DONEGAL - COUNTY GEOLOGICAL SITE REPORT

NAME OF SITE	**Parkmore Dyke**
Other names used for site	Inver Dyke, Casheloogary Dyke Exposure
IGH THEME	**IGH11 Igneous Intrusions**
TOWNLAND(S)	**Casheloogary**
NEAREST TOWN	**Inver**
SIX INCH MAP NUMBER	**92**
ITM CO-ORDINATES	**580913E, 882160N**
1:50,000 O.S. SHEET NUMBER: 10	**GSI BEDROCK 1:100,000 SHEET NOs. 3, 4**
GIS Code DL033	

Outline Site Description
The 30 m-wide dyke is exposed in a disused, overgrown quarry in boggy terrain north of the town of Inver. It intrudes Lower Carboniferous limestones and shales (Bundoran Shale Formation), but the extent of the dyke is unknown due to limited exposure.

Geological System/Age and Primary Rock Type
The intrusion has been dated to a Palaeogene (formerly known as "Tertiary") age of *c.* 43 Ma, although there is also evidence to suggest a Permo-Carboniferous age. The rock is alkali basalt that contains abundant mantle xenoliths, primarily of spinel lherzolite and harzburgite.

Main Geological Interest
The presence of abundant xenoliths in the Parkmore Dyke provides valuable information about the composition of mantle material transported within molten magma from great depth. The xenoliths include spinel lherzolite (peridotite) ranging in size from less than 1 cm to 80 cm, and are ellipsoidal to tabular in shape. Crustal xenoliths are also present, apparently derived from the Dalradian and Carboniferous rocks of the area. The xenoliths are set in fine-grained heavily altered alkali basalt. Disaggregated xenoliths have released xenocrysts of olivine, pyroxene and chrome-spinel into the surrounding matrix.

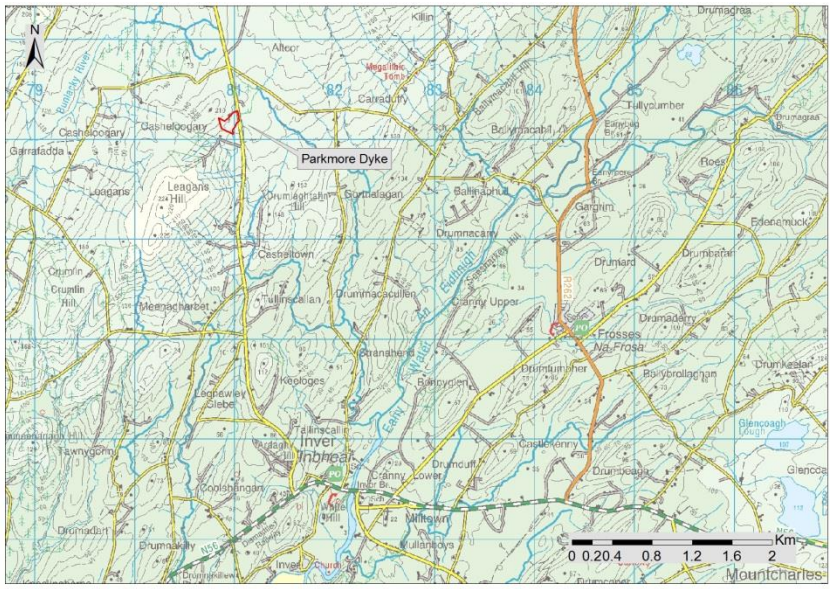
Radiometric dating results, and high $^{3}He/^{4}He$ (Helium) ratios from the dyke, suggest a relationship to the Palaeogene Iceland magma plume. If a Palaeogene age for the Parkmore dyke intrusion is accurate, it implies that deep-seated magmatic activity persisted in this area for almost 20 Ma after the initial opening of the north Atlantic. However, this would be the only Palaeogene igneous body in Ireland containing mantle xenoliths. All the other mantle xenolith occurrences are believed to be of Permo-Carboniferous age, and this older timing is also supported by the previously mapped east–west trend of the dyke, which is unlike the northwest–southeast trend of most other Palaeogene dykes in Donegal.

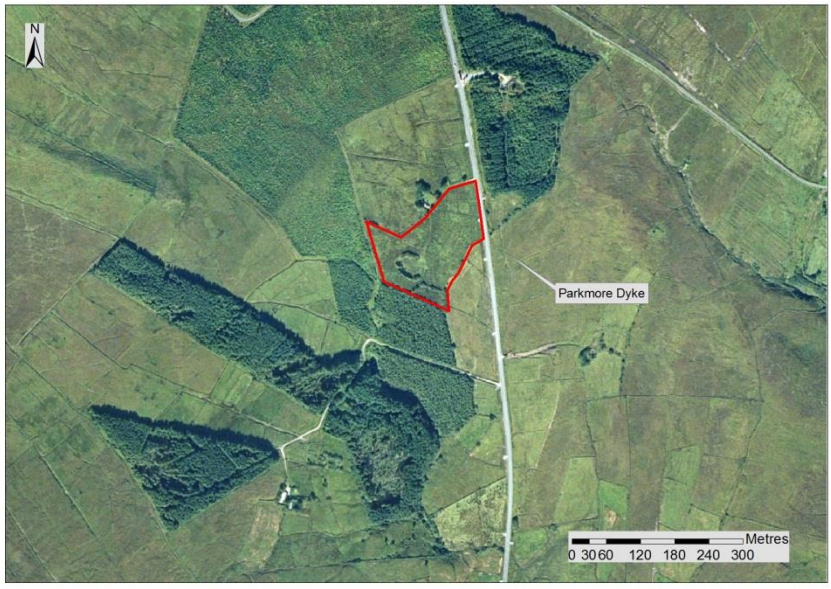
Site Importance: County Geological Site, may be recommended for Geological NHA
The occurrence of large mantle xenoliths at the Parkmore site provides a window into the composition of the upper mantle. If proven to be Palaeogene in age, this is a significant marker for the persistence of Palaeogene igneous activity. Nearby stream sediment samples have indicated that similar dykes with mantle xenoliths may be pointers to the related presence of economically important minerals.

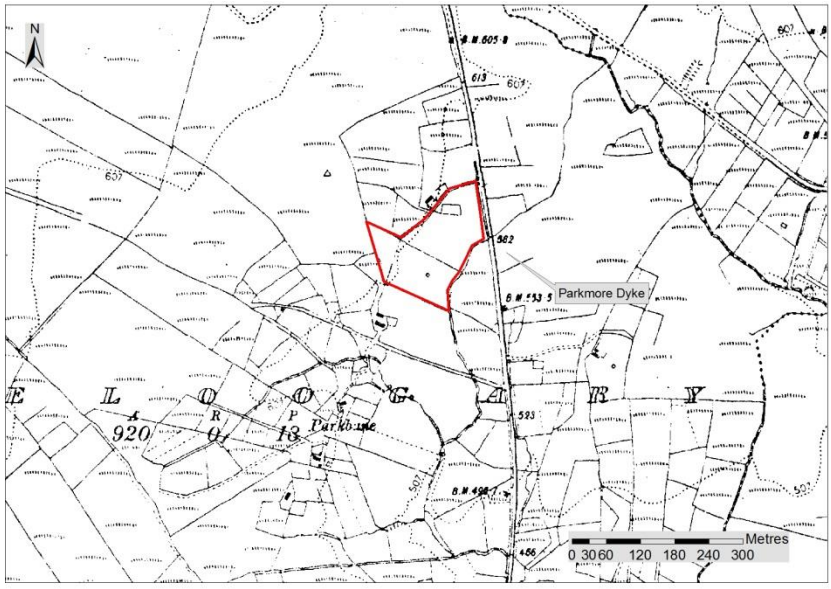
Management/promotion issues
The quarry site is not appropriate for general promotion, and the dyke and xenolith occurrence is probably mainly of interest to researchers and students of geology.

Parkmore Dyke site in the disused quarry at Casheloogary.

Dark mantle xenoliths and pale crustal xenoliths in the alkali basalt Parkmore Dyke.







McClure *et al.* 2019. Geological Survey Ireland.