

## THE PRINCIPLES

1. Introduction. Environmental measurement is an essential part of the Environmental Management System's checking element. The outputs of many processes are already measured and recorded, for example water quality. For some other processes the data exists but is not interpreted, while for others, there is no data collection. This Annex identifies the purposes and principles of environmental monitoring. Appendix 1 tabulates the question relating to assessing the effects of military activities and describes the methodology.
2. Purposes. Environmental measurement is required to:
  - a. Ensure that the existing control measures remain in place and are being enforced.
  - b. Determine the effectiveness of the existing control measures.
  - c. Validate the environmental impacts and the ratings given.
  - d. Assess any military environmental impacts not previously identified
3. The Environmental Measurement Cycle. Environmental measurement can be broken down into separate stages as shown in Figure 1 below.

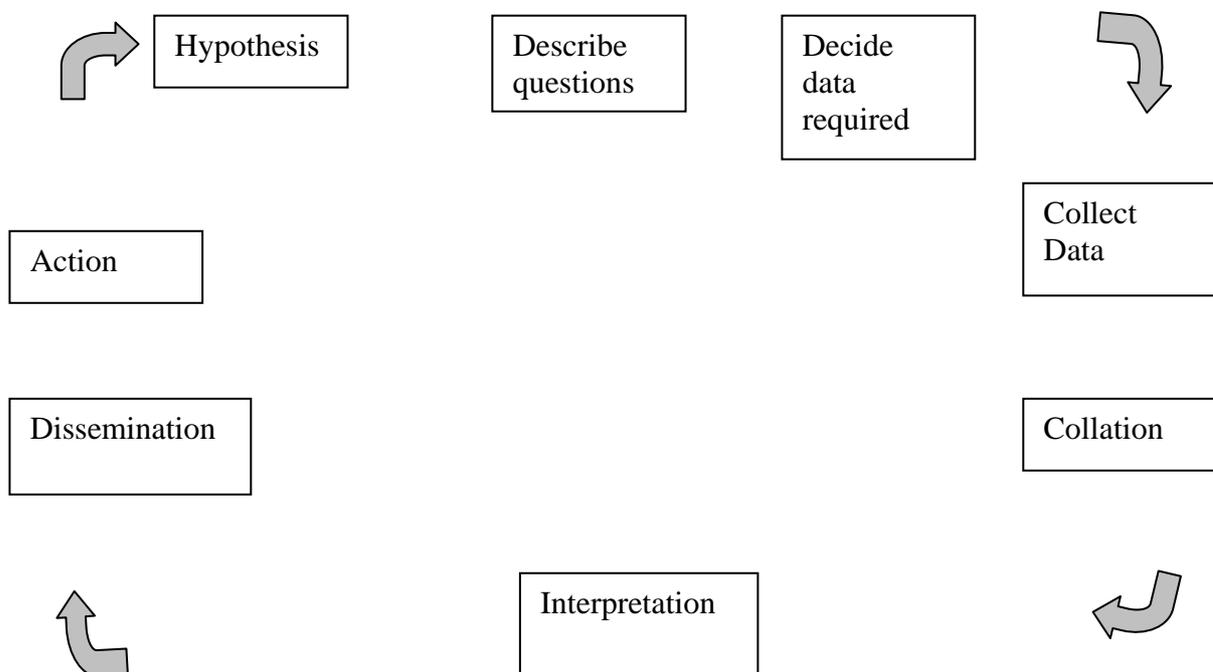


Figure 1: Environmental Measurement Cycle

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a. The Cycle. The measurement cycle is equally applicable to measurement against a baseline or against a hypothesis. The former will probably require similar methodologies to be applied periodically in order to make accurate comparison of data over a period. The latter will require a hypothesis to be set out so that it can be tested, this will lead to a series of questions being decided, which will set in train the collection of suitable data, collection and interpretation.

b. Types of Data. Both factual and perceptual data will need to be collected. Factual data on the impact of military training will include energy inputted (radiation, pressure waves, thermal and chemical) as well as the effects on the environment. Perceptions, such as landscape and effect on tourism, will be harder to collect as statistically valid data but will be equally necessary.

c. Collection of Data. Data will be collected from a broadspan of sources using varying methods, each appropriate to the subject. The principle should be 'Collect once, use many times'. For consistency of description, 4 types of data collection are identified

(1) Surveys; a detailed examination and record of features.

(2) Observations; periodic inspection and record of observations.

(3) Checks; investigation or verification of a particular issue eg supervision to ensure that identified existing controls are in place.

(4) Statistics; collection of verifiable numeric data.

d. Collation. In order to answer a particular question, the required data will be brought together and collated. This process may identify a gap in the data requiring additional data collection.

e. Interpretation. In this process of the Environmental Measurement Cycle, the collated data will be analysed and interpreted to answer a particular question, often a performance indicator. Where the interpretation is comparative over a period of time, it is commonly called monitoring.

f. Dissemination. The report of the data interpretation, often consisting of a summary suitable for the lay reader backed by the detail, will be published and archived. The report will also often include recommendations on the need for additional data or refinement of the interpretation process. These recommendations will be fed back into the Environmental Measurement Cycle. Dissemination should be as wide as possible with messages suited to the audience.

4. Performance Indicator. Rather than attempting to measure every aspect, an indicative sub-set is usually identified thus reducing cost and effort. The performance indicators must be carefully selected to ensure that they are representative of the aspect being measured and acceptable to stakeholders.

5. Need for Controls. Because the military have trained on Dartmoor for over 150 years, it is necessary to compare data with parts of Dartmoor on which the military have not trained in order to separate out any impacts attributable to military activities from those caused by other factors. This will require the collection of usage data and measurements on moorland not used for military training to act as controls. It is acknowledged that it is difficult to find similar areas as comparators, however, within these limitations, the methodology can provide indicators.

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6. Other Users and External Influences. The military share Dartmoor with other users. The moor is also subject to external influences. In order to exclude the impacts of these 2 factors from those attributable to military training, it is necessary to collect data on them.

7. Sampling. Given the size of area used by the military, sampling will often provide a cost effective method of measurement.

8. Consistency. Data collection and interpretation should be consistent, not only over a number of years but also with other organizations. Where possible data should be obtained from measurements already being taken by other organizations, ideally by joint action as other Government Bodies will have similar needs. If this is not possible, MOD will consider sponsoring the appropriate body to carry out the required work. MOD should also use internationally or nationally agreed measurement and interpretation protocols.

9. Latent demand. Measurement of the demand for something that restricts use has proven to be difficult, so called latent demand. The chief difficulty is to separate out other factors and to use a representative unbiased population to sample.

10. Environmental Measurement Plan.

a. The Environmental Measurement Methodology, at Appendix 1 to this Annex and the Environmental Action Plan at Annex D, detail the objectives, performance indicators, methodology to be used, and states by whom, the frequency and when the action is to be completed by.

b. There is still a considerable amount of work to be done to finalise environmental measurement. Funding has also to be obtained for many of the actions. It is hoped that an early conclusion can be reached with the assistance of DNPA.

**Appendix 1:  
Environmental Monitoring Methodology**

Srl	Question	Performance Indicator	Method	By	When/Frequency	Previous Studies/Existing Records	Remarks
1.	<b>How is the Historic Environment impacted by military training?</b>						
	a. Visual checks for damage.	No damage caused by military	Visual	DTA	Quarterly		Reports compiled for observed damage or potential for damage.
	b. Visual Condition survey.		Visual iaw Inspection Methodology Document (IMD).	Service Provider	Annually		Use DIO/EH Condition assessment form
	c. Condition survey.	SMs in good condition	EH methodology	EH or specialist surveyors	Quinquennially		Support EH to fulfil their statutory requirement.
2.	<b>How is Dartmoor's landscape impacted by military training?</b>	Acceptability to Local Planning Authority				a. Government Property Gazetteer b. Landscape and tranquillity assessment ENTEC 2007. c. Intervisibility Study of warning signals and lookouts d. Aerial photo surveys e. Ranger monitoring.	Surveys need to deal with objective evidence and public perceptions

Srl	Question	Performance Indicator	Method	By	When/Frequency	Previous Studies/Existing Records	Remarks
3	What is the impact of military training on the flora and fauna of Dartmoor?						
	a. Impact of military training on habitats.	Habitats improving	NE Common Standards Monitoring	NE	Quinquennially 2010	a. NVC in 05/06 b. NE CSM 2009	
			DEFRA clustered quadrats	NE	?		Areas of troop concentration added.
			Crater survey	MOD			In next 10 years. Doubtful validity .
	Effect of stock clearance.		Grazing Index Performance	NE			
	b. Impact of military training on wildlife.						
	(1) Birds	Quantity of breeding pairs consistent or improving	Breeding Bird Survey using similar methodology to 06	MOD with RSPB	Quinquennially 2011	a. Breeding Bird Survey 06	
			Specific rare bird species surveys	DNPA	?		
			MOD Annual Bird Survey Willsworthy	DTA Cons Gp	Annually		Using BTO methodology since 06
			Effect of noise on birds.	DIO	Early 2007		Use research already conducted elsewhere.
	(2) Marsh Fritillary or other indicator species		Transect walks	TBC	Annually		Support Dartmoor BAP
4	What is the effect of military training on public access to and recreation on Dartmoor?						See also Landscape

Srl	Question	Performance Indicator	Method	By	When/Frequency	Previous Studies/Existing Records	Remarks
			Survey of public attitudes	DIO EAS	Quinquennially	a. North Dartmoor 04/05 b. Cramber 06/07 c. Tourism Associates 06. d. Cramber 2011	
		Quantity of recorded complaints	Complaints and comments made to the Dartmoor Working Party	MOD/DNPA	Biannually	DWP Minutes	
5.	What is the effect of military training on Local Communities?						
	(1) What is the effect of military activities on tourism?						
	(2) What is the effect of military activities on the economy of local communities?					Tourism Associates Report 2007	
	(3) How much noise does military training generate and what is the impact of it on the local communities?		Survey volume and frequency of noise received at selected receptors.			EA 2007	
6.	What is the effect of military training on water quality?						
			EA methodology.	EA	Annually	EA data	
7.	What is the effect of						

Srl	Question	Performance Indicator	Method	By	When/Frequency	Previous Studies/Existing Records	Remarks
	<b>military activity on natural resources?</b>						
8.	<b>How much military use takes place each calendar year?</b>	Man Training Days by area, by type of training & by unit within calendar year	DTA Statistics	DTA	Annually in Spring.	Agreed records held in DSG minutes.	Improved presentation being investigated
9.	<b>How much other use takes place each calendar year and what are the negative impacts?</b>						Answers to these questions are needed in order to isolate the effects of military activities
	a. Agricultural use.	By area, by number	DEFRA/NE Statistics	DEFRA?NE			
	b. Public access use.	By area, by number	DNPA Statistics	DNPA			
	c. Water extraction.			EA/SWW			
	d. Traffic.			DCC Highways			
10.	<b>What is the impact of external influences?</b>				Use open sources already researched		Answers to this question are needed in order to isolate the effects of military activities
	Global warming.						
		Quantities consumed by infrastructure	Maintain energy and water use records	DTE's SPs	Monthly	Held for at least past 10 years	DTE is not responsible for allocated user's energy consumption