DEPARTMENT OF THE ENVIRONMENT FOR NORTHERN IRELAND

DECLARATION OF AREA OF SPECIAL SCIENTIFIC INTEREST AT SCAWT HILL, COUNTY ANTRIM. ARTICLE 24 OF THE NATURE CONSERVATION AND AMENITY LANDS (NORTHERN IRELAND) ORDER 1985.

The Department of the Environment for Northern Ireland (the Department), having consulted the Council for Nature Conservation and the Countryside and being satisfied that the area described and delineated on the attached map (the area) is of special scientific interest by reason of its flora and geological features and accordingly needs to be specially protected, hereby declares the area to be an area of special scientific interest to be known as the 'Scawt Hill area of special scientific interest'.

The summit of Scawt Hill marks the outcrop of an olivine dolerite plug which intrudes the Cretaceous Ulster White Limestone and overlying Tertiary lavas of the Lower Basalt Formation. High temperature and low pressure thermal metamorphism at the plug contacts has produced unusual calc-silicate mineral assemblages in the limestone, and assimilation of the carbonate rock has produced a sequence of alkali basic igneous rocks just inside the old volcanic conduit. A remarkable series of minerals have resulted, many rare and some described for the first time.

Scientific publications from the 1920s and 1930s, described the mineralogical significance of dolerite-limestone contacts, including those at Scawt Hill. These early writings inspired many other geologists to find similar rock relationships worldwide. Interpretation of the associated alkali basic rocks also prompted a revision of the petrogenesis of similar rocks at other sites throughout the world. Scawt Hill demonstrates the progressive desilication of a basic magma, by lime assimilation to the end point of undersaturation, when melilite bearing rocks were formed. The origin of alkali and alkali basic igneous rocks is still a highly contentious issue. The rock series at Scawt Hill, amongst others, proved convincingly that limestone assimilation could produce a differentiation series of basic igneous rocks markedly undersaturated and enriched in alkalis, but on a very restricted scale. This contribution to petrogenesis is appreciated worldwide.

In addition the high temperature formation of the silicate minerals and their subsequent hydration, mirrors the industrial manufacture and use of cement.

The dolerite plug has a roughly circular outcrop with its steep cylindrical contact defined by the east-facing precipitous cliff where curving joints parallel the outer contact. The complex rock interactions can be considered as two major types, each with a clear zonal location; these are alteration of the limestone (the exogenous zone) and of the dolerite (endogenous zone).

The limestone forms conspicuous crags south of the plug and extends as a thin veneer on the steep slope of the hill. The pure carbonate rock, free from detrital materials and containing only flint nodules, passes into a coarse marble towards the dolerite contact and within a few feet from this contact changes to a tough silicate assemblage. This exogenous zone of thermal metamorphism is best developed at the foot of the southeast gully. The silicate zone may reach a thickness of 60cm and is variable in its mineral assemblage; the principal mineral associations found are spurrite-rock (with or without calcite), larnite-rock (with or without spurrite), spurrite-larnite-gehlenite-rock and spurrite-gehlenite-merwinite-spinel-rock (with or without larnite).

Larnite was the first recorded occurrence of calcium orthosilicate. An extensive range of silicate minerals occurs, including some new (notably larnite, scawtite, hydrocalumite, rankinite and portlandite) and many rare types. These formed when solutions from the dolerite magma enriched the contact zone in silica, magnesia, iron oxides and alumina. This metasomatic process varies locally as solutions of different composition soaked into the carbonate rock.

The flint nodules within the limestone also show progressive metamorphic and metasomatic changes towards the dolerite contact.

At the north-east gully, the metamorphic and metasomatic changes are more restricted, but a few inches of larnite-rock have developed. The flint nodules, encased and veined by this calc-silicate material, show extensive hydration to mineral gels, such as plombierite.

The marginal dolerite was extensively modified by assimilation of the carbonate country rock; access of lime precipitated pyroxene to form pyroxenites of progressively more alkaline compositions. Again the best occurrence is in the south-east gully, where veins of pyroxenite penetrate the exogenous zone rocks.

The normal olivine dolerite merges within a metre of the contact into pyroxene-rich dolerite, which carries vesicles lined chiefly with thomsonite associated with analcime, stilbite, natrolite, scawtite, and calcite. Nearer the contact, occasionally as veins or segregations, occur titanaugite rocks of coarser grain size and of a lustrous black colour in hand specimen. The mineralogy varies with the degree of lime assimilation, and titanaugite-plagioclase, titanaugite-plagioclase-nepheline, and titanaugite-nepheline rocks occur. Graphic intergrowths of the pyroxene and nepheline characterise the more undersaturated rocks. The coarsest-grained members of this endogenous zone are those bearing melilite and occur at the immediate contact with the limestone. Titanaugite-melilite rocks with plagioclase or nepheline are further modifications of the titanaugite pyroxenites, but occur more closely associated with the metasomatised limestone as sharply defined segregations and veins of melilite-rock. Melilite is the predominant mineral associated with alkali pyroxene and grossular garnet.

The remarkable development of mineral assemblages in both the exogenous and endogenous zones of the Scawt Hill dolerite plug provided evidence not only of a high temperature metamorphism and metasomatism of a pure limestone rock, but also of the effect of lime assimilation on basic magma.

High temperature, or pyrometamorphism, is demonstrated by the unique mineralogy and the unstable equilibrium preserved by rapid cooling. The existence of a high temperature form of calcium orthosilicate, bredigite, and its apparent inversion to a lower and less dense polymorph by dusting under the shock of a hammer blow, is just one of the mineral geothermometers.

The chemical reaction between basaltic magma and the carbonate wall-rock with the assimilation of lime and the release of carbon dioxide, not only used up the available silica in the magma, producing more and more desilicated rocks, but altered the viscosity of the modified melt and promoted a coarser grain size.

The area is also of biological interest. Acid grassland, developed on the well-drained basaltic soils below the crag, supports communities with Heath Bedstraw Galium saxatile, Common Dog-violet Viola riviniana, Harebell Campanula rotundifolia and Tormentil Potentilla erecta with scattered Common Bird's-foot-trefoil Lotus corniculatus. Bilberry Vaccinium myrtillus and the grasses Common

Bent Agrostis capillaris and Sheep's-fescue Festuca ovina occur as regular elements. The adjacent limestone exerts a marked influence on vegetation, with Kidney Vetch Anthyllis vulneraria, Wild Thyme Thymus polytrichus, Lady's Bedstraw Galium verum, Fairy Flax Linum catharticum and Lady's-mantle Alchemilla glabra all frequent. The crag face vegetation reflects its more base-poor and disturbed nature with Heather Calluna vulgaris, Wood Sage Teucrium scorodonia and Sheep's-bit Jasione montana, while seepage along some ledges has given rise to a substantial cover of Mossy Saxifrage Saxifraga hypnoides. The cushion mosses Bryum capillare and Homalothecium sericeum are widespread on both dolerite and altered chalk surfaces.

The crag provides a regular nesting site for peregrine falcon, Falco peregrinus.

SCHEDULE

The following operations and activities appear to the Department to be likely to damage the flora and geological features of the area:

1. Any activity or operation which involves the damage or disturbance by any means of the surface and subsurface of the land, including ploughing, rotovating, harrowing, reclamation and extraction of minerals, including sand, gravel and peat.

2. Construction, removal or disturbance of any permanent or temporary structure including building, engineering or other operations.

3. The storage or dumping, spreading or discharge of any material.

4. Alteration of natural or man-made features, the clearance of boulders or stones and grading of rock faces.

5. The following activities undertaken in a manner likely to damage the interest of the area:

   (i) Educational activities;

   (ii) Research activities;

   (iii) Recreational activities;

   (iv) Exercising of animals.

6. Sampling of rocks, minerals, fossils or any other material forming a part of the site undertaken in a manner likely to damage the scientific interest.

7. Any change in the annual pattern of application of manure, slurry or artificial fertiliser.

8. The destruction, displacement, removal or cutting of any plant, seed or plant remains, other than plants listed as being noxious in the Noxious Weeds (NI) Order 1977.

9. The application of herbicides, fungicides or other chemicals deployed to kill any form of wild plant, other than plants listed as being noxious in the Noxious Weeds (NI) Order 1977.

10. Changes in tree management, including afforestation or planting.

11. The release into the area of any animal (other than in connection with normal grazing practice) or plant. 'Animal' includes birds, mammals, fish, reptiles, amphibians and invertebrates; 'Plant' includes seed, fruit or spore.

12. Burning.

13. Use of vehicles or craft likely to damage the interest of the area.

Sealed with the Official Seal of the
Department of the Environment for
Northern Ireland on 27 June 1995

John Crowther

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Assistant Secretary

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CIVIL SERVANT
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FOOTNOTES

(a) Please note that consent by the Department to any of the above operations or activities does not constitute planning permission. Where required, planning permission must be applied for in the usual manner to the Department under Part IV of the Planning (NI) Order 1991. Operations or activities covered by planning permission are not normally covered in the list of Notifiable Operations.

(b) Also note that many of the operations and activities listed above are capable of being carried out either on a large scale or in a very small way. While it is impossible to define exactly what is "large" and what is "small", the Department would intend to approach each case in a common sense and practical way. It is very unlikely that small scale operations would give rise for concern and if this was the case the Department would give consent, particularly if there is a long history of the operation being undertaken in that precise location.

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