

PART 2

SECTION 1

GEOLOGY & SOILS

1.1 Introduction

1.1.1 Consultations were undertaken with relevant consultees to determine their opinion on the geology and geomorphology of the site, the scope of impacts, the assessment methodology and relevant sources. Account has been taken of responses received from consultees as summarised below:-

- Cairngorms National Park Authority - Details to be added; and
- British Geological Society - Details to be added.

1.1.3 The initial stages of the assessment process consider the baseline geology and geomorphology, designations and Government policy relevant to an assessment Study Area.

1.2 The Study Area

1.2.1 The site occupies approximately 105 hectares of relatively low-lying, flat to gently undulating terrain adjacent to the River Spey, on elevations ranging from approximately 220m to 230m.

1.3 Assessment Aims

1.3.1 The assessment comprised the following key stages:

- Detailed desk studies and field surveys to ascertain the current baseline conditions of the site; and
- Considerations of the possible interactions between the proposed development and the current site conditions, and identification of potential impacts;

1.4 Baseline Conditions

1.4.1 The site is predominantly well drained and is partially covered with a plantation forest, rough grasses and heather with areas containing sparse trees. Habitats are discussed in detail in the Ecology Section of this ES. A review of the available historical maps indicates that the land use of the area has not changed significantly since 1747. The land belongs to the Rothimurchus estate and has

been primarily used for forest plantations and coarse grazing. On this basis, the area can be considered a 'Greenfield Site' and would not require further contamination investigation.

- 1.4.2** Based on the SNHi GIS datasets there are no Sites of Special Scientific Interest (SSSI), Special Protection Areas (SPA) or Special Areas of Conservation (SAC) within the site boundary. However, it is noted that the River Spey to the immediate west of the site has been classified as both a SSSI and a SAC.

1.5 Geomorphology

- 1.5.1** The geomorphology of the area is controlled by the glacial history. Field evidence (Young, 1977), suggests that the Aviemore area was once submerged beneath thick glacial ice (at least 600m), which down-wasted in-situ, releasing meltwaters that carried large volumes of debris into and under the glacier ice. Evidence of these meltwater channels is visible on current aerial photography across the site. Gradually the ice sheet wasted away completely, leaving large areas of dead ice topography, forming 'kettle holes' across the valley terrain. Subsequently, the River Spey cut into the meltwater debris (glacio-fluvial) deposits, forming terraces and a floodplain within the valley.

1.6 Superficial Geology

- 1.6.1** According to British Geological Survey (BGS) Solid and Drift Geology map, the superficial geology of the site comprises of glacio-fluvial deposits of sand and gravel. Deposits are likely to have significant thickness across the site, potentially greater than 5m in thickness. The deposits have been reworked by the River Spey in the past forming terraces or escarpments to the west and south of the site boundary.
- 1.6.2** An inspection of the superficial deposits across the site indicated that the sand and gravel was well compacted and appeared to be free draining. Localised areas of soft peat deposits were noted at some locations, particularly within gentle troughs in the landscape morphology and within a 'kettle hole' identified at the southwest of the site (KH1).
- 1.6.3** The Macauley Institute Soil Survey Map indicates that the soils originated from glacio-fluvial sands and gravels derived from acid rocks. The soils within the site are described as humus-iron podzols comprising peaty gleys and humic gleys, forming mounds and ridges with gentle to steep slopes. The vegetation is described as acid bent-fescue grassland; Atlantic and boreal heather moor; rush pastures and sedge mires.

1.7 Solid Geology

- 1.7.1** No rock outcrops were found during the walkover survey. However, based on an interpretation of the BGS map, the site is likely to be underlain by undifferentiated Precambrian schists and gneisses belonging to the Moine Series of rocks. Outwith the site boundary, pelitic gneiss and schist from the Grantown Group of

rocks are shown to the northeast of the site boundary. Felsite, quartz porphyry and granophyre veins and are also present locally to the northeast of the site. No geological faults are known within the vicinity of the site.

1.8 Hydrogeology

1.8.1 The BGS Hydrogeological Map of Scotland indicates that the site is underlain by Quaternary sands and gravels. The superficial deposits comprise silts, sands, gravel and cobbles are of a glacio-fluvial origin and form terraced and gently undulating terrain. The groundwater potential varies based on the thickness of saturated material. Boreholes have been known to typically yield 10L/s, to 15L/s in some cases. The groundwater chemistry is variable, but mineralization is typically weak. The exposed shallow nature of the groundwater places it at risk from diffuse and point source pollutants.

1.8.2 The underlying solid geology is known to be Precambrian in age, comprising schists and gneisses that have little potential for groundwater storage and transport, other than in cracks and joints associated with tectonic features or near surface weathering.

1.9 Process

1.9.1 An assessment of existing baseline conditions, sensitivity and magnitude of impacts was undertaken. The significance of these impacts and effects can be defined however in order to provide a level of consistency to the assessment, these assessments are based on pre-defined criteria.

1.10 Sensitivity to change

1.10.1 The sensitivity of the geological and soil resource to changes associated with the proposed development can be defined as **high**, **medium** or **low** based on professional judgement of a combination of parameters, as follows:

- Scale;
- geological and soils value - local, regional or national;
- statutory designations and non-statutory designated areas;
- Distribution of receptors; and
- Scope for mitigation.

1.10.2 Usually, an area would not fit every criterion within just one category; but, rather, it would be categorised based on best fitting more of the criteria within one allocation than another.

Table 1.1 Sensitivity Criteria for Geology & Soils

High	Area containing geological, geomorphical & Soils features considered to be of national interest e.g. SSSI's
Medium	Areas containing features of designated regional importance considered worthy of protection for their educational, research, historic or aesthetic importance.
Low	Features not currently protected and considered not to require specific protection

1.11 Magnitude to change

1.11.1 The magnitude of change to the geological and soils resource arising from the proposed development at any particular viewpoint is described as **high, medium, low, negligible** or **none**. The considerations which have been taken into account during the assessment of the impact on geology and soils at can be grouped as follows:

- The existing information on geology and soils; and
- The change to geology and soils caused by the introduction of the proposed development.

1.11.2 Within each of these groups, specific considerations have been and these are described below.

Table 1.2 Definition of Magnitude of Change

High	Where there would be partial (greater than 50%) or total loss of site, or where there would be complete severance of site such as to significantly affect the value of the site
Medium	Where there would be loss of part (between approximately 15 to 50%) of a site, major severance, major effects to the setting, or disturbance such that the value of the site would not be affected
Low	Where there would be minimal effect on a site (up to 15%) or a medium effect on its setting, or where there would be a minor severance or disturbance such that the value of the site would not be affected.
Negligible	Very slight change from the baseline condition. Change hardly

	discernible, approximating to "no change" conditions.
None	No change on the baseline conditions

1.12 Adverse and Beneficial

1.12.1 When assessing impacts on the geology and soils resource, the following categorisation has been used:

- 'Adverse' – the key characteristics of geology and soils resource are compromised;
- 'No impact' – the key characteristics of the geology and soils resource are not affected; and
- 'Beneficial' – key characteristics of the geology and soils resource are reinforced.

1.13 Impacts and Effects

1.13.2 The following terms are used in this assessment as defined below:

- '**Impact**' is specific and used to refer to changes to an individual element or characteristic of the environment. In order to assess the impact of a proposed development on a particular element of the environment, it is first necessary to identify the degree of change caused to that element by the proposed development. The degree of change affecting an element by the proposed development can be described factually.
- '**Effect**' is a broader based view of the accumulation of one or more impacts which involves not only a degree of professional judgment but also some extrapolation and generalisation, both of which also involve professional judgment.

1.14 Significance criteria

1.14.1 Wherever possible, identified effects are quantified, but the nature of geology and soils assessment often requires interpretation by professional judgment.

1.14.2 EIA Regulations require judgment on the acceptability of a scheme to occur in the full knowledge of the likely significant effects on the environment. However, GLVIA explains that "in the context of EIA, however, 'significance' varies with the type of project and the topic under assessment" and "it may be helpful to define levels or categories of significance (including 'not significant') appropriate to the nature, size and location of the proposed development". To satisfy these

requirements, it is stated that, where landscape or visual impacts of either **moderate** or **substantial impact** are identified by this LVIA, as described within the tables above, these should be considered as a significant effect as per the EIA Regulations. Accordingly, slight or no impacts are considered as not significant.

Table 1.3 Significance of Impacts on Geology & Soils

Sensitivity	High	Medium	Low
Magnitude			
High	Substantial	Substantial/Moderate	Moderate
Medium	Moderate	Moderate	Slight
Low	Slight	Slight	Negligible
Negligible	Negligible	Negligible	Negligible

1.15 Assessment of Significance of Effect

- 1.15.1** The significance criteria of the potential impacts from the proposed development have been defined taking into account the importance of the geological features and the potential magnitude of the impact.
- 1.15.2** The assessment assumes the ‘worst-case’ scenario, without mitigation measures, (i.e. such as the removal of particular geological features during the construction phase of the development). The removal of geological features would result in the feature being destroyed. Mitigation measures to minimise the impact of construction around these features are not possible with the exception of using avoidance as the key mitigation recommendation.
- 1.15.3** The value or significance of the geological features identified within the site would largely be considered to be dependent on whether the features would be considered unique or particularly good geological examples that should be preserved, e.g. geological SSSI.
- 1.15.4** The topographical depressions identified at the site are considered to be common features of the ‘kame’ and ‘kettle’ topography that are present within the valley landscape of the Aviemore area. Aviemore has been built on ‘kame’ and ‘kettle’ topography, much of which has been destroyed by construction, (Young, 1977).
- 1.15.5** Kettle holes are formed by blocks of ice that collapse at the margins of a receding glacier. The blocks of ice are subsequently buried by glacio-fluvial deposits from the melting of the glacier; the kettle hole is then formed by the collapse of the glacio-fluvial cover when the buried glacier ice finally melts in-situ.
- 1.15.6** The kettle hole features found at the site are very small compared to examples that form large kettle hole lakes such as Loch Pityoulish, Loch Mallachie and

Loch Garten. Many other small kettle holes are also present along the valley and have been mapped (Young, 1977), these include Loch Dallas, Loch Dubh, Loch Vaa and many other smaller depressions, with and without water that are unnamed.

- 1.15.7** The significance of the kettle hole features within the An Camas Mòr site are therefore considered to be insignificant based on the size of the features identified and their relatively common occurrence within the Aviemore valley area.

1.16 Initial Letter and Additional Material to Consultation

1.16.1 Proposed e-mail to for the British Geological Survey

Dear David Ross,

We are currently preparing a geology and soil chapter for an EIA for a site near Aviemore. We have enclosed a general site location plan and a marked up aerial photograph showing some pertinent features that we have identified during a site visit.

The key features that have been identified are kettle holes, fluvio-glacial terraces and evidence of meltwater channels within the site.

We would greatly appreciate an opinion from the BGS in regards to the significance of these features, or other advice in the preparation of our geology chapter.

Regards,

Sei Kin Chan
Engineering Geologist

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1.16.2 Proposed e-mail for Cairngorm National Park Authority

To: 'enquiries@cairngorms.co.uk'
Subject: Enquiry regarding the proposed development at An Camas Mòr, near Aviemore

Dear Sir/Madam,

A new planned community to help meet the needs of Badenoch & Strathspey is proposed to be developed over 20-25 years starting in 2011. It is located c. 1 km east of Aviemore and more information can be found on

www.ancamasmor.com. Mott MacDoanld has been commissioned to undertake fieldwork and desk study by Johnnie Grant of Rothiemurchus, to complete the geology chapter for an Environmental Statement (ES). The outcome of this process is planned to be made public through publication of a Master Plan and the ES in early 2009.

We are currently collating baseline information from readily available information (please see the enclosed map for the extent of the proposed scheme, centred at OS grid reference NH 90980 12470).

Additionally, we have attached a general site plan and a marked up aerial photograph showing some pertinent features that we have identified during a site visit. The key features that have been identified are kettle holes, fluvio-glacial terraces and evidence of meltwater channels within the site.

We would be very grateful if the CNPA could provide an opinion on the significance of these features within the site, or other advice in the preparation of our geology chapter.

If you require any further information or have any queries then please do not hesitate to contact me. Please let me know in advance if there will be a charge for this information. I look forward to your response.

Yours sincerely,

Sei Kin Chan
Engineering Geologist

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1.17 Notes and Responses to Scoping Consultation

1.17.1 Response from British Geological Survey

Hi Seikin,

Sorry I've been in and out of the office all day with various things, and have not got round to this till now.

I have discussed the area of interest with my colleagues, Jon Merritt (Project Leader, Sheet 74E Aviemore) and Dr

Tom Bradwell (Team Leader, Quaternary Earth Systems), the three of us being familiar with the landscape at the site. We feel that although the features on the site represent clear examples of Lateglacial meltwater and ice retreat features, they are relatively common in the Aviemore and wider Strath Spey district. As such they do not represent sites of special significance in terms of the Quaternary geology. The scope of your EIA appears to be appropriate, however we would point you to the most recent BGS Superficial deposits survey of the site, completed over 2000 to 2006. I would suggest you contact Jon Merritt (cc'd on this email) to arrange access to this information, as it is not in published form as yet.

Further we would be grateful if, prior to the commencement of works adjacent to or affecting the kettle holes, someone were able to photograph the larger kettle features, and email those images to myself with their locations. This would be useful for two reasons: in our reconstructions of glacial retreat up Strath Spey we may require images to illustrate this part of the glen; and also it may be the case that BGS would wish to core the kettle sites using a Russian Corer (narrow bore, hand-drilled), to retrieve potentially useful palaeoenvironmental information from kettle sediments. It would be important for us to do this before any disturbance of the sites by development, to minimise the possibility of contamination.

It is more than likely that on seeing these photographs BGS would decide that these kettles are not worthy of further investigation, however it would be a great shame if they were potentially important and such an opportunity were lost.

I hope that this information is what you were hoping for, and I look forward to hearing from you again.

Best wishes,

Jez

Dr Jez Everest
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1.17.2 Response from Cairngorms National Park Authority

Dear Sei Kin

Cc Johnnie

Before Christmas you requested comments on the scope of the geological interests in relation to the AnCamas Mòr ES. We have consulted with the earth science specialist at SNH and have the following brief comments to make:

1. The scope of the geology chapter of the EIA appears comprehensive.
2. We suggest that the evaluation of the specific features, as well as the total assemblage of landforms, should be placed in a local as well as a regional context - i.e. how they compare with other examples in the National Park and further afield if appropriate.
3. Opportunities for mitigating the impact should also be considered e.g. open areas or recreational areas fitted around the geomorphology (including making use of opportunities for interpretation), rather than any 're-landscaping' (which I am aware the indicative plan already considers).

We are not able to provide detailed comments on the significance of features in comparison with other sites, this is something that we encourage the ES authors to make an assessment on.

I hope this is helpful

Regards

Hamish

Hamish Trench

Head of Heritage and Land Management

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