
Upper Loch Torridon

[NG 826 538]–[NG 869 553]

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Introduction

The southern shore of Upper Loch Torridon intersects a series of palaeovalleys in Lewisian gneisses, which are infilled by sedimentary rocks of the Diabaig and Applecross formations of the Torridon Group. The sea has invaded the softer sedimentary rocks so that the bays coincide with the ancient valleys, and are separated by hills of gneiss. From west to east these bays are Loch Shildaig, Ob Mheallaidh, Balgy Bay, Ob Gorm Beag and Ob Gorm Mòr (Figure 4.18).

Topographical relief just prior to deposition of the Torridon Group was about 250 m, as shown by the section in (Figure 4.19). The A896 road follows the coast so the area is readily accessible.

The sedimentary sequences of the Diabaig Formation and the basal Applecross Formation are described in detail in the Diabaig GCR site report (this chapter). The Diabaig Formation consists of four component facies. The breccia facies, composed of angular clasts of local basement rocks in a matrix of red sandstone, is found mantling gneiss palaeoslopes and in the lower parts of the palaeovalleys. Moving away from the unconformity the breccias pass upwards and laterally into tabular red sandstones. At still farther distances from the unconformity, the tabular sandstones interfinger with rocks of the grey 'shale' facies. This facies consists of graded units of grey siltstone, interbedded with fine sandstones, which fill the central parts of the palaeovalleys. Towards the top of the Diabaig Formation, the sandstone beds are more prominent (the grey sandstone sub-facies). These are overlain in turn by red fluvial sandstones of the Applecross Formation. The dips of bedding in the Diabaig Formation rocks range from 2° to 30°, but are typically gentle and locally variable in direction. Bedding in the immediately overlying Applecross Formation sandstones mainly dips gently to the west, but farther south the regional bedding dips to the south and south-west at angles between 7° and 15°.

Description

The Upper Loch Torridon GCR site extends from the sheltered bay of Ob Mheallaidh eastwards to include the bays of Ob Gorm Beag and Ob Gorm Mar. It includes the intervening headlands of Rubha na Feòla, Rubha Molach Beag and Aird Mhòr that all expose Lewisian gneisses and were areas of higher relief during deposition of the Torridon Group rocks. The coastal exposures are generally good, and glacially scoured and rounded rocky hills and crags are present inland. The various Diabaig Formation facies along the section are described from west to east.

The palaeovalley presently occupied by Loch Shildaig to the west is infilled by red sandstones of the Applecross Formation at the present level of erosion. There are good exposures along the road that follows the eastern margin of the loch.

The bay of Ob Mheallaidh is surrounded by well-exposed beds of the Diabaig Formation, that dip gently off the gneiss. Exposures at high-water mark along the south side of the bay show the grey 'shale' facies typical of the formation, but also some red micaceous sandstones. Wave ripples in the siltstones of the grey 'shale' facies trend roughly south-east. The road section at about 15 m above sea level exposes locally pebbly red coarse sandstones, and red siltstones with ripples. The ripples are symmetrical and trend SSE. The beds are quite similar to those near Loch Diabaigas Airde (see Diabaig GCR site report, this chapter), and have a similar lateral persistency of 300–1000. However, ripple-drift lamination is not developed here.

On the east side of the bay the contact between the Diabaig Formation and the Lewisian basement gneisses is visible at several points. Red sandstone rests unconformably upon a gneiss crag by the roadside 87 m northeast of the stream flowing into the south-east corner of the bay at [NG 8338 5364]. Tabular-bedded red sandstone and up to 0.5 m of massive breccia mantle the hummocky gneiss surface near high-water mark in Camas a' Chlarsair at [NG 840 551],

passing rapidly upwards into grey fissile siltstone. Compactional dips are particularly noticeable here. The transition from red sandstone to grey siltstone is seen on the coast due west of the sharp bend in the main road at [NG 838 548], and also on the coast about 700 m to the south-west at [NG 833 543]. The Applecross Formation overlies the siltstones with an erosive contact, which is well exposed in the wooded bluff [NG 835 545] overlooking Camas a' Chlarsair, and also under low-tide conditions about 300 m to the WNW. The grey siltstones closely resemble those in the lower part of the type section at Diabaig and, like them, contain phosphatic laminae. However, they lack the grey sandstone beds found in the upper part of the type section.

Diabaig Formation breccias are well exposed on the coast 300 m north of the river mouth at Balgy Bay [NG 845 549]. The clasts are derived from the immediately adjacent gneisses and are predominantly mafic in composition. Blocks are well rounded and average about 10 cm in size, though in places they reach up to 1 m. Conglomeratic units, 0.5–1 m thick, alternate with grey feldspathic sandstone, the proportion of which increases markedly away from the gneiss. A few metres of breccia are also seen on the eastern edge of the Balgy Bay palaeovalley at Camas na Nighinn [NG 857 548]. Elsewhere the gneiss is overlain by red sandstone containing scattered gneiss fragments.

Stratigraphically higher sedimentary rocks at Balgy Bay are mainly tabular-bedded grey sandstones with films of greenish-grey siltstone and abundant ripples (Figure 4.20), quite unlike the grey sandstones at Diabaig. Ripple trends are uniformly south-east and, though typically asymmetrical, were probably wave induced. These grey sandstones are separated from the tabular red sandstones on the eastern margin of the palaeovalley by a peculiar sub-facies not found elsewhere in the formation. It consists of red sandstone with planar cross-bedding in sets about 1 m thick. The average grain-size is 0.5–1 mm, with pebbles of quartz and feldspar up to 1 cm across concentrated along set boundaries. In thin section lithic grains of volcanic origin are detectable. Similar cross-bedding is seen in sandstones directly in contact with gneiss on the north-west shore of Aird Mhòr at [NG 860 552]. At both localities the boundary with the overlying tabular-bedded sandstones is conformable.

In Ob Gorm Mòr the Diabaig Formation consists of gneiss breccias and red sandstones overlying irregular basement topography. Ripple-marked sandstone envelops gneiss blocks at two localities (see also Rubha Dunan GCR site report, this chapter); on the north shore of Aird Mhòr at [NG 8612 5521], and on the shore in Ob na Glaic Ruaidh [NG 8647 5491].

An intercalation of interlaminated red siltstone and pale-grey sandstone about 65 cm thick can be seen in the breccia in the south-east corner of Ob Gorm Mòr at [NG 867 547]. The intercalation can be traced for about 100 m along the low cliff. Bull (1972) attributed this feature to playa-lake deposition within a fanglomerate sequence.

The contact between the Applecross and Diabaig formations along the south side of Upper Loch Torridon is sharp and locally erosive. It cuts down over 1 m into breccia on the west side of Ob Gorm Mòr at [NG 8663 5492], suggesting a degree of pre-Applecross Formation cementation. Sharp, planar contacts are seen on the north shore of the peninsula of Áird Mhòr (e.g. at [NG 8620 5523]), and can be inferred along the south side of the estate road immediately above Balgy Bay.

The Applecross Formation in the Upper Loch Torridon GCR site is almost entirely composed of red, medium- to coarse-grained sandstone with trough cross-bedding. The only silty intercalations crop out on the east side of Ob Gorm Mar, forming the upper parts of fining-upward cycles about 10 m thick. The major part of each cycle is made up of the normal Applecross Formation lithology, with an erosional base. The upper part is formed of centimetre- to decimetre-thick tabular red sandstone beds with rippled surfaces and beds of interlaminated red siltstone and pale-grey sandstone. Siltstone dominates towards the cycle tops, although in places it has been removed by erosion. The orientations of trough axes imply that the palaeocurrents flowed south-eastwards.

Quartzite and chert pebbles up to about 1 cm in size are only rarely found in the lower part of the Applecross Formation in this area. However, where the formation rests on gneiss it contains trails of decimetre-sized, angular gneiss blocks for 10–20 m laterally from the contact. Such breccias are well exposed in the bed of the stream that falls into the south-east corner of Ob Mheallaidh. About 350 m above sea level on nearby Beinn Shieldaig [NG 829 530] and on Sgiurr na Bana-Mhoraire [NG 870 526] the size and abundance of quartzite pebbles increase markedly. Above this level there are

thick seams of pebbles that average 2–3cm in size.

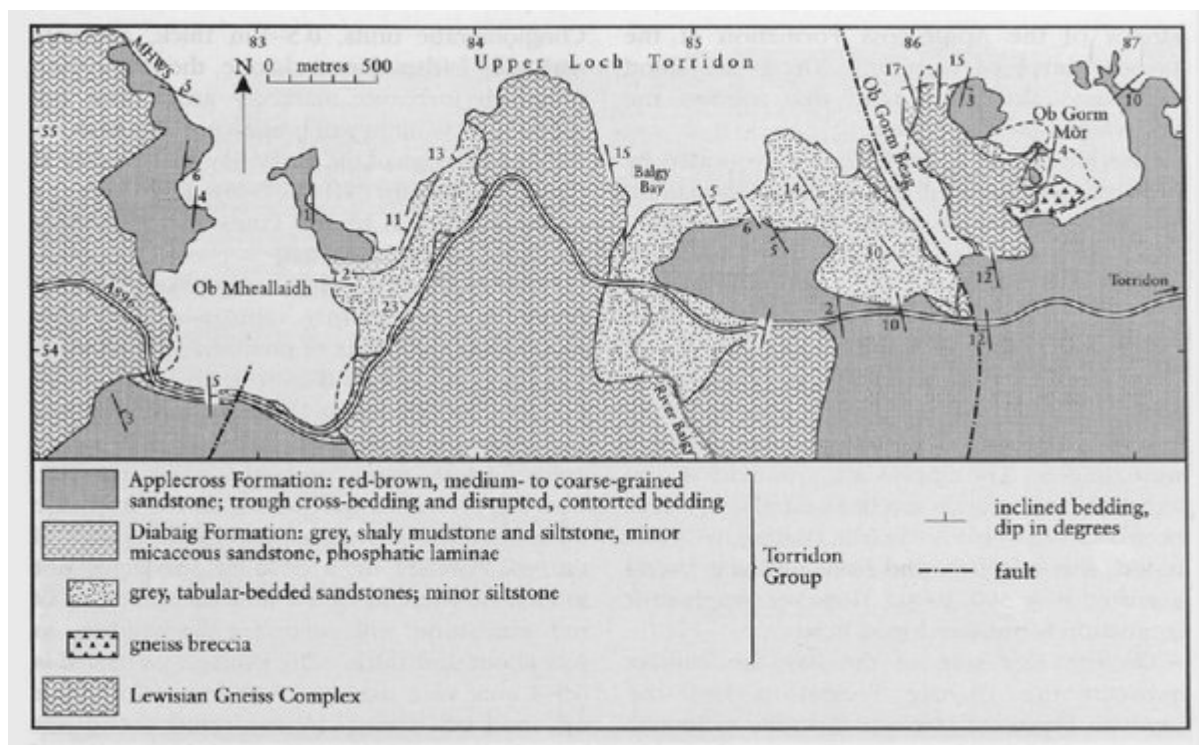
Interpretation

The bays along the south side of Upper Loch Torridon represent palaeovalleys excavated in the gneisses beneath the Torridon Group, which were initially filled by the breccias, sandstones and siltstones of the Diabaig Formation (Stewart, 1972). The breccia clasts reflect the composition of the adjacent gneiss and represent fan-head deposits, grading laterally into the tabular sandstones, which were formed in the more-distal parts of the alluvial fans. The grey siltstones, which occupy the centres of the palaeovalleys, represent lake deposits. The sandstones of the overlying Applecross Formation were deposited on the Diabaig Formation and the remaining protruding basement hilltops by braided rivers flowing from the north-west.

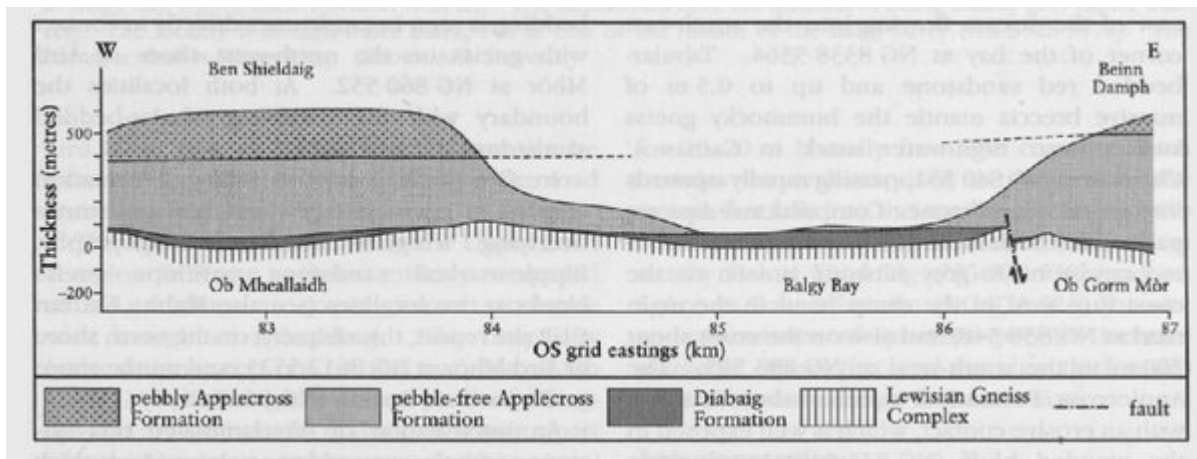
Conclusions

A combination of uplift and erosion during more-recent geological times has exhumed spectacular exposures of the sub-Torridon Group unconformity and the overlying Torridonian sedimentary sequence in the Upper Loch Torridon GCR site. Ancient valleys in the Lewisian gneisses, which were infilled with Torridon Group sedimentary rocks, have been exploited by recent glacial and marine erosion so that they now form bays on the southern shores of the loch. Breccias and sandstones of the Diabaig Formation, which were deposited from ancient alluvial-fans around 1000 million years ago, mantle the gneisses on the slopes of these valleys. These fan deposits pass laterally and upwards into grey siltstones and sandstones, deposited in lakes in the centres of the valleys. Above the Diabaig Formation rocks are exposures of red sandstones belonging to the Applecross Formation, which were deposited from braided rivers carrying sediments from a mountainous source to the north-west. Although the Diabaig site describes similar Lewisian–Torridonian relationships, the Upper Loch Torridon GCR site illustrates the three-dimensional nature of the Lewisian–Torridonian unconformity and local facies variations in the Diabaig and Applecross formations. The site is ideal for teaching and further research and is of national importance.

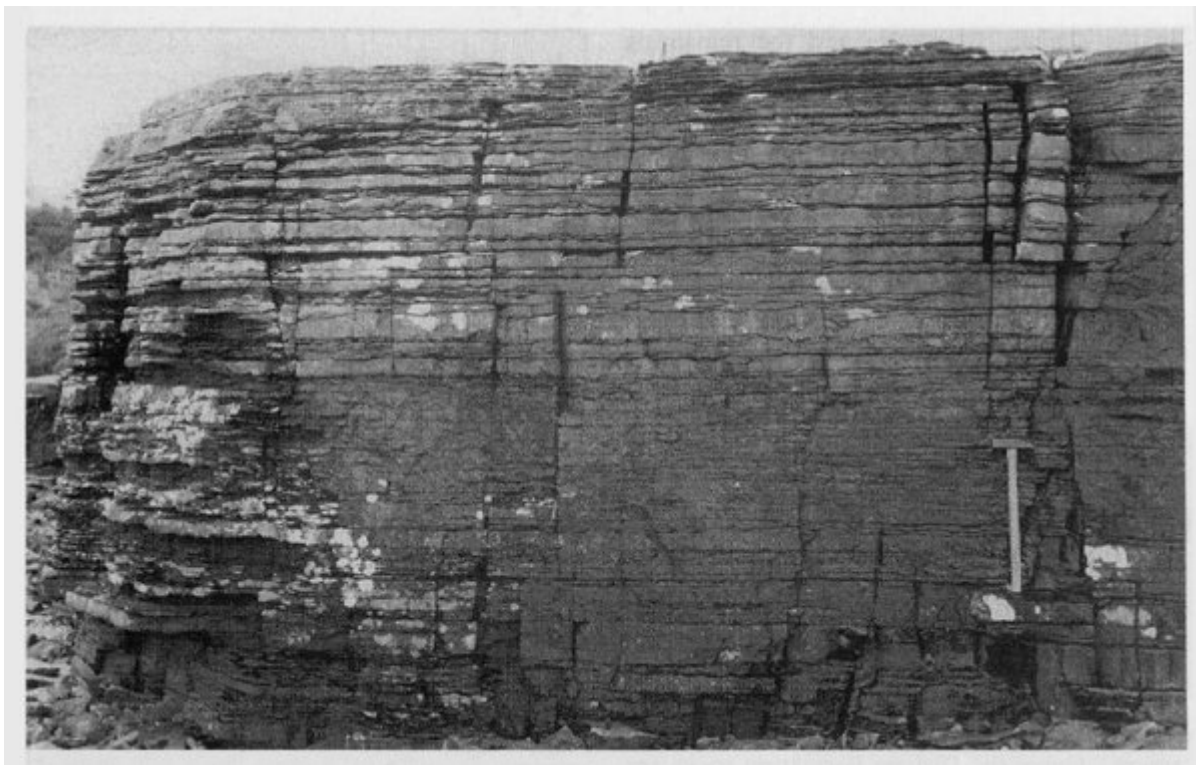
References



(Figure 4.18) Geological map of the Upper Loch Torridon area. After Stewart (2002).



(Figure 4.19) True-scale cross-section along the south side of Upper Loch Torridon, showing undulating topography developed in the basement gneisses, buried by Torridon Group sedimentary rocks. The section follows grid-line northing 542. Kilometre castings are shown.



(Figure 4.20) Tabular ripple-marked sandstones of the Diabaig Formation filling the centre of the palaeovalley at Balgy Bay, Upper Loch Torridon GCR site. The sandstones here are unusual in being mainly grey rather than red. The locality is at high-water mark, 700 m east of the mouth of the Balgy River [NG 8528 5472]. The hammer shaft is 50 cm long. (Photo: A.D. Stewart.)