



# Mitigating operational capability gaps

## Safety & Environmental support for the Storm Shadow programme

### THE CHALLENGE

Storm Shadow, currently in service with the RAF Tornado GR Mk4 (Figure 1), is an air-launched stand-off missile, designed to engage a variety of ground targets. Prior to the withdrawal of Tornado GR Mk4 from service, the UK MOD aims to introduce the missile onto EF Typhoon (Figure 2) to avoid a real risk of operational capability gap.

The Air Dominance and Suppression Project Team (ADS PT) required safety and environmental support to ensure the risks associated with the use of the missile were As Low As Reasonable Practicable.

### OUR SOLUTION

Frazer-Nash supported the ADS PT with ongoing management of the Storm Shadow missile safety and environmental case for carriage, release and jettison from Tornado GR Mk4, and independent safety advice towards missile integration onto the EF Typhoon. We provided a dedicated team of air platform / weapon experts to deliver coherent, robust and timely safety and environmental support to the ADS PT; providing continuity (over eight years) to the Storm Shadow programme.

Our support included development of the Tornado GR Mk4 centric Storm Shadow missile safety argument structure, and independent technical evaluation in aid of EF Typhoon ground, air and avionics, evidence gathering flight trials. Given the difference in operating environment and envelopes between the Tornado GR Mk4 and EF Typhoon platforms, this involved an in-depth knowledge and understanding of a number of key weapons integration considerations / principles. Frazer-Nash support to the Storm Shadow programme included:

- ▶ Development of the Safety Argument Structure
- ▶ Authoring the Safety and Environmental Management Plan
- ▶ Hazard Identification and Analysis workshops
- ▶ Development of the Hazard Log
- ▶ Authoring the Safety and Environmental Case Report
- ▶ Support at the Project Safety and Environmental Panel meetings
- ▶ Supporting Ordnance Munitions and Explosives, Safety Review Panel submissions
- ▶ Legislative compliance assessment
- ▶ Life Extension Assessments
- ▶ EF Typhoon Flight Trial Capping Paper assessments
- ▶ Periodic Independent Safety Audits
- ▶ Management of the Livefiles technical repository database

The support Frazer-Nash provided to the ADS PT culminated in the first release of a Storm Shadow missile from the EF Typhoon aircraft in November 2015. Squadron Leader Ross Clarke, ADS PT Weapons Integration Programme Manager, stated that "Frazer Nash helped MOD Weapon and Platform Project Teams understand and articulate the relevant safety arguments enabling a successful trials programme".

### WHY FRAZER-NASH?

- ▶ Our Leadership: Robust risk mitigation / management with safety and environmental consultants including former DOSG experts, OSRP chairs and RAF service personnel.
- ▶ Our Independence: No affiliation to OEMs providing confidence in impartiality of advice.
- ▶ Our People: Large team (including reach-back) of SQEP air/weapons experts to produce timely, authoritative, fit for purpose deliverables; and help achieve challenging milestones.
- ▶ Our Simplicity: Cost effective delivery and agility to respond to changing customer requirement. Flexible task management process and on-site presence at Abbey Wood, Bristol.

#### Client

UK Ministry of Defence

#### Business need

Confidently manage the safety and environmental risks associated with the Storm Shadow programme.

#### Benefits

We were able to bring together a team of skilled and experienced weapon and air platform integration experts. Our team called upon years of experience and knowledge of the SSWS, Tornado GR Mk4 and EF Typhoon platforms; hence, we fully understood the requirements of the ADS PT. Consequently, ADS PT received coherent & targeted advice, which supported ongoing safety and environmental management and a successful trials programme.

Figure 1: Tornado GR Mk4



Figure 2: EF Typhoon



#### Find out more

To find out more about our work and how we can add value to your business; please visit our website.

