

CHAPTER 7 SUMMARY OF ASSESSMENTS OF EFFECTS

7.1 Introduction

- 7.1.1** This chapter provides a summary of the likely environmental effects of the proposed new community on the range of topics studied as part of the Environmental Impact Assessment process.
- 7.1.2** The Scoping process by which the assessment topics were identified is explained in Chapter 6 Section 6.7. Paragraph 6.7.5 lists the assessment topics.
- 7.1.3** The detailed studies and assessment of effects are contained in the Technical Appendices Vol.2 Chapter 9.

7.2 Possible Impacts

- 7.2.1** Three types of possible impacts have been identified, based on the different Assessment Periods (Volume 1, Chapter 6, Section 6.7, Paragraph 6.7.2) of the development. Each Technical Appendix uses these categories when and where appropriate. They are:
- Construction impacts – temporary, short term to long term that occur during construction;
 - Permanent impacts – result in a permanent change; and
 - Operational Impacts – resulting from the use of the site (both temporary and permanent).
- 7.2.2** Assessments at Assessment Periods B, C and D require to take into account that part of the development which would be construction and that part which would be operation.

7.3 EFFECT ON GEOLOGY & SOILS

Introduction

- 7.3.1** This section presents an assessment of the effects of the proposed new community at An Camas Mòr on the geology and geomorphology of the area. This is based on available desk study information and walkover surveys of the site of the proposed development.

Scope

- 7.3.2** The assessment covers aspects of the proposed development and how it would affect the geological and geomorphological features of the site. Potential impacts arising from these activities are identified, along with the significance of the

effects on the geological and geomorphological features. Appropriate mitigation measures are also considered.

Possible Effects and Inter-relationships

- 7.3.3** Several possible effects and Inter-relationships have been identified as relevant to the assessment of effect on geology and soils. Table 7.11 lists the various effects and Inter-relationships with the Environmental Impact Assessment topics. Possible Inter-relationships have been identified with the Landscape Resource, Ecology and Nature Conservation and Hydrology and Water Quality.

Influence of Periods A-D on Assessment

- 7.3.4** It is assumed that any assessment of the site would not take into consideration the interim construction phases (A – C), as indicated on the Indicative Land Use Plan maps. This is due to baseline evidence indicating that the An Camas Mòr site does not include any significant geological or geomorphological features. Baseline data sources indicate that the only noteworthy features are a number of relatively small, shallow topographic depressions (or ‘kettle holes’). The assessment is based upon the final layout shown on the Indicative Land Use Plan, Period D 2027 (Chapter 5 Figure 5.5).

Consultations

- 7.3.5** The following consultees were contacted via email on the 9th December 2008 to comment on the scoping of the geology section of the ES:-
- British Geological Survey (BGS); and the
 - Cairngorms National Park Authority (CNPA).
- 7.3.6** For details on consultee responses see Volume 2 Chapter 9 Section 1.

The Study Area

- 7.3.7** A walkover of the site was carried out as part of the fieldwork and was limited primarily within the proposed development boundary. A brief reconnaissance of areas outwith the boundary was carried out to gain an appreciation of the site in relation to its geomorphological setting.

Baseline Conditions

Geomorphology

- 7.3.8** 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.

- 7.3.9** Kettle holes are formed as a consequence of relict blocks of ice from 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.
- 7.3.10** 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).
- 7.3.11** The kettle hole features found at the site are relatively 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.

Superficial Geology

- 7.3.12** According to the British Geological Survey (BGS) Solid and Drift Geology map, the superficial geology of the site comprises alluvial terrace 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 the terraces or escarpments to the west and south of the site boundary.
- 7.3.13** An inspection of the superficial deposits across the site would suggest that the sand and gravel was reasonably 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.
- 7.3.14** 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.

Solid Geology

- 7.3.15** No rock outcrops were found during the walkover survey, and bedrock is believed to be at such a depth not to be encountered by the development.

However, based on an interpretation of BGS information, the central area of the site is likely to be underlain by interbanded gneissose psammitic and subsidiary semi-pelitic rocks of the Central Highland Migmatite Complex. The remaining underlying rock types are anticipated to be predominantly psammitic, with beds of semi-pelitic rocks, schists and quartzites. Felsite, quartz porphyry and granophyre veins are also present locally to the northeast of the site. A major fault, the Ericht-Laidon Fault, is indicated to be present running beneath the site parallel to the alignment of the River Spey. With reference to 'Eurocode 8 seismic hazard zoning maps for the UK, Seismology and Geomagnetism Programme, Technical Report CR/07/125 Issue 3.0, 2007', the risk of potential seismic impact is shown to be very low with Peak Ground Acceleration less than 0.02g for a 475 year return period. However, near-fault seismicity may present an increase in this value, as illustrated by the magnitude 2.7 earthquake which was felt at Aviemore on 28 August in 1995. Nevertheless, it is considered that with the absence of any mechanism the presence of the development would not increase risk to the existing environment with respect to the affects of any seismicity.

Hydrogeology

7.3.16 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 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, with to 15L/s in some cases. The groundwater chemistry is variable, but mineralisation is typically weak. The exposed shallow nature of the groundwater places it at risk from diffuse and point source pollutants.

7.3.17 The underlying solid geology comprising psammites, schists and gneisses is described to have little potential for groundwater storage and transport, other than in cracks and joints associated with tectonic features or near surface weathering.

Designations

7.3.18 There are no geological designations (e.g. SSSI or Regionally Important Geological (RIG) Features) within the site or within the vicinity of the site.

Key Considerations

7.3.19 The key considerations in relation to the geology and soils are:

- Impact on geological and geomorphological features;
- Impact on soils; and
- Impact on hydrogeology.

7.3.20 The possible impacts on which the key considerations for the assessment are based are:

- The impact of infilling and / or construction in and around small topographical depressions identified as 'kettle holes';
- Loss of glacial terraces;
- Loss meltwater channels; and
- Loss and disturbance of soils and disturbance of soil structure.

Assessment methodology

7.3.21 The assessment comprised the following key stages:

- Desk studies and field surveys to ascertain the current baseline conditions of the site;
- Considerations of the possible Inter-relationships between the proposed development and the current site conditions, plus identification of potential impacts;
- Assessment of the significance of potential impacts, taking into account the sensitivity of receiving environment, the potential magnitude of each impact and the likelihood of the impact occurring; and
- Identification of committed mitigation measures to prevent, reduce and where possible offset significant adverse effects.

Effects

7.3.22 To determine the effects of the proposed development upon the geological and geomorphological features within the proposed An Camas Mòr site, and the immediate vicinity, the extent of construction activities are based on the Indicative Land Use Plan, Period D 2027.

7.3.23 Impacts on the proposed development site are identified as occurring only in the construction period., therefore operational and post-operational impacts are not considered applicable in this assessment.

7.3.24 he main features that have been identified within the site are the topographic depressions (or kettle holes) within the glacio-fluvial deposits. Additionally, terraces within the glacio-fluvial deposits and meltwater channels have been identified at the west and south of the site boundary.

7.3.25 No construction or earth works are proposed where 'kettle hole' features were identified, these features would remain as natural landscape features within the development.

- 7.3.26** Development of the site is anticipated to generate earthwork material. It is expected that the glacio-fluvial sand and gravel deposits are likely to be suitable for re-use during the site constructions works, particularly for levelling areas of the site or landscaping. The suitability of the glacio-fluvial deposits for use in construction would be dependent upon their properties.
- 7.3.27** Topsoil across the site is likely to be affected by construction activities; being stripped where construction is to take place and stockpiled. Onsite topsoil would be potentially re-used for landscaping of public areas and private gardens within the development. The upper soil layers are of poor quality.
- 7.3.28** The construction of roads would impact upon the glacio-fluvial terraces at the south and northwest of the site. However, the glacio-fluvial terraces and meltwater channels are considered to be relatively common features of glacial terrain.

Significance of Effects

- 7.3.29** An assessment of the significance of the effects on geological and geomorphological features are summarised in Table 7.1.

Table 7.1: Summary of Significance of Construction Effects

Effect	Assessment of Construction Effects		
	Sensitivity	Magnitude	Significance
Kettle holes	Low	Major	Not Significant (Minor)
Areas Around Kettle holes	Low	Insignificant	Not Significant (Insignificant)
Glacial terraces	Low	Moderate	Not Significant (Minor)
Meltwater Channels	Low	Major	Not Significant (Minor)
Soils	Negligible	Major	Not significant (Insignificant)

Mitigation

- 7.3.30** Due to the nature of the geological/geomorphological features on the site, and the extent of proposed development and avoidance of development in Kettle Holes mitigation is limited to the use of Construction Environmental

Management Plan (CEMP) to control construction activities around the kettle holes. There is no practical mitigation for the loss of Glacial Terraces or Meltwater Channels.

7.3.31 The effects of construction on the topsoils and sub-soils within the site can be reduced using a CEMP that details good-practice construction methodologies and preventive measures would help alleviate the overall impact upon soils at the site, e.g. separation and storage of topsoil and sub-soils, temporary storage bunds and method statements covering prevention of run-off from spoil heaps.

Significance of residual effects

7.3.32 The residual effects from the construction activities affecting the geological and geomorphological features are considered in Table 7.2.

Table 7.2: Summary of Residual Impacts

Effect	Mitigation	Assessment of Construction Effects		
		Sensitivity	Magnitude	Significance
Kettle holes	None – Infilling of the kettle holes or lost due to landscaping.	Low	Major	Not Significant (Minor)
Areas around Kettle holes	Construction activities around the kettle holes would adhere to the CEMP.	Low	Insignificant	Not significant (Insignificant)
Meltwater channels	Construction of playing fields and other areas of the sports development no mitigation possible	Low	Major	Not significant (Minor)
Glacial terraces	Construction of roads with cut through terrace deposits - No mitigation possible	Low	Moderate	Not Significant (Minor)
Soils	Soils managed under usage and reinstatement plans.	Negligible	Major	Not significant (Insignificant)

Summary

- 7.3.33** The impacts upon Geology & Soils all occur during the construction phase.
- 7.3.34** An assessment of the effects on the geological and geomorphological features of the site for the proposed development, demonstrates that the overall significance of the effects of the development to be Insignificant or Minor, these effects are not significant.
- 7.3.35** It has been proposed that the 'kettle hole' features within the site would be left intact, forming natural landscape features within the development. Therefore, the impact upon these features is considered to be Insignificant, that is not significant.
- 7.3.36** The remaining features comprise glacio-fluvial terrace deposits and evidence of meltwater channels (only visible from aerial photographs). These features are also considered to have Low sensitivity due to their common occurrence in the Aviemore area and therefore the effect on them is not significant.
- 7.3.37** The effects of construction upon the topsoil and sub-soils within the site can be reduced using a Construction Environmental Management Plan (CEMP). These effects are not significant.

7.4 EFFECT ON THE LANDSCAPE RESOURCE

Introduction

- 7.4.1** This summary outlines the findings of the assessment of the proposed new community at An Camas Mòr on the landscape resource.
- 7.4.2** The landscape resource is defined as:
- The distinct spatial distribution, at a given moment in time, on the surface of the earth, of the physical components resulting from the interaction between natural and human processes over time, and which contribute to landscape context and character and how this is experienced and valued.

Scope

- 7.4.3** The scope of this assessment considers the likely effect of the proposed new community on the landscape resource at a local level, on the wider landscape setting to the site and in relation to the Cairngorms National Park and The Cairngorm Mountains National Scenic Area (NSA); both landscape designations of national importance. A range of information is brought together to describe the baseline conditions of the landscape resource for these different levels of assessment; the introduction of the proposed new community is assessed against these baseline conditions, in relation a series of different stages of development and over different time periods.