*) grows, and are surveyed by Natural Resources Wales staff assisted by volunteers.

By using standardised recording methods along the transects, we can say that the population fluctuates each year, but overall there had been a decline since 2017. However, despite the spring of 2021 being poor for butterflies in general (not helped by a cold April and a very wet May), marsh fritillaries at Castlemartin had a very productive summer with more than 2,600 larval webs recorded this year. Numbers were particularly good in the Linney Head area, which is now the stronghold for the species. The Linney transects accounted for more than three-quarters of the webs counted in 2021.

Templeton yellowhammer monitoring

Templeton Airfield, a wonderful 403 acre site of old runways, willow, hawthorn, ponds and grazed open grasslands, has been home to a resident population of breeding yellowhammers for many years and is one of the last breeding strongholds for this species in Pembrokeshire. Building on the enjoyment of seeing and hearing so many of these beautiful birds in the spring and early summer sunshine of lockdown 2020, a small group decided to survey the site in 2021 to estimate the size of the breeding population. Lynne Houlston (MOD and National Park Ranger), Clive Hurford, Bob Haycock, Annie Haycock (local ornithologists) and Clare Flynn carried out monthly yellowhammer surveys, each recording a designated route to cover as much of Templeton Airfield as possible.

After an unseasonably cold spring, the birds reappeared on the site and started to sing in late April/early May – in a more typical year, the birds would return in late March/early April or perhaps even earlier.

A conservative estimate is that at least six males held territories on the airfield, but the true number could easily have reached double figures. It is also possible that the wet cool spring may have suppressed breeding numbers as with several other breeding birds in the area.

The group hope to survey again next year, refining recording methods to note when two birds sing simultaneously. This would provide a more accurate assessment of the number of pairs nesting within the larger territories identified in 2021. So, fingers crossed for a milder spring in 2022!

Clare Flynn[1] & Bob Haycock[2]
Project Officer Skills for Bees Cymru[1] & Seasonal Warden[2]
Bumblebee Conservation Trust[1] & Castlemartin Range[2]

Marsh fritillary caterpillars on a larval web © Annie Haycock

Marsh fritillary butterfly © Bob Haycock

Hampshire
Longmoor

Longmoor – open short sward heath with soldiers training © Sarah Jupp

Longmoor Conservation Group (LCG) has remained active during 2021. One major project was completed to extend the grazing area and numbers of pedigree, native breed longhorn cattle at Woolmer. This was via a new Countryside Stewardship with Amphibian and Reptile Conservation (ARC) and Hampshire and Isle of Wight Wildlife Trust (HIWWT), in partnership with the Ministry of Defence (MOD), the grazier, Natural England and the South Downs National Park Authority (SDNPA). Additional cattle were acquired from the Isle of Wight, with the support of SDNPA Heathland Reunited funding, to complement the extensive scrub clearance, new fencing and other infrastructure works undertaken. The cattle are a very important management tool for helping to achieve high quality short sward habitat for natterjack toads and mire restoration at Forked Pond Enclosure.

LCG botanists found 16 tower mustard *Arabis glabra* plants on semi disturbed ground. It is in decline nationally and listed as endangered. This four foot tall biennial plant, with creamy yellow flowers, now only occurs at two Hampshire sites and is doing well at Longmoor. The MOD, via Landmarc Support Services, occasionally cut the semi natural grassland to prevent smothering by coarse vegetation. Other rare to very rare national plants monitored during 2020 included pennyroyal *Mentha pulegium*, which has a pungent odour and was widely grown in cottage gardens to aid ailments with its sedative and anti-spasmodic properties.

The Species Recovery Trust updated the status of the rare marsh clubmoss *Lycopodiella inundata* populations. It is an indicator of good quality damp heath-mire ecosystems but continues to decline in south-east England, probably partly due to increased atmospheric nitrogen. However, populations on Longmoor Ranges are stable and increasing. The plant likes the short mown, damp heathy fire breaks with disturbed ground from low intensity vehicle use. It is thought that some purposefully created scrapes may be too 'smooth' and a rougher surface to support the crucial mycorrhiza association is now being created by HIWWT, ARC and the MOD.

Other LCG members continued to record butterflies, birds and odonata. For example, it was a much better year for the nationally endangered silver studded blue butterfly, with populations holding up well at a stronghold on MOD Bramshott Common and Longmoor Ranges. At Bramshott the annual maintenance mowing, scrub and bracken control allows the continuation of a flowering grassy-heathy sward, including a favourite food plant of bell heather, as well as of sheltered habitat corridor links.

ARC reported positive signs of range expansion of the rare sand lizard by finding hatchlings on a couple of the new MOD/ARC scrapes on Woolmer Down. Hopefully they are using scrapes made by both parties – it is competitive!

The MOD completed final drafts of the Integrated Rural Management Plan, Long Term Forestry Plan and Management Plan for Round Hill Site of Importance for Nature Conservation. These were based on survey data from LCG, alongside data such as Lidar (Light Detection and Ranging) undertaken by the Defence Infrastructure Organisation's archaeologist, of the former Conford Range to analyse historical use and help to inform wider site management.

Sarah Jupp
Ecologist
Defence Infrastructure Organisation

Tower mustard © Chris and Bill Wain

Europe
European Conservation Group

A robin taking a thoughtful break © Stewart Guy

The Defence Infrastructure Organisation (DIO) European Support Group (ESG) has established a European Conservation Group over the past year. It has been engaging with a variety of Ministry of Defence (MOD) staff, Service Personnel and the many families living in Europe.

The team have established the bee box and pollinator network, involving the estate staff who cover accommodation allocation, occupation and day to day management across 16 countries in Europe and Turkey, from the Arctic to the Mediterranean. The aim of the project has been to raise awareness of the needs of pollinators, improve habitat and forage where possible and develop a network for wider sustainability engagement across the regions. A pollinators photo and art competition was held during the UK Government's Bees Needs Week in July 2021, as part of DIO ESG's contribution to the Department for Environment, Food and Rural Affairs led initiative.

Phase one of the bee box project has seen the procurement of 12 bee boxes and three bug hotels, enabled with the financial support of the DIO's Conservation Stewardship Fund (CSF). These have been hand made in Europe and are on their way to estate offices, military bases, community centres and British schools in Italy, Norway, Turkey, Portugal, Spain, Belgium and the Netherlands, as well as to multiple locations in Germany.

In Sennelager, Germany, we have looked at some areas of the existing estate, accompanied by DIO Overseas Training staff, both on the main establishment and on parts of the training area, with nature conservation initiatives in mind. We have identified work to enhance habitats for nature conservation as well as a few locations ideal for the erection of nesting boxes for birds and bats. Bee boxes from phase one of the bee box project have now been delivered for use on the estate, as well as a four foot bug hotel for the local Attenborough School, where it can be incorporated into the educational programme, as well as benefitting nesting and hibernating insects throughout the year.

Sustainability 'Get You In' packs are currently being trialled at the Supreme Headquarters Allied Powers Europe (SHAPE) in Belgium, with a number of sustainable items and information provided to families at move in, with an intent to roll the initiative out into the wider European regions. This project was also enabled thanks to funding from the CSF. The initial feedback has been very positive from families that opted-in to a pack and this has also provided an opportunity for furthering our network of sustainability engagement and awareness.

We are one of the newest MOD Conservation Groups and the travel restrictions imposed over the past year and a half certainly slowed down progress of planned initiatives across Europe. But, it has certainly not dampened the spirits! We continue to hold our quarterly meeting virtually and would welcome new staff and families who would like to join our Conservation Group, where they will receive encouragement and support for their local initiative or mini project.

Looking ahead, we plan to establish phase two of our support to pollinators as well as small conservation projects in collaboration with European schools and military family communities. We aim to collaborate with host nations and private landlords and link into other NATO country networks.

For more information or to join our group then please email DIO-EuropeanConservationGroup@mod.gov.uk

Stewart Guy
Conservation Group Chair
SHAPE, Belgium

A very busy bee © Ashley Philipson

North Yorkshire Foxglove Covert

Her Majesty's Lord Lieutenant for North Yorkshire presents the QAVS award and certificate © FCLNR

The Queen's Award for Voluntary Service (QAVS) is the highest award that an UK voluntary group can receive and has often been described as 'the MBE for voluntary groups'. The award was created in 2002 to celebrate Her Majesty The Queen's Golden Jubilee, and recognises outstanding work by volunteer groups that benefit their local communities.

In the autumn of 2020, Foxglove Covert Local Nature Reserve (FCLNR) was nominated for a QAVS award and an assessment visit took place in November 2020. During the visit, the FCLNR volunteers were questioned on their work on the reserve, their work in the community and their plans for the future. At the assessment, the volunteer team was led by the reserve's founder, Maj Tony Crease, and poignantly this was one of his last contributions to the reserve as very sadly he died in January 2021.

It was a bittersweet moment for the Trustees and volunteers to hear in June 2021, on the anniversary of the Coronation, that they had been granted the QAVS in recognition of their outstanding contribution to the creation of the reserve and their work to promote nature conservation in the local community. It was a fitting tribute to mark the 20th anniversary of the founding of Foxglove Covert and a lasting tribute to Maj Crease's passion and dedication to his work.

On 27 August 2021, Her Majesty's Lord Lieutenant for North Yorkshire, Johanna Ropner, visited the reserve to present the award – a beautiful glass commemorative dome and a certificate signed by Her Majesty The Queen. Also in attendance were Lord Zetland, Patron of the reserve, The Rt Hon The Countess Peel and Tom Ramsden, the QAVS assessors.

The presentation ceremony took place outside at the FCLNR Field Centre. The Chair of Trustees, Lesley Garbutt, welcomed everyone and paid tribute to Maj Crease for his tireless efforts to maintain and develop the reserve, even despite his illness in 2020. His absence on the day was keenly felt by everyone.

Sophia Crease, Reserve Manager, gave Johanna Ropner a tour of the Field Centre, after which she presented the crystal QAVS award and certificate, commenting *"I can see the most wonderful legacy that Tony has left; but today is about celebrating, and it is a huge well done to you all".* After the presentation she planted a tree to commemorate the award and her visit. The final part of the event was the presentation of QAVS lapel badges to all the volunteers by Lord Zetland, followed by tea and cakes.

The reserve covers 100 acres of moorland edge and has a remarkable mix of habitats and species. It has an active pool of 70 volunteers from all walks of life and they all use their diverse talents to maintain and develop the reserve's habitats and projects. In addition, all the Trustees who form the Management Committee are volunteers. In 2022, two of the volunteers will be chosen to represent the reserve at a garden party at Buckingham Palace.

Sophia Crease
Reserve Manager
FCLNR

Commemorative tree planting after the presentation © FCLNR

Isle of Wight
Newtown Range & Jersey Camp

A playing pair of white-tailed eagles © Ainsley Bennett

Newtown Range and Jersey Camp is an 810 acres estate located on the north-west of the Isle of Wight. Partially a Site of Special Scientific Interest, Special Protection Area, Special Area of Conservation, Ramsar and Area of Outstanding Natural Beauty, the estate is owned and managed by the South East Reserve Forces' and Cadets' Association (SERFCA) with its main role providing a training facility for Regular, Reserve & Cadet forces.

SERFCA has been working with Forestry England and the Roy Dennis Wildlife Foundation to play a small role within the White-tailed Eagle Reintroduction Project, by providing a quiet location for the bird of prey to be re-introduced onto the Island.

The white-tailed eagle, also known as the sea eagle, is the UK's largest bird of prey. They have an impressive wingspan measuring 2.5m and are recognisable by their brown body plumage, pale head and brilliant white tail feathers that give them their name. They were a common sight across the Island until persecution led to their decline, with the last known breeding site recorded at Culver Cliff in 1780. Lost through human activity, they have been a missing part of England's biodiversity for over 240 years and they remain one of the UK's rarest species – listed as a Bird of Conservation Concern.

The release site was chosen due to its environmental designations and model habitat alongside its proximity to shallow water fishing. The Solent and surrounding estuaries provide the species with an abundance of fish (which is their preferred diet) such as grey mullet, as well as various water birds (which make up another important part of their nutrition needs). The coastline is an ideal habitat due to its cliff edges, which provide plenty of potential quiet nesting sites.

The five year reintroduction programme began in late June 2019, with six young birds collected from the wild in Scotland under a Scottish Natural Heritage (now NatureScot) licence. They were transported to the Island and monitored by Project Officer Stephen Egerton-Read and his dedicated team.

The birds were fitted with GPS transmitters so that their progress could be closely monitored and in August 2019 the six eagles were released. The project team initially continued to provide feeding sites for the birds, to encourage them to settle along the south coast. However some soon gained the courage to fly further afield and have been tracked across the length and breadth of the UK as well as on the continent.

There have been two more releases, one in summer 2020 with seven birds released and one in summer 2021, releasing a further 12 birds. The white-tailed eagles are becoming established and they are a more familiar sight over the skies of the Island and southern coastline.

The reintroduction of Britain's largest bird of prey is being conducted under licence from Natural England and further releases of birds are expected to take place annually as part of the five year programme. It will take several years for the young birds to become established and breeding is not expected to start until at least 2024. However the team will continue to monitor them closely and hope to see signs of breeding success in the future.

Wesley Woolcock
Range Officer & Estate Manager
Newtown Range Conservation Group

A white-tailed eagle taking off © Ainsley Bennett

Useful contacts

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Update – Defence Infrastructure Organisation's Environmental Support & Compliance team

It is a real credit to Defence and its commitment to a sustainable estate that this is the 50th edition of *Sanctuary* magazine. Looking back over the years it is clear how much conservation and sustainability have grown within Defence and how these are now embedded as part of our business as usual.

The early editions of *Sanctuary* were produced by Lt Col Norman Clayden, the Ministry of Defence's (MOD) first Conservation Officer, in support of the newly formed Conservation Groups. I have been involved with *Sanctuary* in one way or another for more than 15 editions, yet continue to be amazed by the breadth, depth and diversity of projects featured, reflecting the ever growing understanding of the importance of the current risk to our planet and how Defence must play its part in wider Government sustainability targets.

Whilst *Sanctuary* magazine has grown and evolved since the first edition was published in 1975, I believe that the magazine has remained focussed, interesting and relevant. Whilst I know this view is supported by many close to the team, it has never been tested. To that end we have compiled a short readers' survey, the details of which can be found on the inside front cover. It would be hugely informative if we had the views of some of you who read *Sanctuary* and I would encourage as many of you as possible to complete the survey and help to inform the future content of *Sanctuary* magazine.

In my update piece in *Sanctuary* 49, 2020 I announced the imminent arrival of a variety of specialist posts within the Defence Infrastructure Organisation's Technical Services team, to bolster the subject matter experts already in place. I am pleased to say that 12 months on those posts are now filled, and the strengthened team is connecting across Defence to help lead the climate challenges that face us. Defence has also seen the creation of the Climate Change and Sustainability Directorate in

Richard Brooks © Guy Salkeld

MOD Head Office which will set the strategic direction of a more sustainable Defence (see Julia Powell's column opposite).

All across Defence business areas are challenging themselves to be 'better' and there are some amazing innovations, research and projects happening on our estate both at home and overseas. If you are involved in any such project then the Sanctuary team want to hear about it through the submission of a synopsis for a *Sanctuary* magazine article or nominations for Sanctuary Awards 2022. Tell us how you are making Defence more sustainable! The calling notice for articles and nominations for Sanctuary Awards 2022 will be published online at www.gov.uk/guidance/ministry-of-defence-sanctuary-awards later in the year.

Finally, as ever my thanks to everyone who has played a part in the delivery of the Sanctuary Awards 2021 and this 50th edition of *Sanctuary* magazine – it is a credit to all involved and in particular to Holly Broomfield who has almost single handedly created this 50th edition in exceptionally challenging times. Thank you Holly *et al*...

Richard Brooks
Principal Environmental Advisor
Defence Infrastructure Organisation

Update – Finance & Military Capability's Climate Change & Sustainability Directorate

Before I start to look back at the last year, I want to say thanks to the Sanctuary team for an amazing 50th edition. The magazine and Awards continue to be one of my yearly highlights as it demonstrates so vividly the achievements and progress on sustainability across the Ministry of Defence (MOD).

This time last year we were looking ahead to the launch of MOD's Climate Change and Sustainability (CC&S) Strategic Approach and the first virtual Sanctuary Awards. These events coincided with a year of significant change in the UK, with a new Net Zero Strategy, new legislative environmental and agricultural frameworks and a period of unprecedented global engagement on climate change at COP26. Progress since the launch of the CC&S Strategic Approach has been swift as illustrated by the Around the Services updates (pp. 12 – 14).

A new CC&S Directorate was established in June 2021 (p. 15), bringing together new talent, fresh ideas and a wealth of professional knowledge to build the MOD's capacity to respond to its CC&S ambitions. Its creation and the appointment of a CC&S Non-Executive Director to the MOD Defence Safety and Environmental Committee, underlines our commitment to the CC&S agenda.

The MOD's CC&S Strategic Approach set out an initial action plan for our first year. We have made significant progress and continue to build on the MOD's carbon literacy and programme to respond. This includes work with our suppliers and procurement professionals on the reduction of emissions, decarbonisation of the built estate and nature recovery on our rural estates.

The team's work on climate security is also maturing. Climate change is reshaping the global

Julia Powell © Julia Powell

security landscape and we continue to build our partnerships with academia and international allies to understand the changes and the actions the MOD must take in order to adapt. Defence is complex and whilst the aims of the new directorate are challenging, they are achievable due in large part to our partnerships and alliances at all levels. The Defence Green Network has bought together over a thousand people, including environmental and sustainability professionals, military and civilian staff all determined to drive CC&S change and improvement.

We continue to work closely with our wider Government colleagues to ensure that the MOD plays an active part in initiatives such as the Greening Government Commitments, the 25 Year Environment Plan and the development of the 3rd National Adaptation Plan. As an operational department that reflects the make-up of the UK economy, with large tenanted land holdings, industrial processes, housing stock, a large workforce and significant procurement spend our input reflects this unique perspective, the challenges and good practice work already undertaken.

Julia Powell
Head of Policy
FMC Climate Change
& Sustainability

SUBMISSIONS

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

DIO-Sanctuary@mod.gov.uk

A note from the Editors

Dear readers,

We hope you enjoyed the magazine. We are interested in hearing how we could improve it – please see our survey on the inside front cover. Please could we 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.

Ministry of Defence

Ministry
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