

# Notes



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<b>Project title</b>	Geological Society Periglacial and Glacial Engineering Geology Working Party	<b>Job number</b>	
<b>Meeting name and number</b>	03/2011	<b>File reference</b>	
<b>Location</b>	William Buckland Room, Burlington House	<b>Time and date</b>	10:00 28th June 2011
<b>Purpose of meeting</b>	Steering Group meeting of Periglacial and Glacial Engineering Geology Working Party	<b>Page 1 of 4</b>	
<b>Present</b>	John Charman (Chair) Chris Martin (Secretary) Dave Giles Kevin Privett Mike Winter Jim Griffiths		
<b>Apologies</b>	Julian Murton		
<b>Circulation</b>	Those present EGGS committee		

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## Action

- 1. Chairman's introduction and review agenda**
  - The main objective of the meeting was to discuss potential WP members/authors and the Publication Proposal, after briefly reviewing the Terms of Reference (ToR) and Table of Contents (ToC) that has been developed over the previous meetings
  - Minutes from the last meeting (3rd March 2011) were reviewed. Outstanding actions were either carried over or incorporated into the agenda items.
- 2. Terms of Reference for Working Party**
  - Draft 2 of the ToR was reviewed and some minor changes were incorporated as Draft 3 (attached).
  - Item 3: Quaternary vs. Pleistocene age definition was discussed. The extent and applicability of 'Quaternary' is currently being debated in wider circles. The scope of the WP is not intended to encompass inter-glacial features, but should e.g. introduce de-

**Prepared by** Chris Martin  
**Date of circulation** 8<sup>th</sup> July 2011

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glacial features (glacial rebound, river terrace deposits, etc.). A footnote would be added that '(Quaternary) *nomenclature subject to review over the duration of the Working Party.*'

- Item 3: Relict vs. contemporary features and materials were discussed further. The Report would consider contemporary processes, in terms of the formation of relict materials. However the Report it is not intended to be a state-of-the-art review for engineering in contemporary periglacial and glacial environments. There are significant differences between engineering practices in Alaska, Canada, Scandinavia / Europe, Russia, China, etc., therefore this is considered too onerous a task to compile with the available resources and timeframe. No changes to ToR proposed.
- Item 8. Four year completion. Discussed further under Item 5, but revised to aim for completion in three years. This would be challenging, but desirable and thought to be achievable, if everyone was focussed from the onset. Noted that, compared with previous WPs, less reliance should be placed on completing thorough reviews during the WP meetings, with greater emphasis on 'offline working.'

### 3. Outline of Working Party Report Structure and Contents

- Draft 3 circulated with agenda.
- CM/DG to produce first draft of risk matrix (carried over). CM (+DG)
- MW has revised Section 8 (Design & Construction Considerations).
- KP has rationalised Glacial Conceptual Ground Models.
- Comments received from JM before the meeting.
- Minor changes incorporated into Draft 4 (attached), which includes some guidance notes (highlighted yellow).
- Section 2.4 - agreed that this should be a separate chapter. Geomorphological framework = 'macro-model.' (new Chapter 3).
- Section 8 - 'Materials' sub-section added.
- DG (+JG) to starting working-up Chapter 3 and, to a lesser extent, the cross-referencing with chapters 2, 4, 5. These form an important framework for the remainder of the Report, therefore it would be useful to get a head-start on these sections, or at least the proposed approach and nomenclature, before the main WP DG (+JG)

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**Action**

starts.

#### 4. Potential Officers and Members of Working Party

- Editor: Jim Griffiths
- Chair: Chris Martin
- Secretary: options to be developed
- Treasurer: combine with Secretary role
- Illustrator: to be considered
- Potential lead and co-authors were identified by the SG, which draws from members of the existing Steering Group and other subject matter experts. However the ability to lead and deliver draft chapters in the required timeframe was considered an equally important factor.
- It was agreed that one lead author should be identified for each chapter, who would have ultimate responsibility for chapter delivery. However additional co-authors would also be approached. The aim would be to include a balance of individuals from different disciplines and backgrounds (geology, geomorphology, engineering, academia/industry, etc) as appropriate. Authors and co-authors may be expected to contribute to a number of chapters to help deliver consistency and minimise gaps and overlaps.
- It was anticipated that the WP officers and lead authors would number approximately ten individuals.
- SG to approach the identified lead authors before the next SG meeting.
- The Publication Proposal would be forwarded to Potential lead and co-authors on completion (prior to commencement of WP).

JC/CM/JG

All

CM - see below

#### 5. Publication Proposal

- Identify Editor, Authors, etc.
- Table of Contents.
- Terms of Reference.
- Programme: Year 1 - start-up and complete first draft; Year 2 - internal and external review, and prepare final draft; Year 3 - final review and editing.
- WP expenses and outline publication budget.

CM to produce  
first draft

(SG to review)

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## Action

- Review and editing arrangements.
  - Photos / images copyright, colour printing, requirements - GS guidance is available on the website.
6. **Input to Engineering Group Forum** ('Quaternary Engineering Geology,' 23<sup>rd</sup> November 2011)
- DG is Forum convenor
  - CM / JC to work-up draft presentation for SG review. CM/JC
  - Assumed that JC would 'set the scene' (WP background) and CM would discuss the proposed format.
7. **Expense claims**
- All to submit to CM, for approval and onward transmission to GS. All
8. **AOB**
- None
9. **Date of Next Meeting(s):**
- Wednesday 19<sup>th</sup> October. Aim to be final meeting. Possibly at Publishing House in Bath, which may reduce travel costs. All to determine cost estimate for travel to both Bath and London. CM to make arrangements and advice on final agreed location. All  
CM
  - Tuesday 22<sup>nd</sup> November (before the EGGS Forum); tentative date pending requirement (if any outstanding actions still to be completed) and subject to budget review.

# PERIGLACIAL AND GLACIAL ENGINEERING GEOLOGY

A Geological Society Engineering Group Working Party

## DRAFT TERMS OF REFERENCE

**to be formulated into the final Terms of Reference  
during the first and/or second meeting of the Working Party**

(This is to be considered a working draft)

1. These Terms of Reference are as agreed by the Periglacial and Glacial Engineering Geology Working Party (PGEGWP).
2. The PGEGWP has been established by the Engineering Group of the Geological Society and comprises officers and specialist participating members who will act as chapter authors or co-authors. The participating members may be assisted by any number of corresponding members.
3. The PGEGWP will produce a report, in book format, to complement the earlier report on Tropical Residual Soils produced by an earlier Working Party of the Engineering Group, first published in 1990 and republished in book format in 1997. A similar format was adopted by the Hot Deserts Working Party, which is due to publish their final report in 2011. It is intended that the report will be a comprehensive, state-of-the-art review on the ground conditions associated with relict Quaternary\* periglacial and glacial environments and their materials, from an engineering geological viewpoint. There necessarily will be appropriate coverage of the processes and environments that formed these relict materials.
4. It is not intended to define the geographic extent of relict periglacial and glacial environments around the world, but to concentrate on ground models that would be applicable to support the engineering geological practitioner.
5. The aim of the PGEGWP is to produce a report that will act as an essential reference handbook for professionals as well as a valuable textbook for students and others. The style will be concise and digestible by the non-specialist, yet be authoritative, up-to-date and extensively supported by data and collations of technical information. The use of jargon will be minimised and necessary specialist terms will be defined in an extensive glossary. There will be copious illustrations, many of which will be original, and many good quality photographs.
6. The content of the report will embrace a full range of topics, from the latest research findings to practical applications of existing information. There will be an endeavour to identify likely directions of future research and to predict future development. The report will be based on world-wide experience in periglacial and glacial terrain and will draw upon the experience of its members and publications on periglacial and glacial conditions.
7. The Working Party members will be collectively responsible for the whole report. Although each participating member will be the named author or co-author of one or more chapters, all members will be expected to review and contribute to the chapters drafted by other members and would be acknowledged as such. Individual book chapters will be included in the Thomson Book Citation Index.
8. It is intended that the report will be completed within three years.

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\* *Nomenclature subject to review over the duration of the Working Party.*

## DRAFT TABLE OF CONTENTS

*WP members & acknowledgements.*

*Contents.*

*Forward.*

*Preface.*

### 1. INTRODUCTION

### 2. QUATERNARY\* SETTING (\*Nomenclature to be reviewed by WP)

2.1 Event framework

2.2 Stratigraphic framework

2.3 Geographic framework

### 3. GEOMORPHOLOGICAL FRAMEWORK (Landsystems approach)

- Mega / Macro-model - 'notes for guidance' style. Identify chapter headings in following two chapters.
- Discuss interrelationships and overlaps. Should define scope of Report and each ground model.

### 4. GLACIAL CONCEPTUAL GROUND MODEL

- Types of materials & variations.
- List of ground models (GM).
- For each GM
  - processes, landforms, deposits
  - list of geohazards (g/h).
- For each g/h
  - list of problems (eg g/h = gulls, prob = voids, deposits at elevation below expected from stratigraphy, etc.)
  - risk register (L/M/H)

4.1 Ice-related terrains: sub-glacial, supra-glacial & glaciated valley

- a) Processes, Landforms & Deposits
- b) Ground Model
- c) Geohazards checklist and engineering significance

4.2 Water-related terrains: glaciofluvial, glaciolacustrine & glaciomarine

- a) Processes, Landforms & Deposits
- b) Ground Model
- c) Geohazards checklist and engineering significance

4.3 Ice-front-related terrains: glaciotectonic & ice marginal. (Possibly combine with 4.1 and 4.2?).

- a) Processes, Landforms & Deposits
- b) Ground Model
- c) Geohazards checklist and engineering significance

### 5. PERIGLACIAL CONCEPTUAL GROUND MODEL

5.1 Upland regions.

- a) Processes, Landforms & Deposits
- b) Ground Model
- c) Geohazards checklist and engineering significance

5.2 Lowland regions.

- a) Processes, Landforms & Deposits
- b) Ground Model
- c) Geohazards checklist and engineering significance

### 6. GEOHAZARDS & PROBLEMATIC GROUND CONDITIONS

- Focus on difficult areas.

- More details of the main g/h from Ch 3 & 4. Sub-headings for each g/h described.
- Start with lists from Ch 3 & 4.
- Same sub-headings in Ch 3 & 4 as Ch 5. Expand to para-pages as required.
- Matrix based on higher level of classification eg cambering.
- Link to SI in Ch 6.
- PRELIMINARY STRUCTURE, depending on outcome of Ch 4 & 5.

- 6.1 Hazards related to particular soil types or associations of soil types
- 6.2 Ice-related terrains: sub-glacial, supra-glacial & glaciated valley
- 6.3 Water-related terrains: glaciofluvial, glaciolacustrine & glaciomarine
- 6.4 Ice-front-related terrains: glaciotectonic & ice marginal
- 6.5 Upland region periglacial terrains
- 6.6 Lowland region periglacial terrains

## 7. ENGINEERING INVESTIGATION & ASSESSMENT

- Needs to reference BS5930 and EC7, but not repeat verbatim. Should highlight difficulties and possible alternatives / work-arounds.
- 7.1 Soil & rock description & characteristics.
  - 7.2 Desk study, remote sensing (include Lidar, etc.), walk-over/field evaluation & eng geol mapping.
  - 7.3 Ground investigation, testing & interpretation.
    - a) Drilling, trial pitting & trenching.
    - b) Sampling equipment & quality. Include 'representativeness'
    - c) In-situ testing – SPT, CPT, plate bearing, pressuremeter, permeability.
    - d) Geophysics.
    - e) Lab. testing.
  - Onshore vs Offshore
  - 7.4 Hydrogeological investigation.
    - a) Aquifers, recharge, abstraction, hydrochemistry, superficial cover.

## 8. ENGINEERING BEHAVIOUR & PROPERTIES

- 8.1 Engineering behaviour of rock and soil materials.
  - a) Deformed/shattered bedrock, frost heave and thaw settlement deposits, ice-rich soil/rocks, till, sand & gravel, laminated silts & clays, quick clay, loess & brickearth, solifluction deposits, ice rafts, boulder fields, patterned ground, peat (associated with periglacial/glacial terrain - acknowledge / cross-ref, or just mention in Ch3-5?).
  - b) Example for tills – engineering classification, PSD, Atterbergs, moisture content, liquidity, post-depositional modification, shear strength, influence of discontinuities, compressibility, in-situ stress.

## 9. DESIGN & CONSTRUCTION CONSIDERATIONS

- 9.1 Foundations.
  - a) Common problems, bearing capacity & settlement, rockhead, shallow foundations, piles, wind farms.
- 9.2 Slopes and slope stability
  - a) Cut
  - b) Natural slopes
- 9.3 Earthworks
- 9.4 Aggregates and other materials (e.g. brickearth, glass sands, fuller's earth?, boulderfields as armourstone)
- 9.5 Retaining walls
  - a) Depending on detail this may end up under either foundations or earthworks or drop-out completely.
- 9.6 Dams and reservoirs
  - a) Common problems, valley profiles, rockhead, rock conditions, groundwater, construction materials, buried valleys, superficial deposits.
  - b) Inevitably some overlap with earthworks, foundations and slopes so we may need to refer back and deal only with issues that reflect the unique issues surrounding dams (i.e. the need to impound water) here.

- 9.7 Tunnels and underground structures
  - a) Common problems, water, variability of ground conditions.
  - b) Specific features – sand lenses, etc.
- 9.8 Issues related to linear infrastructure
  - a) Roads (highway vs wind farm/forestry access).
  - b) Railways.
  - c) Pipelines and buried cables.
  - d) Transmission lines.
- 9.9 Offshore

*References and Bibliography* - at end of each chapter. Include 'key references' in Introduction, each chapter or separate appendix?

*Appendices.*

*Glossary.*

*Index.*