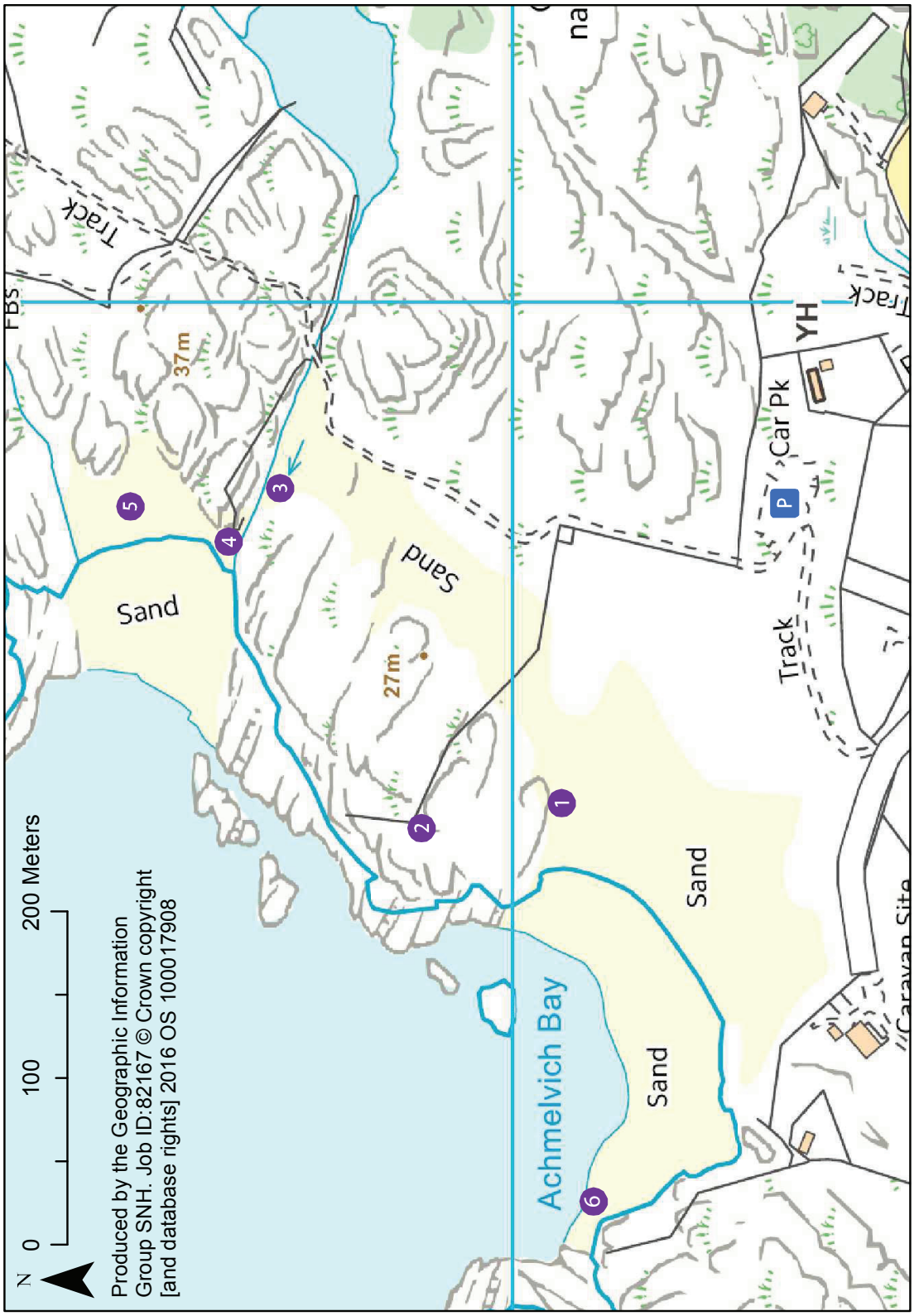
Achmelvich



Teacher's Sheet

Description of the site in terms of how to approach, walking direction and general topography and features (150 words max)



Location Map

Teacher's Notes

SUGGESTED STOPS	POINTS TO NOTE
Access:	Achmelvich lies just three miles north west of Lochinver. Park in the available space.
1	Follow the path, across the machair (grassy area), from the car park by the Ranger Hut down to the north side of the beach. The first view of the gneiss gives students the opportunity to establish some of its basic characteristics. • Identify the alternate light and dark layering (foliation) on different scales with the light layers mostly quartz and feldspar and the dark layers mostly pyroxene and amphibole • Note that the dark layers tend to etch out as the pyroxene and amphibole weathers more easily • Describe the direction and angle of slope (dip). Use a clinometer to measure the strike angle and dip. Site 1 is near the crest of an anticline of the folded gneiss. • Identify some of the 'eye' shaped pods of the dark gneiss in the light coloured gneiss • Note joints where the rock has cracked but not moved along the cracks The gneiss here in Assynt is part of some of the oldest to be found in the Drifting Apart area. The Lewisian is not a coherent block of gneiss, but rather pieces that were assembled at some stage during a very ancient plate tectonic cycle. The gneiss was once a variety of igneous rocks that formed part of the early crust which went through a mountain building episode deep within the crust (30-35 kilometres) and hence formed high grade regional metamorphic rocks about 3 billion years ago. Later geological events have not left much of a mark on the gneiss as it then formed a stable piece within the crust, which has been moved around by later plate movements including the most recent, which has opened the Atlantic Ocean. The foliation within the gneiss is folded into a very broad anticline shape, which can be observed (or even measured with a clinometer) as the excursion proceeds.
2	Walk up the slope behind Site 1 using the path and then around the hill overlooking the sea. There may be some small scale folds to find along way. The dyke at Site 2 is dark in colour and about 10 metres wide and runs approximately NW – SE. This location is a good place to demonstrate the characteristics of dykes in general. Features worth observation/investigation: • The width of the dyke and how straight the sides are • The mineral composition being pyroxene and feldspar and medium grained, making it a dolerite • The lack of foliation in the bulk of the dyke shows that it was intruded after the main metamorphism of the gneiss took place • There has been some shearing (producing a foliation) on the very edge of the dyke which is one of the few signs that the rock locally was involved in larger scale movements after the dykes were intruded • Close to the point of low tide is a large xenolith of gneiss on the south side of the dolerite dyke, close to the edge • The north edge of the dyke, west of the bend in the wire fence, shows where magma has penetrated into the wall intrusion, forming small scale intrusions and possibly another xenolith • Sheared edges of the dyke where there has been some movement during a metamorphism event which occurred later than the dyke intrusion- it produces a foliation at the very edge of the dyke and leads to the gneiss foliation swinging round until parallel to the side of the dyke • Cores taken by a rock drill by geologists. This has disfigured the site

3	Go over the style in the fence and follow the path around the hill slope towards Site 3. There will be a point where you will be able to see the fold on the small stack at Site 4. There is a wide trench running down to the beach where a dyke has been eroded out. You can usually get down to the beach along the trench observing the sidewalls of the gneiss with the dyke 'missing'. The shape of a dyke is obvious and there is still a little of the dyke at some points of the trench. There are slabs of rock in the trench so care is needed and if this is not possible then a small path goes along the north side of the dyke but care is needed climbing down to beach level here. A small stream runs down the trench and often provides a natural stream table where it crosses the sand at the bottom of the trench. Transportation and deposition of sediment can be observed and experimented with. The dyke consists mainly of the minerals feldspar (light) and pyroxene (dark) and is a medium grain size making it a dolerite. It is one of the Scourie Dykes that was intruded 2.4 – 2.0 billion years ago. The dykes in general are more easily eroded than the surrounding gneiss as they weather chemically and whole blocks have been removed along the joint planes during recent glacial erosion.
4	Site 4. There is a large-scale fold in the gneiss down at beach level on the small stack next to the eroded out dyke. It is a good opportunity to see a fold from different directions and think about the orientation of the forces that produced it and the state of the rock at the time. The rock would have behaved in a ductile manner (flowing in the solid state), whilst being folded as it was so hot Note how the layers thicken up in the (tight bend) core of the fold, which means that there was an overall movement of material flowing into this area from the straight sections (limbs).
5	The group can work their way across the base of the cliffs at the back of the beach looking for folds and other features. There are some really good 'eye' shaped pods called 'Boudins' that have been either completely or partially eroded out allowing observation to be made of them in 3D. Boudins are a type of French sausage so geologists have borrowed the word to describe these features which often look like sausage links. They form under stretching forces. Long green amphibole crystals, the remnants of the boudin edges, can be observed. It is chemical weathering of these that has allowed the pods to be removed. Return to the car park is possible via the gulley at the north end of the beach and then along a small path to join the vehicle track. It may be appropriate for the group to work out a small area for themselves and perhaps draw a small sketch map. A suitable site is available by returning to site 1 and then going SW along the tide line to the rock outcrop near the A in Achmelvich on the map. To be investigated: • Areas of gneiss • Partially eroded out dyke with joints • A fault can be postulated truncating the outcrop of the dyke to the NW and allowing preferential erosion of a small bay.