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Geological input to a Landscape Character Assessment of the Cairngorms National Park

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Front cover

Oblique aerial view of Lairig Ghru, Creag an Leth-choin (the prominent crag in the left foreground) and Cairn Gorm, Cairngorms National Park. P002986.

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Foreword

This report describes the geological input by the British Geological Survey (BGS) to a landscape character assessment of the Cairngorms National Park commissioned by the Cairngorms National Park Authority (CNPA). The geological input was jointly funded by BGS and the CNPA.

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Contents

Summary

This report describes the geological and geomorphological contribution by BGS to a landscape character assessment of the Cairngorms National Park commissioned by the Cairngorms National Park Authority (CNPA).

To underpin assessment and description of landscape character areas, BGS provided bespoke bedrock and superficial deposits/geomorphological ‘character’ maps of the CNP with accompanying descriptive text.

The resulting Landscape Character Assessment will be used to inform landscape and land management policy to assist the CNPA and its partners in delivering the four aims of the National Park. It will also help the CNPA ensure that plans and policies conform to the European Landscape Convention.

1 Introduction

Although there is an existing Landscape Character Assessment (LCA) of the Cairngorms area (Turnbull Jeffrey Partnership, 1996), the Cairngorms National Park Authority (CNPA) required a more detailed assessment of the Park that paid closer attention to the role of geology and the historic environment in shaping the landscape. To this end, the CNP commissioned a new LCA in 2009, with geological input jointly funded by the British Geological Survey (BGS) and the CNPA.

The aims of the new LCA are:

- To produce an accurate and detailed description of the landscape types (LCTs) and areas (LCAs) within the Cairngorms National Park (CNP) that encompasses the many formative influences upon that landscape
- To make the description clear and understandable to a wide range of users
- To be able to utilise the Landscape Character Assessment (LCA) as a fundamental building block for all policy and activity of the CNPA and its partners in delivering the four aims of the National Park:
    1. To conserve and enhance the natural and cultural heritage of the area
    2. To promote sustainable use of the natural resources of the area
    3. To promote understanding and enjoyment (including enjoyment in the form of recreation) of the special qualities of the area by the public
    4. To promote sustainable economic and social development of the area's communities

Landscape consultants were commissioned by the CNPA to prepare the LCA and the CNPA requested that they work closely with BGS to evaluate how BGS geological and geomorphological information could be incorporated usefully within the LCA. The CNPA also wished the consultants to utilise the Historic Landuse Assessment (RCAHMS, 2001) within the LCA.

The project was managed by the CNPA and overseen by a steering group with members drawn from CNPA (Chair), Aberdeenshire Council, Angus Council, BGS, Forestry Commission Scotland, Highland Council, John Muir Trust and RCAHMS.

2 Methodology

To allow the consultants preparing the LCA to use geological and geomorphological information to underpin their assessment and description of landscape character areas, a bespoke bedrock (Figure 2) and superficial deposits/geomorphological (Figure 3) 'character' maps of the CNP was provided by the authors. For ease of visualisation in relation to the topography, these were draped over hill-shaded Digital Surface Models (DSM) derived from NEXTMap® Britain elevation data from Intermap Technologies and plotted at 1:50 000 scale. Descriptive text accompanying both these maps was also provided (chapters three and four of this report).

These plots were using during steering group field meetings to aid discussion of landscape character area boundaries.

3 Bedrock controls on the development and character of gross landscape features

3.1 SIMPLIFICATION OF GEOLOGICAL LINEWORK

After reviewing the relationship between the bedrock geology (Figure 1) depicted on BGS 1:50 000, 1:250 000 and 1:625 000 scale digital geological maps (DiGMapGB) and the landscape of the Cairngorms National Park a simple classification was adopted. The area was divided the area into three sectors that display significant contrasts in landscape character primarily as a consequence of bedrock controls: the Western Sector, the Eastern Sector, and the Cairngorm Massif.

Figure 2 depicts coloured polygons representing the three sectors superimposed on the hill-shaded DSM. Details of the bedrock geology and associated landscape character in each sector are summarised briefly below.

3.2 WESTERN SECTOR

3.2.1 Bedrock geology

This area of the park is underlain by rock units that display little significant lithological variability. The bedrock is dominated by thick units of metamorphosed sandstone, most of which represent the oldest part (Grampian Group) of the Dalradian Supergroup. The sector includes two areas of rocks representing the Badenoch Supergroup, which are older than, but lithologically similar to those of, the Grampian Group. The sector also encompasses several relatively small intrusions of granitic rock. The granite intrusions and the metamorphosed sandstone units have very different origins and histories, but they are mineralogically similar (both rock types are dominated by the minerals quartz and feldspar). The large, south-west– to north-east–trending Ericht–Laidon Fault is inferred to underlie the western part of this sector. For details of bedrock geodiversity see Barron et al. (2011).

3.2.2 Landscape character

The lack of significant lithological variability within this sector is reflected in the landscape, which is characterised by topographically subdued terrain and relatively smooth, gentle slopes. The Ericht–Laidon Fault is probably responsible for initiating the millions of years of selective erosion that have produced the broad valley floors of Glen Tromie and Strathspey.

3.3 EASTERN SECTOR

3.3.1 Bedrock geology

This area of the CNP is underlain by rock units that display considerable lithological variability. Bedrock types include layered sequences of metamorphosed sandstone, mudstone, limestone and lava, intrusions of widely varying igneous rock types (granite, diorite and ultramafic rock), and a small area of non-metamorphosed conglomerate, sandstone and mudstone. The metamorphosed sedimentary rocks belong to the Appin, Argyll and Southern Highland groups of the Dalradian Supergroup, which were deposited sequentially on top of (i.e. are younger than) the Grampian Group. The layered sequences have been tilted and folded, exposing the original sedimentary rock layers to the agents of erosion over many millions of years.

3.3.2 Landscape character

The lithological variability and structural complexity of the bedrock underlying this sector of the park is reflected in the landscape, which is characterised by a topographically complex terrain comprising numerous mounds, ridges and valleys.

3.4 THE CAIRNGORM MASSIF

3.4.1 Bedrock geology

This sector is underlain by a single geological entity, the Cairngorm Granite Pluton. The pluton is one of many intrusions of granite that crop out wholly or partly within the CNP, but it is by far the largest.

3.4.2 Landscape character

An upland massif with a distinctive and relatively uniform landscape character overlies the Cairngorm Granite Pluton. The massif owes its existence to the pluton, which has eroded at a slower rate on average than the surrounding metasedimentary rocks. Much of the distinctive landscape character within the massif is a consequence of two factors: the way that granite responds to erosion, and a higher average elevation than other areas of the park, leading to a more extreme climate. The interaction of climate and granite bedrock has yielded many of the distinctive landscape features that characterise the Cairngorm mountains, including glacially-incised features, tors and blockfields (Thomas et al., 2004; Kirkbride & Gordon, 2010).

The massif may owe its high average elevation to the substantial size of the Cairngorm pluton. The buoyancy of such a large volume of granite magma may have allowed the top of the pluton (now removed by erosion) to reach a shallower level in the crust than the tops of other granite plutons in the CNP. There is good evidence, for example, that the nearby Glen Gairn and Ballater granite plutons are currently exposed within their roof zones, so the tops of these plutons were clearly considerably deeper in the crust than the top of the Cairngorm pluton. The Cairngorm pluton may therefore have been exposed at Earth's surface earlier than other nearby plutons, providing more time for the slower average rate of denudation of granite relative to metasedimentary lithologies to take effect and create an upstanding massif. Once it was exposed, the considerable areal extent of the Cairngorm granite may also have acted to slow the average rate of denudation.

4 Superficial deposits and geomorphology

4.1 SIMPLIFICATION OF GEOLOGICAL LINEWORK

For the purposes of this project the existing BGS DiGMapGB-50 superficial deposits linework has been simplified (Table 1), especially in the western half of the park, where modern mapping has been undertaken. Some 20 map units have been reduced to 12 (Figure 3). The following section briefly describes the deposits that have been included in each new category and explains which ones have been amalgamated. For more details, readers are directed to Geology of Britain Viewer on the OpenGeoscience section of the BGS website; and to the printed 1:50 000 BGS maps covering the park, and, in particular, to the 1:10k geological standards that are available for much of the western half of the park. These maps also depict a full range of landform information.

4.2 BACKGROUND

The superficial deposits of CNP were mainly laid down during, or since the last major glaciation of Scotland. This event, known as the Main Late Devensian (MLD) glaciation, occurred between about 29 000 and 15 000 calendar years ago. An ice sheet expanded quickly to cover the whole of the Scottish mainland in that period, followed by a slow glacial retreat under 'Siberian' conditions, especially in the north-east of the park. The region had been previously glaciated on several occasions during the Pleistocene, but only isolated pockets of glacial sediment formed during those events have survived the erosive powers of the last ice sheet. Pockets such as these have been preserved, for example, on the Gaick and Monadhliath plateaux, which have experienced relatively little glacial erosion.

The climate warmed abruptly 14 700 years ago when tundra vegetation was replaced by one of birch and juniper scrubland. However, the climatic amelioration was short-lived and Arctic conditions returned about 12 500 years ago. During the ensuing 'Loch Lomond Glaciation', ice caps developed over the Gaick and the West Drumochter Hills, and small glaciers formed in the high corries of the Cairngorms and Monadhliath mountains. Most of the district remained unglaciated, but repeated freezing and thawing destabilised cohesive glacial deposits, causing them to creep and slip downslope into the valleys, where they locally accumulated on top of river terrace deposits.

The present warm, interglacial climate of the Holocene began abruptly 11 500 years ago. Birch woodland had returned by 10 000 years ago, followed later by pine. Though relatively stable, the climate has varied sporadically and has become colder and wetter since 4 300 years ago.

For details of superficial deposits geodiversity see Barron et al. (2011).

4.3 CLAYEY, POORLY-DRAINED GLACIGENIC DEPOSITS (TILL)

The most widespread deposit laid down directly by the last (MLD) ice sheet was glacial till or 'boulder clay', depicted in pale blue on most BGS superficial deposits maps. It generally rests on bedrock, covers much of the low ground and extends into the upland valleys. The till generally consists of cobbles, boulders and pebbles mixed with clayey sand and silt (formed of 'rock flour' ground-up by the ice). Tills represent some of the least permeable superficial deposits. Although many tills in the region are very sandy, particularly on granites bedrock, they are nonetheless relatively impermeable because they have been extremely compacted beneath ice.

The lithology of the tills strongly reflects the nature of the underlying bedrock. For example, tills in the west of the park tend to be very stony, containing large proportions of tabular, micaceous psammite (metamorphosed sandstone) with scattered, more rounded boulders of white granodiorite carried from the Strath Ossian area to the west. Tills developed on the granites of the Cairngorms are very gritty, and tend to contain many boulders of granite. The ice smeared the sandy, granitic tills eastwards down Strath Dee and north-eastwards down Glen Avon

The thickness of tills varies significantly across the region, being controlled to a large extent by topography and to former strengths of flow within the ice sheet. Relatively thick, fast-flowing ice moved along the Strathspey from high ice divides situated to the west and south-west. It laid down an extensive swathe of till up to about 15 m thick. In contrast, ice centred over the Cairngorms, Gaick and Monadhliath was relatively thin and sluggish. Apart from in corries and the narrow glens, it caused minimal glacial erosion and laid down thin (< 5 m) patchy sheets of till.

Also included here are spreads of fine-grained glaciolacustrine deposits, which were laid down in ice-marginal lakes during deglaciation. They are commonly thinly laminated and impermeable. However, deposits such as these are generally under-represented on BGS maps, because of the difficulties in observing and mapping them, and are commonly not distinguished from glaciofluvial deposits or till. They commonly underlie river terrace gravels and the floodpains of major rivers such as the River Spey. On valleysides, these laminated deposits form perched water tables and are particularly prone to landslipping.

4.4 MOUNDY, WELL-DRAINED, GRAVELLY GLACIGENIC DEPOSITS

Mounds and ridges of more heterogeneous, bouldery gravel and till were laid down as ‘recessional’ moraines at the margins of the ice sheet and outlet glaciers as they retreated. These moraines are most widespread in the valleys of the Cairngorms and the Gaick, but also occur elsewhere, notably around Dalwhinnie. The deposits forming the moraines are generally poorly consolidated, sandy and permeable and most rest on till. They are identified on older BGS maps of the district as morainic drift. They are classified as hummocky glacial deposits on more modern maps, but the same pale green colour is used.

The recessional moraines are commonly associated with ‘glacial drainage channels’ that were cut into the underlying till and bedrock at the retreating ice margin during summer thaws. Most of the channels contain some modern drainage, but most of them are clearly ‘misfits’. Some are many tens of metres in depth and are major topographical features. Particularly prominent channels occur to the south and east of Rothiemurchus, and along the northern slopes of Strathspey between Glen Banchor and Kingussie. Some very deep channels appear to have been cut by meltwater flowing beneath the ice sheet, across the ‘grain’ of the landscape, as for example, at Dirc Mhor, west of Dalwhinnie.

Seasonal glacial meltwaters laid down deposits of glaciofluvial sand and gravel during deglaciation that now occur as terraces, plateaux, mounds (kames) and ridges (eskers). Traditionally, terraced and moundy deposits have been identified separately on BGS maps in shades of pink and red, although names and symbols have changed over the years. At present the terraced deposits are identified as ‘glaciofluvial sheet deposits’ whereas the moundy deposits are ‘glaciofluvial ice-contact deposits’. Only the latter have been included here.

Glaciofluvial deposits are most common within valleys that have for some reason been protected from subsequent fluvial erosion, as for example around Loch Etteridge, on the Phones Estate. This fine assemblage of glaciofluvial features, which constitutes an SSSI, were laid down by meltwaters emanating from an outlet glacier flowing down Glen Truim whilst the Strathspey to the north was still occupied by ice. Once the Spey glacier had retreated westwards towards Laggan, the Truim was able to take its present course, abandoning the Etteridge route.

Glaciofluvial deposits are also common within valleys where retreating outlet glaciers blocked the lower reaches during the deglaciation, causing lakes to form upstream. Meltwaters flowed into the lakes laying down fans and deltas composed of sand and loose gravel. These deposits typically form flat-topped mounds and commonly coarsen upwards from silt into sand and then gravel. Large-scale cross-stratification is commonly evident. Notable examples of deltaic deposits such as these occur in Glen Einich, the Lairig Ghru and Glen Banchor.

4.5 TERRACED, WELL-DRAINED, GRAVELLY FLUVIAL DEPOSITS

The glacial, morainic and glaciofluvial ice-contact deposits once formed were commonly subsequently ‘reworked’ by outwash streams to form widespread terraces in many valleys, similar to Icelandic sandar (glacial outwash plains formed of sediments deposited by meltwater at the termini of glaciers). These terraces are underlain by ‘glaciofluvial sheet deposits’ that are typically more gravelly, densely-packed, uniform in composition and thicker than moundy deposits. Although moundy deposits are locally several tens of metres in thickness, the sheet deposits are commonly between 5 and 10 m thick. However, moundy and terraced spreads commonly merge together in which case boundaries drawn between them are somewhat arbitrary.

The glaciofluvial terraces are generally distinguished from younger, alluvial terraces occurring at lower levels in the valleys by the presence of enclosed hollows (kettleholes) that were formed by the melting of blocks of ice trapped within the sediment. Many alluvial terraces, however, were probably created only a short time after the glaciofluvial ones.

The major rivers of the park are flanked by flights of alluvial terraces, those of the Spey being particularly extensive downstream of Grantown-on-Spey. The features were formed by braided rivers during the retreat of the last ice sheet and during the subsequent Loch Lomond Glaciation. They are typically underlain by several metres of densely-packed cobble gravel resting on till; terrace deposits of major rivers such as the Dee are commonly 10 to 15 m thick. Glen Feshie contains a notable array of terraces that constitute an SSSI.

Alluvial terraces are generally depicted on BGS maps either as ‘alluvium’ (lemon yellow) or River Terrace Deposits (orange or orangey brown).

4.6 RIVER FLOODPLAINS

4.6.1 Upland river floodplain straths

Once dense vegetation had become established about 10 000 years ago, most major rivers changed from ‘braided’ systems to their present, ‘single-thread’ style. Gravelly alluvium underlies the floodplains of most upland streams in the park, which are commonly bordered by steep, relatively unstable bluffs up to 25 m high. Most streams are fast flowing with beds of cobble and boulder gravel, bifurcating channels and shifting linear bars of shingle. The river gravel is generally less than about 5 m thick, water-saturated, with subangular to well rounded cobbles. Thicker deposits probably underlie stretches of some of the larger rivers, such as the Truim, Feshie and Dee. Tabular boulders exhibit a pronounced upstream-dipping imbrication.

Unless streams have become engorged into bedrock they are prone to alter course periodically following flood events. Abandoned braid-bars soon become rough, boulder-strewn scrubland whilst abandoned channels become filled with sand and silt. Slower flowing stretches are associated with more sandy beds, wider floodplains and meander-belts. Here riverbank sections commonly reveal clast-supported gravel (shingle) capped by loamy ‘overbank’ deposits that accumulated during the waning stages of periodic flood events.

4.6.2 Low-lying river floodplains

The most extensive deposits of alluvium in the park are associated with the rivers Spey and Dee. The floodplain of the Spey is about 1 km wide in the vicinity of Kingussie. The river bed is formed mainly of sand and gravel, but the floodplain is generally underlain by compressible, fine-grained ‘overbank deposits’ that are between 0.5 and 2.5 m thick. These deposits consist of yellowish brown, coarsely laminated, humic, micaceous, silty, sand (loam), locally intercalated and/or capped with organic mud and peat. Former meander channels and ox-bow lakes are filled with organic mud and peat, although the more modern features may have locally provided repositories for farm waste and other materials. Artificial levées have been constructed to help constrain flooding, which occurs regularly.

The floodplain of the River Spey between its confluence with the Truim and Grantown is probably atypical in that it is underlain by many metres of water-saturated sand and gravel commonly grading down into fine sand and silt (see transect on BGS Sheet 64W Superficial and Simplified Bedrock). The sequence is at least 80 m thick immediately upstream of Aviemore, where ice flowing down Strathspey was constrained by major constrictions in the valley thereabout. The ice consequently gouged out deep, enclosed basins into bedrock that now provide valuable aquifers to supply Aviemore (and potential geothermal heat resources).

4.7 ALLUVIAL FANS

Alluvial fans (canary yellow) composed of silty sand and gravel are common throughout the park where tributary streams with relatively steep gradients debouch onto flatter ground. The deposits were laid down by braided distributaries that migrated slowly across the fan surface, and during sheet flood events. Many of the features are now relatively inactive and have been partially dissected by drainage. General speaking, the rate of fan accumulation was greatest immediately following deglaciation from when it has diminished exponentially.

Many excellent examples of high-angle alluvial fans occur within the central breach of the Gaick, in and around the Cairngorms and within the Pass of Drumochter

Several large, relatively low-angle alluvial fans occur within Strathspey, including those at the mouths of the Truim and Tromie, and at Newtonmore and Kingussie. Another occurs at Cuaich, where the Allt Cuaich joins the Glen Truim.

Alluvial fans have been a focus for habitation because they are relatively free-draining and generally do not flood. However, distributary channels occasionally change their routes drastically following flood events despite the efforts of man.

4.8 BLANKET PEAT

Most deposits of peat in the park comprise blanket upland accumulations of wet, acidic, partially decomposed vegetation, generally less than 2 m thick, but locally over 5 m. They are most widespread within topographical depressions, over the more poorly drained, gently undulating parts of the Gaick and Monadhliath plateaux, in the upper catchment of the River Feshie, and on the more extensive spreads of till.

4.9 PERIGLACIAL DEPOSITS

A wide range of periglacial features and deposits occurs across the park (like in the Arctic tundra), but it is not practical to depict many of them on BGS maps. For example, ‘stone lobes’ are a characteristic feature of many slopes above about 750 m OD. These

lobe-shaped accumulations of boulders are typically up to a few tens of metres wide and up to 5 m or so high. Piedmont lobes commonly occur where several lobes have coalesced. The lobes are the washed-out, wind-deflated remnants of large 'gelifluction' lobes that formed in the harsh periglacial conditions that prevailed in the district following ice-sheet deglaciation and during the Loch Lomond Glaciation. The boulders were transported to the front of the lobes where they are now piled up following the subsequent removal of the original finer grained matrix. The Cairngorms and Gaick Plateau are internationally important areas for the study of such phenomena, which include a gamut of 'fossil' late-glacial features together with smaller scale, periglacial forms that are active today. A particularly good range of phenomena occur within the Lairig Ghru, including fossil rock glaciers and protalus ramparts.

4.10 LOOSE SLOPE DEPOSITS AND SCREE

This category includes head deposits, which are poorly sorted and poorly stratified sediments that have mainly formed as a result of the slow, viscous, downslope flow of waterlogged soils (solifluction and gelifluction), soil creep and hillwash. It occurred during the summer months when the uppermost 0.5 to 1 m of the soil, the so-called 'active layer', thawed, whilst the ground below remained permanently frozen. The thickness and potential mobility of active layers depends very much upon the cohesiveness of the sediments affected, hence the thickest head deposits tend to occur where thoroughly decomposed rocks and clayey tills have been remobilised.

Most mapped deposits in the district are accumulations of angular fragments of weathered rock with a matrix of silty sand. Much of the material is derived from frost-shattered rocks and mountaintop regolith. Most deposits are thinner than they appear to be, but thicken substantially on lower slopes. Deposits of head of this type are particularly widespread on the steep slopes of Glen Tilt, the Lairig Ghru and around the Gaick Plateau. The widespread head deposits mapped in the Cairngorms are mostly composed of granite boulders in a matrix of gritty, quartzo-feldspathic sand.

Scree (talus) is typically a clast-supported accumulation of angular rock fragments derived from cliffs or steep rock slopes, having been dislodged by freeze-thaw processes. Actively accumulating screes are not common within the park, but there are many that are being reworked by debris flow processes during heavy rainfall and by snow avalanches, notably within the Lairig Ghru and Glen Tilt. The rate of scree accumulation was greatest immediately following deglaciation and during the Loch Lomond Stadial. Particularly coarse screes occur on both sides of Glen Tromie upstream of Glentromie Lodge, and overlooking Loch Cuaich. Other notable examples occur within the central breach of the Gaick Plateau overlooking Loch an t-Seillich, Loch Bhrodain and Loch an Dùin.

Also included here are talus cone deposits, which are matrix-rich, cone-shaped accumulations of rock fragments at the foot of gullies or chutes that are steeper than those identified as alluvial fans. They are commonly associated with the reworking of screes and head deposits on very steep slopes across the park, but only the larger ones have been delineated on BGS maps. Debris cones are mainly formed catastrophically during heavy rainfall as a result of landslides that develop quickly downslope into debris flows; many cones are bounded by levées up to 2.5 m high. Talus cones are particularly common on the steep slopes of Glen Einich, the Lairig Ghru and in the central breach of the Gaick Plateau.

4.11 LOOSE MOUNTAINTOP DEBRIS

This category includes sheets of weathering products lying on mountaintops, including disintegrated rock, rock fragments and mineral grains. It is commonly a compact, yellowish brown to orange, matrix- to clast-supported deposit, formed of angular fragments of weathered rock in a silty sand matrix. Granular, non-cohesive, non-frost-susceptable deposits tend to accumulate over coarse-grained igneous rocks such as granite, and psammite, whereas mica-rich, clayey, cohesive, frost-susceptable deposits form on schistose rocks. The granular regoliths are generally well drained and are typically covered by smooth, mossy turf, such as on the Gaick Plateau, providing important summer grazing for deer. A feature of regoliths such as these is 'patterned ground'. This generally takes the form of polygonal networks of erect stones with turf developed on finer materials at the centre of each polygon. The polygons commonly become elongated downslope and merge into 'stone stripes'.

4.12 BLOCKFIELDS

Blockfields are mountaintop accumulations of blocks produced by the frost shattering of underlying rocks. Blockfields have developed on many mountaintops in the Cairngorms, notably on Ben Macdhui and Derry Cairngorm, in the eastern Gaick, such as on An Scarsoch, on Meall Chuaich and Carn an Righ. The summit of Beinn Dearg (Atholl) is capped by a particularly extensive boulder-field.

4.13 LANDSLIDE DEPOSITS

As elsewhere in the Highlands, rock slope failure is principally a response to glaciation and deglaciation involving stress relief and re-equilibration. Landslides have influenced the long-term landscape evolution of the region and they tend to cluster within relatively recently formed glacial breaches. Standard BGS maps depict only landslide deposits (the materials that have moved), rather than antiscarps, tension cracks etc. Landslides are common within the central breach of the Gaick Plateau and around the Beinn a' Ghlo massif and adjoining mountains. Landslides are probably under-represented on the published BGS maps of the park, particularly as many are poorly preserved and difficult to identify unambiguously and some undoubtedly failed before the last glaciation and have been subsequently masked by glacial deposits.

Simplified category	Representative DiGMapGB code	Main subsumed units	Subsumed DiGMapGB unit codes
Clayey, poorly-drained glacigenic deposits (till)	TILLD-DMTN	Till, glaciolacustrine deposits	PATT-DMTN; AILL-GSSC; FTIL-DMSG; GLLD-SSCL; LPSI-SSCL; CEAR-SGVS; OGFD-SGRB
Moundy, well-drained, gravelly glacigenic deposits	GFIC-GRSS	Hummocky glacial deposits, morainic drift, glaciofluvial ice-contact deposits (kames/eskers)	HMGD-DMSG; HMGD-GRSS; HMGD-SGRB
Terraced, well-drained, gravelly fluvial deposits	GFSD-SGRB	River terrace deposits, glaciofluvial sheet deposits	RTDU-SAGR
Upland river floodplain straths	ALV-SGRB	Alluvium	
Low-lying river floodplains (Spey)	ALV-CSSG	Alluvium	LDE-SSCL; LABD-SAGR
Alluvial fans	ALF-GSSC	Alluvial fan deposits, glaciofluvial fan deposits	GFN-GSSC
Blanket peat	PEAT-PEAT	Peat	
Loose, slope deposits and scree	TALU-RFAU	Talus (scree), talus cone deposits, head deposits	TCON-GSSC; HEAD-GSSC
Loose, mountaintop debris	BHED-RFAU	Blanket head (Regolith)	GPM-GSSC
Landslides	SLIP-ROCK	Landslide deposits	
Blockfields	BLOC-BCSU	Blockfield deposits	HEAD-BOLD; RGD-BCSU
Exposed bedrock	PQU-ROCK	Bedrock undivided	

Table 1 Simplification of BGS DiGMapGB map categories

5 References

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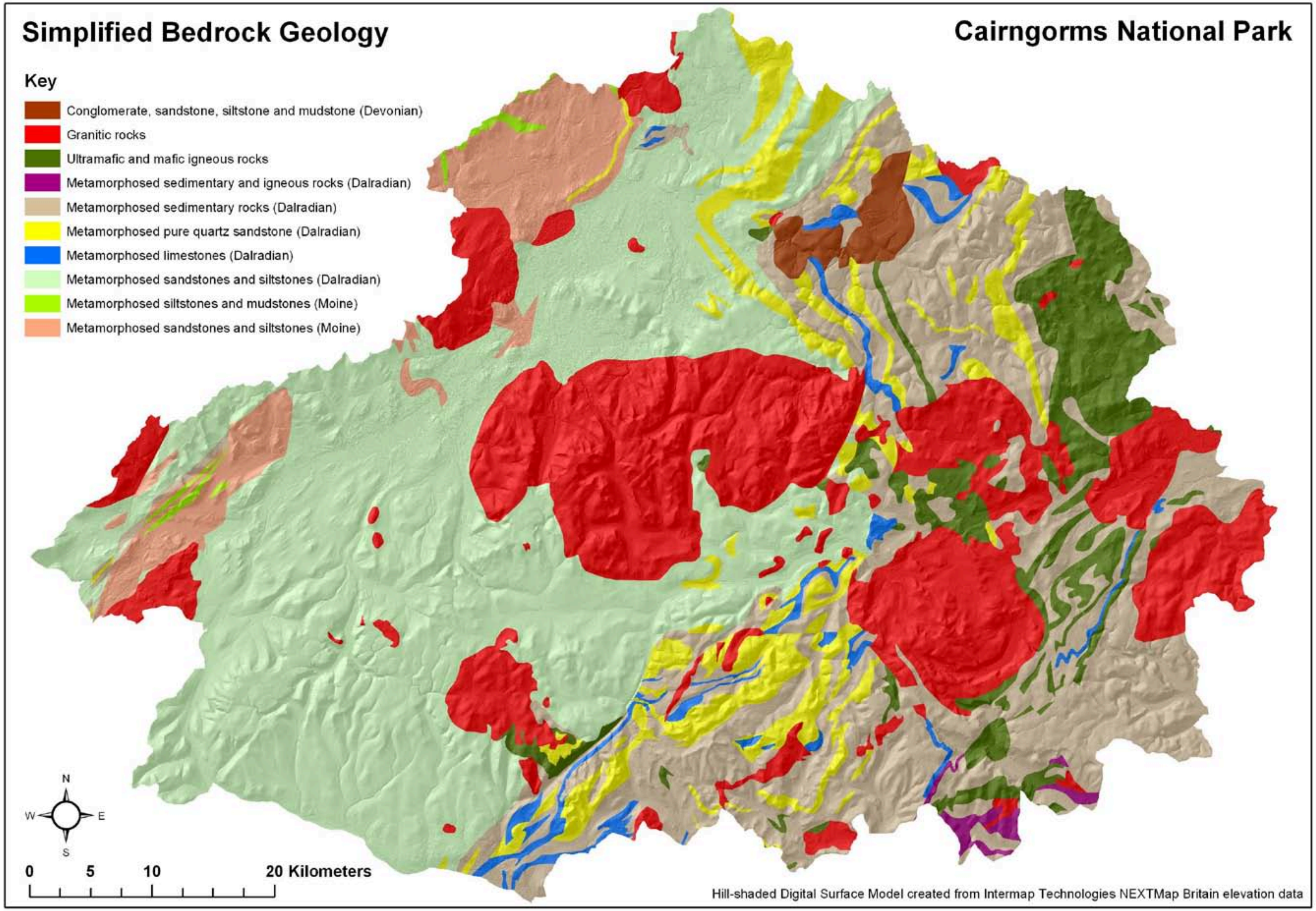

Figure 1 Simplified bedrock geology of the Cairngorms National Park

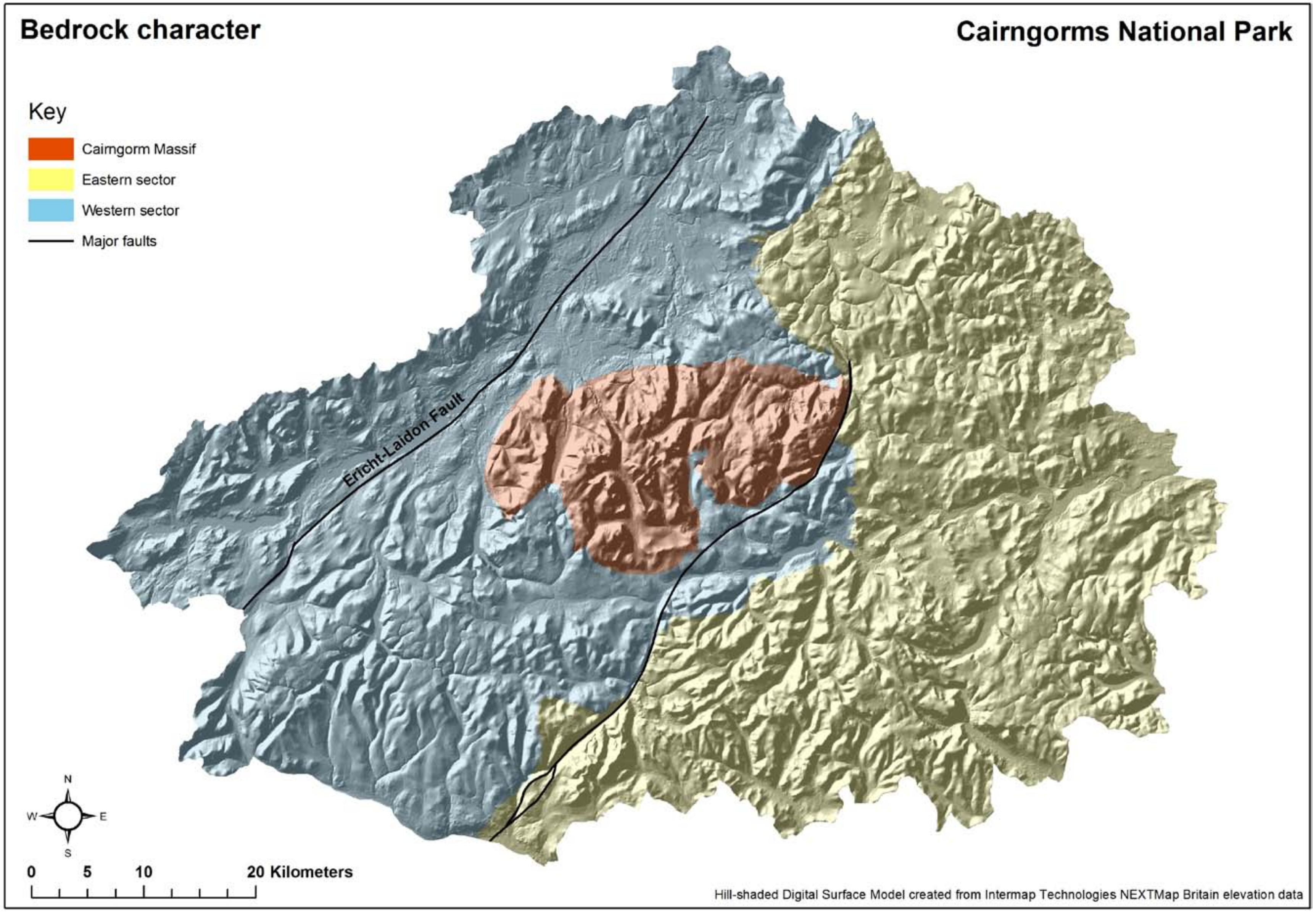

Figure 2 The three bedrocks sectors of the Cairngorms National Park

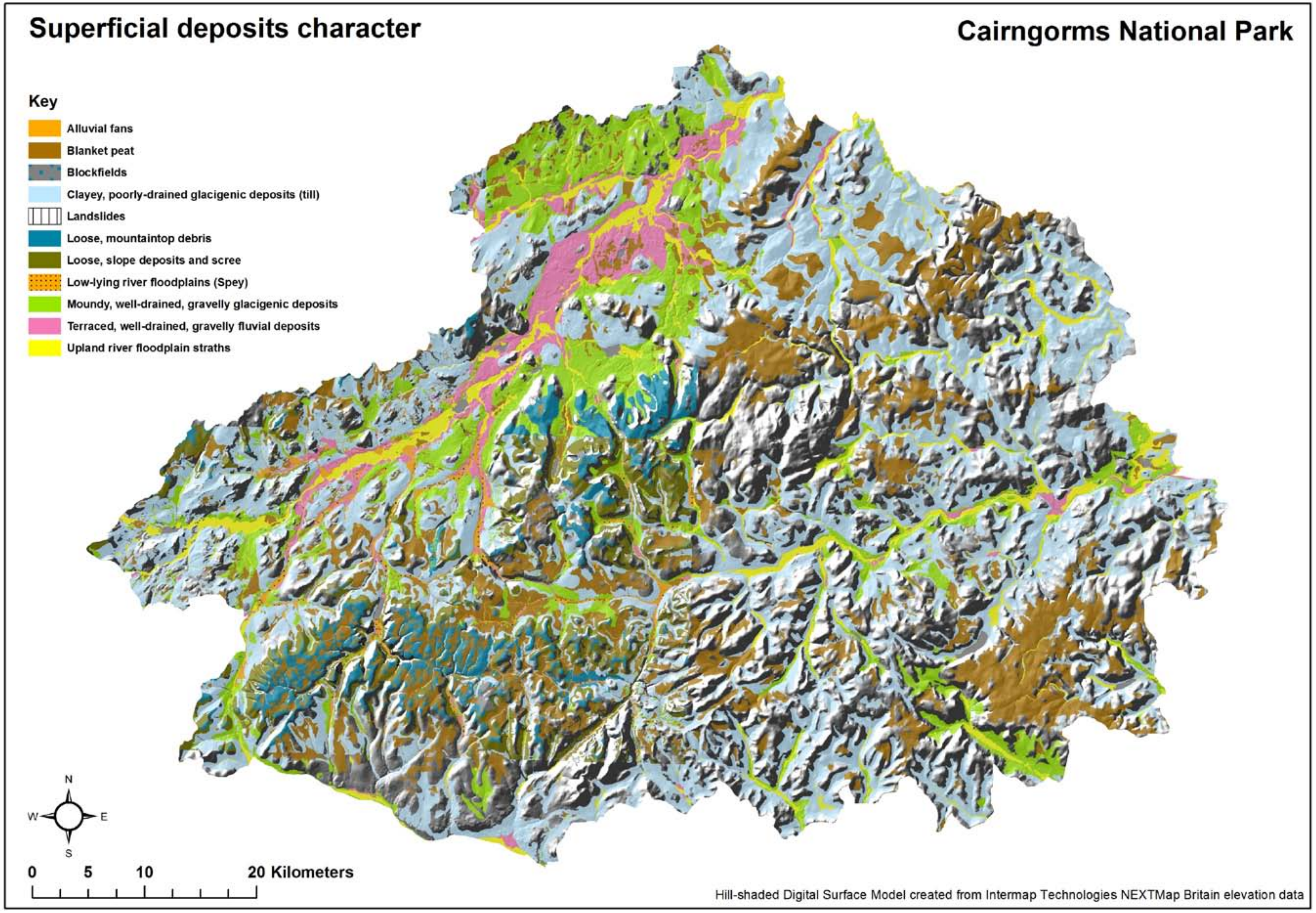

Figure 3 Superficial deposits character of the Cairngorms National Park