



An
Bord
Pleanála

Inspector's Report

PL20.244346

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Appendix No. 1

Report on Oral Hearing held on 9th, 10th and 13th June

Representations:

1. The following gave evidence or made representations:

For Galetch Energy Developments Limited:

Mr. John Kenny BL

Dr James Hodgson (Geophysics and Geology)

Ms. Karen-Lee Ibbotson (Geology and Hydrogeology)

Mr. Kevin Collins (Ornithologist)

Dr William O'Connor (Ecologist)

Mr. Gavin Daly (Town Planner)

Mr. Mike Simms (Acoustics)

Mr. David Kiely (Engineer of Jennings O'Donovan and Partners)

Mr. Ger O'Donohoe (Environmental Scientist) (Via Skype)

Mr. Edward Zakrajsek (Wildlife Biologist and Manager DeTect Global Ltd.) (Via Skype)

For Mr. Eamonn Kelly and the Wind Turbine Group South Roscommon:

Ms. Eugenie Houston BL

Mr. Eamonn (Ted) Kelly

Ms. Rose Burke (Engineer)

Professor Paul Johnston (Hydrogeologist)

For Skyvalley Concerned Residents Action Group:

Mr. Liam Kildea

For the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs:

Mr. David Tierney

For Planning Authority:

There was no representation on behalf of the Planning Authority on any of the three days of the Oral Hearing.

Observer:

Mr Peter Sweetman.

**Submissions on Behalf of Mr. Kelly and the Wind Turbine (Action) Group
South Roscommon:**

Submission by Ms. Burke:

2. Mr. Burke stated that she was a chartered structural engineer with over 35 years experience. She had expert knowledge of the local turloughs. She had been examining those for 20 years. She had also received advice from a local historian and environmentalist. She expressed the view that it was important to have a good understanding of flooding and groundwater flow in the local situation. She referred to the previous winters flooding in the area when the R357 was impassable for five months. The road to Fairhill was also impassable. She submitted that Roscommon County Council had records to show the details of this extensive flooding in the area. She showed a video and slides indicating flooding in the area. (One of the slides indicated Turbine No. 6 in Phase 1 in a flooded area). She referred to the significant rate of increase in the level of water in the turloughs in a short period of time. She further referred to difficulties in establishing the catchment of the Killeglan water

supply and to the GSI/Roscommon County Council Report (2003) on that scheme. She referred to the request for further information on the Phase 2 development in relation to this issue and submitted that the response from WaterWise did not adequately cover the issues raised. She considered the mitigation measures proposed to be vague and ill-defined.

3. Ms. Burke submitted that excavations may not be limited to 1 metre for the access road depending on what is encountered. She questioned who would decide the timing of excavations. Concentrated inputs of groundwater would be most undesirable in karst areas. She disagreed with the statement in the planner's report to the effect that the questions asked in the additional information request had been adequately responded to. She submitted that whilst the fact that the hydrology was highly complex was acknowledged in the documentation after six years the conceptual model has not been further developed. With reference to Phase 1 in the Dysart area she referred to regular occurrences of flooding on the R357 and on the Fairhill Road. There is however very little reference to flooding in the Phase 1 EIS, apart from a reference in the ornithological report. The request for further information did refer to flooding. In the response however there was no reference to the effect of the development on flooding. She referred to a history of flooding in the area and people having to leave their homes. She submitted that there was flooding at proposed Turbine No. 6 in 2014 and the 2009 flooding was greater. Roscommon County Council has further raised the level of the access road to Fairhill following flooding in the recent winter.

4. Ms. Burke submitted that drainage in the area had changed following arterial drainage schemes in the second half of the 19th century. She submitted that on the earlier ordnance maps flooding was not indicated at Dysart. She submitted that man-made efforts to relieve flooding had caused the flooding at Dysart. She queried the WaterWise Report questioning if the Ballyglass River draining Cuilleenirwan Turlough was a man-made drain. She submitted that small actions can have a major effect in terms of drainage of such areas.

5. Ms. Burke referred to the recent raising of the road leading to Fairhill. She was critical of the manner in which the road had been raised. She also submitted that the name of the townland i.e. Gortaphuil when translated from the Irish meant a field with holes. This indicated the karstic nature of the area. She submitted that the appellant had not at any point argued that the flooding at Dysart had predated the construction of the man-made drain which currently drains the turlough at Cuilleenirwan.

6. Ms. Burke submitted that the materials used for the construction of the access tracks would have to be compacted in order to support the vehicles carrying concrete to the turbine bases. She submitted that the permeability of these lands would be altered and that in Phase 2 there would be a total of 34 acres of impeded permeability.

7. Ms. Burke submitted that there are a number of flaws in the applicant's submissions. She considered that the area of the site impacted upon had been underestimated. She also questioned the arguments made in relation to the shallow depth of excavations and the argument that there would accordingly be no impact on hydrogeology.

8. Ms. Burke referred to and submitted a number of technical papers indicating the difficulties of carrying out development and predicting impacts in karst areas. She referred to affidavits submitted by Mr. Usher in the judicial review on behalf of the applicant. These referred to the necessity for sealing voids etc. and various good practice construction methods. She agreed that to carry out construction in such circumstances would require compliance with good construction techniques. She considered however that there is too much doubt and too much unknown in relation to the hydrogeology that it could not be concluded beyond reasonable doubt that there would be no impact.

9. Ms. Burke in responding to the applicant's submission in relation to the connection to the national grid referred to the EirGrid 25 document prepared by EirGrid. She noted that it is stated in Appendix A of that document that the normal

connection to the national grid from energy facilities is by means of overhead lines. The document referred to some areas where undergrounding might be required. None of those apply in the current case. Ms. Burke referred to Annex A of the Networks Ireland/EirGrid 25 document. This indicated that there are 4,810 kilometres of 110 kV overhead lines whereas there is only 80 kilometres of underground cables. This represented only 1.6% of the total network. She considered that this supported the previous submissions in relation to the likelihood of the connection being by means of over-ground wires.

10. Ms. Burke, in responding to the applicant's submissions, referred to a number of technical articles and journals which refer to the importance of the upper layers and epikarst in the hydrology of karst areas. The unsaturated zone of the topsoil etc. played an important role in groundwater recharge. She submitted that the applicant's premise, that because the foundations would be shallow there would be no impact, was incorrect.

Submission by Professor Paul Johnston:

11. Professor Johnston stated that he had been a professor in hydrology and hydrogeology in Trinity College for 25 years. Prior to this he had worked at Imperial College in London and at University College Galway. He had 40 years experience in wetland hydrology and recently in turlough hydrology. He submitted that groundwater is the driver of the hydrology of the turloughs and the conservation objectives for which the turloughs had been designated. Groundwater is an issue in all sorts of development in Roscommon and it is a very vulnerable resource. Turloughs are fed by groundwaters and if the groundwater is impacted upon this will impact upon the turlough. Turloughs are in effect groundwater arriving at the ground surface. The turloughs are fed by groundwater. He submitted that the ecology and vegetation in the turloughs depend on the frequency etc. of flooding.

12. Professor Johnston questioned whether or not enough is known about the foundations, roads etc. in the proposed development and how these would impact on

recharge of the turloughs. The impact can be in quantity or quality terms. Karst is a very difficult environment in which to carry out investigations. He submitted that drilling boreholes may miss the conduits in the karst. If, however, one measures the hydraulics or the response of the turlough to rainfall it will give a good indication of the response of the turlough. He submitted that whilst geophysics is a useful tool it did not provide a definitive resolution. He considered that in spite of the few additional boreholes which had been drilled since the previous decisions no serious investigation of the hydrogeology had been carried out. He submitted that through measurement of the hydraulics i.e. the response to rainfall, one can get a good indication of the response of the turlough and of the catchment.

13. Professor Johnston referred to some research which he had been involved in in relation to Four Roads Turlough on behalf of Galway County Council in this regard. He considered that, in spite of the few additional boreholes which have been drilled since the previous decisions, no serious investigation of the hydrogeology had been done in the current cases. He submitted that there is a way of investigating the issue and so ensuring that the impact on the SAC is investigated. He did not doubt that foundations could be designed and constructed to support the turbines but there is very little hydrogeological investigation carried out to indicate what the effect on the turloughs would be.

14. In response to questions from Mr. Kenny, Professor Johnston stated that he did not consider that it is adequate to assume that there is a hydrological linkage between the sites and the turloughs. He considered that it is necessary to investigate the nature of this link. (Professor Johnston's responses to Mr. Kenny are dealt with in more detail in Mr. Keohane's report on Hydrogeological and Hydrological issues which is attached to this report). In response to a question from Mr. Keohane, Professor Johnston stated that whilst he agreed that the additional investigations, suggested in the Jennings O'Donovan Report, would be useful these recommendations did not include the type of hydrogeological investigations which he had referred to.

Submission by Mr. Eamonn Kelly:

15. Mr. Kelly stated that he was one of 16 children and had been born and raised in the area. He referred to caves which previously existed near the centre of the site of Phase 1. These, however, could no longer be seen. He showed a slide of himself standing by a quarry face of karstified rock with conduits at lower levels. He also showed a slide of a borehole which he submitted was located about 600 metres to the south-west of the Phase 1 site. This borehole had supplied water for the area in the past. He initially referred to it as being 150 metres deep but later in response to a question from Mr. Keohane clarified this as 150 feet. The water level fluctuated greatly in this borehole depending on the season. He referred to between 20 and 80 feet of lining being required for bored wells in the area.

16. In commenting on the visual impact of the proposed development Mr. Kelly referred to all the villages in the distance which his father used to point to him when looking outwards from their lands. He stated that the Devils Bit in County Tipperary could be seen from the lands. This is 100 kilometres away. He submitted that this gives an idea of the potential visual impact of the wind farm. He stated that he had lands close to the Phase 1 development. These lands are 250 metres from the nearest turbine. Mr. Kelly stated that the borehole to which he had referred linked to an underground stream rather than a normal well. The water level could be as high as 70 feet and as low as 3 feet in October.

Submission by Ms. E Houston BL:

17. In her closing submission, on behalf of South Roscommon Wind Turbine Action Group and Mr. Kelly, Ms. Houston stated that the correct legal criteria against which the application had to be judged were those set out by Ms. Finlay Geoghegan at paragraphs 40 and 41 of her judgement. She submitted that it was noteworthy that the County Council had not taken part in the proceedings. She stated that it could be implied accordingly that the County Council accepts that both approvals which it had granted were incapable of being sustained. (Mr. Kenny in responding on behalf of

the applicants stated that it was not fair of Ms. Houston to invite inference to be drawn on the failure of Roscommon County Council to attend the oral hearing). Ms. Houston submitted that the test set out in the legal judgement had not been met. She summarised the conclusions of Professor Johnston in relation to hydrogeology to the effect that no hydrogeological investigations had been carried out to date. She submitted that there is a significant amount of work to be done before the certainty required of the Appropriate Assessment as set out of the Directive could be met. She submitted that the Board was not in a position to grant planning permission and accordingly she invited the Board to refuse planning permission for the developments proposed. (In her closing submission Ms. Houston also submitted that it was the view of Mr. Kelly that the turbines of themselves would constitute clutter in terms of interference with the proposed Merlin Radar mitigation measure).

Submission by Skyvalley Concerned Residents Group:

18. Mr. Liam Kildea for the Skyvalley Concerned Residents Group stated that he supported the submissions made by the South Roscommon Wind Turbine Action Group in relation to hydrological and hydrogeological issues.

Submissions and responses of applicant:

19. In responding to points raised by Ms. Burke in her submission, Mr. Kenny on behalf of the applicant submitted that the photomontage purporting to show Turbine No. 6 in a flooded area submitted by Ms. Burke had not been accepted by the judge in the High Court case. Mr. Kenny also pointed out that there is a difference of opinion between Ms. Burke and the applicant in relation to whether or not Ballyglass River where it drains Cuilleenirwan Turlough is or is not a man-made drainage channel. In response to a request to clarify whether or not she had submitted that the access road to Phase 1 flooded Ms. Burke indicated that she was referring to the existing public access road rather than the proposed access to Phase 1. She submitted that the public access road off which access to Phase 2 would be provided had been flooded earlier in the year.

20. In responding to Ms. Burke's submissions, Mr. Kenny submitted that the issue which she had raised in relation the potential impact of the Phase 2 development on the Killeglan groundwater supply scheme had been dealt within pages 7 – 11 of the response to further information submitted to Roscommon County Council.

21. Mr. Kenny, having been instructed by his clients, stated that the location of Turbine No. 6 in Phase 1 was close to the water level experienced in the early part of the year. It was not clear whether or not the water level exceeded the location where Turbine No. 6 was proposed. He pointed out that there was a condition in the decision of the Planning Authority in relation to the construction of this turbine.

22. In response to questions from the inspector, Mr. Kiely of Jennings and O'Donovan Engineers clarified that references to core boreholes at Turbines 3, 8 and 9 contained in the additional data submitted in May, 2015 in relation to the Phase 2 development should have been to Turbines 3, 8 and 19. In response to the inspector's query as to whether or not the cavity indicated in the borehole at Turbine 8 could be described as a fissure. Mr. Kiely stated that possibly but additional investigations would be required to establish the extent of the cavity or fissure at this location. In response to a query as to what the proposal was in relation to this turbine he stated that additional investigations would be required to establish the extent of the cavity or fissure. In the event of it being an extensive fissure the turbine could be micro-sited away from the fissure. If, however it was localised piled foundations could be provided around the cavity. In response to it being pointed out by the inspector that the NIS for the Phase 2 development had indicated that in the event of a fissure being identified in the footprint of any of the turbines such turbine would be omitted, Mr. Kiely stated that in the event of a significant cavity or fissure being identified in any of the turbine footprints such turbine would be omitted.

23. (The responses by Mr Hodgson and Mr Kiely to questioning from Mr. Keohane are referred to in Mr. Keohane's report on hydrogeology and hydrology.)

24. Prior to the completion of Day 1 of the Oral Hearing the inspector posed a number of queries and sought clarification on a number of issues from the applicant. On Day 3 of the Oral Hearing these points were responded to in a written submission signed by Mr. Darren Sherry on behalf of Galetch Energy Developments Limited which was read into the Oral Hearing mainly by Mr. Kenny. In addition to responding to the queries from the inspector, the report also includes some responses to questions from Mr. Arnold and some further points of clarification arising. Also included are proposed or suggested conditions for both applications and concluding comments from the applicant. Responses, where relevant, are referred to in the inspector's assessment of the application. The responses to Mr. Arnold's questions together with responses given in the Skype interview with Mr O'Donohoe are also referred to, where relevant, in Mr. Arnold's report.

25. In responding to the inspector's questions the applicant indicated that the applicant is still awaiting a response from the Commission for Energy Regulation to determine when the next round of grid applications will be processed. It is anticipated that a policy will be in place in 2017. The applicant intends to enter into a contestable connection agreement with EirGrid to connect to the national grid. More detailed information of the route of the connection through the built up area of Athlone was submitted as the inspector had referred to a lack of clarity in the plans submitted with the revised EIS for the connection which had been submitted on 18th May 2015. The connection would be by way of an underground cable along the public road.

26. The applicant submitted that a condition in relation to a community fund would be appropriate having regard to the terms of Section 37G (7) (d) of the Planning and Development Act 2000. Reference was made to previous decisions of the Board in this regard. (The inspector queried whether the cases referred to and the section of the legislation quoted related to strategic infrastructure developments rather than normal appeals against planning authority decisions).

27. The applicant clarified that the archaeological walkway proposed in Phase 1 would be along the access track to the turbines and would not provide access to the monuments.

28. The applicant confirmed that a micro-siting buffer of 20 metre radius only, rather than 50 metres is being sought. It was submitted that the 4 hectares of calcareous grassland referred to in the Habitat Management Plan for Phase 1 was within the blue line as outlined and Condition No. 5 of the Board's original decision required that all environmental, construction and ecological mitigating measures set out in the environmental impact statement and in the further information responses shall be implemented. The applicant was happy to accept such a condition.

29. The applicant confirmed that the rate of revolution of the blades of the turbines was 5 to 14.05 revolutions per minute and that the rate given in the Bat Reports i.e. 5 to 21.5 revolutions per minute was included as a conservative assumption. It was confirmed that no specific noise assessment was carried out at the archaeological sites as such sites are not classified as noise sensitive locations in accordance with the Wind Energy Development Guidelines for Planning Authorities 2006.

30. The applicant confirmed that in the event of both planning applications being granted permission the phases would not be built simultaneously but on a phased basis. The applicant would be happy to accept a condition requiring a phasing agreement with the Planning Authority.

31. In responding to queries from the inspector in relation to different figures given in the documentation in relation to total savings in carbon emissions the applicant stated that the different figures resulted from different methods used in calculating the relevant savings.

32. The applicant also submitted that sufficient information had been provided in order to allow the Board to conduct an assessment of the cumulative ornithological impacts of Phase 1 and Phase 2 i.e. the two separate applications.

33. The documentation submitted by the applicant on the final day of the oral hearing also contained a copy of the inspector's report on file reference PL29S.PA0024 and of the decision of the High Court in the case between People over Wind, Environmental Action Alliance Ireland and An Bord Pleanála. (Decision of Mr. Justice Robert Haughton dated 1st March, 2015).

34. The responses to the inspector's questions which are contained in a folder submitted to the Oral Hearing were read into the record of the hearing generally by Mr. Kenny, Barrister on behalf of the applicant. The response to the first issue addressed i.e. queries in relation to the connection to the national grid were read by Mr. Donal Smith an electrical engineer and an adviser on grid connections. Pages 21 and 22 which were read by Mr. Kenny contained the applicant's overall submissions in relation to the application.

35. The applicant requested the Board to grant planning permission for both Phases 1 and 2. It was emphasised however that the 2 phases are standalone and independent projects and the refusal in respect of one does not and should not necessarily entail a refusal in respect of the other. The applicant submitted that there would be no significant impacts in respect of hydrology or ornithology and there would be no integrity level impacts on any Natura 2000 sites or species.

36. In relation to hydrology it was submitted by Mr Kenny that the applicant had always assumed a hydrogeological link between the sites and the surrounding turloughs. The development would not interfere with the recharge mechanisms of the turloughs. All karst features would be avoided. If it was not possible to avoid such features by micro-siting the relevant turbine would be excluded. It was submitted that it would be possible to achieve the objectives of avoiding sedimentation being introduced into ground waters and avoiding interaction with the karst landscape as referred to by Professor Johnston.

37. In respect of ornithology the applicant submitted that the site is not a habitat for any species of significant concern. It was submitted that surveys in excess of those

required by the Scottish National Heritage Guidelines established beyond any reasonable scientific doubt that there would be no impact on the integrity of any Natura site or species of conservation concern. The sites are outside the buffer zones for the Natura 2000 sites and surveys had demonstrated species of conservation concern only rarely overfly the sites and then at heights not swept by the turbine rotors. The collision risk modelling had demonstrated that the number of fatalities would be negligible. In order to mitigate even that low level of impact a state of the art radar system was proposed as a mitigation measure.

38. Mr. Kenny submitted that the appropriate test to be applied was that contained in the decision of Mr. Justice Haughton in *People over Wind and An Bord Pleanála* a copy of which was submitted to the Oral Hearing. The Court in that case approved the idea that technical details could be prepared and refined post consent.

39. In commenting on the draft conditions prepared by the applicant and indicated at Tabs 9 and 10 of the document submitted at the Oral Hearing Mr. Kenny stated that these generally reflected those of Roscommon County Council and the previous decisions by An Bord Pleanála. In the Phase 1 development there was a difference in the omission of the Roscommon County Council condition omitting Turbines 7 and 12. Mr. Kenny stated that the draft conditions did not provide for the omission of Turbines 7 and 12 in Phase 1. He submitted that the basis for the omission contained in the Roscommon County Council decision was the Development Plan for County Roscommon 2008 – 2014 which was no longer the operative Development Plan. He stated that the restriction is not contained in the current Development Plan. He drew attention to Condition No. 28 which relates to a community fund. He accepted that Section 37G (7) (d) of the Planning and Development Act 2000, as amended, referred to decisions on strategic infrastructure development. He submitted however that the general provision contained in Section 34(4) of the Act would allow the Board to impose a condition requiring payment to a community fund. An alternative viewpoint would be that a community fund forms an integral part of the planning permission. The developer would view the community fund as part of the

development in the same way as the substation etc. The developer accepts that this would be required as part of the permission.

40. Mr. Kenny submitted that the developer had also undertaken to avoid any karst feature which would be identified and which cannot be avoided either by micro-siting or by a construction solution. If neither of these is available, the turbine would be omitted.

41. Mr. Kenny told the inspector that the developer did not query any of the contribution or bond conditions contained in the Roscommon County Council decisions. The intention was that they are all reproduced in the draft conditions and it was not the applicant's intention to cherry pick but the intention was to replicate the decisions of the County Council. He noted that the condition in relation to noise had been modified to include a provision to the effect that the relevant criterion was the greater of the two levels indicated.

42. Mr. Kenny referred to the two legal cases included in the folder containing responses to the inspector's queries. The first was the case of Buckley v. An Bord Pleanála. He stated that this had been included in order to address the issue raised by the inspector when he queried if Turbine 17 in Phase 1 was still part of the proposed development. (The applicant had responded stating that it was) The second legal case included was the judgement of Judge Haughton in the case of People over Wind, Environmental Action Alliance Ireland versus An Bord Pleanála. He stated that this judgement had been referred to in the previous written correspondence. He stated that this referred to the appropriate test to be applied when considering granting planning permission.

43. In responding to a request for clarification by the inspector of the difference between Conditions 2 and 3 relating to the timescale of the permission and the timescale for decommissioning Mr. Kenny, on reflection of the questions posed by the inspector, stated that he agreed that the timescale referred to in Condition No. 2 was the timescale for carrying out the development. The timescale in Condition No. 3

was the period of time following commissioning of the wind turbines prior to decommissioning and removal of the turbines. Condition No. 2 gave a 10 year period in which to carry out the development. Condition No. 3 imposed a period of 25 years on the life of the development following commissioning.

44. In response to a question from the inspector in relation to the observation submitted by another wind farm company Mr. Kenny stated that his information was that this development was no longer proceeding. In response to a query as to whether or not the applicant wished to make any further submission in relation to the setback distance from adjoining land boundaries having regard to the national guidelines Mr. Kenny stated that his client had nothing further to add to previous submissions

Ecological and Ornithological Issues: Applicant's responses to questions:

45. None of the parties presented direct evidence in relation to ornithological issues apart from a presentation through Skype by a radar technician and biologist (Mr Edward Zakrajsek) in relation to the proposed Merlin Radar System which the applicant intended to use as a mitigation measure at both sites. Dr. William O'Connor with a PhD degree in Zoology and Mr. Kevin Collins an ornithologist responded to questions from Mr. Arnold, Mr. Tierney, Ms. Houston and the inspector in relation to ecological issues. Mr. Ger O'Donohoe responded to questions from Mr. Arnold and others in relation to ecology and the earlier surveys which had been carried out on the sites. The questioning of Mr. O'Donohoe was also carried through Skype. Dr Tina Aughney also responded to questions in relation to bats.

46. (Some responses to questions in relation to ecology posed by Mr. Arnold are contained in the responses to Questions 37, 38 and 39 in the document submitted and read to the hearing by Mr. Kenny on behalf of the applicant. These responses to the ecological issues were prepared in conjunction with Dr Pat Moran who was not in a position to attend the hearing. This information contains details of vantage points used in the surveys, the length of the surveys and the number of viewers per

vantage point during the survey work carried out. More detailed consideration of responses to Mr. Arnold's questions is contained in his reports which are attached.)

47. In response to questions from the Inspector Dr. O'Connor stated that the cumulative or in- combination effects of both Phase 1 and Phase 2 together had not been specifically assessed in the reports to inform the appropriate assessment prepared for both sites in 2012. This issue is covered in more detail in the written response to the inspector's questions received on Day 3 of the Oral Hearing. It is stated in this submission that in the applicant's view sufficient information has been provided in order to allow the Board to conduct an assessment of the cumulative impacts of Phases 1 and 2. It is submitted that there is no extra impact greater than the sum of the two individual impacts. It is also submitted that there is no important feeding or roosting area between the two proposed wind farms which would be negatively impacted upon because of the action of the two wind farms acting in- combination. It was submitted that Greenland White Fronted Geese are not known to feed or roost in the area of Phase 2 and the Phase 2 development would not have any impact on Greenland White Fronted Geese. Whilst there would be a limited loss of foraging habitats for Whooper Swans this type of grazing is widely available in the area. Whooper Swans have been seen moving between Ballyglass Callows and Lough Feacle. These are not Natura 2000 sites. The number of swans involved was well below internationally important numbers and the swans followed lower ground where no turbines are proposed. It was not considered that the two phases considered cumulatively would have a significant adverse impact on swans. It is further argued that there would be no cumulative impacts on the turloughs and consequently on the ecology of the turloughs arising from the carrying out of both phases of the overall development. It was submitted that in its previous decisions the Board considered that it had adequate information to grant permission and expressly conducted a cumulative assessment in respect of both applications. Additional information has been submitted since that time particularly in regard to ornithology and the grid connection.

48. In response to questions from the inspector, Mr. Collins stated that flight paths for Golden Plover had not been plotted. He stated that during his visits to the area the number of Golden Plover seen had been relatively small in comparison to what could be interpreted as numbers of national significance.

49. Mr. Kevin Collins referred to a recent study carried out by Mr. Richard Nairn in relation to the wind farm in Carnsore Point in County Wexford. This study indicated Greenland White Fronted Geese and Whooper Swans within 200 metres of the wind farm and Lapwing and Golden Plover within 100 metres. He was questioned by Mr. David Tierney as to whether or not this close proximity would result in endangerment of the birds in question. (Mr. Tierney questioned whether or not collision risk assessment based on survey work would adequately reflect the likely collision risks in such a complex situation. He also questioned whether or not the sighting of individual birds in the vicinity of wind turbines could be extrapolated to the impact on birds at a population level).

50. In response to questions from Mr. Arnold, Mr. Collins referred to the tables in the wintering bird survey of January to March 2013 setting out the findings of the survey and Figure 5 of the document which gives the vantage point locations used. He told Mr. Arnold that dawn and dusk surveys had been carried out but no observations were made at night. He told Mr. Arnold that the document contains a discussion on the movement of birds observed during the survey.

51. Mr Collins told Mr. Arnold that the collision risk modelling was based on 450 Whooper Swans per annum passing through the site. He stated that the table used indicates 45 birds flying through the site but the text indicates that the modelling had been done on the basis of 450. He stated that he considered the estimated mortality rates not to be of significance having regard to the numbers in the SPAs. He stated that Whooper Swans had never been observed at nationally important numbers at Louth Croan. The estimated mortality rate was 1 every 3.9 years. He stated that this was on the basis of a very precautionary calculation. He stated that no regular flight line of Whooper Swans had been recorded across either of the two sites. He did not

consider that there would ever be ten passes or 45 Whooper Swans per annum through the sites. He stated that the general pattern was for the Whooper Swans to roost on one of the turloughs and feed in lands in close proximity and they did not travel far from their roosting location. He stated that they never recorded regular flight paths across the sites. He stated that they had noted occasional passes between Lough Croan and the Thomas Street turlough but these were never in large numbers. (Dr O'Connor referred to the I-WeBS (Irish Wetlands Bird Survey) publication for 2004 to 2008 which indicated peak counts for Whooper Swans for the Suck of 256 and Lough Ree of 205. The South Roscommon lakes were not included as they were not at nationally important levels. Mr. Collins stated that Whooper Swans were not listed as a conservation interest in the Lough Croan SPA.

52. Mr. Collins told Mr. Arnold that one could clearly see the wind farm sites from Vantage Point 1 and Vantage Point 2 used in the 2014 – 2015 survey. He stated that they had never seen Whooper Swans flying over the site travelling from Thomas Street to Lough Croan but by a process of accountancy, having regard to the numbers of swans present, they had assumed that on one occasion such flight had been made. He stated that they had never recorded Greenland White Fronted Geese anywhere away from the River Suck site during the 2014/2015 survey. He stated that 11 hours had been spent on Vantage Point 1 and 9 at Vantage Point 2. Mr. Collins stated that the Phase 1 and Phase 2 reports of the Wintering Bird Surveys 2014/2015 were based on the same survey with the focus in the reports being on the particular phases of the development. The basis survey material is the same. Mr. Collins told Mr. Arnold that for Phase 2 five hours monitoring had been carried out at Ballyglass and 18 hours at Lough Feacle. He stated that the bulk of this survey was a general one to discover what birds were doing in the area. He stated that full day surveys had been done as part of the overall survey work. Table 2 of the document indicates the sites which were visited.

53. In response to questions from Mr. Tierney on the hypotheses that there would be not more than 10 passes in any year, Mr. Collins stated that they were never sure of

more than 1 pass in any of the surveys. There was no indication of any regular flight path over the sites. He submitted that Lough Croan appears to act as a self-contained location with birds feeding close to the lake. He did refer to a flight path which they had observed in the 2013 survey from Brideswell Grassland to Coolagarry Lough. This flight path did not involve crossing any of the proposed development sites. In response to a question from Mr. Tierney as to how confident he could be that there was never more than 10 passes in any season in the past 25 years or there wouldn't be more than 10 passes in the next 25 years having regard to the variable weather conditions which might pertain, Mr. Collins stated that from the survey work they had carried out and the previous surveys of Dr Moran, they were satisfied that there would be few passes over either site. He submitted that on a biological basis there was no need for the swans to pass over either site. He stated that the only possible method of investigation was to survey and to base conclusions on that.

54. In response to questions from Mr. Tierney, Mr. Collins stated that he was familiar with the literature in relation to the heights at which Greenland White Fronted Geese and Whooper Swans may fly on migration. He stated that Greenland White Fronted Geese may fly at exceptional heights and Whooper Swans had been seen at an altitude in the order of 17,000 feet. He accepted that the range of flying heights of the birds overlap with the rotor sweep of the turbines. Mr. Collins and Dr O'Connor stated that their surveys did not indicate Whooper Swans or Greenland White Fronted Geese commencing migration from the turloughs in the vicinity or any congregation of birds which would indicate commencement of migration from the area. They submitted that the birds had moved out of the area prior to the migration season. Mr. Collins accepted a suggestion from Mr. Tierney to the effect that surveys carried out at dusk and dawn could miss the migratory paths of some birds such as Shovelers or other wintering water birds which might travel in low visibility or at night. He stated however that nothing arose to indicate that the wind farms were in the line of any migratory paths.

55. Dr O'Connor told Mr. Kenny, for the applicant, that they had not seen any evidence of there being a regular flight pattern over the sites for any species of bird. He also stated that in terms of the use of the radar mitigation measure there would be no difference between the flight of migratory birds and the normal movement of birds during the wintering period. He told the inspector that the risk assessments carried out had not taken account of a radar mitigation measure, such as that proposed, being in place.

56. Dr O'Connor in response to questions from Ms. Houston accepted that some birds move and migrate at night. He accepted that all water birds can migrate at night. In response to a question as to why survey work had not been carried out at night time Mr. Collins submitted that they were satisfied that they understood the movements of the birds in the area and that the geese and swans did not move at night. They had identified Shovelers in Lough Croan but the other turloughs were not suitable habitats for them so they would not move from Lough Croan to the other turloughs. In response to a suggestion from Ms. Houston that their survey investigations were incomplete in the absence of night time survey work, Mr. Collins submitted that he was satisfied from their 4 years survey work that they understood the movements of the birds in the area. He considered the level of survey work to be sufficient to give them a good understanding.

57. Dr O'Connor told Ms. Houston that their full methodology for the survey and investigations were set out in the relevant reports. Mr. Collins accepted that they did not know what happened at night. Dr O'Connor stated that reference to birds flying at night related to migratory flight patterns. He told Ms. Houston that the basis for using a figure of 450 birds passing through the site in the collision risk assessment was that the maximum number seen on any occasion in Lough Croan which was 45. In response to Ms. Houston's submission that Dr Moran also had not carried out any surveys at night it was submitted that Dr Moran's surveys coincided with the expected movement times of the birds. Dr O'Connor stated that night surveys would not generally be used for wind farm assessment. He alluded to the difficulties of night

surveys where it is difficult to identify numbers of birds etc. He referred to the possibility of using radar for this. He stated that the normal pattern for the Greenland White Fronted Geese and the Whooper swans was to roost at night and then feed in fields during the day. The Golden Plover however may feed at night. (Mr. Tierney referred to the possibility of geese and swans also feeding at night. He, also, referred to a situation where radar was used to monitor night movements of birds in proximity to a proposed development).

58. Dr O'Connor in responding to Mr. Tierney's query in relation to peak counts of Whooper Swans in Lough Feacle stated that having reviewed the documentation he noted that on the 3rd February, 2011 there was a peak count of 203 Whooper Swans at Lough Feacle. A count later in the evening indicated 42. Mr. Collins for the application submitted that the relevant surveys for the lakes in the area stated a total figure of approximately 200 for the relevant period. Their surveys indicated a total of approximately 180. (Mr. Tierney submitted that the count on 3rd February, 2011 would have been close to the threshold of international significance which at that time was 210. In response to a question from Mr. Kenny for the applicant he stated that the numbers of Whooper Swans have been increasing and the current threshold for international significance is 270 and 150 for national significance. These figures are based on 1% of the flyaway population and 1% of the national population respectively).

Presentation by Mr. Edward Zakrajsek:

59. Mr. Zakrajsek gave a presentation with the aid of some power-point slides. The Merlin Avian Radar System which would be supplied by the DeTect Company is indicated on the slides which are attached. He submitted that the system can detect and track birds on a 24 hours/7-day week basis at night in fog and in precipitation. He submitted that the system provides a relatively complete picture of bird activity over time and space. Birds are detected in size categories and not by species. The radar antennae scan approximately every 2.5 seconds. The system filters out stationary clutter such as buildings, trees, terrain etc. The idea is to detect moving

objects. He submitted that the system typically detects small birds out to a range of about 3.5 kilometres. Large birds such as geese can be reliably detected beyond 7 kilometres. He stated that it takes 8 to 10 seconds to start tracking a flying bird within the radar viewshed. Mr. Zakrajsek stated that the system can be used for pre-construction monitoring and post-construction monitoring. It also can be used as a risk mitigation measure in an operating wind farm. In the latter system there is a radar activated turbine curtailment and/or deterrent action. Custom risk control parameters are built into the system based on pre or post-construction data. The control rules can be modified for the system. The rules set are specific to each application. Curtailment can be automatic or based on a manual system. The rule sets can be redefined. The mitigation technique minimises bird mortality and turbine downtime by targeting high risk periods in real time.

60. In commenting specifically on the Seven Hills wind farm i.e. the applications under consideration, he stated that Whooper Swans and Greenland White Fronted Geese are large birds so they could easily be detected by radar. He stated that at the flight speeds involved there would be time for the turbines to be idled as the birds approach. The turbines could be curtailed when geese or swans are detected crossing into the protection zone.

61. In response to questions Mr. Zakrajsek stated that he was not aware of any peer reviewed research into the use of the system as a risk mitigation measure. He stated that smaller birds could be detected out to 2 nautical miles or 3.7 kilometres. Larger birds could be detected up to twice that distance. He stated in response to questions that bats could be detected but the difficulty would be in distinguishing if they were bats. They had not used the system for detecting bats beyond the 2 nautical miles distance he had referred to. Mr. Zakrajsek in responding to questions stated that visibility of the radar system depended on line of sight. Birds behind buildings, trees or hills could not be detected. The radar system however would be set at a height higher than normal eye height and so would have a greater visibility. He stated that moving birds could be detected down to ground level provided the ground is visible.

Birds could be detected up to an angle of 30 degrees. He stated that the S band radar system, which was that envisaged for the sites, was less subject to interference from rainfall. Rainfall was also more likely to interfere with the movement of small birds rather than larger ones such as swans or geese. He stated that he had visited the sites and considered that they are suitable for the use of the radar system proposed. He stated that in the event of birds flying into the wind farm site itself and landing there the turbines would recommence after the scheduled shut down time but birds would be detected again after an 8 to 10 second period if they re-commenced to fly.

62. In response to a question as to what period of time, in terms of number of years/ seasons data, was required to allow for the rules which are suitable to the site to be set, Mr Zakrajsek stated that for less complicated situations shorter periods would be adequate. In a more complex situation a longer period would be desirable. The more variable the situation is the longer the period required is. In the past they had often only had access to one season or one year data. He stated however that one could study a site for 30 years and still be surprised. Mr. Zakrajsek stated that the presence of water on the ground did not per- se result in clutter interfering with the radar system. He stated that water was a good surface above which to detect movement. Birds over water could be detected when they began to move. In response to a question from the inspector he stated that there is no wind farm in the United Kingdom or Ireland where the Merlin Avian Radar System is used as a risk mitigation measure as proposed in the current application. He stated that the proposal is to have one radar unit on each of the sites.

63. In the written response by the applicant to questions raised at the Oral Hearing which was read into the record of the hearing by Mr. Kenny a clarification on Mr. Zakrajsek's evidence and the Merlin Radar System is referred to at page 20. It is stated that Mr. Zakrajsek wished to clarify an element of the system which was queried. He submitted that if birds of concern fly into the buffer zone around the wind

farm it is feasible to prevent the turbines from restarting until the birds had left the buffer zone again. This could be done automatically or by human verification.

Mr. O'Donohoe's responses to questions:

64. In a Skype presentation by Mr. O'Donoghue, (Ecologist) who had been involved in some of the earlier surveys, responses were given to questions raised by Mr. Arnold and Mr. Tierney.

65. Mr. O'Donoghue told Mr. Arnold that the criteria used for the ecological classifications were based on the criteria given by Fossett. Guidance from the European Union was also used in the classifications. He told Mr. Arnold that any information on a field by field basis of the ecological classifications was contained in the EIS. Aerial photography had been used to initially identify the area of improved grasslands. He told Mr. Arnold that he had not done any quantification of the hedge enhancement and tree planting which had been referred to. This would have to be cross-referenced with the landscaping proposals. The documentation, however, referred to species which would be suitable but they did not get into detail of where the planting should be. In response to a question as to whether or not the loss of any scrub would be mitigated, Mr. O'Donoghue stated that some of the species specified were low growing species. In relation to the differentiation between the classification of the unimproved grasslands in the Phase 1 and Phase 2 developments he stated that the basis for the classification is set out in the EIS. He referred to the presence of orchid rich grassland in this context. He told Mr. Arnold that the invertebrate survey had been carried out by himself and by another person whose basic qualification was in ecology. He stated that all the information available was contained in the EIS. He stated that some netting had been carried out but he had no information on the number of samples.

66. In response to a question from Mr. Tierney as to whether the hedgerows and trees to be planted could impact on the proposed radar bird mitigation facility, Mr. O'Donoghue stated that the species of planting suggested were similar to those

which already existing in the area. He stated that there had been some mention of ash in the Phase 1 development and there were some trees in lands in this area. He stated that this would need to be co-ordinated with the landscaping proposals. He referred to the possibility of this being conditioned by An Bord Pleanála. In response to a question from the inspector in relation to the long-term management of the proposed 4 hectare grassland area in Phase 1 Mr. O'Donoghue stated that he could not recall any reference to cutting of the grass. A grazing regime would be the normal method for control and he referred to the system in operation in the Burren in County Clare in this regard.

Responses of Dr Tina Aughney (Bat Expert) to questions posed by Mr. Richard Arnold, the Inspector and others:

67. Dr Aughney told Mr. Arnold that the bat scaring radar technology referred to in the documentation related to studies being carried out by Bristol University. Since the documentation was produced this technology had not proved viable and it was no longer proposed. She considered that the mitigation measures of curtailment of the turbines and the removal of turbines to a minimum of 50 metres from walls or hedges are adequate. She stated that in the Phase 1 development it was important that the separation distance applied in relation to Turbines 3, 4, 6, 8, 9, 10, 11, 12, 13, 14 and 16. She stated that only in the case of T6 is the recommended separation distance being complied with in the current proposal. She stated that micro-siting could potentially increase the separation distance by 20 metres. She stated that as a last resort the mitigation measure would be to remove any linear features from the 50 metre zone of the turbines referred to. She stated that she did not have the information to hand to establish for which turbines micro-siting would result in the 50 metres separation distance being achievable. In relation to Phase 2 she referred to Turbines 3, 4, 6, 14, 15, 17, 18 and 19 where the distance was less than 50 metres. She referred to Table 5.8.1 of her reports on the 2 cases which contained details of separation distances. She referred to the removal of linear features as a last resort.

She stated that it is important that the linear features were continuous outside the 50 metre restriction zone.

68. In response to a question from Mr. Arnold as to whether or not bat detectors at 8 metres high would be able to detect bats at the rotor and blade levels of the turbine. Dr Aughney stated that she considered that they would be adequate to detect the relevant bat species which would be flying at this level. Dr Aughney told Mr. Arnold that she did not have any numbers available in relation to bat mortality rates and how such rates might affect the bat population in the area. She considered that compliance with the mitigation measures she referred to i.e. separation distance and curtailment of turbines at low wind speeds would ensure that mortalities would be significantly reduced.

69. In response to questions from the inspector as to whether the locality was particularly suitable or important for bats from a national or regional perspective Dr Aughney stated that it was a typical lowland agricultural area in South Roscommon. The Common Pipistrelle would be the common bats in the area and the other species referred to would not be common in the area due to the absence of dense tree lines or water bodies. Agricultural buildings in the area would facilitate roosting but it would not be a high value area for bats. There would however be a number of bats typically travelling through the area.

70. In response to a question from the inspector as to whether having regard to Table 5.8.1 of Phase 1 the majority of the turbines which she had referred could not be relocated outside the 50 metre buffer zone within the 20 metre micro-siting proposed, Dr Aughney agreed that this was so. In response to a query from the inspector in relation to her recommendation about the cut- in speed being increased for periods prior to dawn and dusk, Dr Aughney stated that dawn and dusk in this context should refer to sunrise and sunset. She also clarified that the recommended restriction referring to a period prior to dusk and after dawn was intended to cover the entire night-time period.

71. In response to a further question from the inspector as to whether or not there was an archaeological site relatively close to Turbine 14 in phase 1, where there was a reference to no such site being in close proximity in the report, Mr. Dermot Nelis (archaeologist) stated that there was a fort and souterrain located approximately 100 metres to the south-east of the proposed turbine.

72. In responding to a question from the inspector as to whether or not she could comment on any cumulative impacts between the two phases of the overall development, Dr. Aughney stated that subject to compliance with the recommendations in relation to distances from linear features and cut-in speeds any impacts from cumulative effects would be reduced.

73. In responding to questions from Ms. Burke on behalf of the appellants Dr. Aughney agreed that the guidelines recommended a minimum of 50 metres from the blade tips which would, depending on the orientation of the blades, require a greater distance from the tower. (Ms. Burke quoted from the Natural England guidelines in this regard and she also referred to submissions from the applicant where it had been stated that the measurements should be from the blade tip). Dr Aughney stated, however, that for each turbine the measurements had been made in accordance with the guidelines.

Submission by Mr. Gavin Daly (Town Planner) Planning and Policy Issues:

74. Mr. Daly stated that he was a town planner with 16 years' experience in planning consultancy and environmental assessment. He dealt with the planning context in which the applications were submitted in October, 2010 and July, 2011 when the County Development Plan 2008 – 2014 was the operative development plan. He submitted that the planning issues were dealt with in Chapter 5 of the EISs', in the planning submissions made with the applications and in the responses to the grounds of appeal. The sites are located in areas identified as being of moderate landscape value. They are located in the areas identified as the most favoured areas for wind farms. He referred to the draft Wind Energy Strategy for County

Roscommon published in 2010. This plan had never been formally adopted. The sites are in the areas identified as being most favourable and they are not in any of the buffer zones around designated conservation sites. An assessment of the provisions of the Wind Energy Strategy in terms of its impact on bird life etc. had identified the need to protect buffer zones around designated conservation sites. He submitted that the decisions of Roscommon County Council and An Bord Pleanála on both applications supported the argument that the developments were in accordance with the appropriate relevant planning policies. He referred to the decisions of the Board being overturned for technical/procedural reasons.

75. Mr. Daly referred to the 2014 to 2020 Roscommon County Development Plan and the accompanying Renewable Energy Strategy which had been adopted since the previous decisions of An Bord Pleanála. He stated that the Renewable Energy Strategy had been supported by a Strategic Environmental Assessment and a Habitats Directive Assessment. He referred to the three scenarios identified for consideration of renewable energy proposals. Scenario three had been identified as the most appropriate and this had been assessed in the SEA and HDA. He referred to Table 2 of the Renewable Energy Strategy which sets out the mitigating measures required to exclude any indirect effects on designated areas. Table 1 sets out the survey requirements for such developments. He submitted that the sites are located in the areas identified as the most favoured areas and they are not located in the identified buffer zones for the nature conservation areas.

76. Mr. Daly submitted that the Renewable Energy Strategy accepted that wind energy would be the most significant contributor towards renewable energy. The positive support for wind energy developments contained in the 2008 Plan is continued in the present policy documents. He submitted that there is scope for additional wind energy development in County Roscommon. He noted that currently there are developed wind energy facilities in County Roscommon for a total of 29 MW. County Cavan is a county of similar characteristics and it has developed facilities for 160 MW of wind energy. He referred to Chapter 5 of the Renewable

Energy Strategy which sets out the criteria for development management. He referred to the locational criteria set out in the strategy which he submitted had been taken into account in the applications and in the submissions to date on the applications. He stated that the only difference between the development management criteria in Chapter 5 and the National Guidance related to the apparent requirement that the noise criteria would be 40 dB(A). He submitted that there is an apparent contradiction in the Strategy which indicated that the criteria was in accordance with the national guidance which he submitted is 45 dB(A). He stated, however, that having reviewed the issue the applicant considered that the 40 dB(A) criteria could be achieved if necessary.

77. (Mr. Kenny on behalf of the applicant in responding to questions on the noise limit set out in the Renewable Energy Strategy submitted that in their opinion there is a mistake in the Strategy which appeared to be adopting the criteria set out in the Windfarm Guidelines of 2006 but had used a figure of 40 dB(A). He submitted that the figure in the Guidelines is 45 dB(A). He submitted that Roscommon County Council would not be legally entitled to adopt different standards from those set out in the National Guidelines. In a legal submission on this issue he referred to the requirement for Planning Authorities to comply with directions under Section 28 of the Planning and Development Act 2000).

78. Mr. Daly submitted that there is no significant change in national, regional or local planning or renewable energy policies since the original applications had been lodged. He submitted that the development of on-shore wind will continue to be the main source of renewable energy. He referred to the Government White Paper on Ireland's Transition to a Low Carbon Economy 2015 – 2030. This indicates on-shore wind continuing to be the main source of renewable energy. 200 – 250 MW of additional renewable energy is required per year up until 2020 to achieve the required targets. He submitted that the appeal sites had been assessed and they remain suitable sites for contributing to this requirement.

operational phase was misplaced and should have been moved up to include the reference to House 16. The noise level given was the operational noise level for this house (not the construction noise level).

82. In responding to a question from the inspector in relation to the claim that the shadow flicker assessment had been done on the basis of a worst case scenario, Mr. Simms explained the assumptions which had been taken into account included that there would be a window in the house facing towards the turbine and that the wind direction would also be such that shadow flicker could arise. He accepted that the average percentage of time when the sun was shining in Irish conditions had been built into the calculations. He considered that the conditions in the planning authority's decisions to the effect that shadow flicker at surrounding dwellings should not exceed 30 hours per year or 30 minutes per day could be complied with and were enforceable. He submitted that detectors/monitors could be located on the turbines to detect the relevant scenario which could give rise to shadow flicker. The relevant lengths of time per day and per year in which shadow flicker to a nearby dwelling could arise would be measured and the turbines would be stalled when the time periods referred to in the condition would be exceeded. He stated that such detectors are proposed where there is a risk of shadow flicker arising.

83. Mr. Kenny on behalf of the applicant, in responding to the Inspector in relation to a query as to how many houses in both phases of the development would exceed 30 hours of shadow flicker per year if the derating provisions contained in the relevant EIS's have not been applied, stated that the figure for Phase 1 was 32 and the figure for Phase 2 was 23. He stated that these figures had been obtained from Mr Simms.

Observation from Mr. Sweetman:

84. Mr. Sweetman made a short submission to the oral hearing. He quoted paragraphs 40 and 41 of the decision of the European Court of Justice in Case Ref. C 258/11. These paragraphs contain the Courts interpretation of Article 6(3) of the Habitats Directive. (Mr. Kenny on behalf of the applicant queried why Mr. Sweetman

wished to make a submission at this stage having had 6 years in which to get involved in the case.)

Submissions and responses from Mr. Tierney (DAHRRG):

85. Mr. David Tierney of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs told the inspector that Lough Croan had been designated as an SPA in 2011. It had been previously designated as an SAC. A review of SPA designations had commenced in 2006. The designation of Lough Croan arose from this. Mr. Tierney told the inspector that site specific conservation objectives had not been set out for all designated sites including Lough Croan. However, there were general conservation objectives which he considered are adequate for an assessment. Mr. Tierney told the inspector that Lough Croan was a fully designated SPA. He stated that the SAC's were still formally cSACs but had been transmitted to Europe for designation.

86. Mr. Tierney told the inspector that the view expressed in the submission of the 8th December, 2015 to the effect that the major concern of the Parks and Wildlife Service was in relation to the risk of bird collisions arising from the proposed developments remained that of the Department.

87. Mr. Tierney referred to difficulties in predicting bird movements based on surveys. Whilst survey work was important the surveys carried out indicated that the movement of birds across the sites could change from one survey period to another. He referred to the unpredictable nature of such movements. He considered that in a complex ornithological area such as that in question it is difficult to predict bird movements. He also referred to one of the surveys which indicated two Berwick Swans in the area. This, on face value, might not appear significant. When one considered however that the Irish threshold for national significance is 21 the figure of 2 is more significant.

88. In commenting on the submissions, made to the oral hearing by the applicant, in relation to ornithological issues Mr. Tierney having noted the clarification from Mr.

Zakrajsek submitted that he considered that there would be still be a potential difficulty in that birds taking off from within the buffer zone around the wind farm would only be tracked by the radar system after 8 to 10 seconds. This is a relatively long period of time if they were in close proximity to the turbines.

89. In commenting on Mr. Nairn's presentation, to which Mr. Collins had referred, Mr Tierney noted that this research had not been peer reviewed. He was also concerned that the location of individual birds, within certain distances of turbines, might not accurately reflect the impact at a population level.

90. In response to questions from Mr. Arnold, Mr. Tierney stated that when comparing existing wintering bird numbers with peak numbers counted in the 1995 to 2000 period the situation nationally in relation to Whooper Swans is that the numbers are stable. In relation to Greenland White Fronted Geese numbers have been decreasing.

91. In his closing submission, on behalf of the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, Mr. Tierney stated that he had expressed his concerns during the course of the Oral Hearing. He submitted that the Department relies on its previous submissions, made in relation to the applications, and it is not detracting or departing from these.

List of documents submitted at oral hearing:

1. Folder submitted by applicant responding to questions and containing supporting material.
2. Power-point presentation of Mr. Edward Zakrajsek on behalf of applicant.
3. Article entitled “Impacts of Wind Farms on Swans and Geese a review” by Ms. Eileen C Rees. Submitted by applicant
4. Affidavit of Mr. William Cormacan (NPWS) on High Court on judicial review. (Submitted by applicant in response to request from inspector)
5. High Court decision on Kelly -v- An Bord Pleanála case. Submitted by applicant
6. Power-point presentation of Ms. Burke on behalf of appellants.
7. Power-point presentation of Mr Kelly (appellant).
8. Affidavits of Ms. Rose Burke, Mr Michael Long, Mr. Paul Johnston, Ms. Aebhín Cawley and Mr Tony Nagle, on High Court judicial review (Submitted by appellants on request from inspector).
9. The following articles on turloughs/karst aquifers submitted by Ms Burke on behalf of appellants.

Percolation and Particle Transport in the Un-Saturated Zone of a Karst Aquifer by Pronk and others (Ground Water May June 2009).

Turloughs-Ireland’s Unique Wetland Habitat by Sheehy-Skeffington and others (Biological Conservation132 -2006-).

Development of a coupled surface-groundwater-pipe network model for the sustainable management of Karstic groundwater by Adams and Parkin (Environmental Geology -2002-)

Solute transport processes in a Karst Vadose Zone characterised by long term tracer tests by Kogovsek and Petric. (Journal of Hydrology. 519 -2014)