

TOWN AND COUNTRY PLANNING SCOTLAND ACT 1997

TOWN AND COUNTRY PLANNING (INQUIRIES PROCEDURES) (SCOTLAND)
RULES 1997 AS AMENDED



**OUTLINE PLANNING PERMISSION FOR GOLF COURSE AND RESORT
DEVELOPMENT ON LAND AT MENIE HOUSE, BALMEDIE, ABERDEEN**

PRINCIPAL PRECOGNITION OF

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Evidence on behalf of Scottish Natural Heritage

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INTRODUCTION

1. I am Paul Rooney, an Environmental Geographer and Senior Lecturer at Liverpool Hope University. I lead the undergraduate Environmental Management pathway and am the course director for our MSc in Environmental Management. I specialise in coastal dune management at both undergraduate and post graduates level, and I am research active in this topic. I also teach sustainability and environmental impact assessment at undergraduate and post graduate levels, and have an MSc in Environmental Assessment. For the last three years (and ongoing) I am an invited guest lecturer at the University of Amsterdam, Netherlands, contributing to their specialist postgraduate course in coastal dune management.
2. I have wide experience of dune management in the Atlantic Biogeographical Region, a region defined by the EU as stretching from the top of the United Kingdom and Ireland down to the northern shores of Spain and Portugal, encompassing all of the Netherlands and parts of Germany, Denmark, Belgium and France along the way. This region includes almost half of Europe's coastline and contains an impressive range of dunes sharing habitat similarities and management issues. I have travelled widely in a professional capacity to dune sites and projects in this area, typically making two or three excursions per year. I am called upon by site managers to provide advice and support for restoration / rehabilitation management for coastal dunes. For instance, I was an invited expert adviser for the Amsterdam Waterworks, Netherlands, as part of their project development to restore the area occupied by the Van Limburg Stirumkanaal, a project to restore a dune landscape on a scale previously untried in the Dutch coastal dunes. This project is presented here as productions T23 and SNH44a. The purpose of this huge project was to create a dune system that could develop as naturally as possible, with special regard for geomorphological interests of moving sand and the regeneration of dune slacks.
3. I am the Director of the 'UK Sand Dune and Shingle Network'. This promotes the sustainable use and sharing of experience in conservation practice. It sets out to achieve this through the promotion of linkages, the use of science for evidence based decision making, and the exchange of understandings between the communities of stakeholders including conservation and recreation managers, academics, engineers, representatives of the golf sector, water companies, the military, government bodies and non-governmental groups. The purpose is to benefit the natural values, biodiversity, social and economic functions of the coastal zone in general, and dune and shingle habitats in particular.
4. In 1998 I was one of the organizers of the European Symposium 'Coastal Dunes of the Atlantic Biogeographical Region' with the proceedings published and included as production SNH 44. Particularly through the work of the 'UK Sand Dune and Shingle Network' I have organized a series of coastal dune workshops and national and international dune study tours. Between 31st March and 3rd April 2008 I was the organizer of the international conference

'Changing Perspectives in Coastal Dune Management' attended by delegates from four continents. I am currently editing the proceedings of this event.

5. Between 1996 and joining Liverpool Hope University in January 1999 I was the Project Officer for the EU co-financed LIFE-Nature Project 'The Sefton Coast Life Project: a conservation strategy for the sand dunes of the Sefton Coast, northwest England' (see production SNH 44e). A significant part of this project was to work with the seven links golf courses along the Sefton dune coast, including the Royal Birkdale Golf Club. Working with these clubs we produced site management plans, implemented dune restoration, rehabilitation and habitat creation projects and provided expert advice on matters such as the impacts of water abstraction. During this time I also contributed significantly to the drafting of the UK Biodiversity Action Plan for Coastal Dunes (see production SNH 36).
6. Between 1987 and 1996 I was responsible for a series of coastal dune sites on the Sefton coast, owned by Sefton Council, some of which had been severely damaged by uncontrolled and excessive human use such as high levels of trampling and inappropriate use of the dune and beach areas by horses, cars, 4x4's, motorcycles etc. The sites were damaged to the point where the sea defence functions were compromised, landscape and aesthetic qualities were diminished and conservation features reduced. As a site manager I was responsible for the restoration and rehabilitation of these areas, some of the largest dune repairs works initiated recently in the UK.
7. I have led several government funded 'Species Recovery Programme' projects to remove scrub and enhance dune mobility and dynamics. Part of this work included re-establishment of the Natterjack Toad to the Royal Birkdale Golf Club, and to the combined site of Red Rocks SSSI / Royal Liverpool Golf Club using spawn translocation, creation of breeding sites and restoration of open dune habitats preferred by this important and protected animal.
8. I am a Chartered Environmentalist, a full member of the Institute of Ecology and Environmental Management and am elected to sit on the Council of the Institute. I am a Chartered Geographer and Fellow of the Royal Geographical Society (with the Institute of British Geographers) and member of their Coastal and Marine Working Group. I am on the Advisory Board of the European Union for Coastal Conservation – The Coastal Union. I am on the Editorial Board of the 'Journal of Coastal Conservation: Planning and Management' published by Springer, and I am a reviewer of coastal papers for the 'Geographical Journal' published by the Royal Geographical Society.
9. Together with representatives of significant golfing bodies, I am on the Board of Trustees for the Foundation for Golf and Environment. This is the organisation which operates the Golf Environment Europe Programme and is represented by the website www.golfenvironmenteurope.org. It was developed from the Committed to Green Foundation (2000), which had previously stemmed from the European Golf Association Ecology Unit (1994 to 2000). The Foundation is the only independent not-for-profit entity in

Europe specifically focusing on the environmental and sustainability aspects of golf at an international level. Golf is the Foundation's sole focus.

10. The Foundation's sole purpose is the promotion of environmental responsibility and sustainability in golf. The founding principles of the Foundation for Golf and Environment are:
 - The application of good science
 - A commitment to continual improvement in environmental performance
 - Multi-stakeholder dialogue
 - Transparency
 - Independent setting of environmental criteria and standards
 - Independent monitoring and verification
11. I was closely involved with the environmental management and impact assessment of the Open Championship at Royal Birkdale in 1998, and co-authored the hole-by-hole environmental guides for the Open Championships at Royal Birkdale in 1998 and at Royal Lytham St. Annes in 1999. These are precursors to, and helped set the style and content of, those included as production T28a. I have also published best practice guidelines for links golf management (see production SNH 44f). In February 2008 I was an invited guest to the launch of the 'Irish Links Initiative' organized by the Golfing Union of Ireland.
12. My professional familiarity with the Aberdeenshire coast dates back to 2004 with preparatory background research and site visits to the Foveran Links SSSI and Ythan estuary. I was the leader of a field meeting to the Sands of Forvie NNR which was attended by over 100 international coastal experts as part of the conference 'Littoral 2004 – Delivering Sustainable Coasts: connecting science and policy' hosted in Aberdeen, September 2004. On the 20th March 2008 I was engaged by Scottish Natural Heritage to consider matters detailed in this precognition relating to a proposed development at Menie Links. On Thursday 15th May 2008 I visited the proposed development site along with Scottish Natural Heritage. This was for the particular purpose of considering the detailed nature of the site in the field and the impacts and proposed mitigation associated with the development proposal. I am familiar with the proposed development site and the coastal dune features associated with it.
13. In summary, I have a deep understanding of coastal dune systems and their management across a wide geographical area. I have a particular insight in to the challenge of balancing conservation with resource exploitation in the coastal dune environment, especially in the context of links golf. I have applied this knowledge and understanding to my consideration of the proposal to develop a golf course at Menie Links.
14. In my precognition I will outline the following
 - The importance of naturally dynamic dune processes and an outline of the interdependence and reliance of dune habitats on the dynamic geomorphological processes.

- The importance of a sustainable view in both time and space, and particularly in relation to naturally dynamic dunes.
 - An assessment of the likely efficacy of the proposed mitigation, translocation and compensation measures proposed by the applicants.
 - A conclusion from a coastal dune management and golf perspective.
15. The material presented in this precognition initially used the information presented in the Fazio course layout (see production T1), and information in the associated environmental statement. Subsequently it has been revised and updated, but it is constrained in its full consideration by the timing of information made available by the development proposer. This is particularly in respect of the revised course layout (see production T2), the additional ecological assessment and the proposed ecological mitigation measures (listed as production T50, but marked as production T55 and titled “*Status, extents, development impacts and mitigation for key vegetation types and rare species at Menie*” which I will subsequently refer to as production T50). The precognition must be considered with this caveat, and I reserve the right to revise and update materials contained within it in further consideration of the materials.
16. The area considered by this precognition is defined in the production SNH 11, and described in the precognitions of Hansom and Angus.

Importance of Naturally Dynamic Dune Processes

17. Coastal dunes are naturally dynamic systems. Their formation is driven by the forces of wind and water, and their vegetation is both influenced by, and influences, the dune topography. The complex and changing topography found on coastal dunes, and particularly at Menie Links, creates a high environmental heterogeneity (see production SNH 46a). This means that dunes are complex places with many physical and ecological variations, differences and interactions. It is this complexity, formed out of the interaction of sand, wind and water, along with the influence of vegetation that make coastal dunes important and valuable for nature conservation. The sustained interaction of these factors is necessary to maintain a naturally dynamic dune environment. This is especially true of the dunes subject to this proposal at Menie Links.
18. In support of this position, Ritchie (see production SNH 44a p13) recognizes that “*the natural development of coastal dunes is dependent on movement and change*”. Geomorphological processes are of high conservation interest and importance in their own right, but they also underpin the ecological interests of dune systems. This is recognized in established and authoritative studies on dune geomorphology and ecology, including the classic works by Salisbury (see production SNH 50) and Ranwell (see production SNH 48). The developer also recognizes this, for example under the heading titled ‘Summary’ in Section 6, page 43, of the Environmental Statement which

states that “*the geomorphology of the area and its drainage underpins the area’s ecology including soils, vegetation and wildlife*”.

19. So, it is the complex and continuing interaction of changing wind and water conditions resulting in moving sand that keep this naturally dynamic dune system at Menie Links ‘pulsing’ and ‘alive’. These are the key qualities of a dynamic dune system, a system that is a changing landscape and important for biodiversity. It is these qualities that are found at Menie Links and for which the site is important.
20. The concept of the dynamic approach to dune management came together at the European Union for Dune Conservation conference in Leiden, Netherlands in 1989 (SNH 47b and SNH 47c). This conference was a landmark event in Europe that established an approach to dune management which appreciates, values and works with natural dune dynamics. This approach to dune management is viewed as a good practice, and is not adopted by this development proposal.

Temporal and Spatial Aspects

21. Especially in relation to dune habitats and dune dynamics, the environmental statement typically focuses on what is present at this time. The assessment prepared by the developer would benefit from a fuller consideration of past conditions and changes as a factor in valuing and understanding what is present now, and more particularly what will and may be present in the future.
22. To fully appreciate the value of naturally dynamic dunes requires thinking beyond our everyday human timescales. We are challenged to think not just about short to medium timescales (perhaps years or low tens of years), but to think beyond our lifetimes in high tens of years (for instance seventy years plus) and hundreds of years. This is beyond (most) of our lifetimes. It is an ‘intergenerational’ view. This view is fundamental to the concept of sustainable development and is widely adopted. To achieve sustainability for coastal dunes and golf we must think in this intergenerational timeframe. The proposal for this golf course fails to take an intergenerational sustainable view, particularly in the mitigation, translocation and compensation measures proposed for the geomorphological and ecological site interests.
23. Naturally dynamic dune systems require long, intergenerational, timeframes to appreciate their operation and to enable sustainable choices about their future to be made. In addition, they also require space. Moving sand must have space to move around in and for cycles of dune development in which to occur. A dynamic system, as found at Menie Links, requires physical space to operate, space for sand to move from one place to the next, and space for the physical and ecological features of the dunes to form, senesce and be consumed by moving sand thereby creating the interest and value. Hansom and Angus in their precognitions identify how the geomorphological and resultant ecological features on this site have developed to date with the benefit of space of time.

24. The dynamic dunes present at Menie Links require both space and time to sustain their function and value. The proposal does not take the long view required by the concept of sustainability, nor does it permit the required space for the physical and ecological cycles to proceed uninterrupted. It is essential that the site benefits from both time and space being available long in to the future to sustain its interest.

Impacts

25. The direct impacts on dune habitats is most recently detailed in production T50, section 7.1, page 25, and summarized there as Table 4. The scale of the impacts is, to use the developer's phrase, considerable. The scale and significance of these potential losses must not be understated and the developer recognizes them as severe adverse (see production T50, section 7.1, final sentence). They are highly significant for the site and of grave concern both regionally and nationally. From my extensive experience of dunes, I consider that the scale of the potential habitat losses associated with this proposal equals and exceeds the size of some individual dune sites in Britain. Furthermore, the losses should be considered even greater if the implications of the second proposed golf course, for which no details are provided, are taken in to account. The cumulative impact of the two proposed courses therefore gives cause for even greater concern.

26. It is noteworthy that the developer recognizes that "*the key dune habitats present, within and without the Foveran Links SSSI are considered to represent SSSI quality ground. This is the same level of valuation reached in the 2007 Environmental Statement*" (see production T50, p25, section 7.1.1). This indicates the wide occurrence of high quality dune habitats, and that they are not confined to the SSSI area. The impact is therefore wide ranging.

27. As set out in the precognition by Hansom, the most significant adverse impact is on the geomorphological processes. These are on such a large scale and of such a significant level as to render the dynamic dune environment significantly compromised. The developer recognises this in the Environmental Statement under the heading titled 'Summary' in Section 6, page 43, and identifies them as major adverse.

28. The impact of golf course construction on dune slacks is considerable, particularly as dune slacks are closely associated with dynamic dune environments. Golf course construction and operation will require dune stabilisation and this will result in the destruction of slacks as process related features. The construction of fairways will destroy dune slacks as soil surface levels will have to be raised considerably, beyond the significant influence of groundwater, and certainly without inundation, for turf grass management and golf firmness of play reasons. The impact is therefore both considerable and extensive. In this context, the developer recognises that "*the significance of any small loss of dune slack is important on a national scale*" (see Chapter 7 of the Environmental Statement, p108, third paragraph).

Mitigation

29. A summary understanding of 'mitigation' is taken to be the avoidance or reduction of negative impacts to the point where they are no longer considered significant in the assessment. This is based upon a definition provided in the glossary contained within production SNH 45 (p56).
30. In terms of good practice in environmental assessment the proposal should, as its goal, aim to avoid severe adverse impacts in the first place. Although the applicants make some efforts to do this in adjusting the proposed course layout, the Environmental Statement identifies the geomorphological impacts as major adverse and the overall impact on dune habitats are considered severe adverse (see sections 6 and 7 of the Environmental Statement and production T50 section 7.1).
31. Considering this proposal in terms of the impact on the dune dynamics and associated ecological features there is a mismatch between the identified impacts and proposed mitigation and compensation. Specifically, although it may be a step towards formulating mitigation measures, establishing the 'Menie Environmental Management Advisory Group' as the major measure for the mitigation of geomorphological, geological and soil impacts (see Chapter 6, Table 6.5 in the environmental statement) is in itself not mitigation. Unfortunately, this is also offered as part of the mitigation proposals for the impacts on dune habitats (see production T50, section 7.1.2 page 25)
32. Mitigation in relation to wetland habitats is extremely difficult and known to have a low success rate (see production SNH 49a). This refers to all wetland habitats, and as experience in mitigation for coastal dune wetland habitats (slacks) is scarce the success rates likely to be lower.
33. In considering mitigation for dune slacks it must be understood that they are particularly difficult environments for which to propose successful mitigation. A range of complex factors are associated with dune slacks as part of the naturally dynamic dune environment (see productions SNH 46b, and SNH 48). This, combined with the complex soil and geomorphological conditions found at Menie Links, makes the formulation of successful mitigation and compensation measures for dune slacks highly uncertain.

Dune Stabilisation

34. In the Environmental Statement under the heading titled 'Summary' in Section 6, page 43, the applicant describes that "*the development proposes to modify the existing topography and stabilise areas of mobile dunes to allow the creation of the links golf course. This stabilisation is contrary to the SSSI citation and will effectively cause the loss many of the dynamic features of the site, which is the basis of its natural heritage interest. Due to the stabilisation the impact in geomorphology is assessed as major adverse*". This impact is not mitigated.

35. In section 6.7 of the Environmental Statement the developer states that *“it will be necessary to control sand movements at and near specific golf holes, including those that are on or contiguous to the dome. This policy will require stabilization of most mobile sand surfaces. A substantial combination of sand trapping fences, topsoil and / or spraying of stabilizers and grass planting will be required. Many dynamic elements of the geomorphology will be lost as will some habitats associated with sand movements”* Stabilisation of the Menie sand sheet and other mobile features is therefore a damaging operation that will result in an unfavourable impact on the natural and conservation values of the dunes.
36. As a point of clarification, dune stabilisation of the sand sheet and other mobile features outlined in this proposal is not mitigation, whatever the outcome in terms of habitat creation. The developer states that Appendix 6.5 of the Environmental Statement *“Mitigation and technical means for coastal dune management for Scotland – a summary guide”* is included *“in order to describe techniques of construction, re-instatement and mitigation for dune landforms, with special reference to north east Scotland”*. Section 7.1.2 of production T50 outlines a mitigation proposal to establish grey dune and heath on the Menie sand sheet. This must not be associated with mitigation at all and must be discounted from the calculation of mitigated habitat. It is a damaging operation for the geomorphological interests. The significance of this damage is not altered by proposals to create habitats on the damaged feature.
37. Dune stabilisation is not the favoured understanding and practice of dune scientists and conservationists in NW Europe, particularly with respect to the sustainable conservation management of dynamic dunes. Production SNH 43, in the section ‘Guidance (routes to restoration) asserts that *“an over zealous approach to stabilization can (and has) led to loss of interest, especially for nature conservation”*. The work goes on to state that *“reversing the process is possible, but it can be fraught with difficulties”*. The proposal to stabilise at Menie Links therefore reduces future options and so does not accord with the principles of sustainable environmental management.
38. As an option of last resort in dire situations, such as threats to existing infrastructure features, loss of coastal defence qualities through mis-use of the dune area, or damage arising from excessive human use, dune stabilisation is available using hard or soft techniques. However, the dynamic approach to dune management is now well established and accepted, and application of this approach along with the concept of sustainability should avoid such crisis points.
39. Based on my professional experience, and for the reasons discussed in this precognition, the dune stabilisation measures described in Appendix 6.5 of the Environmental Statement are for the context of this proposal not within good practice in dune management that adopts sound ecological principles. As an example, the addition of topsoil to dune environments is damaging to the natural and conservation values.

40. Ritchie (SNH 44a) directs that management processes should be designed to work with change, and states that “*good practice for a mobile, changing, responsive environment must have at its core dynamic conservation, not static preservation*” (SNH 44a, p14). In contrast to this the proposal takes the clear stance that for the development to proceed at the location described, large scale stabilization of the Menie sand sheet and mobile features is required, even though it has taken sympathetic account of some of the mobile and dynamic dune features at the course design stage. Mitigation would be best achieved by avoiding the Menie sand sheet, mobile and dynamic dune features altogether and allowing the natural processes to continue to operate and develop.

Habitat Translocation

41. The scale of translocations proposed by the developer is very large at 19.4 ha within the SSSI and 35.1 ha for the development area as a whole (see production T50, section 7.1.2, page 26, paragraph 2). The developer recognises that “*it is not certain that such translocation can be done entirely successfully*” (see production T50, section 7.1.2, page 26, paragraph 5)

42. The location details of donor and receptor sites as part of the proposed habitat translocation programme are provided by the developer at only the indicative level in production T50 and the map ‘Ecology and Receptor Areas’ dated February 2008 produced by Hawtree Ltd. Details of the characteristics of donor sites and receptor sites are not detailed. Significantly, the developer does not give grounds for, nor detail what will go where, nor is there a sufficient assessment of suitable site condition matches for donor and receptor sites. Additionally, the proposal does not include an adequate assessment of what habitats currently occur at the proposed receptor sites and what impacts the translocations would have upon them.

43. The habitat translocation techniques, subsequent aftercare and monitoring are not detailed. Moreover, the lack of skills, experience and availability of specialist equipment to perform the translocations is recognized by the developer (see production T50, section 7.1.2, second paragraph). The developer also states that “*it is not certain that such translocation can be done entirely successfully*” (see production T50, section 7.1.2, page 26, paragraph 5). These factors alone combine to give grounds for significant doubt as to the prospects of success for the complex nature and large scale of habitat translocations involved in this proposal.

44. Translocation of dune habitats, especially wet dune habitats, is not well understood (SNH 49a). The established techniques employed on non-dune sites are not proven in terms of success for dunes. For instance, moving dune vegetation from a donor to receptor site successfully is full of significant practical difficulties that reduce the likelihood of success. Not least of these difficulties are those related to the nature of dune soils, sand, gravel and cobbles in them having a low degree of coherence to form turves able to be translocated, and the intimate connection that the translocated vegetation had with its donor site micro and meso topography, soils and hydrology.

45. Production T64 sections 5.1, 5.1.1 and 5.1.2 (p4) and sections 5.2 and 5.3 (p5) describe the thin top soils present throughout the dune area, and the natural granular soils that “*where encountered either directly from ground level or beneath the topsoil*”. This accurately describes that dune soils are typically thin and raw comprising unconsolidated non-cohesive sands as a sole or primary component. Dune soils as a whole are notoriously under studied and poorly understood. This makes their reaction to translocation, if at all possible, difficult to predict. The presence of rare bands of gravel and occasional cobbles (see production T64 section 5.1.2, p4) in the soils at Menie Links makes successful translocation and restoration / re-creation of site conditions particularly difficult, especially in context of the complex groundwater conditions, local variations and the effect this has on the dune habitats. The ‘algal skin’ found on the sand surface of damp dune slacks, and described in the precognition by Angus, is an example of the product of complex interactions of various site conditions, and is a feature that is fragile and significantly challenging to translocate.
46. Moving dune vegetation in large turves (which increases possibilities of success, see production SNH 49c) is problematical due to the nature of the sand, gravel and cobbles found in these dunes. Production T50 section 7.1.2 (p26) details the results of trials attempting habitat translocation on the site. It recognizes a failure in maintaining turves intact, in particular those containing “*a high volume of shingle and cobbles, leading to breakage and stone loss*” (see production T50 section 7.1.2 p26, third paragraph). These soil conditions are likely to be particularly frequent in the dune slack habitat. Dune slacks are formed as a dynamic environment where sand is blown away until damp sand associated with the groundwater level, is exposed. This surface can and does include gravel / cobble deposits at this site. Dune slacks constitute a significant part of the proposed habitat translocation programme following potential loss through the proposed golf course construction.
47. In section 6.10 of the Environmental Statement the developer recognizes that the formation and function of new dune slacks is related to the dynamic dune processes of the Menie sand sheet as it moves northwards leaving deflation surfaces behind. The precognition provided by Hansom accounts for this dynamic change. Section 6.10 of the Environmental Statement outlines the complexity and varying nature of new dune slacks as they are formed in the wake of a sand sheet, stating “*these retreat features develop in time in to stabilized deflation ‘plains’ of different size, shape and altitude*”. This is a process that simply can not be replicated through habitat translocation, and especially not within an essentially stabilized dune landscape that results from golf course development.
48. Production T50 section 7.1.2 (p26) variously claims short and medium term (terms which are not defined by the developer) success for habitat translocation trials as a means to mitigate habitat losses. This is a bold claim, especially for medium term success and as the translocation trials are understood to be less than one year old. Data are not presented to support these claims. As residual impacts are being considered it is conspicuous that

the developer does not mention the long term. I have viewed some of the trial translocation areas in the field, especially those for the dune slack habitats. As a result, and after reading the description of the trials in production T50, I am concerned that based on their appearance they may not have been conducted in a controlled manner and therefore I am unsure that they have scientific rigor as trials.

49. As a principle, high value habitats should be conserved *in situ*, and translocation should not be considered (SNH 49c). This principle is not adopted by the proposal. Again, as a principle and not withstanding the constraints explained above, if translocation of dune habitats is to occur the site from which habitats are removed from must match the donor site's soils and hydrology (SNH 49c). The complexity of physical conditions in the dune environment at this site deems it unlikely to facilitate success.
50. The proposal treats habitat translocation as part of the habitat mitigation proposals and states "*the main mitigation method will involve habitat translocation*" (see production T50, p26 lines 2 and 3). As an approach, this is likely to be of limited success, and is therefore not likely to greatly reduce the significance and scale of the impacts caused by construction and operation.
51. Additionally, Anderson (see production SNH 49c) identifies as a principle that the significance of habitat translocation depends on the value of the site, and that site integrity can be significantly compromised for the highest value sites. Menie Links contain habitats of high quality both within and without the SSSI (see production T50, p25, section 7.1.1 and the precognition by Angus). Therefore, if habitat translocation is to be employed in this proposal site integrity would certainly be severely compromised.

Compensation

52. 'Compensation' is defined in the glossary of SNH 45 (p55) as "*measures taken to make up the loss of, permanent damage to, biological resources through the provision of replacement areas. Any replacement area should be similar to or, with appropriate management, have the ability to reproduce the ecological functions and conditions of those biological resources that have been lost*".
53. If compensation is pursued then success depends on difficult matters such as nature of site conditions, including the relationship between the soils and hydrology. Hydrological conditions are complex on the Menie Links, with significant meso and micro variations as a result of the variations in underlying glacial and marine deposits, combined with a varying and thin sand veneer. As argued previously, under such conditions the possibilities of success for habitat compensation seem unlikely.

Conclusions

54. The proposed mitigation does not adequately value the significance of dune dynamics and the associated process of ecological succession, particularly

dune slacks and their formation as part of the dynamic nature of the site. The mitigation proposed for the geomorphological and ecological interests does not take a long term, intergenerational, view and therefore does not accord with the principles of sustainability. The impacts must be viewed over an intergenerational time frame of at least high tens and preferably hundreds of years, and with full consideration of the required spatial limits to permit the function of natural dune dynamics. The unfettered operation of natural dune dynamics has given rise to the significant geomorphological and ecological interests present at Menie Links. These are detailed in the precognitions of Angus and Hansom.

55. The development proposal does not propose credible measures to mitigate for the severe adverse impacts on the dynamic dune processes, particularly the Menie sand sheet and the mobile dynamic dune features. The proposal for dune stabilization is particularly damaging, and the mitigation of grey dune and heath habitat establishment associated with the stabilization of the sand sheet should not be considered as having any relationship with mitigation. Dynamic dune processes are fundamental to the conservation values of the site and their loss is not mitigated. Establishment of the 'Menie Environmental Management Advisory Group' is not mitigation, but rather a step towards formulating potential mitigation.
56. As described by Hansom in his precognition, the naturally dynamic dune processes are of paramount importance for the long term functioning and sustained geomorphological values of the site and the associated ecological interests. The proposal would create a major adverse and lasting impact on dune dynamics and geomorphological features. This is not mitigated and will have adverse effects on the ecological interests of the site in the long term. This will result in a loss of value in the site.
57. Based on the previously and currently proposed course layout, ecological assessment and mitigation information relating to this proposal, there is a low degree of confidence in being able to adequately and successfully mitigate for the loss of the key dune habitats present on the site, as are described in the precognition by Angus. The established success rate for translocation of wetland habitats is considered low, and experience of translocation of dune wetland habitats is particularly scarce. This identified shortage of expertise in dune habitat translocation combines worryingly with the fact that specialist equipment for the task of habitat translocation under these conditions must be developed, if attempted. These uncertainties and shortfalls, taken together with the large scale of this operation (something not undertaken before in Scotland [see production T50, section 7.1.2, fifth paragraph] or Britain in my professional experience) indicates that there is the potential for failure resulting in considerable loss.
58. Even if habitat loss could be successfully mitigated or compensated, the continued existence, quality and new formation of key dune habitats, especially dune slacks, are intimately related to the unfettered operation of natural dune dynamics. The proposal denies this possibility.

59. Golf can rightly claim credit for conserving many important coastal dune sites over the last 100 years, for instance by providing a 'full stop' to harder development (SNH 44d). So, there is an important place for golf in coastal dune conservation, and *vice versa*. However, it is now broadly understood that new golf course development must choose sites carefully, give full consideration to the legal and environmental constraints and aim to achieve a sustainable future for both golf and the environment in which it is played. This golf course proposal clearly falls short of the requirement to protect the dynamic dune environment and therefore to achieve a sustainable future for Menie Links and its important natural values. As such this proposal would not be beneficial for dune conservation, nor the reputation of golf as a responsible environmental steward.