

LANDSCAPE-SCALE POST-MINING RESTORATION IN CORNWALL (UK)



**SUSTAINABLE ECONOMIC
AND SOCIAL LINKS ARE
ESSENTIAL**

**PHILIP PUTWAIN – ECOLOGICAL
RESTORATION CONSULTANTS**

IAN DAVIES – IMERY'S GROUP plc

HISTORIC CULTURAL LANDSCAPE



WILD EXPANSE OF
OPEN HEATHLAND
DERIVED FROM
TRADITIONAL
MANAGEMENT
ORIGINATING IN THE
BRONZE AGE



HEATHLAND LOSSES IN CORNWALL

80,000 ha present in 1800

7,000 ha left in 1997 (when large scale restoration began)

Losses mainly due to changes in socio-economic fabric of farming that formerly maintained heathland

LOST LANDSCAPE DUE TO MINING OF KAOLIN



SUBSTANTIAL LOSSES DURING 20TH CENTURY DUE TO MINING FOR KAOLIN (CHINA CLAY) FROM LARGE OPEN-CAST PITS

490 MILLION TONNES OF WASTE TIPPED OVER 50 Km² OF THE HISTORIC LANDSCAPE ENCOMPASSING HEATHLAND, WOODLAND, SMALL ENCLOSED FIELDS

ST AUSTELL CHINA CLAY AREA CORNWALL



RESTORATION OF DISTINCTIVE LANDSCAPE



IN 2004 TIPPING
REMAINS ACTIVE

RESTORATION OF
750 Ha
HEATHLAND AND
800 Ha BROAD
LEAVED
WOODLAND

RE-CREATE THE
HISTORIC
LANDSCAPE AND
HABITAT
DIVERSITY

RESTORATION OF DISTINCTIVE LANDSCAPE



**IN 2004 TIPPING
REMAINS ACTIVE**

**RESTORATION OF 750
Ha HEATHLAND AND
800 Ha BROAD
LEAVED WOODLAND**

**RE-CREATE THE
HISTORIC LANDSCAPE
AND HABITAT
DIVERSITY**

QUARTZ FELDSPAR WASTE



ANALYSIS OF WASTE

pH 4.5

Cation exchange capacity
(milliequiv.100 g⁻¹) 1.0

Total N (μg.g⁻¹) 18.3

Extractable P (μg.g⁻¹) 1.1

Extractable Ca (μg.g⁻¹) 4.0

**STARTING
POINT –
SCIENTIFIC
EXPERIMENTS**



SMALL SCALE EXPERIMENTS COMMENCED IN 1976

**AIM TO RESTORE CHARACTERISTIC HEATHLAND
VEGETATION**

HEATHLAND RESTORATION ON CHINA CLAY WASTE EXPERIMENTAL DESIGN

MAIN PLOT 25-30 MM MOORLAND TOPSOIL

- 1) DIRECT ON THE WASTE
- 2) ON 100mm LAYER OF TOPSOIL

SUB PLOTS 0, 100, 300 KG PER HA

17% N : 17% P₂O₅ : 17% K₂O

± COMPANION GRASSES

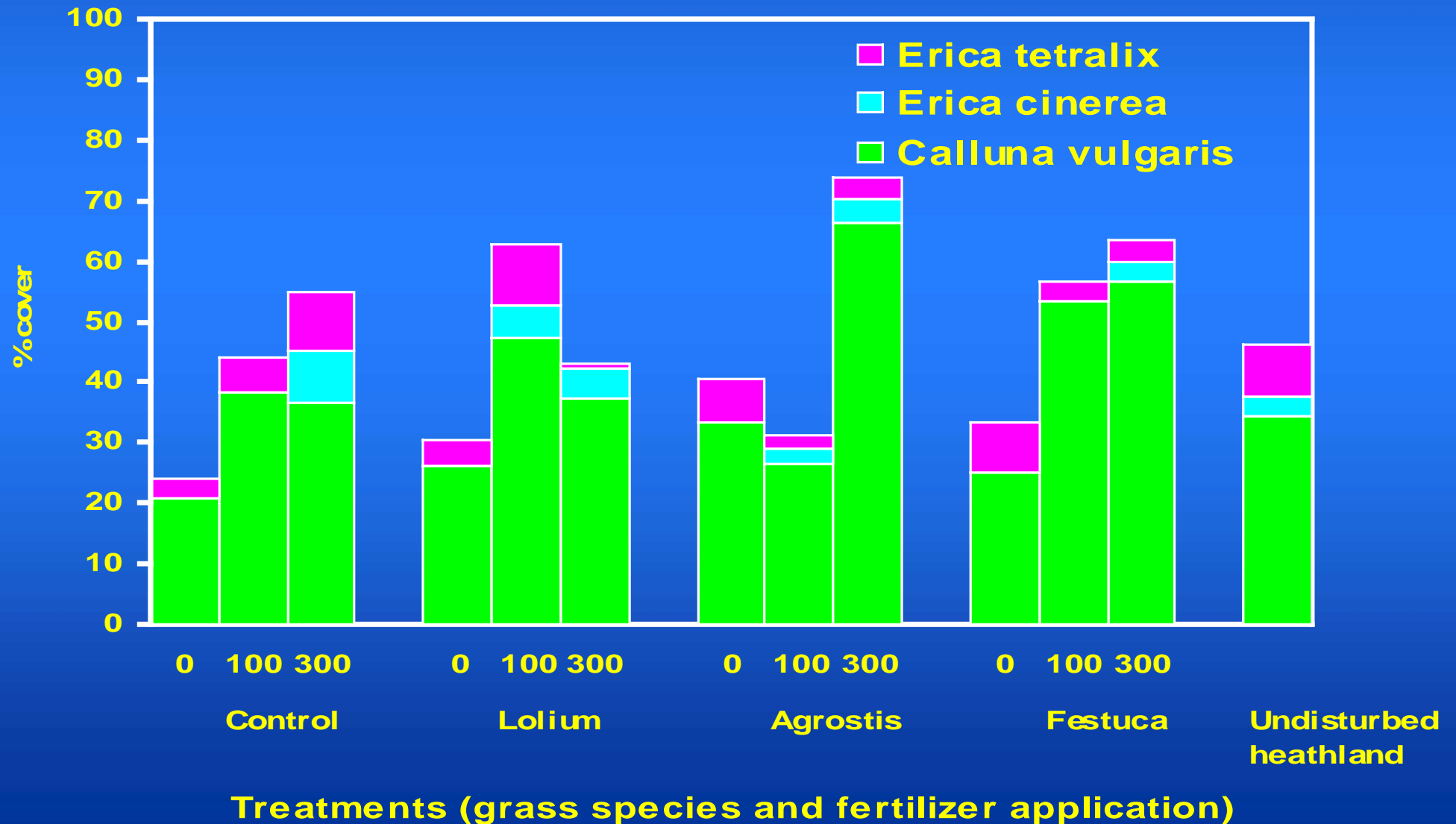
AGROSTIS, LOLIUM, FESTUCA,
NONE

± GRAZING

RESULTS AFTER 7 YEARS UNGRAZED



HEATHLAND PLANT COMMUNITIES 17 YEARS AFTER RESTORATION (QUARTZ SUBSTRATE)



MEDIUM SCALE EXPERIMENT ON SAND AND GRAVEL WORKINGS IN DORSET

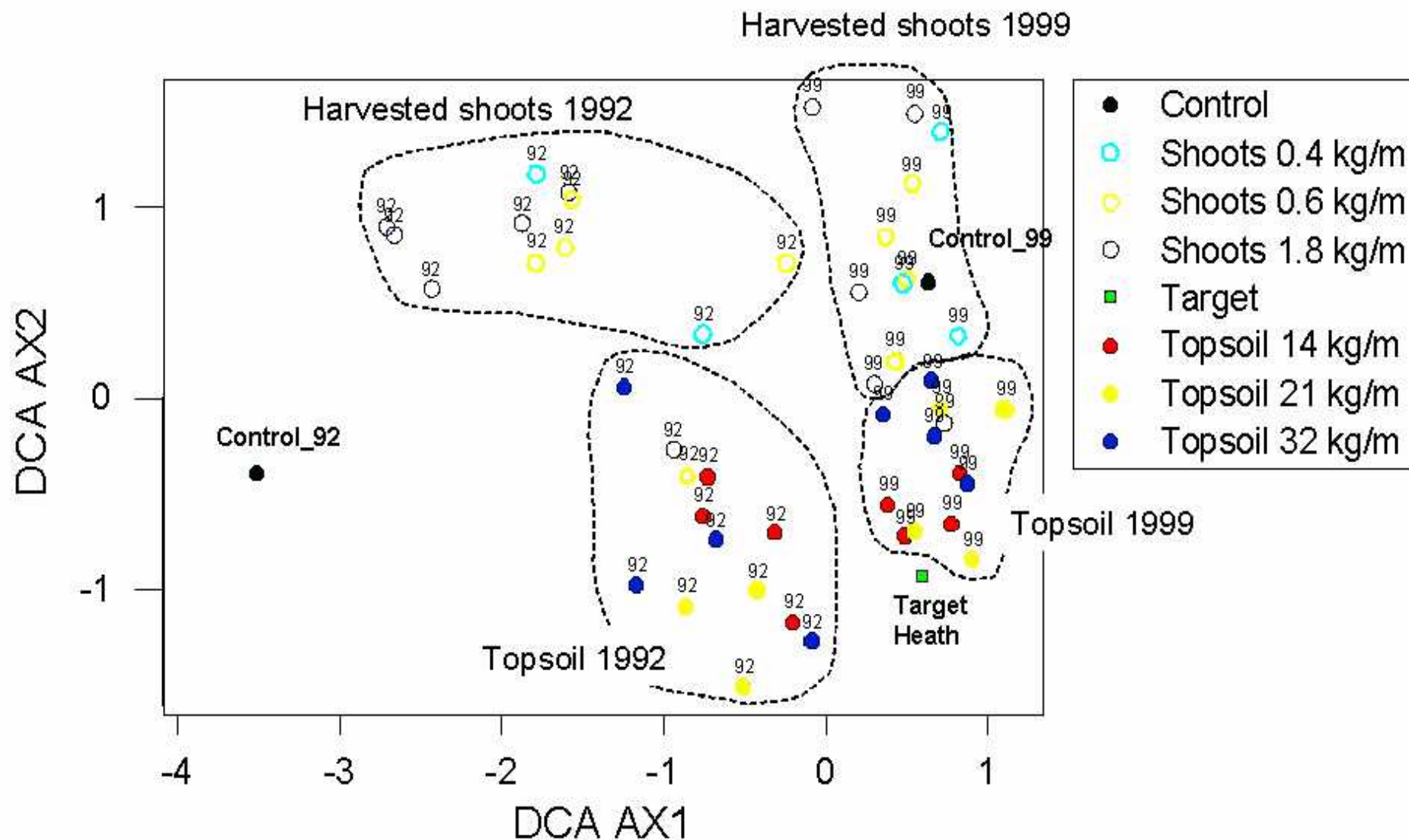


SITE PREPARATIONS

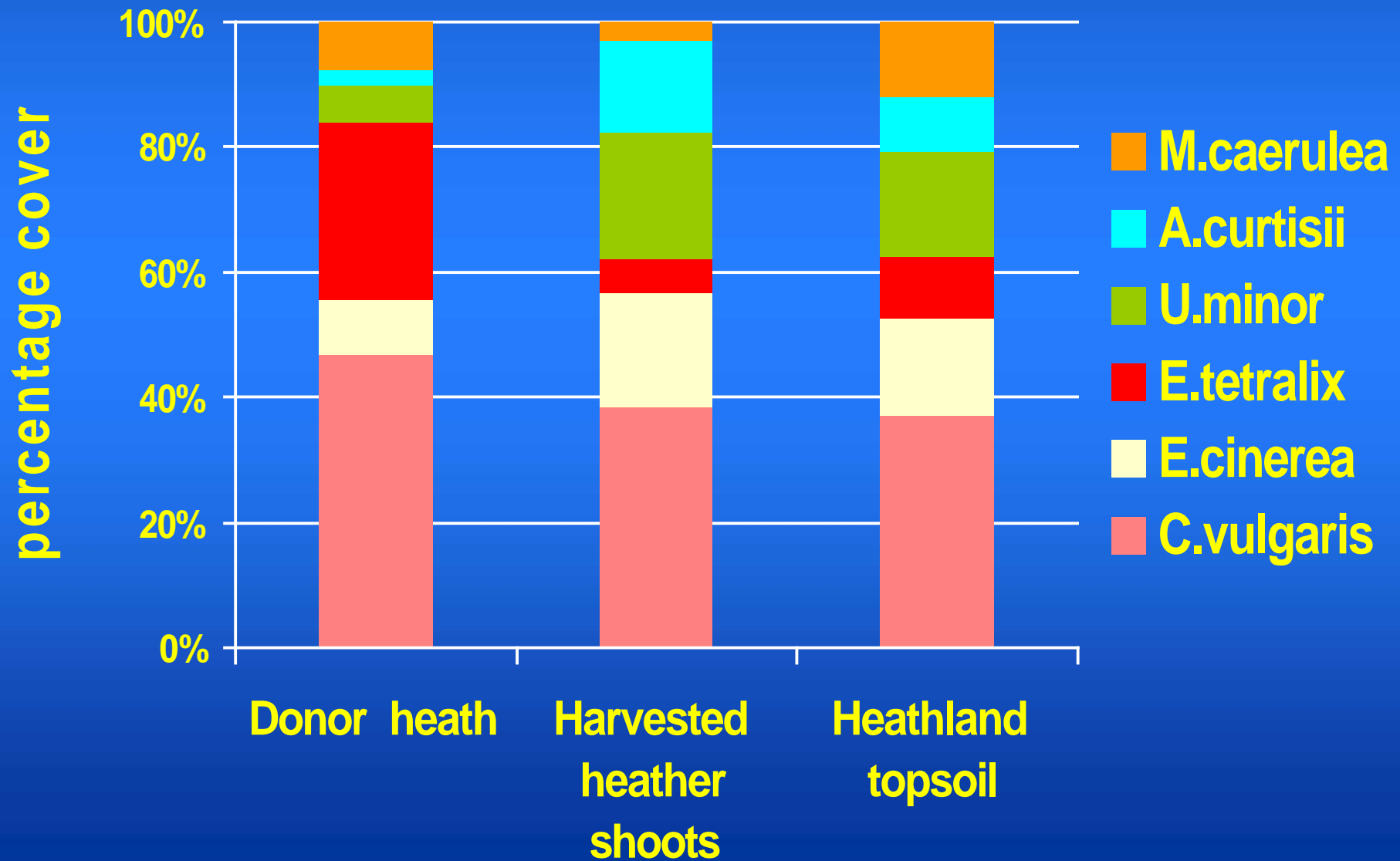
HEATHLAND PLANT COMMUNITIES AFTER 6 YEARS (UNGRAZED) ON SAND AND GRAVEL WORKINGS



TREATMENTS ORDINATION AFTER 7 YEARS



SPECIES ASSEMBLAGE AFTER 10 YEARS



CAERLOGGAS DOWNS THE FIRST LARGE SCALE RESTORATION (60 Ha) ON QUARTZ WASTE (in 1995)



RESTORED HEATHLAND AFTER 4 YEARS (AT THE TIME GRAZING COMMENCED)



RESTORED HEATHLAND WITH

Erica cinerea, *Calluna vulgaris*,
Ulex gallii and *Agrostis curtisii*



LANDSCAPE SCALE RESTORATION



750 hectares of re-created heathland

12.5% UK BAP target for heathland re-creation

800 ha of new naturalistic woodland in addition

Capital cost – Heathland €3.5 million, Woodland €4.4 million

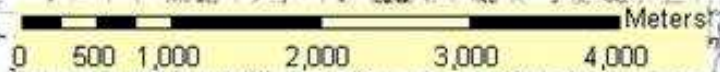
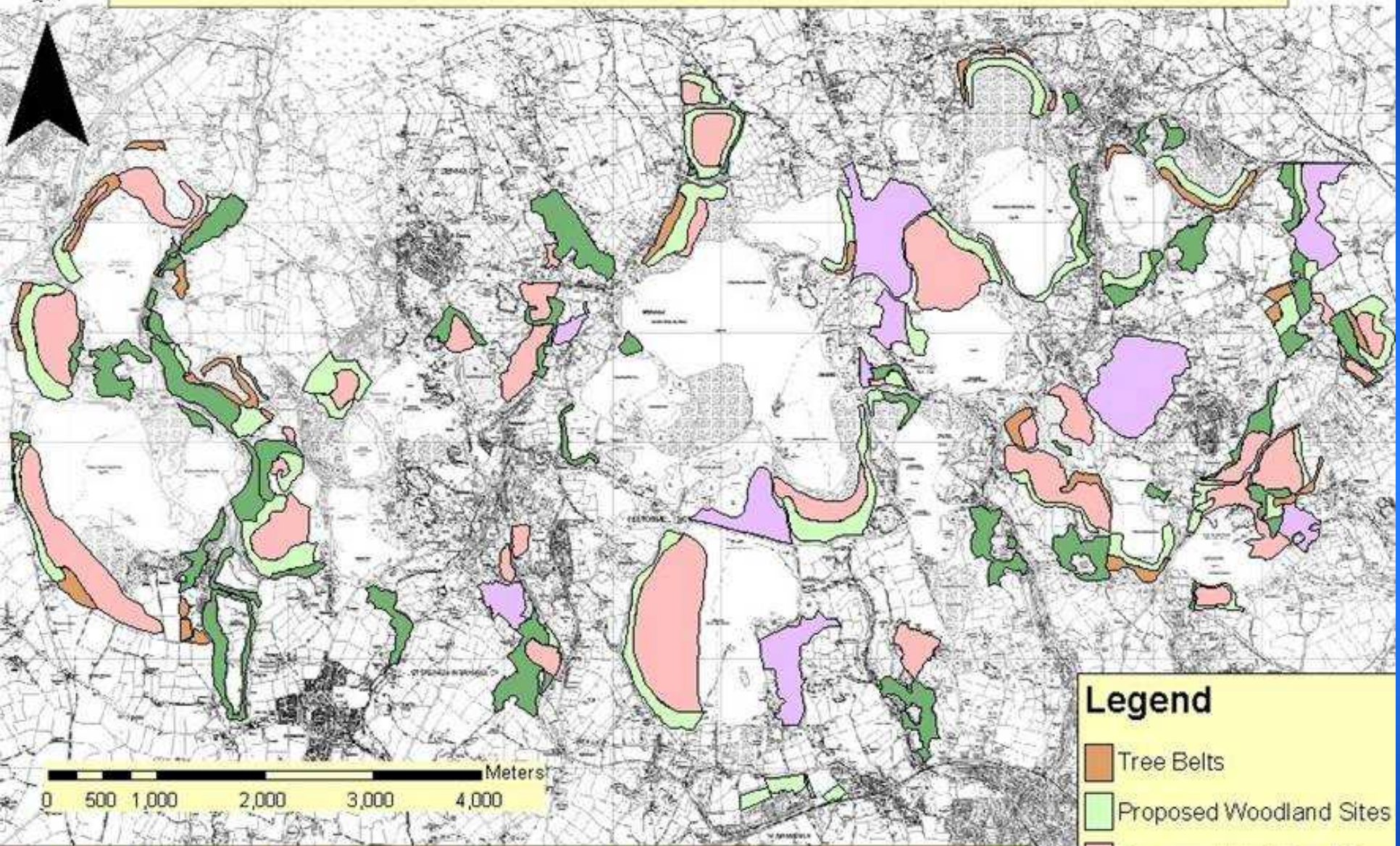
Landscape Design

Reflects and reinforces local distinctiveness with culturally appropriate habitats

Creates a functioning landscape with heathland and improved grassland in proportion, to support grazing animals

Significant public benefits through increased access, improved visual amenity and environment

Restored Landscape in the China Clay Region



Legend

- Tree Belts
- Proposed Woodland Sites
- Proposed Heathland Sites
- Existing Woodland
- Existing Heathland

The information in this map is reproduced thanks to the permission of English Nature. Crown Copyright Reserved. Licence No. 1234567890

ECONOMICALLY SUSTAINABLE MANAGEMENT OF RESTORED HEATHLAND IS ESSENTIAL



**RANGE
GRAZING OF
BEEF CATTLE**

**Expanding
market for
heathland beef**

**Quality breeds
at premium
prices**

SOCIAL & ENVIRONMENTAL GAIN FROM LANDSCAPE RESTORATION

Philip Putwain retired from the University of Liverpool in autumn 2004 and now is principal consultant at Ecological Restoration Consultants

Ian Davies recently left English Nature in Cornwall after 10 years service and now is International Landscape Restoration Manager for Imerys Group Plc

**Social gain:
public benefits
through greater
access and improved
amenity**

**Post-mining
economic gain
through local
employment,
agriculture and
tourism**