Trump International Golf Links
SCOTLAND

Professor William Ritchie
Independent Coastal Geomorphologist

Main Precognition

Golf & Leisure Resort

Menie Estate, Balmedie, Aberdeenshire



Public Inquiry

19th May 2008

MAIN PRECOGNITION OF PROFESSOR WILLIAM RITCHIE
INDEPENDENT COASTAL GEOMORPHOLOGIST

1.0 INTRODUCTION

My name is Professor William Ritchie. I have appended my detailed professional experience as Appendix A. I have been, and continue to be, engaged in coastal research, mainly in the geomorphology of sand dune systems since the mid 1960s. Many refereed publications and reports relate to this research that took place mainly in Scotland and on the Gulf Coast of Louisiana. A significant proportion of this work includes advice on coastal managerial problems. Of particular relevance to this Inquiry is the chapter in the Beach Report in 1978 for the Countryside Commission for Scotland (Production T12), which included Balmedie, Menie, Foveran and Forvie. These Reports continue to be used as the baseline for many managerial issues for dune and machair coastlines throughout Scotland and were reissued by Scottish Natural Heritage (SNH) in 2006. Several Ph.D. theses have been used in the course of the geomorphological assessment of this proposal and were supervised mainly in the period 1976 to 1982.

In 1984, I was contracted by the Nature Conservancy Council (NCC) - which preceded SNH - to produce recommendations for the inclusion of beach and dune sites in the selection of sites in Scotland for the Geological Conservation Review (GCR). I was a Member of the Gordon District Council Don-Ythan Working Party on coastal land use and provided the geomorphological assessment for the development of the Balmedie Dunes Recreational area. I have also provided geomorphological (and to this day) advice to the major oil and gas companies on all oil and gas pipeline landfalls and their restoration at Cruden Bay and St. Fergus.

In relation to SSSIs, I was a member and, subsequently Chairman, of the Advisory Committee for Sites of Special Scientific Interest as set-up by the Scottish Office to provide advice to SNH.

In relation to the Menie Environmental Management Advisory Group (MEMAG), I am presently the permanent Ecological Advisor to the St. Fergus Coastal Environment Committee and the Acting Chairman of SOTEAG (The Shetland Oil Terminal Environmental Advisory Group to the Sullom Voe Association Ltd.)

Professor Alastair Dawson is also a coastal geomorphologist, with almost thirty years experience in research and consultancy work. He has published over one hundred academic papers on aspects of coastal change and climate change. His particular interests lie in the reconstruction of past changes in sea level and extreme coastal flooding in Scotland. He has also published widely on aspects of Scotland's weather and climate history. His recent research has included the use of Digital Terrain Modelling to attempt to quantify amounts and rates of coastal changes in north-east Scotland through the use of time series of aerial photographs. He has also investigated patterns of change in Scotland's tide gauge records, and has identified regional climate trends from meteorological records, including trends in recent storminess. He is co-author with myself of Chapter 6 Geology, Geomorphology and Soils of the Environmental Impact Assessment and some of the Appendices.

2.0 HISTORY OF INVOLVEMENT IN THE PROJECT

The original contractual arrangement for geomorphological advice was initiated between Jenkins and Marr Planning Consultants, Ironside Farrar Environmental Consultants and the Aberdeen Institute for Coastal Science and Management (AICSM) in 2006. Both the original contract and later arrangements relating to this advice, to the compilation of the Environmental Impact Assessment, and to other work - all restricted to coastal geomorphology (and to the initiation and conceptual development proposed for MEMAG) - was and continues to be undertaken on an independent basis. From the outset, the client agreed that the work done by myself, Professor William Ritchie (witness) and Professor Alastair Dawson would be solely on the basis of our independent scientific judgement and that neither consultant was in support of, or in opposition to, the proposed development at Menie

Links. The clients and the developer, TIGLS, accepted and have continued to honour this agreement.

3.0 STATEMENT OF GEOMORPHOLOGICAL ADVICE AS PROVIDED TO THE DEVELOPER

3.1 Preparation of Chapter 6 of the Environmental Statement

Chapter 6 of the Environmental Statement and the associated Appendices, included:

- an evaluation of coastal and possible future weather and sea level changes,
- a supplementary geomorphological assessment of the North End of Balmedie Dunes (2007) and
- a report on 'Mitigation and Technical Methods for Coastline Dune Management in Scotland',

These documents were produced in parallel with the preparation of the formal application for planning approval to Aberdeenshire Planning Department. Subsequent advice has been limited to *ad hoc* comments on responses to other submissions to Aberdeenshire Council and to comments on possible minor changes to the golf course layout that might reduce direct environmental impact on the geomorphological interest.

The principle of the creation of MEMAG and its opus operandi was also initiated at an early stage of the consultancy work and was presented as an Appendix to the EA. As such it was welcomed by Aberdeenshire Planning Department and listed as a condition. The Appendix includes a definition of purpose, area of concern, terms of reference, possible membership and structure (including a structure for the Main Committee and the Monitoring Committee). It is not a Dunes Management Group, but will be created to monitor a full range of possible environmental changes, advise on good practice managerial responses and act as an independent check that undertakings that were agreed by the developer in relation to the dunes environment will be fulfilled. It will begin work before site work begins and continue to advise throughout the operational life of the development. Part of

its remit is to advise on possible ways to assist mitigation and minimization of environmental impacts which are consequential upon the nature of the development.

3.2 Identification of Key Issues

In relation to the impact of the development of the golf course at Menie Links, several issues can be highlighted:

(i) Except for the 'Beaches Report' of 1978, and minimal reference to the Menie area in the publication 'Sands of Forvie and Ythan Estuary SSSI and Foveran Links SSSI for Geological Conservation Review Interest' by F. MacTaggart in 1998 and the report by R. Wright also for SNH on the movement of dunes at North Menie and Foveran in 2001, no academic papers or reports could be found to provide prior information on the geomorphology of the site. Accordingly the mapping and interpretation of the area, which was completed as part of the EIA process in 2006, was original, intensive geomorphological research.

(ii) The conclusions of this geomorphological assessment remain largely unaltered. Since 2006 to the present time, there are no significant differences in interpretation, at informal and formal levels, with the advice given by SNH, other than the normal minor differences in emphasis and interpretation as exist in most academic work on the geomorphology of any natural coastal system.

3.3 Key Findings

Specific elements in these geomorphological assessments are as follows:

(i) The coastal dune and beach/ dune interface must not be utilised in any way by the developer. This recommendation is not for operational reasons, but as a requirement to preserve the integrity of the coastal longshore sediment system within the recognised Aberdeen Bay sediment cell. At this time, and in the recent past, the Menie Area is located in an accretionary zone, which is likely to continue into the future, but cannot be guaranteed.

(ii) As illustrated by production T14, the gap in the coastal dunes to the south-east of the dome, which had some effect on the dynamics of the dome, has closed completely since 2006. The survey in 1978 showed this gap to be much wider, almost 200m, but it never extended downwards to beach level: it was more an extensive de-vegetated area with considerable sand blow landwards. The exact consequence of this closure, which shows every sign of permanence, to the movement of the dome needs further study. Nevertheless, although a contributing factor to mobility, it is likely to have been much less important than the main "rolling advance" of the larger volume of sand within the total mass of the dome.

(iii) Although examined in detail for contextual purposes, we believe that issues of possible climate change scenarios, speculation of both sea level changes and possible increased storminess for this part of the Scottish coastline are irrelevant since they are wholly independent variables which will occur whether or not the development proceeds. (Incidentally, the Scottish Environment Protection Agency [SEPA] published in 2007 an independent assessment, which classified this coastline as having no flooding risk.) In so far as these changes *might* impact on the use of the golf course, any trends would have to be considered within the stated adaptive/soft solution management system as agreed by the developer. which can be defined as reacting to change in ways that are measured responses and do not rely on pre-determined, fixed managerial solutions. "Soft" is a brief description of those engineering techniques that eschew fixed, hard, man-made coastal defences but attempt to work with natural forces and materials to achieve more responsive, flexible and mobile solutions.

Moreover, under the policy of no development along the coastal edge and on the primary dune ridge, the golf course management regime would not be permitted to construct any form of coastal protection works along the Menie shoreline.

(iv) Explicit statements have been made to underline the geomorphological differences between the interior dunes and links landforms at South Menie and North Menie, as defined by the SSSI boundary. There has also been acceptance that the SSSI boundary is appropriate and that the area to the north is properly designated as having considerable geomorphic interest for both its landforms and formative processes within the normal guidelines that SNH uses for the definition of an SSSI. In contrast, the South Area can be assessed as having less geomorphic interest. It is stable, mature and essentially non-dynamic. Impact is therefore low to moderate and individual holes will modify existing topography without significant earth moving or topographic modification. Stabilisation of existing bare sand areas is almost negligible as such surfaces are not present in South Menie.

Like North Menie, considerable areas of existing links and dunes will not be altered due to the wide separation between fairways and to the design which normally requires 'clearance' for the first drive from tee to fairway. Nevertheless, some reshaping and surface modification will be needed but this is almost entirely within existing low axes and depressions in the existing topography. There is no reason to reduce the elevation of most higher dunes and ridges.

Other than along the coastline, North Menie SSSI is not connected by active geomorphological processes to South Menie, because the nature of the south to north movement of active features, specifically 'the dome' has left a buffer zone of recolonised, stable deflation and slack surfaces at its southern margin. Similarly, North Menie is not connected by significant transfer of sediment north of the Sandend Burn (the north limit of Menie Estate) and Drums Links, which is also part of Foveran SSSI, other than along the beach by longshore processes.

Menie is part of Foveran SSSI and is estimated to be equal to one third of the total area, which stretches south from the Ythan Estuary. Further north, the Sands of Forvie NNR continues the conservational

designations for the north end of Aberdeen Bay. Unlike North Foveran and South Forvie, the sedimentation link with the Ythan Estuary is less important. The remainder of Foveran SSSI contains similar dune landforms at different stages of development, as can be found at Menie. Although not identical, Foveran also has an extensive deflation sequence, with large areas of bare sand at the north end. This includes a large arcuate mass of sand, which migrates northwards against older dune landforms. In general, there are more open connections between these bare sand areas, with devegetated coastal dunes and the open beach than at Menie. The general morphology is similar to the dome at Menie, but is less massive and has a different shape. Nevertheless, the formative processes of sand movement are the same, but might have different rates of change due to local factors. In general, such massive inland bare sand features are almost unknown elsewhere in Scotland, but are uniquely found at Balmedie, Menie, Foveran and Sands of Forvie.

(v) There is no argument that North Menie SSSI contains an excellent assemblage of dune and links landforms with clear examples of active and historical formative processes. Accordingly, for the most part, Chapter 6 of the ES described the impact of the golf course development as normally moderate to severe. Like South Menie, many areas, in addition to the coastal zone, are untouched due to the spacing of the fairways and to the avoidance of some dynamic and topographically over-steep slopes. Nevertheless, the majority of holes have a severe impact as they necessitate topographic modifications (but not normally removal or large-scale ground reconstruction) and artificial stabilisation. Rightly, the focus of interest has been on the golf course architect's need to stabilise the open, unvegetated sand dome and most contiguous areas. If this is done, then a major element in the reason for site designation i.e. dynamic and relatively rapid but variable movement in a generally northwards direction, would cease. There is no disagreement between developer and objectors on this specific concern. It is also agreed that this golf course design requirement crystallises the question whether or not sufficient

geomorphological interest remains in this North Menie area to continue to justify the appellation SSSI.

Certainly mitigation, and good practice, dune management advice from MEMAG will be helpful, but, from the outset, this remains the key geomorphological issue and is central to the outcome of the Inquiry. Reciprocal reviews of verbal and documentary statements between SNH and its advisors and the consultants for the developer have never disagreed on the importance of this central issue - in principle and in practice. Without going into detail, there is also general agreement on the specific locations of the greens, tees and fairways that are affected directly or indirectly by both topographic reshaping and by the stabilisation of mobile sand in order to meet constructional and operational requirements. Very minor differences between the developer and SNH relate to the latest version of the golf course layout, but there is probably room for some 'fine-tuning'. Nevertheless, this is almost irrelevant compared with the central issue of the proposal for relatively extensive stabilisation of large areas of mobile bare sand surfaces within the SSSI.

(vi) In April 2008, a modified golf course layout was submitted. For most tees, greens and fairways, there is less impact on the existing dune and links topography than the previous outline course layout. Partly due to both the shortening of some holes and to the relocation of Holes 15 and 16, there is also some additional avoidance of some mobile sand surfaces. Nevertheless, substantial areas in the SSSI require to be stabilised using progressive methods and techniques to provide an appropriate cover of vegetation. Holes twelve, thirteen, seventeen and eighteen fall wholly, or partly, into this category with hole thirteen, on the dome, being notable in requiring complete stabilisation. In addition, the amount of stabilisation and vegetation cover will also affect geomorphological processes in adjacent areas. The plans require little or no stabilisation of mobile sand surfaces elsewhere in the course but all tees, greens and fairways require topographic modification (normally described as smoothing) and

revegetation, in order to convert natural surfaces to golf course standards.

[A hole by hole description on the pre-existing topography and geomorphological process as appended as Annex I and was written after a site visit with SNH and the golf course architect on 6th May 2008. The most recent design is different from the earlier 'Fazio' layout in requiring much less cut and fill operations. It also avoids several dynamic dune zones. Thus, the overall impact on the landforms is less and the amount of stabilisation has been reduced. This new plan also provides more information on tracks between greens and tees and makes use of low ground, existing pathways and natural depressions. The areas to be used for ancillary constructions, e.g. clubhouse, also seem to be less. In general, these reductions are mainly a consequence of re-positioning and re-alignment.]

One minor issue, which has been raised by some objectors other than SNH, is the use of the term 'destruction' of the dunes. This is misleading. A golf course modifies, preserves and fixes dune topography, but does not 'destroy' in the accepted sense of complete removal. It is not in the interest for any manager of any coastal links-type golf course to 'destroy' the topography that produces its unique character and sporting challenge.

CURRICULUM VITAE

NAME: WILLIAM RITCHIE

DEGREES ETC: OBE, BSc, PhD, DUniv (Stirling), D.Sc(Lancaster), FRSGS, FRICS, FRSE (Edin.)

CAREER:

1964 Appointed Assistant Lecturer in Geography, University of Aberdeen.

1966 Appointed Lecturer in Geography, University of Aberdeen.

1971 January to September - Post-Doctoral Research Associate in Department of Geography and Anthropology, Louisiana State University, Baton Rouge, LA, USA. (National Science Foundation Scholarship).

1972 Appointed Senior Lecturer in Geography, University of Aberdeen.

1979 Visiting Professor in the Department of Geography and Anthropology, Louisiana State University, Baton Rouge, LA, USA.

1979 Appointed Professor of Physical Geography, University of Aberdeen.

1981 Research Associate Centre for Wetland Studies, Louisiana State University, USA.

1983-1989 Head of Department of Geography, University of Aberdeen.

1986	Visiting Scientist. Louisiana Geological Survey.
1987, 1988, 1989, 1990 and 1993	Consultant Coastal Geomorphologist, Louisiana Geological Survey.
1988	Elected Dean of the Faculty of Arts & Social Science.
1989	Appointed Vice-Principal, University of Aberdeen
1992	Appointed Professor (Gratis) in Coastal Studies Unit of Louisiana Geological Survey at Louisiana State University.
1992	Senior Vice-Principal, University of Aberdeen
1995-2002	Vice-Chancellor, Lancaster University
2003-	Visiting Professor in Ocean Science (World Maritime University, Malmö)
2003-	Adjunct Professor, (World Maritime University, Malmö)
2006	Interim Director Macaulay Land Use Research Institute
2002-	First Director of Aberdeen Institute for Coastal Science and Management. Aberdeen University (Half-time appointment)

EXTERNAL

- Secretary (Section E), British Association for the Advancement of Science (1968-72). Recorder (Section E), (1972-77).
- Member of Panel of Examiners for Certificate of 6th Year Studies.
- Assistant Examiner and Setter for above (1975-1985).
- Member of Central Committee for Social Subjects (1973-1978).

- Chairman of sub-committee anent Certificate Courses in Social Subjects (1974).
- Aberdeen University Representative on Scottish University Council on Entrance. (Convener of Geography Panel [1981-1985]).
- Member (part-time) Geological Survey (London). Working Party on Terrain Evaluation (1974).
- Founder organiser of Machair Study Group (1973-).
- Member SED Steering Committee on Project for the use of Computers in School Geography (1977-1981).
- Member Gordon District Council Don-Ythan Working Party on coastal Land Use (1979).
- Director and Co-Director of the programme of Beach, Dune and Machair Resource evaluation work for the Countryside Commission for Scotland (1968-82).
- Co-Director of the Marchand-Caminada Coastline (Louisiana) Project (Sea Grant and Geological Survey, USA) (1979 –1994).
- Member SOTEAG (1980-).
- Vice-Chairman of SOTEAG (1990-1995).
- Chairman of SOTEAG Monitoring Committee (1995-).
- Member St Fergus Dunes Management Committee (1980-).
- Member Zetland Harbour Advisory Committee (1980-1985).
- Member Scottish Examination Board, Council and Sub-Committees (1982-1986).
- Member Editorial Board of Transaction of Royal Society of Edinburgh (1982-1992).
- Member of Validation Panel for Degree Courses in New University of Ulster (1985).
- Chairman of Geological panel of Royal Society of Edinburgh (1986-1988).
- Representative of the University of Aberdeen on the Scottish Council for the Validation of In-Service Courses (1982-1988).

- Chairman of Validation Panel of Post-Certificate Technical Courses (Jordanhill College) (1986-1992).
- Member Advisory Committee for the Nature Conservancy Council for Scotland (1983-1989).
- Board Member of CEMP (AURIS Company) (1984-1987).
- Member of Council of Royal Society of Edinburgh (1986-1989).
- Member of Council of Royal Scottish Geographical Society (1986-1989 and 1993-1995)
- Convenor joint SCOVACT-Jordanhill College standing committee on modular teaching (1988-).
- Chairman St Fergus Environmental Advisory Group (1988-1991) and its Technical Committee (1989-).
- Executive Editor of Transactions of Royal Society of Edinburgh (1988-1991).
- Research Fellowships Committee of Royal Society of Edinburgh (1988-1990).
- Appointed Convenor of SCOVACT (1989-1993).
- Appointed as first non-American member of Environmental Committee of American Association of Petroleum Geologists (1990).
- Trustee National Library of Scotland (1989-1992).
- Trustee Aberdeen Music Festival (1990-1995).
- Member of Scottish Office Advisory Committee for Sites of Special Scientific Interest (1992-98), and Chairman (1998-2003).
- Appointed to Fulbright Commission by Secretary of State for Scotland (1992-1995).
- Appointed Chairman of U Travel (1993-1995).
- Appointed Chairman of Ecological Steering Group on the Oil Spill in Shetland by Secretary of State for Scotland (1993-1994).
- Appointed to Chair national advisory group for Sustainable Development by Secretary of State for Scotland (1994-1995).

- Member of Dounreay Nuclear Energy Facility Advisory Group on Safety and Environment and its Technical Advisory Group (1995). Ad hoc advice (1995-2002).
- Appointed as representative of English Universities to Fulbright Commission (1995-).
- Appointed Editor in Chief of Journal of Coastal Conservation (1998-2003).
- Academic and strategic advisor to World Maritime University (Malmö) (1994-).
- Appointed to lead HEFCE group to advise Universities in Paraná (Brazil) on strategic managerial developments (2000).
- Appointed to Board of Trustees of National Maritime Museum (Greenwich) (2000- current).
- Appointed to HEFCE Committee on Additional Student Numbers (2001-2003).
- Assistant Editor WMU Journal of Maritime Affairs (2003-).
- Chairman of National Maritime Museum Sub-Committee on Research and Education (2001-).
- Member of Working Group of Scotland's Marine Resources (2002-).
- Member of Marine Science Strategy Group for Highlands and Islands Enterprise (2003).
- Chairman of Scottish Aquaculture Research Forum (2003-)
- Member and Acting Chairman of Scottish Coastal Forum (2004).
- Acting Chairman of SOTEAG (2004-2005)
- Chairman of Scottish Aquaculture Research Forum (2003-).
- Member of Scottish Coastal Forum (2003-).
- Member of AGMACS (Ministerial Working Group on Coastal and Marine Resources) (2005-2006).
- Member of SSTF (Ministerial Working Group on Sustainable Seas Task Force, 2008 onward).

As at May 2008