Tandinas Quarry RIGS

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RIGS Statement of Interest:

Tan Dinas quarry RIGS (Penmon) provides sections in a distinctive division of the local Dinantian succession not seen elsewhere on the island. This unit comprised the Tandinas Limestone of Power (1977), or the broadly equivalent Careg-onen Limestone of Davies (1983) and Walkden and Davies (1984; see also BGS 1989), but is now recognised as the local equivalent of the regional Leete Limestone Formation which has its type section in the Mold area (Somerville, 1979; Davies et al., 2004; Waters et al., in press). However, the Tandinas Quarry RIGS still provides one of the best sections in this unit in North Wales. It also exposes the contact with the succeeding Loggerheads Limestone Formation and, within the latter, one of the key marker beds within the Anglesey Dinantian sequence. Viewed as a whole, the latter, records the establishment and growth of a carbonate platform during a protracted, but pulsed marine transgression. As part of this event, the local Leete Limestone records the initial inundation of the older Ordovician and Precambrian rocks which form the basement to the Anglesey Dinantian sequence.

The Tandinas RIGS extends the GCR site described by Adams and Cossey (2004), and provides opportunity for additional descriptive and interpretative detail. The lower 47 metres of the sequence exposed at Tandinas Quarry and in the cliffs to the east displays features typical of the Leete Limestone Formation in which the abundance of beds of white weathering, fine-grained porcellaneous limestone, in tectural terms ranging from calcite mudstone (or micrite) to fine-grained wackestones, is diagnostic. These distinctive beds alternate in rhythmic sequence with a suite of associated limestone facies. In the lower parts of the section dark argillaceous limestones interbedded with plant-bearing mudstones, both containing the thick-shelled chonetid brachiopod *Daviesiella llangollensis*, form the lower portions of these rhythms. In upper parts of the sequence paler grainstones rich in algal plates and onclolites are more prevalent. The ubiquitous porcellaneous limestones at the top of each rhythm commonly display spar-filled fenestrae and rhizocretions, some exhibit cryptalgal lamination (stromatolites); ostracodes and calcispheres are seen in most thin-sections. All are features consistent with deposition on frequently exposed inter- and supra-tidal mudflats (see Davies et al., 2004, and references therein). The rhythms record the repeated progradation of such flats across adjacent subtidal facies. The *Daviesiella*-bearing units accumulated in still water with raised salinities probably in the lee of sheltering barriers and shoals. The grainstone units of the upper rhythms may include such shoal deposits, but winnowed lags at the bases of tidal channels, or well sorted material derived from the protective barriers as storm washovers provide alternative origins. *D. llangollensis* is recognised as an early Asbian taxon; foraminifera from the Leete Limestone suggest that elsewhere it spans the Holkerian–Asbian boundary (George et al., 1978; Davies et al., 2004).

At the top of the formation in Tandinas Quarry is an 11 m-thick sequence of porcellaneous limestones with interbedded dark grey mudstones; this comprises the Flagstaff Member of Power (1977) and is an important marker within the local succession widely recognised in inland sections. Hummocky palaeokarstic surfaces with associated rhizocretions, laminated calcrete and clay palaeosols, a conspicuous feature of younger divisions of the Anglesey Dinantiona succession, are rare within the Leete Limestone. This suggests that the falls in sea level (forced regressions) which promoted the dissolution and pedogenesis evidence by such horizons (Davies, 1991) were not a prevalent feature during the early Asbian. The peritidal rhythms of this period, exposed in the Tandinas RIGS, record a succession of small-scale progradational events generated in response to a slowly rising sea level; though subsidence too may have played a part. The entry in the upper part of the Tandinas RIGS section of shoaling-upwards carbonate cycles bounded by palaeokarstic surfaces therefore signalled a significant change in depositional regime. These cycles, in which porcellaneous limestones are largely absent, are included in the overlying late Asbian Loggerheads Limestone, a regional division equivalent to the Penmon Limestone of Power (1977) and the Flagstaff Limestone of Davies (1983; see also Walkden and Davies, 1984). Around 16 m above the base of the Loggerheads Limestone in Tandinas Quarry, is a 2 m-thick dark grey mudstone bed with spiny productid brachiopods. This is the Tollhouse Mudstone Bed of the Great Orme (Warren et al., 1984) and its recognition here, and at Flagstaff Quarry (RIGS JRD 12), permits precise correlation between the Dinantian successions of the Llandudno area and Anglesey.

Geological setting/context: The Dinantian succession of North Wales records the evolution and growth of a carbonate platform founded on the older Palaeozoic and Precambrian rocks of the region in response to pulsed, but sustained marine transgression (George, 1958, 1974; Somerville & Strank, 1989; Davies et al., 2004). The Dinantian sequence on Anglesey was deposited during the latter phases of this event, during the Asbian and Brigantian stages. Late Asbian and younger parts of the succession are cyclic in character; constructed from a series of shoaling up-wards limestone sequences each capped by a palaeokarstic surface. In contrast early Asbian strata on Anglesey and elsewhere in North Wales record peritidal deposition in the form of progradational rhythms capped by inter- and supra-tidal mud flat facies. Evidence of subaerial exposure leading to dissolution and pedogenesis is poorly developed and suggests that marked falls in sea level (forced regressions) were not a feature of this period. The Tandinas RIGS provides one of the best sections through such early Asbian facies in North Wales, as well as the contact with the overlying late Asbian cyclical division. The section exposes two of the key Dinantian marker beds used to underpin regional correlation.

Network context of the site: The site forms one of series of 9 selected to illustrate the Anglesey Dinantian succession and the processes, erosional, depositional and diagenetic, which were active during and subsequent to its accumulation; these in turn from part of a broader network of Upper Palaeozoic RIGS in North Wales.

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Site geometry: Site boundary