

**THE EFFECTS OF WINDFARMS
ON MEDITATIVE RETREATERS**

A Human Impact Assessment

(Interim Report)

**Tharpaland International Retreat Centre
Parkgate, Dumfries DG1 3LY**

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FOREWORD

As an expert in qualitative methods in psychology, I have been asked to assess the study conducted by the people of Tharpaland International Retreat Centre. I conclude that the report has been conducted in line with normal procedures for qualitative assessments; indeed it shows a remarkable degree of resourcefulness and rigour in assessing subjective accounts of concentration. I fully support the findings. The following represents an overview of the reasoning behind this conclusion.

The role of qualitative methods in assessment and evaluation of subjective states

Qualitative methods have a long and distinguished history in sociology and anthropology and over the past 20 years there has been a growing recognition in psychology that qualitative methodologies provide a much deeper insight into participants' experiences and perspectives than most quantitative methods.

This growth is reflected by the explosion of literature in psychology: there is now a handbook of qualitative research (Richardson, 1996) as well as a range of volumes and special journal issues whose major focus is on developing qualitative approaches to psychological problems (e.g. Antaki, 1988; Bannister, Burman, Parker, Taylor & Tyndall, 1994; Henwood & Parker, 1995; Henwood & Nicolson, 1995; Smith, Harré & van Langenhove 1995). At the same time, an increasing permeability of boundaries between the social sciences has provided the environment for a range of trans-disciplinary qualitative methods books including a useful doorstop-sized handbook (Denzin & Lincoln, 1994) and varied edited and authored works (e.g. Bryman & Burgess, 1994; Bogdan & Taylor, 1975; Coffey & Atkinson, 1996; Gilbert, 1993; Lofland & Lofland, 1984; Miles and Huberman, 1994; Miller & Dingwall, 1997; Silverman, 1993, 1997a).

The rise in qualitative methods in psychology is due to three main factors. First, there is a widespread sense that traditional psychological methods have not proved successful in providing major advances in the understanding of human life and experience. Despite regular promissory notes, psychology seems to offer no earth-moving equivalent of the transistor, of general relativity or molecular genetics. Second, views of science have changed radically since the 1950s, making it much harder to paint qualitative researchers as either anti-scientific or merely sloppy humanists. Third, psychology is no longer as insulated from other social sciences as it has been in the past. This is reflected in contemporary theoretical developments such as constructionism (Gergen, 1994) and post-structuralism (Henriques, Hollway, Irwin, Venn & Walkerdine, 1984) that have swept right across the human sciences. These provide an important grounding for the introduction of more sensitive qualitative approaches in psychology as I have discussed elsewhere (Hepburn, 1999a & b; 2000; 2003).

The Social Sciences Department at Loughborough University houses the international centre for the development of discourse analysis, a qualitative approach that often deals in the kinds of accounts presented by the Tharpaland International Retreat Centre's

report. Many of us work solely with this type of analysis. My current research engages in a discourse analytic evaluation of helpline interaction for the NSPCC (e.g. Hepburn and Potter, 2003 a, b & c; Potter and Hepburn, 2003) and has attracted funding from the Leverhulme Trust. I have also conducted discourse analytic investigations into school bullying (Hepburn, 1997, 2000, 2002) and teacher stress (Hepburn and Brown, 2001).

Assessment of the study

The care and rigour with which the study was conducted is impressive. The interpretation of the results seems fair and impartial, the statistical analysis exemplary. As Buddhist practitioners the participants have unique training and insight into their own subjective experiences, unlike many lay people. They are also bound by the strict moral code of Buddhist teaching and I am in no doubt that they will have gone to great lengths to give impartial and objective accounts of their experiences.

The importance of concentration to the development of Buddhist practice cannot be underestimated. Silent retreats are a crucial part of developing the concentration and inner peace required for spiritual development. The assessment of something as ill-defined as 'concentration' would give many psychologists long hours of head scratching. It is a testament to the subjective insights to be gained from Buddhist practice that the researchers were able to overcome this problem so neatly, producing a method that has both quantitative and qualitative elements. It is an ingenious solution to what many would see as an intractable problem.

The analysis and treatment of the subjective accounts is entirely appropriate.

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To whom it may concern

This is to endorse the approach taken by the Tharpaland International Retreat Centre in assessing the likely impact of the proposed Harestanes and Forest of Ae windfarm.

I am an engineer with twenty years experience in the UK wind industry, latterly as Managing Director of the Wind Energy Group, a subsidiary of Taylor Woodrow Construction Ltd. In this capacity I supervised the construction of many windfarms in the UK and overseas, and saw to my regret some of the negative effects of the inappropriate juxtaposition of technology with human habitation.

The TIRC is right to be concerned about the proposed windfarm, both in its scale and in its proximity. The Centre provides a very profound and specific service to the community that is threatened by this development.

I believe the TIRC has gone about the assessment of the impact of the proposed windfarm in a realistic way that is also as objective as it can be in the circumstances, and I commend its approach to those carrying responsibility for approval of this development.

Yours sincerely

A handwritten signature in black ink, reading 'John Armstrong'. The signature is written in a cursive, flowing style with a large, stylized 'J' and 'A'.

John Armstrong

PREFACE

The exploratory studies described in this 'Interim Report' highlight some of the many methodological issues involved in carrying out a systematic investigation of subjective experience on a highly specific and unique population, in this case "meditative retreaters". As the studies are exploratory in purpose, the methods of subjective assessment were, in the first instance, unstructured and open-ended, so as to avoid prejudging or inhibiting the diversity of subjective effects described.

Clearly it is desirable to complement subjective description with quantification of the effects as far as possible. Therefore, our research has used a simple measure of concentration times to quantify this particular effect. Concentration is not only relevant to the general public both at work and at home, but it is also an important part of Buddhist meditation practice, and therefore an area in which we have considerable experience both in measuring and developing.

Some people might question whether the experience of meditators is relevant to these issues. However, there is growing interest in Buddhism by cognitive scientists¹, and recognition of the validity of Buddhist meditation as a valid empirical technique for investigating subjective experiences. "Buddhist insights into the nature of the mind and consciousness are presented as genuine discoveries in the scientific sense of the term: they can be replicated by any competent researcher with sufficient prior training"². For these reasons, we assert that the experiences reported by the meditative retreaters in our studies constitute a valid data-base for an exploratory investigation.

In presenting the findings of our investigations in this document, we recognize that from the standpoint of normal evaluation methodology there are weaknesses in the research. These arise mainly from the fact that we have devised and conducted the experimentation ourselves, and the subjects are residents at the Retreat Centre and therefore may have a vested interest in the results.

In meeting these potential criticisms, we assert that there is no existing standard methodology appropriate to this type of evaluation of a location that is both a sacred site of great spiritual value to many thousands throughout Scotland and the world, and also a site that, because of its specific use as a Retreat Centre, requires special scenic quality and a quiet, peaceful and tranquil environment for the meditative retreaters who use the location.

Furthermore, there is no methodology specifically for the evaluation of the physical and psychological effects on humans of windfarms, although there has been much anecdotal evidence of their adverse effects. In meeting our constitutional and legal responsibilities of care for the Centre as a resource for the Scottish people, and other members of our tradition worldwide, and in responding to the real threats to Tharpaland arising from the proposals of a windfarm in the vicinity, we have acted to the best of our ability and resources to devise an investigation into an area where little

¹ 'The Colour of Happiness' & 'Luminosity of Being' New Scientist, 24 May 2003

² Buddhism and Science, B Allan Wallace, Columbia 2003, p8

understanding or knowledge exists. Notwithstanding these comments, we respectfully suggest that the type of evaluation methodology we have created is *not* inappropriate for this evaluation.

Although the subjects of the investigation are residents of Tharpaland Retreat Centre, they are not ordinary subjects. Their special training in meditation over a long period of time makes them uniquely qualified to participate in the evaluation of the effects of proximity to a windfarm on a meditation Retreat Centre. The use of other subjects without such meditation training and experience would not provide an appropriate sample of the true effects on such a centre. In addition the subjects have all taken vows for life to abstain from lying and only speak the truth and were explicitly instructed to be ‘objective’ and completely truthful in reporting their experience. It is therefore unlikely that conscious subject bias is present to any great extent in the results.

In this context it should be noted that far from expecting problems, many of the subjects initially hoped that the windfarms would possibly be an enjoyable and pleasant experience and those that had some reservations hoped that once there, the windfarm would not prove to actually produce any problematic effects. The relatively positive attributes and experiences they described at Hagshaw Hill when the turbines were initially stationary suggest that there was not an initial bias. Subjects’ reports were prepared independently without communication during the visits or during the period of writing-up experiences, and yet the experiences described are very similar; and remarkably similar as well to those described by many people living near to existing windfarms.

Notwithstanding these claims in support of the validity of our investigation, the reported accounts of the subjective physical and psychological experiences of the subjects are so powerfully negative and adverse that in our view there is no room for any doubt that windfarms of many times the number of turbines and twice the size of most of those experienced in the investigation, will have far more intense and dramatically adverse effects on the humans who live in and enjoy the environment of the various locations in proximity to the Forest of Ae’s proposed windfarm.

It is important to make clear that we are not claiming to account for the causes of these effects. **The purpose of our research is simply to demonstrate that there *are* measurable effects.** The fact that the standard assessment methodology does not predict these effects cannot discredit the fact that effects are experienced – rather our research, based on a systematic subjective methodology, strongly suggests that there *are* factors that are not picked up by the standard methodology, which *do* have a health effect, and therefore, cannot be ruled out *a priori*.

The main Introduction to our studies – ‘Effects of Windfarms on Meditative Retreaters: A Human Impact Assessment’ – sets out the assessment methodologies used and summarises the results as a basis for conclusions regarding the proximity of Tharpaland to a windfarm. The actual explanation of each study, background information and results data are given in appendices after this main Introduction.

EFFECTS OF WINDFARMS ON MEDITATIVE RETREATERS

A Human Impact Assessment

Introduction

This report sets out the results of an on-going investigation into the likely impact that the proposed Forest of Ae/Harestanes Windfarm will have on Tharpaland International Retreat Centre.

Tharpaland International Retreat Centre (see background information in TIRC brochure) is the main international meditation retreat centre of Kadampa Buddhism, which is one of the largest and fastest growing mainstream Buddhist traditions in the West today, with over 700 centres and branches world-wide. Tharpaland is also the main spiritual training and retreat centre for the development of Kadampa Buddhism in Scotland, serving a growing community of hundreds of Buddhist practitioners from all over Scotland. For these and other reasons, Tharpaland is now looked upon by thousands of people around the world as a sacred site of pilgrimage.

In March 2003, Tharpaland was notified by Scottish Power of their intention to build a massive windfarm (Harestanes) covering an area of roughly 30 km² of Ae Forest adjacent to Tharpaland. An accurate assessment of the likely effects the proposed windfarm would have on Tharpaland was therefore considered to be a matter of great urgency. For this reason, the following Human Impact Assessment was carried out.

Although the findings of these 3 windfarm studies relate to the experiences of meditative retreaters, indirectly they have potentially serious health implications for the general public at large, especially as there are currently many people living near existing windfarms who are experiencing many of the same adverse effects as those experienced in the 3 windfarm studies. The results of these windfarm studies should therefore give pause for thought in regard to the nearly 300 windfarm applications currently being prepared for Scotland, many to be sited close to human habitation, some immediately adjacent to major centres of population (e.g. Glasgow, Aberdeen).

Human Impact Assessment

Buddhists cherish the natural environment and all who live within it, and are committed to the development of clear and sustainable forms of energy and are therefore not opposed in principal to the development of windfarms in appropriate locations, with adequate sensitivity to and accommodation of the situation and needs of all of those affected by such developments. In their initial Response to Scottish Power's Scoping Report (see Appendix 1) Tharpaland stated that the assessment methodology proposed in Scottish Power's Scoping Report to assess the impact of the proposed windfarm on human beings in general, and on highly sensitive meditative retreaters in particular, was inadequate, and indicated that Tharpaland would carry out investigations itself to assess the effects that the proposed windfarm would have on the Retreat Centre and its functions.

The results of these investigations, including 3 studies carried out at 3 windfarms, *Hagshaw Hill*, *Beinn An Tuirc* and *Deucheran*; (see Appendix 4 for full results) indicate that the assessment methodology proposed by Scottish Power is indeed inadequate. The findings of these studies confirm that an Environmental Impact Assessment must include an appropriate and vigorous human impact assessment, because human beings constitute an essential part of the environment.

A human impact assessment must take into account human experience and since the very nature of human experience is subjective, a subjective assessment methodology is required. Objective measures of physical variables alone, such as decibel noise levels and landscape features, as proposed by Scottish Power's request for a scoping opinion, are not enough to adequately predict the human impact.

To assess the probable impact of a proposed windfarm on the human experience of those who will be affected by it requires a thorough assessment of subjective variables that architects, engineers and corporate executives are simply not trained or qualified to assess. These subjective variables include many psychological, health, social and spiritual factors not included in the standard assessment methodologies.

These studies to some extent re-dress some of the omissions in Scottish Power's assessment methodology by providing a detailed and systematic Human Impact Assessment of 3 windfarm visits, based on the subjective reports of experienced meditators, most of whom are currently living at Tharpaland and who will be most affected by the proposed windfarm if it is actually sited there.

The findings of these studies therefore reflect the experience of a '*specific*' population - meditative retreaters who already possess a heightened awareness of and sensitivity to mental and physical states, and to the external environment, and indicate clearly the probable effects that the proposed windfarm in the Forest of Ae will have on those most likely to be affected by it - namely, the residents and the many thousands of visiting retreaters who come to Tharpaland on meditative retreat.

Assessment Methodologies

Ability to Develop Concentration

The TIRC brochure highlights the necessary conditions for retreat and explains how Tharpaland and its surrounding environment is qualified to provide these unique conditions.

As the development of concentration is absolutely central to all of the training programmes at Tharpaland – indeed, to the whole Buddhist spiritual path – a significant adverse impact on Tharpaland's ability to provide the necessary conditions for developing concentration, or on student's ability to develop concentration while at Tharpaland, will in effect negate the viability of Tharpaland's core training programmes and as a consequence, its ability to sustain its existence as a qualified centre of meditation retreat.

Within all Buddhist traditions, the development of concentration is understood to be a vital part of the spiritual path because the experiences of peace of mind, lasting happiness and human freedom, as well as all of the essential spiritual realisations that lead to liberation and full enlightenment depend upon it. The principal goal of meditation retreat is to gain deep and stable inner experience of such spiritual subjects as inner peace, universal love and compassion, and wisdom, through the development of deep internal states of concentration. The main purpose of the retreats carried out at Tharpaland, is to attain these deep levels of concentration that are difficult, if not impossible, to reach in meditation practice in daily life.

Concentration was therefore selected as the key variable against which windfarm impact was assessed in all of the studies. The criterion-measure assessing ability to develop concentration at the various assessment points within the studies, was *the time required* for a subject to maintain uninterrupted awareness of the sensation at the tip of the nostrils associated with 21 successive inhalations and exhalations of the breath, without a break in concentration. This procedure was conducted at various distances approaching each windfarm and was easy for subjects to carry out, as it is a standard procedure for settling the mind before a meditation session. In general a *short time would indicate high ability* to develop concentration and a *longer time a low ability*.

This measure of ability to develop concentration is a very accurate and reliable numerical measure of subjective experience and provided the necessary basis for making precise quantifiable comparisons within, and between, the various windfarm and control studies.

Subjective Reports

The subjects were also asked to observe and record their physical and mental states, at various distances from and within the windfarms themselves. The subjects who participated in these studies represent a diverse cross section of Scottish society (see Appendix 2). What makes them unusual is that they are highly trained in observing, evaluating and describing their mental states, and are therefore qualified to report accurately on their subjective experiences; they live within vowed restraints of moral conduct, including not to lie, and therefore what they report is truthful; and in comparison with non-meditators they have developed deep states of concentration over long periods of time, and as a result have become increasingly and even acutely sensitive to their external environment, a completely normal and natural consequence of deep spiritual training.

In order to preserve the unique suitability of the subjects to be studied whilst controlling subject bias in affecting the outcome, the subjects were instructed to be strictly objective and truthful in describing their experiences. Furthermore, throughout the whole 4-5 hour assessment period of each windfarm visit - from arriving at the approach to the windfarm to leaving the site - there was no communication amongst the subjects, and only the minimum essential communication from the facilitators. Each subject also prepared their report without discussing their experiences with others.

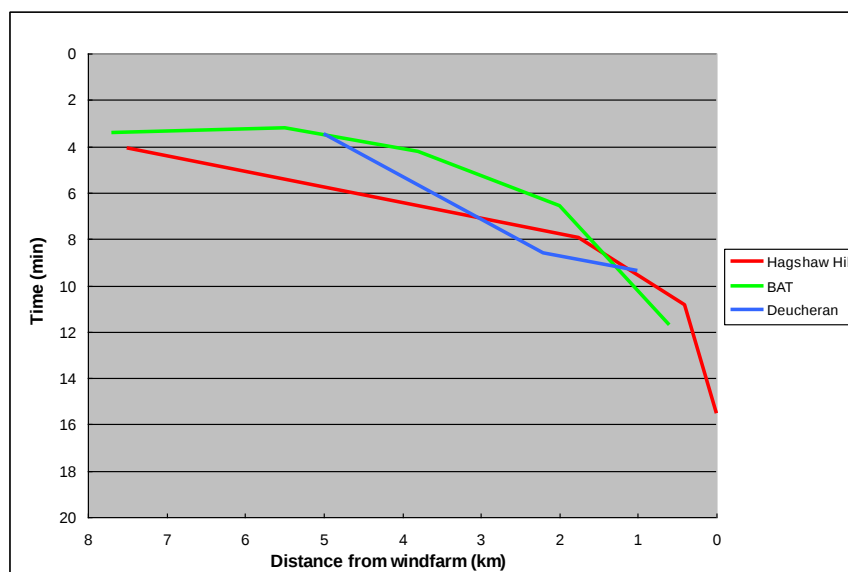
Results

These findings, which were obtained at the three windfarms (*Hagshaw Hill*, *Beinn An Tuirc*, and *Deucheran*), address some of the central issues and concerns raised in the original Scoping Report Response (see Appendix 1). A synopsis of these findings is presented below. A detailed presentation of results can be found in Appendix 4.

1. On the Ability to Develop Concentration

- 1) The three windfarm studies showed a consistent and progressive average 70% loss in ability to develop concentration over the various distances approaching the windfarms, and virtually a total loss in ability to develop concentration at the turbine site itself (see Appendix 4).

Three Windfarm Studies



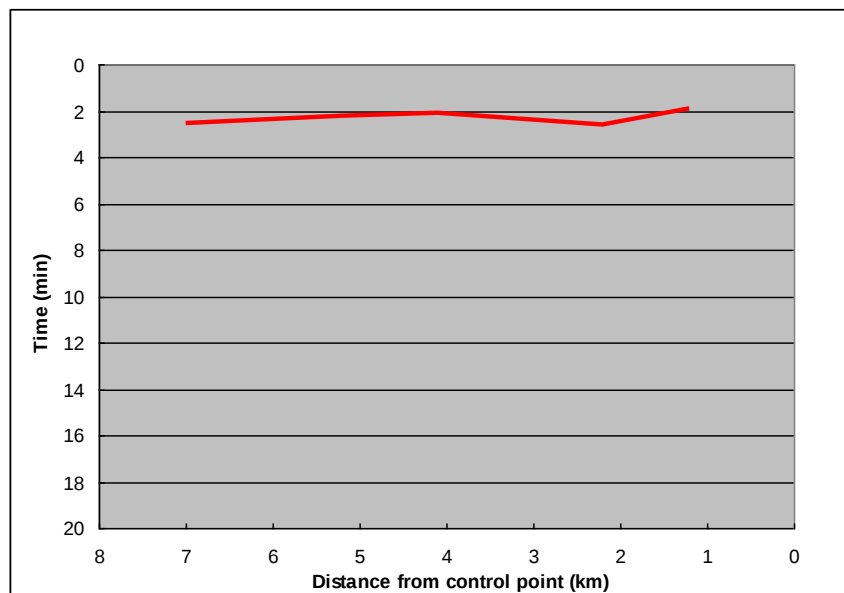
Graph 1. Comparison of average time taken to reach criterion of concentration (min) / Distance from windfarm

A simple preliminary regression analysis (see Appendix 6) using four statistical models was carried out to analyse the relationship between distance from a windfarm (*Beinn An Tuirc* and *Deucheran*) and the time taken to reach the criterion measure of concentration; the results of this analysis indicate that...

- (1) Proximity to a windfarm does have a significant adverse impact on the development of concentration (at a 99% level of confidence).
- (2) To be able to meditate normally, a meditative retreatreater would have to be approximately 6 km specifically with reference to any one of the two windfarms studied (at a 95% level of confidence).

- (3) The distance required to ensure that meditative retreaters were not adversely affected by a windfarm of the size and density of the one proposed in the Forest of Ae can be reliably estimated to be much greater than 10 km.
- 2) A control study showed no significant change in ability to develop concentration indicating that the assessment methodology itself did not contribute to the observed results of the windfarm studies (see Appendix 4).

Ae Control Study



Graph 2. Average time taken to reach criterion of concentration (min) / Distance from control point

2. On Subjective Experience

In all of the windfarm studies, subjects reported a variety of other, often intensely disturbing, adverse impacts:

(1) Effects on the Development of Concentration

The subjective reports for all 3 windfarm studies indicate a progressive intensification of three of the principal obstacles to developing concentration, (1) mental excitement (2) mental dullness and (3) mental sinking, during the approach to and within each windfarm³:

- (1.75 km from Hagshaw Hill) *“Mind is buzzing and agitated. Concentration is reached with effort but does not have the clarity or quality of previous meditation.”* (SS)⁴
- (3.8 km from Beinn An Tuirc) *“Feel heavy, had difficulty to sustain concentration, mind scattering and easily distracted, fragmenting. Feel spaced out.”* (SS)
- (2 km from Beinn An Tuirc) *“Mindfulness very weak/loose. It took all I could do to keep hold of sensation of breathing. At first it was difficult even to remember to look for that sensation in the first place.”* (NB)
- (606 m from Beinn An Tuirc) *“Concentration very poor. Mind feels very dull, like ‘mental fatigue’.”*(PA)
- (606 m from Beinn An Tuirc) *“Mental dullness, sinking, mind multi-pointed. Can’t get my mind to focus on one object. Distractions coming every few seconds.”* (SS)
- (2.2 km from Deucheran) *“When meditating found the image of the windmills popping into my mind and distracting me from the object of meditation. A lot harder to maintain concentration with this distraction.”*
(DC)

³ **Mental Excitement** – occurs when the mind wanders to an object of desirous attachment; **Mental Dullness** – functions to make both the body and mind heavy and inflexible; **Mental Sinking** – caused by mental dullness, the mind loses clarity and intensity of the object of meditation.

⁴ Initials in parenthesis refer to subjects.

(2) Acute Physical Symptoms

Many of the subjects reported the development of acute physical symptoms including (1) head and chest pressure and pain, and even intense pain (2) heart palpitations (missed beats) (3) nausea, stomach pain and dry retching (4) breast pain and (5) dizziness, both approaching and on site at all windfarms:

- (Beside first turbine at Hagshaw Hill) *“I feel pain in my left temple. My head feels heavy and I feel pressure around the top half of my body – especially my head – slight tightness in chest – dizzy feeling.”* (KE)
- (Beside the first turbine at Hagshaw Hill) *“I am aware of my heart missing a few beats, which causes me some concern.”* (KG)
- (3.8 km from Beinn An Tuirc) *“My head feels tense, like it's under a lot of pressure, especially at either side of my head.”* (SS)
- (606 m from Beinn An Tuirc) *“Felt pressure in upper part of chest.”* (AM)
- (Within turbine field at Beinn An Tuirc) *“Heart flutters/palpitations, pain in head intensifying, agitation and feeling squeamish. (On walk) – sound was very disturbing, no meditation possible, kept losing place and forgetting. Head scramble, lost concentration totally. Mildly nauseous and pain on top of head intense.”* (CY)
- (1 km from Deucheran) *“Felt pressure/force on head pushing back and to the right from left (left ear pain). Acute pain across head through eyes, even to teeth! Emotional response and release of pressure in form of tears.”* (CY)

(3) Acute Negative Psychological Reactions

Subjects also reported disturbing negative psychological reactions including (1) confusion (2) loss of self-confidence (3) effects similar to depression (4) effects similar to mania (5) irritability and anger (6) heightened emotionality and crying. It is important to emphasise that these reactions are very different from subjects' normally happy and well-balanced psychological states:

- (Beside the first turbine at Hagshaw Hill) *“Feeling intense agitation and discomfort, found experience very disturbing emotionally, almost to the point of crying out in distress and primal urge to run away from site.”* (CY)
- (Within the turbine field at Beinn An Tuirc) *“I felt very irritable and short-tempered when back in the car.”* (DC)
- (In the evening at house after Beinn An Tuirc) *“Feeling very raw and sensitive, slight paranoia and very emotional. Cried. Wanting to find quiet corner and hide, seeking solitude, didn't want to be part of the group. Feeling confused and not like myself, very negative thoughts. Better after evening puja.”* (CY)

- (In the evening at house after Beinn An Tuirc) *“We are all manic and high and the general humour is again filled with innuendos. I am also high but this swings into a real downer and I feel depressed. I am about to begin teaching meditation in a few days and quite unexpectedly I really lose all my confidence in my being able to do this. I swing between having a good time with the group to being filled with self reproach and loss of confidence.”* (SS)
- (2.2 km from Deucheran) *“We all seem a bit tight, ‘snappy’,...Bit like on a family driving holiday in the blazing hot sun: where everyone’s just a little bit tense and could explode easily, but won’t because they’re all aware that it is only the conditions that are making them unhappy.”* (RM)
- (In the evening at house after Deucheran) *“I felt more depressed and upset than I have for a long time. I can’t describe what these feelings were connected to, they were just coming up again and again. Depression, despair. I couldn’t cope with being in company. In fact, during dinner I nearly burst into tears, it took a huge effort to remain there and not let it out. But afterwards I retired to my room and cried and cried.”* (SP)

(4) Disturbing Visual Effects

Many of the subjects reported adverse effects just looking at the turbines, describing the demand quality and hypnotic effects of their spinning blades and the shadow flicker as very disturbing:

- (In turbine field at Beinn An Tuirc) *“I feel sick (looking at them) and yet I am mesmerised.”* (KE)
- (2.2 km from Deucheran) *“...looking at the windfarm (my mind) becomes almost focused on it like being hypnotised. Can only see windfarm in the landscape. It is difficult to see beyond.”* (AM)
- (2.2 km from Deucheran) *“From this distance, they seem to have an almost mesmerising effect. It’s not quite calming, more nullifying...they’re larger and more hypnotic.”* (SP)
- (2.2 km from Deucheran) *“My eyes are constantly being drawn toward the turbines”* (PA)
- (1 km from Deucheran) *“felt almost hypnotic, seductive pull toward the turbines as if the blades were slowly beckoning.”*(CY)
- (Beside the first turbine at Hagshaw Hill) *“Slicing sounds and flashing shadows felt penetrating, as if being lacerated at a subtle level.”* (CY)
- (Within turbine field at Hagshaw Hill) *“Shadows cutting right through my body – feels like if I stood here for a long time I’d develop epilepsy or some kind of mental insanity...”*

“... shadows more violent than actual blades – so intense – I have to move away from them – I actually put my hand out to protect myself – from a shadow!” (KE)

- (Within turbine field at Hagshaw Hill) *“I found it very disturbing to walk in or near the shadows, both with my eyes open and shut. I became very disoriented at this point.” (NB)*
- (Just before leaving Deucheran) *“It feels as though the flicker effect is cutting through the trees, the car and my mind. I am glad I do not have to stay here a moment longer.” (KG)*

(5) Disturbing Visual After-Effects

Subjects also reported a number of disturbing visual after-effects:

- (Driving back from Beinn An Tuirc) *“Could see faint images of rotating blades when I closed my eyes.” (DC)*
- (On the drive back from Deucheran) *“...During meditation I had the image of rotating blades. It seems like the rotating blades have left a deep impression.” (DC)*
- (Driving back from Deucheran – meditation stop) *“When tried to meditate...ringing and humming sound with the sensation/image of blades turning and swishing when I closed my eyes...” (LC)*

(6) Other Disturbing After-Effects

Many of the preceding adverse effects as well as other symptoms or reactions that developed later, persisted after leaving the windfarms:

- (Night after Hagshaw Hill) *“That night when I closed my eyes to sleep I saw the windfarm and the swirling blades vividly.” (KE)*
- (Next few days after Hagshaw Hill study) *“Feeling very emotional all weekend, very sensitive (raw), mild depressive, negative moods – feeling unsettled, tense and easily irritated. Better after 3-4 days.” (CY)*
- (Night after Deucheran) *“...a couple of times during the night I dreamt I was pulled back into the middle of the windfarm. I felt anxious and woke up immediately.” (LC)*
- (Night after Deucheran) *“that night I dreamt of wind turbines, lots of weird gigantic shapes dotted around the land. All of them rotating at different speeds. One of them was made out of gigantic buckets.” (SP)*

- (3 days after Argyll study) “*I heard what sounded like turbines in the Gompa this morning⁵.*” (RM)

(7) Other After-Effects Experienced:	That evening	Next few days
• “ <i>Manic energy/madness</i> ”	9	3
• “ <i>Loss/degeneration of spiritual attitude and intention</i> ”	5	3
• “ <i>Pre-occupation with self</i> ”	4	-
• “ <i>Tired/run down/drained</i> ”	5	-
• “ <i>Drugged/hungover/cut off and flat</i> ”	1	1
• “ <i>Loss of self-confidence</i> ”	3	-
• “ <i>Cried</i> ”	3	-
• “ <i>Very irritable/aggressive</i> ”	4	1
• “ <i>Behaviour out of control</i> ”	5	-
• “ <i>M.E. symptoms have returned</i> ”	1	1

What is remarkable in all of these findings is the extent to which subjects’ experiences in these windfarm studies differed so completely from their usual relatively peaceful and happy experience of everyday life. However, these findings are extremely consistent with the description of adverse effects reported by many people who live near windfarms at present (see appendix 7).

3. Conclusions on Auditory Impact

It is repeatedly claimed by windfarm developers that the individual noise levels of turbines and the cumulative noise levels of windfarms are negligible and non-intrusive, and are either totally or at least effectively masked by ambient background sound. The subjective reports of the Hagshaw Hill and Argyll windfarm studies throw these claims into serious question, as most of the subjects reported that they found many of the different types of sound/noise produced by the turbines to be highly intrusive and disturbing. (These developers’ claims are also contradicted by the many reports by people who live near existing windfarms who find the sounds of the turbines unbearable – see Appendix 7).

- (Within the turbine field at Hagshaw Hill) “*lots of different noises – also an occasional clanging noise.*” (KE)
- (400 m from HH) “*...distracted by whoosh of turbines. I can feel the blades cutting through the air – repetitive sounds slice my concentration to bits...relentless noise – it feels like I’m in an airport*” (KG)

⁵ ‘Gompa’ – refers to the Meditation room.

- (Beside the first turbine at Hagshaw Hill) *“Standing underneath the turbines, I can hear a noise similar to a car horn and sometimes a noise like a groan or plane flying by. Sometimes there is an occasional shudder and the noise of metal banging, as if a piece of machinery was not attached properly. I have the feeling as though I’m going through the cycle of a washing machine with some money or keys left in the pocket. I am aware of my heart missing a few beats.”* (KG)
- (Beside the first turbine at Hagshaw Hill) *“Acutely aware of squeaking, grating noises amidst constant “swish” of blade with occasional rhythmic bass sounds which induce heart palpitations.”* (CY)
- (606 m from Beinn An Tuirc) *“whoosh was more apparent. Sounded much like a jet or train, but with fluctuations in volume. I noticed a high constant whine, which accompanied this. These noises stood out from the background noise made by the wind in the trees...”* (DC)
- (Within turbine field at Beinn An Tuirc) *“Walking between the turbines, the sound of the blades was very loud – a cutting sound. There was also a very loud humming sound coming from the transformer at the base of the turbine. Walking away from the turbine, the transformer noise was more intrusive even when some distance away and fading. As noise from the first turbine faded I became aware of walking into another one but was unable to see it because of the fog. Now surrounded by noise: the cutting sound of the blades from two or more turbines and the humming of the transformer...felt completely enveloped by the sound. Surrounded by sound I felt as if I was walking through a factory rather than open countryside.”* (LC)
- (Within turbine field at Deucheran) *“I had no sense that I was walking through a forest but that I was in an industrial area. The noise was very pronounced – a humming sound like that of an aeroplane in the clouds only it was constant and not fading away. This was combined with the swishing of blades at different times. There was constant noise. When I looked away my experience was dominated by the noise.”* (LC)
- (313 m from Deucheran) *“Sounded like a distant tumble drier.”* (RM)
- (Walking into Deucheran) *“Can hear the sound of the turbines across the valley. Low almost rumbling noise from the turbines with the swooshing noise of the blades.”* (AM)
- (Walking into Deucheran) *“Certain parts of valley bottom there is no sound – then at one part can hear (anti)-nodal noise effects trapped in bottom of glen.”*
(KM)
- (Walking into Deucheran) *“...noticed a constant high pitched whine like that of the electric engine in cable car stations. There was the occasional clunking sound.”* (DC)

During the visit to Deucheran windfarm, the mechanical noise (high pitched, pervasive humming sounds) emitted by the turbines was clearly audible at 2.2 km,

and the aerodynamic noise (whooshing sounds) of the turbine field at Beinn An Tuirc could be heard at a distance of 4kms (on a previous visit on 27th March, 2003). If these noises were clearly audible above ambient background sound from smaller windfarms (9 turbines and 46 turbines respectively) which contain smaller sized turbines (83 m and 62.5 m), it is realistic to assume that the composite and cumulative auditory impact of the proposed Forest of Ae windfarm (according to current iteration 95 turbines⁶ at 125m each) will be many times greater.

Furthermore, it does not follow that a sound that is masked by an auditory background does not have a subjective impact. For example, auditory and visual subliminal advertising can have a far greater impact on an audience than would normal advertising, precisely because it is not “heard” or not “seen”, and therefore not subject to normal defensive screening or other conscious cognitive processing. This is why subliminal advertising is outlawed in many countries.

In summary, our findings show that many of the sounds made by the turbines in the windfarms we studied (1) were not masked by ambient background sound/noise, (2) were audible at distances of up to several kilometres, and (3) were reported to be highly intrusive and disturbing. Furthermore, just because some fraction of the sound emissions of these turbines may have been masked from conscious awareness by background ambient sound, does not mean that there was no subjective impact at an unconscious level, as illustrated above in the case of subliminal advertising.

4. Conclusions on Visual Impact

The visual impact of the turbines, even at considerable distances of up to 8.6 km, was found to be highly intrusive and disturbing, both physiologically and psychologically.

- (8.6 km from Beinn An Tuirc⁷) *“(When looking across to Beinn An Tuirc) It was a bit hypnotic. I also experienced a weird optical illusion on the periphery of my field of vision where the turbines appeared to be spinning, not just the blades, but the whole structures.”* (LC)
- (8.6 km from Beinn An Tuirc) *“I found it difficult not to look at them. Looking away from them I immediately felt my vision relax and become more expansive. When I looked back in that direction, my eye was immediately drawn to them.”* (LC)
- (8.6 km from Beinn An Tuirc) *“...looking across at Beinn An Tuirc ... my attention and focus was grabbed by the movement of the blades. I found the lack of synchronisation between the turbines very distressing. After staring at it for a while I developed a headache and started to feel a bit queasy. Then when looking away I could see faint images of the blades overlaying the horizon where I was looking.”* (DC)

⁶ The original plan was for 180 turbines. It was then reduced to 150 and is now reduced again to 95.

⁷ These observations were recorded at assessment point 2 on the approach to Deucheran windfarm. From this point the turbines at Beinn An Tuirc were clearly visible – at a distance of 8.6 km.

Amongst other visual factors reported to be disturbing at all three windfarm studies were (1) the constant rotation of the turbine blades (2) the lack of synchronicity of blades within dense clusters of turbines (3) the view of partial blades ‘flicking’ on a horizon (4) the strobe effect of shadow-flicker and (5) the dominating presence of the turbine structures.

These findings indicate, therefore, that ‘visual impact’ is not merely in the ‘eye’ of the beholder and related to visual amenity alone, as asserted by many developers, but is related to deep physiological and psychological processes within that beholder.

As with auditory impact, the visual ‘impact’ of the turbines proposed for the Forest of Ae will be significantly greater than that of the three windfarms visited, as demonstrated in Figs 1 - 3. Figure 1 shows a subject at the base of a 65m high turbine at Hagshaw Hill windfarm. The increase in visual impact of a turbine twice the size is demonstrated in figure 2 as being not twice, but more than 5 times greater.

Conclusions

For most of the subjects in these studies, these windfarms were centres of massive and traumatic disturbance, even after only a few hours. In almost all cases, subjects reported a ‘relief’ in leaving the turbine field. Had they actually been in strict silent retreat at the time of their windfarm visits, their experiences would have been devastating.

The combined effects and impacts of 95 turbines, twice the size the turbines at Beinn An Tuirc and Hagshaw Hill, and 1.6 times the size of those at Deucheran, would be many times greater than that of any one of these 3 smaller windfarms. The cumulative force of these impacts and the many other adverse effects of a windfarm, such as the one proposed, on the residents and visiting retreaters at Tharpaland would be devastating.

Although the findings of these 3 windfarm studies relate directly to the experiences of meditative retreaters, they have potentially very serious implications for the general public at large. Until the issues raised in these studies are investigated in depth with respect to the general population, there is the very real danger that large population areas within Scotland (e.g. Aberdeen, Glasgow) will be put at risk of contracting serious health problems if some of the windfarms currently proposed are actually approved and built. This risk is substantiated by many people living near existing windfarms and experiencing many of the same adverse physiological and psychological symptoms reported in the 3 windfarm studies.



Fig. 1 A Subject at base of a 65m high turbine at Hagshaw Hill windfarm

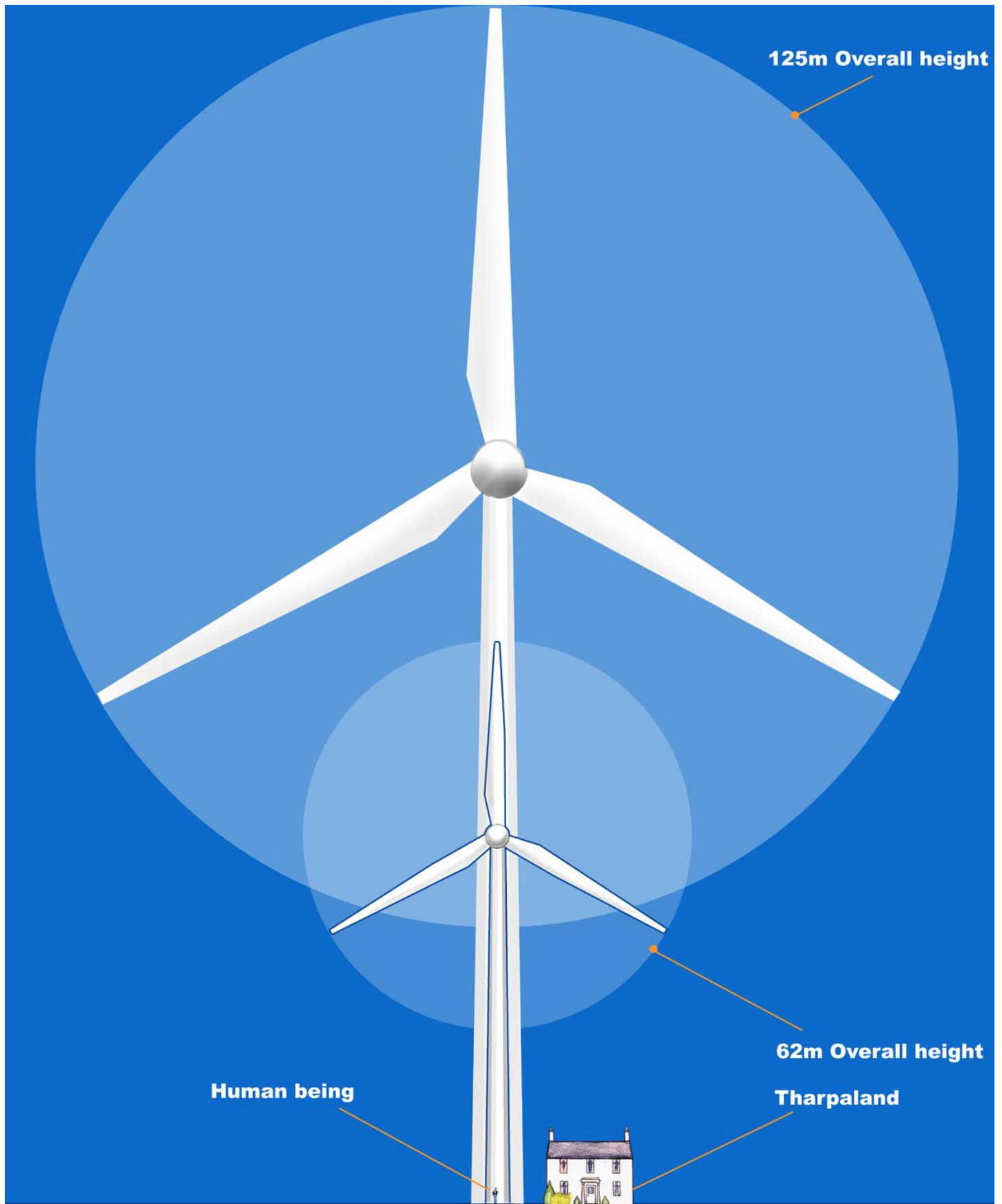


Fig. 2 Comparison of the visual impact of two wind turbines, one twice the size of the other



Fig. 3 *Photomontage illustrating the visual impact of the larger turbine in Fig. 2 (130m) within the context of a landscape*

APPENDIX 1

EXCERPTS FROM SCOPING REPORT RESPONSE

**Harestanes & Forest of Ae
Windfarm Proposal**

**Initial Response to
Scottish Power's Scoping Report
March 2003**

Tharpaland International Retreat Centre

14th April 2003

Introduction

This document, which is an initial response to the Scoping Report recently distributed by Scottish Power, highlights our key concerns and recommendations for increasing the scope of the Environmental Impact Assessment proposal, to include a number of factors that we consider necessary for the survival of our Retreat Centre.

Results of Preliminary Investigations

Our preliminary investigations, including three site visits to operating windfarms, has raised concerns about the standard ETSU assessment methodology proposed in Scottish Power's Scoping Report to assess the impact of the proposed wind farm on human beings in general. Furthermore, we believe that if the standard criteria are not augmented to take account of the highly unusual circumstances at Tharpaland, the EIA will not assess factors likely to have a serious adverse effect on Tharpaland, and that any proposed mitigation methods will not address these detrimental factors sufficiently. Therefore an expansion of the criteria is necessary in order for the EIA to address the 'locational considerations' set out in NPPG 6 para 22.

Central Issues

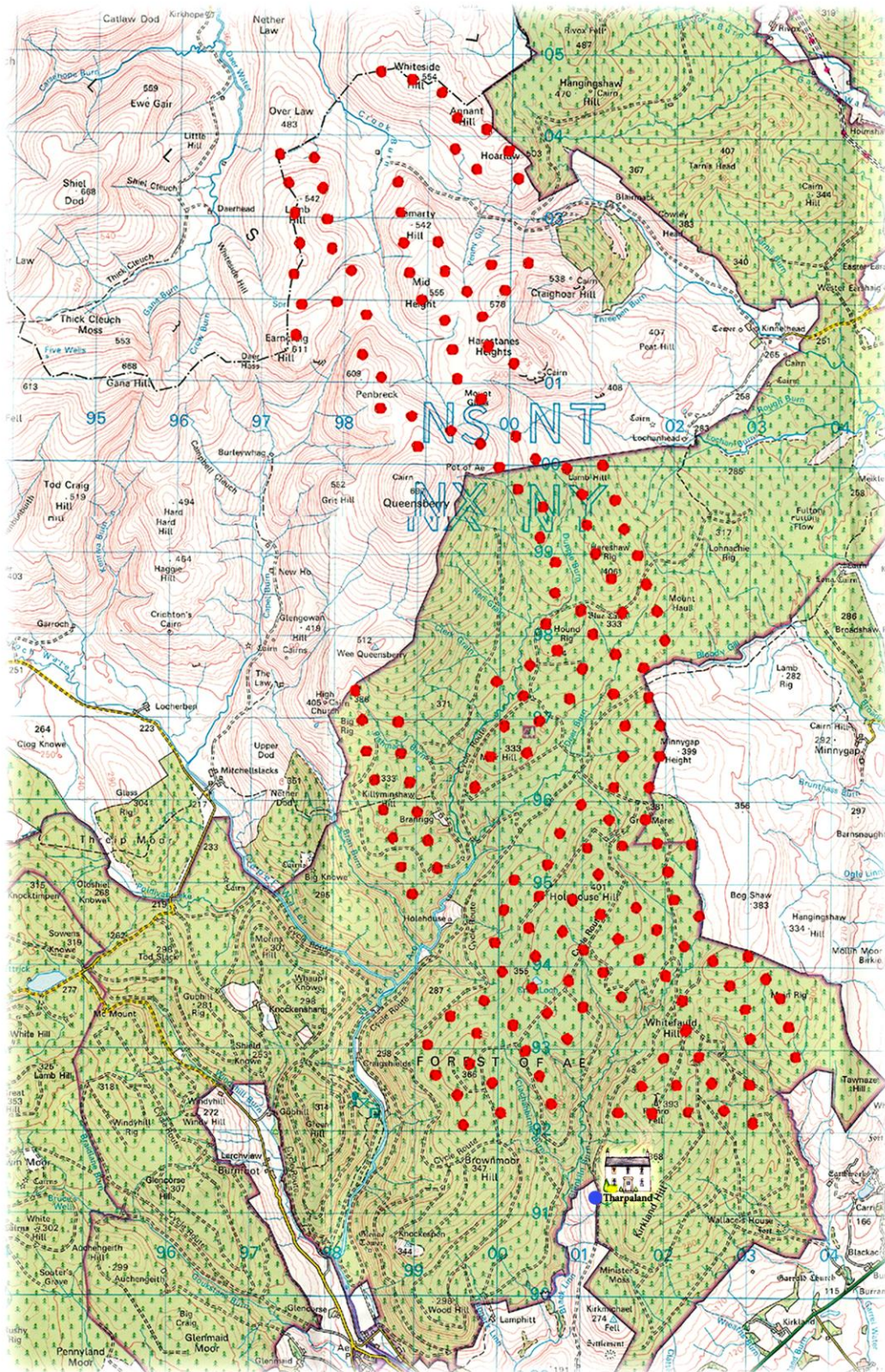
We therefore request that the following key areas be included within the Environmental Impact Assessment and subsequent Environmental Statement and that Tharpaland's own findings and recommendations, to be presented in due course, should also be included within this Environmental Statement.

Amongst the central issues are:

1. The **noise** impact of the turbines at the cut-in speed as well as higher and lower wind speeds, on meditators both at the Retreat Centre and in the surrounding walking areas:
 - a. Mechanical noise from the transmissions and generators.
 - b. Aerodynamic noise from the blades.
 - c. Interactive and cumulative effects amongst numbers of turbines, including variable patterning, rhythmic and shadowing effects, etc.
 - d. The nodal effects often observed in complex terrain.
 - e. The effects of variable speed operation.
 - f. The fact that any masking wind noise may be absent in observation sites significantly lower in altitude than hub height and in a more sheltered area, making the turbine sound more intrusive.

- g. The possibility that the spectrum of noise produced by the turbines includes peaks of intensity at particular frequencies that would not be masked by broadband ambient noise such as that from trees or wind, even when the overall noise level from the turbines did not exceed the ambient noise.
 - h. Other effects, e.g. from mechanical malfunctions, such as the following effects which were both experienced at a site visit arranged by Scottish Power.
 - i. Continuous squeaking sounds from a nearby turbine shaft.
 - ii. In a different turbine, periodic loud roaring sounds due to resonance of the tubular tower, associated with variations in rotor speed (as loud as a low flying jet).
 - i. The degree of accuracy to which the basic sound power level of the turbine can be specified.
 - j. The impact of random variation in noise levels, which can be a cause of complaint even when the noise levels are not high in absolute terms.
2. The **visual** impact of the turbines during operation, on meditators both at the Retreat Centre and in the surrounding walking areas:
- a. The dominating effect of large numbers of turbines over the northern sector view from Tharpaland. The turbines are among the largest ever built, and as designed will cover a 120 degree sector from Tharpaland - one third of the total horizon. Within the latest proposed design layout, the closest turbine is approximately $\frac{3}{4}$ km away – only six times the height of each turbine.
 - b. The disturbing effects of the rotation of large numbers of rotors at various distances.
 - c. The visual impact of warning night lights on top of turbines, possibly required by the Ministry of Defence in this low-flying zone (PAN 45 Fig 4).
 - d. The extent and effect of shadow-flicker throughout a variety of distances.
 - e. The visual effects on the perception and experience of those arriving to do retreat at Tharpaland both from distant and close viewpoints.
3. The effect on meditators of **visual-auditory interaction effects** during operation.
4. **The impact on meditators at the Retreat Centre** of the 2 year construction period:
- a. Road building, widening and upgrading etc of the forest track network surrounding Tharpaland.

- b. Blasting to quarry for the above.
 - c. Turbine site preparation (e.g. Noise of machinery, blasting operations, etc).
 - d. Large numbers of transport journeys for construction, especially foundation pouring.
5. The impact on a Retreat Centre which is trying to up-hold particularly high standards of **environmental purity**:
- a. Noise, dust and intrusion especially during the construction period.
 - b. Loss or contamination of our water supply during construction and during operation of the turbines (e.g. from blasting, dust, transmission oil or hydraulic fluid leaks).
 - c. Disruption of the peatland ecosystem from which our water supply comes.
6. **Other possible impacts** e.g. from electro-magnetic, sub-auditory and geophysical vibrations, etc.
7. How the above impacts (1-6) relate to the development of stress **and stress-related physical and mental disorders**, especially in very sensitive individuals in strict retreat.
8. The impact on our own **ownership** and **use of** our **land**, and our use of adjacent areas within the proposed site, and hence the consequential impact on Tharpaland's **financial viability**.
9. The impact on **tourism** that the loss of Tharpaland as a Retreat Centre and important tourism site within Southern Scotland would entail. The assessment needs to also take into account the *present* **recreational use** by visitors to Tharpaland of the part of the forest within the current proposal. Consistent with the Forestry Commission's own policy of increasing public access and recreation in the forest, we note that the closure of Tharpaland would be in direct contradiction to this. In addition a substantial annual contribution to the local and national economies would be lost.



● Wind-turbine

● Tharpaland

one of the proposed placements of the wind-farm

APPENDIX 2

SUBJECTS

SUBJECTS

When considering the subjective data of the 3 windfarm and control studies, it is important to take into account the characteristics of the subjects who provided them. They represent a diverse cross-section of Scottish society: (1) a butler at a leading Edinburgh hotel, (2) an electrical engineer, (3 & 4) 2 care workers, (5 & 6) 2 artists, (7) a medical herbalist, (8) a university student, (9) a computer engineer, (10) a radio journalist, (11) an administrative assistant, and (13) the administrative director of a charity.

What makes this group unusual is that:

- (1) Their main goal in life is a spiritual goal, specifically, to benefit others and society through improving and developing their mind.
- (2) They are highly trained in observing moral discipline and live within vowed restraints of moral conduct, such as not to lie.
- (3) They are all highly experienced in meditation and meditative retreat having spent from 3-months to over one year in strict silent retreat.
- (4) They are highly trained in observing, evaluating and describing their mental and physical states, this being a result of their spiritual training.
- (5) They are unusually open, sensitive people with very peaceful, gentle and happy minds – most of the time.
- (6) From these points it can be understood that the experiential reports given by these subjects are completely honest, reliable and true.

As indicated earlier, the subjects who participated in these studies are meditators who in comparison with non-meditators, have developed deep states of concentration and as a result have become increasingly sensitive to their environment. This has been due mainly to the progressive de-stressing and re-sensitisation that occurs spontaneously in the process of developing concentration. This is a completely normal and natural consequence of deep spiritual training.

APPENDIX 3

WINDFARM BIOGRAPHIES

Introduction to Hagshaw Hill (HH)

Turbine manufacturer and rating	No. of Turbines In Windfarm	Hub Height (m)	Blade Diameter (m)	$\frac{1}{2}$ Blade Diameter (m)	Overall Height (hub height + $\frac{1}{2}$ blade diameter (m))
Bonus 600kW	26	45	41	20.5	65.5

Date of Visit: 1st May 2003

No. of subjects: 6

As well as a baseline assessment, 4 further assessment points approaching and within the turbine field were selected

<i>Point 1</i>	7.5 km
<i>Point 2</i>	1.75 km
<i>Point 3</i>	400 m
<i>Point 4</i>	At 0 km (1 st turbine)
<i>Point 5</i>	Within Windfarm

Introduction to Beinn An Tuirc (BAT)

Turbine manufacturer and rating	No. of Turbines In Windfarm	Hub Height (m)	Blade Diameter (m)	$\frac{1}{2}$ Blade Diameter (m)	Overall Height (hub height + $\frac{1}{2}$ blade diameter (m))
Vestas 660kW	46	40	45	22.5	62.5

Date of Visit: 17th May 2003

No of subjects: 12 (only 11 went into windfarm itself)

With the aid of the Global Positioning System (GPS), 4 assessment points on the forestry approach to Beinn An Tuirc (see map 1), as well as a baseline assessment point, were selected at precise distances from the nearest turbine in the windfarm. The final assessment point was the windfarm itself.

Baseline	7.7 km
Point 2A	5.5 km
Point 3A	3.8 km
Point 3AA	2.0 km
Point 4BB	606 m
BAT windfarm	Within windfarm

A precise system of recording other relevant background information on a table was also established under the following headings (see page 30):

Assessment point

This shows the name given to each assessment point (at various distances from the windfarm)

Ordnance Survey point

This shows the exact OS points at which each assessment took place

Distance away from windfarm

This shows the distance from the windfarm based on a specified turbine within the windfarm (established by GPS)

Contour of land

This gives the contour level of the land at the exact point at which the assessment took place (or in some cases where the cars stopped initially)

Terrain levels

This gives the range in contours of the landscape surrounding each assessment point, thereby indicating the type of terrain that each assessment was conducted in i.e at the base of a hill or top of a hill etc

Land description

This describes the type of terrain both within and surrounding each assessment point i.e grassland, forest etc

Other noise

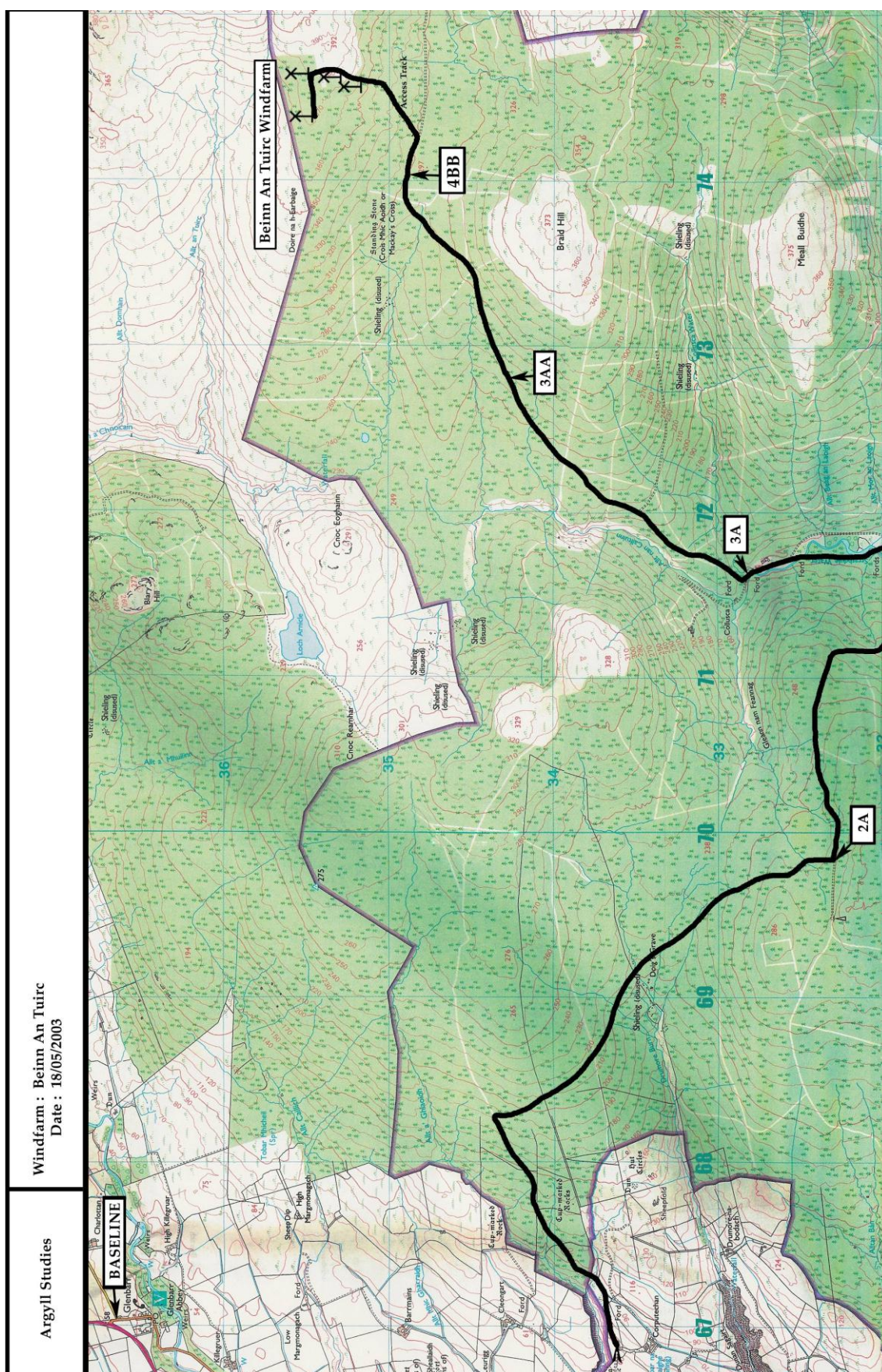
This gives an indication of any noise that was audible at the time of each assessment including from the windfarm and other noise, for example, birdsong.

Weather

This gives the weather conditions for the time of each assessment

Any other points

This gives indications of any other things that occurred at an assessment point or what was seen i.e. no. of turbines visible



Map 1

BAT	OS	Distance from wf	Contour	Terrain levels	Land description	Other noise	Weather	Any other points
Baseline	67046 36621	7.7km	62m	N/A	Village lane Near main road	Road traffic Rain	Rain Fog cover in view	Car 1 went down Glenbarr valley to see view of BAT -too foggy
Point 2A	69838 32279	5.5km	230m	230m>302m	Open forest track turning area. Hills either side. Extensive tree cover	Babbling brook Birdsong	Light rain Clearing	
Point 3A	71600 32854	3.8km	171m	150m>375m 150m>328m	Base of climbing road. Besides ford. Trees to left and behind. Mainly felled to right.	Forestry operations at 1km Stream water Rain	Showers Thick fog coming down	
Point 3AA	72815 34283	2km	229km	229m>373m	Higher up near wf* Smaller trees either side of track. Quite enclosed	Whooshing	Rain Little foggy on hill to right	
Point 4BB	74046 34875	606m	290m	290m>450m (BAT hill)	Higher up near wf Smaller trees either side of track	Whipping noise like a factory in valley Wind in trees Whooshing	Foggy Slight rain Then stopped	Ven K.Tharchin and NB left at this point
BAT wf	N/A	Within it (46 turbines)	Range from 230m>360m	230m>360m	Open moorland on top of hill. Extensive views (usually). Surrounded in parts by tree cover, Treeline below wf	Whooshing Cutting Whining	Very foggy (turbines only visible close up)	

* Wf = windfarm

Introduction to Deucheran

Turbine manufacturer and rating	No. of Turbines In Windfarm	Hub Height (m)	Blade Diameter (m)	$\frac{1}{2}$ Blade Diameter (m)	Overall Height (hub height + $\frac{1}{2}$ blade diameter (m))
Vestas 1.75MW	9	50	66	33	83

Date of Visit: 18th May 2003

No of subjects: 11 (one stayed at home)

With the aid of the Global Positioning System, 4 assessment points on the forestry approach to Deucheran (see map 2) were selected at precise distances from the nearest turbine in the turbine field. At Deucheran, a further assessment method was added - walking from point 3 towards the windfarm - in order to assess the experience of walking into the windfarm from a distance. The final assessment point was within the windfarm itself.

Point 1	5 km
Point 2	2.2 km
Point 3	1 km
Walk from 3 to 4B	From 1 km to within 313 m of windfarm
Point 4B	313 m
Deucheran windfarm	Within windfarm

A precise system of recording other relevant background information was also established under the following headings (see pages 34-35):

Assessment point

This shows the name given to each assessment point (at various distances from the windfarm)

Ordnance Survey point

This shows the exact OS points at which each assessment took place

Distance away from windfarm

This shows the distance from the windfarm based on a specified turbine within the windfarm (established by GPS)

Contour of land

This gives the contour level of the land at the exact point at which the assessment took place (or in some cases where the cars stopped initially)

Terrain levels

This gives the range in contours from the surrounding landscape of each assessment point, indicating the type of terrain that each assessment was conducted in i.e at the base of a hill or high up etc

Land description

This describes the type of terrain both within and surrounding each assessment point i.e grassland, forest etc

Other noise

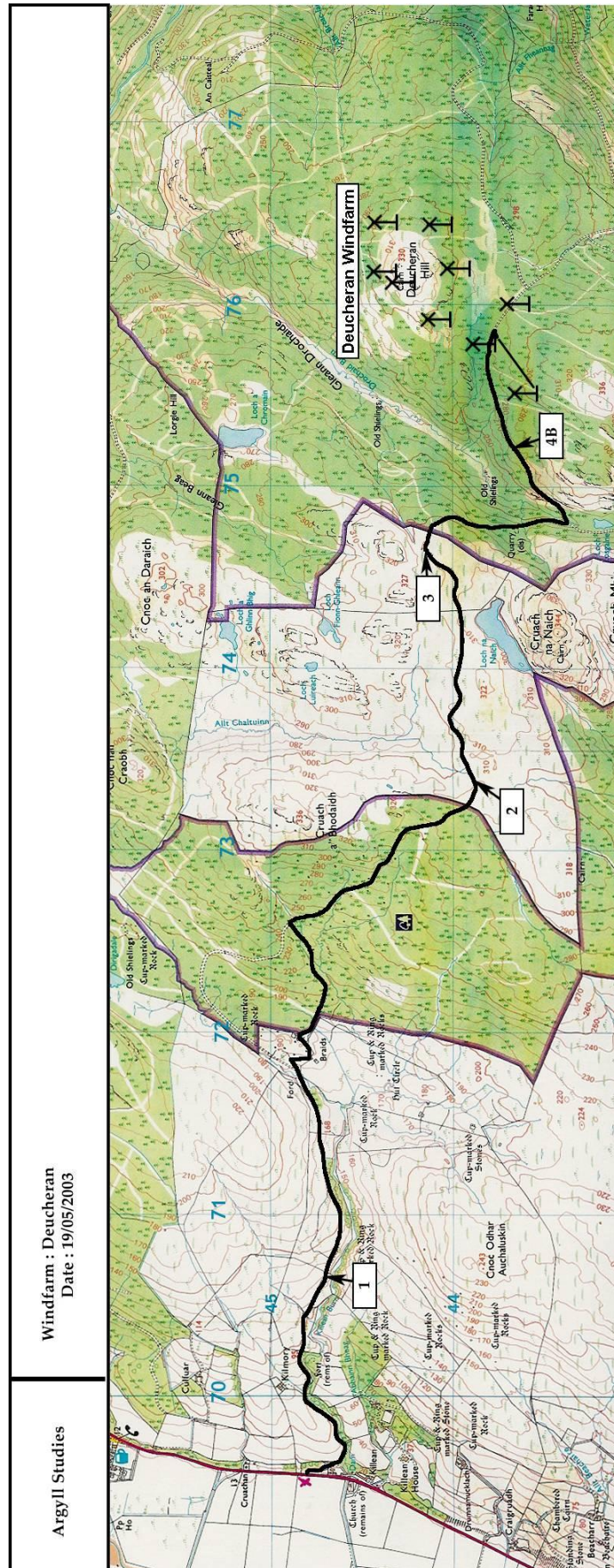
This gives an indication of other noise that was audible at the time of each assessment i.e. Birdsong

Weather

This gives the weather conditions for the time of each assessment

Any other points

This gives indications of any other things that occurred at an assessment point or what was seen i.e. no. of turbines visible



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Map 2

DH	OS	Distance from wf	Contour	Terrain levels	Land description	Other noise	Weather	Any other points
Point 1	70678 44698	5km	113m	113m>243m 113m>220m	Sea in background Not far from bottom gate – near house. Bottom of grazing hills. Small stream to right with slight broad leaf tree cover	Stream Birdsong Local householder and family and dog walk by	Sunny day Blue sky Some grey clouds No rain Slight wind Fresh air	
Point 2	73369 43836	2.2km	320m	320m>318m 320m>336m	Wide open road – turning point – shale Open moorland either side going downhill Trees either side at a distance	Rain Wind Whooshing Locals pass again	Rain on and off Grey sky Slight fog over DH at times	6 DH turbines in view BAT in view
Point 3	74688 44164	1km	313m	313m>344m	Top of hill looking east to DH wf. Open moorland to sides and behind. Glen below to left and far right (NE) Forest ahead between us and wf	Whooshing Rain	Rain No fog Grey clouds	All DH turbines visible
Walk from point 3 to windfarm edge (just before 4B)	75830 43749 walked to 75506 43534	Walking from 1km from wf towards windfarm	Range from 313m>292m	Range from 313m>292m	Steep walk down hill - extensive view at top walking down into tree surround – glen to left. Steep walk back up hill on other side – flattens off once in windfarm	Intermittent whooshing Nodal effects in glen valley Birdsong	Light rain	

DH	OS	Distance away from	Contour	Terrain levels	Land description	Other noise	Weather	Any other points
Point 4B	75204 43620	313m from turbine	292m	292m>336m	Near first turbines. Top of hill in DH wf field. Trees either side.	Whooshing	Raining then clearing	
DH wf	N/A	Within it (9 turbines)	270m>330m	270m>330m	Underneath first turbines. Turbines at sides of forest tracks or in forest trees. Walked up hill to view all DH wf field	Whooshing Cutting Whining Sloshing	Raining Clearing Rainbows	

Introduction to Ae Control study

Date of Visit: 31st May 2003

No of subjects: 6

With the aid of the Global Positioning System (GPS), a baseline point and 4 assessment points were selected as well as a walking assessment near the 'control point' itself. Tharpaland was chosen as the 'control point' and Queensbury as the baseline (see map 3)

Baseline	7 km
Point 1	5.2 km
Point 2	4.1 km
Point 3	2.2 km
Point 4	1.2 km
Walk from approx. 500 m to TIRC	approx. 500 m - 0 m

A precise system of recording other relevant background information was also established under the following headings (see page 39):

Assessment point

This shows the name given to each assessment point (at various distances from Tharpaland)

Ordnance Survey point

This shows the exact OS points at which each assessment took place

Distance away from Tharpaland

This shows the distance from the Tharpaland property (established by GPS)

Contour of land

This gives the contour level of the land at the exact point at which the assessment took place (or in some cases where the cars stopped initially)

Terrain levels

This gives the range in contours from the surrounding landscape of each assessment point, indicating the type of terrain that each assessment was conducted in i.e at the base of a hill or high up etc

Land description

This describes the type of terrain both within and surrounding each assessment point i.e grassland, forest etc

Other noise

This gives an indication of other noise that was audible at the time of each assessment i.e. Birdsong

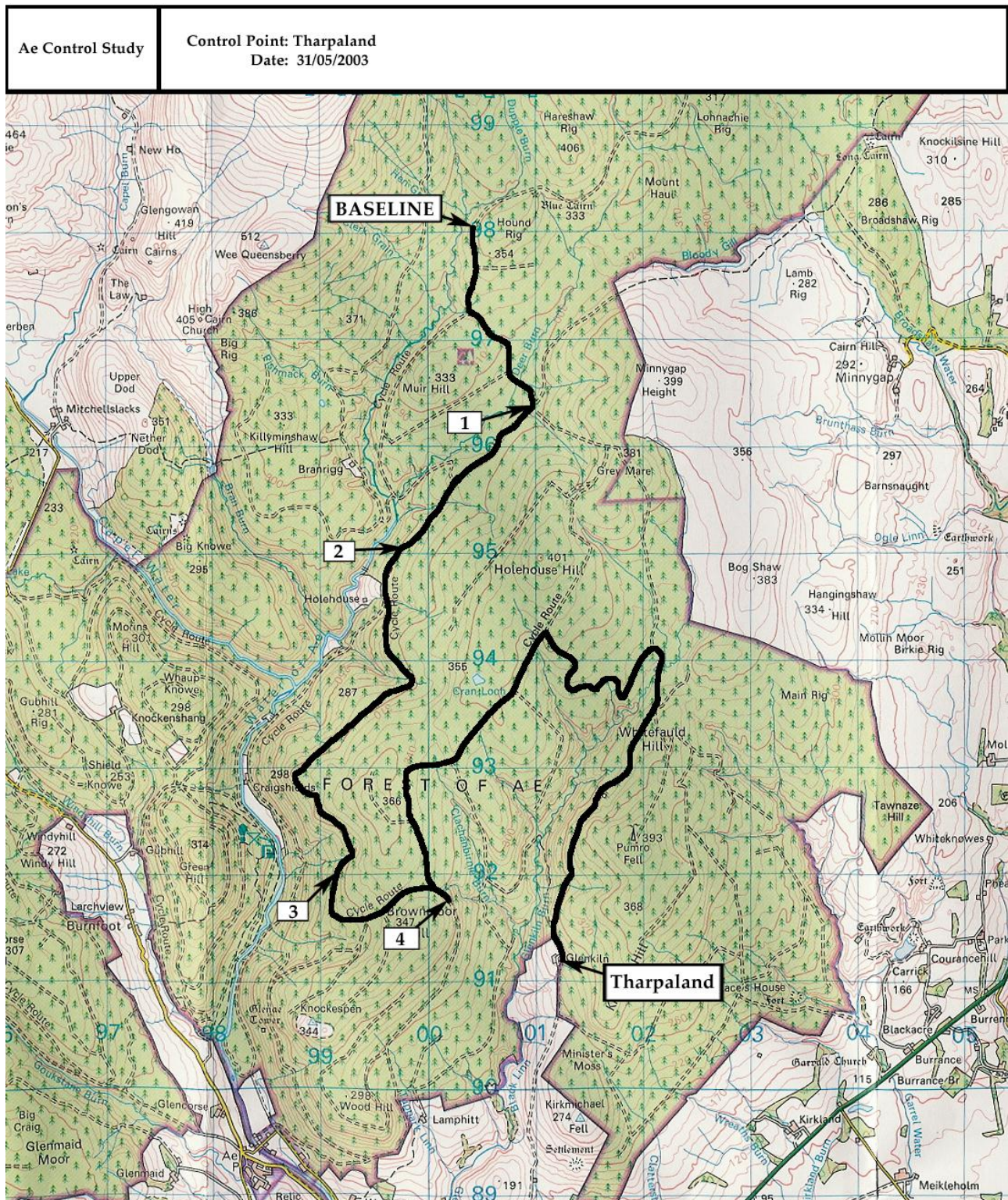
Weather

This gives the weather conditions for the time of each assessment

Any other points

This gives indications of any other things that occurred at an assessment point

Map 3



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AE	OS	Distance from Tharpaland	Contour	Terrain levels	Land description	Other noise	Weather	Any other points
Baseline	0058 98215	7km	348m	348m>697 m	Semi-forested moorland...pockets of forest around. Quite open. Queensbury to left	Birdsong	Humid Dry Foggy on hills	
Point 1	01027 96392	5.2km	288m	288m>233 m 288m>399 m 288m>401 m	Long Tall forest corridor behind us. Small trees ahead of us. Some felled areas. At intersection of four roads	Birdsong Cuckoo Breeze in trees	Overcast Dry Cool Breeze	
Point 2	99800 95038	4.1km	258m	258m>401 m 258m>200 m	Surrounded by mature forest on either side. No distant view.	Birdsong Distant plane Can hear small brook on passing	Overcast Sun behind clouds	
Point 3	99163 92032	2.2km	277m	277m>347 m 277m>200 m	On top of high ridge. Distant view to left, right and in front of hills, forest and burn. Mature forest behind	Lot of birdsong	Hazy Sunshine Bright	
Point 4	00151 91796	1.2km	323m	323m>347 m 323m>223 m	Top of other ridge looking down into valley. Small trees below and behind. Forest and felled areas in distance. TIRC on distant hill.	Pheasant call Very quiet	Slight breeze Bright sun Fresh air	
Walk from 500m to TKRC	00190 91198	500m-0m	323m?	323m>368 m 32m>223m	Felled to left. Mature forest then field to right	Distant birdsong at TIRC	Sun setting Cool breeze	

Windfarm Comparison

<i>Windfarm</i>	Turbine manufacturer and rating	No. of Turbines In Windfarm	Hub Height (m)	Blade Diameter (m)	½ Blade Diameter (m)	Overall Height (hub height + ½ blade diameter (m))
Hagshaw Hill⁸	Bonus 600kW	26	45	41	20.5	65.5
Beinn An Tuirc²	Vestas 660kW	46	40	45	22.5	62.5
Deucheran ²	Vestas 1.75MW	9	50	66	33	83
Proposed Forest of Ae³	Vestas 3MW	95 ⁴	80	90	45	125

⁸ Ecogen website:<http://www.ecogen.co.uk/hagshaw.htm>

² Hub height and blade diameter figures for Beinn an Tuirc and Deucheran from TIRC meeting with S. Macken and J. McLaughlin of ScottishPower on 27th March, 2003

³ From 'Vestas V-90-3.0MW' The Window, no 11 Vestas May 2003, pp 7-9;<http://www.vestas.com>

⁴ According to current iteration as of September 2003.

APPENDIX 4

WINDFARM STUDIES

INTRODUCTION TO WINDFARM STUDIES

Dun Law windfarm

In March 2003, following notification of Scottish Power's proposal to build one of Europe's largest windfarms near to Tharpaland, Venerable Kelsang Tharchin (Resident Teacher of TIRC) and Kelsang Malaya (Admin Director of TIRC) visited the windfarm at *Dun Law* (south of Edinburgh), to gain an initial experience of a windfarm and an impression of what impact a windfarm might have on the retreat conditions and functions of Tharpaland, and on the experience of meditators living and retreating there. This windfarm was observed at a distance of approximately 1 km and at close range within the windfarm itself. The attitude of the observers was open to the possibility, even to the deep wish, that the impact of a windfarm close to Tharpaland might perhaps be negligible and too insignificant to be of concern.

The first observation point of the Dun Law windfarm was from a road just off the A68 approximately 1 km due north of a field of nine turbines.

The initial experience of the windfarm from this point was neutral. Only two and occasionally three of the turbines were actually operating in the slight breeze. This initial experience then gradually changed, over a period of a few minutes, to a feeling similar to anxiety and then into pressure and a turbulent sensation in the region of the heart and stomach. This was experienced by both Tharchin and Malaya, simultaneously and without comment to each other at this point.

Tharchin and Malaya then alternated viewing the turbine field to the south for 2-3 minutes with viewing the completely natural setting of fields, forests and hills to the east for 2-3 minutes. They both experienced gradual relief from the disturbing experience whilst looking east, only to have it return once again whilst looking south (towards the windfarm.) These alternating experiences associated with alternating viewpoints recurred many times. This way of alternating viewpoints was adapted as a standard assessment procedure in the subsequent studies.

The second observation point was from within the windfarm itself, accessed over a stile in a fence on a lay-by off the A68 approximately 1 km south of the nine turbines. Over an approximately 60 minute period, Tharchin and Malaya wandered around and between two operating turbines which were approximately 300 metres apart, noting their experiences. When they attempted to meditate, however, they noticed that they were unable to develop either concentration or mindfulness against a growing background experience of intense distraction, growing anxiety and eventually nausea.

When their experience reached the level of intense nausea, headache and dry retching, Tharchin and Malaya left the turbine field and returned to the car. As they walked the one mile from the turbine field, they noticed a distinct gradient of relief. By contrast, the car, sitting on a lay-by, just off of a heavily trafficked A-road, was remarkably peaceful and serene. It took two days to completely recover from this experience.

Initial visit to Beinn An Tuirc and Deucheran Windfarms

On March 27th, Tharchin and Malaya were invited by Scottish Power to visit the *Beinn An Tuirc* and *Deucheran* windfarms on the Mull of Kintyre. The experiences at these two windfarms were very similar to those at Dun Law, and were followed by severe migraine headaches the following day and other symptoms over subsequent days. These experiences clearly indicated that a systematic approach to the assessment of the subjective impact of windfarms on meditators was necessary to gauge the full implication of siting one of Europe's largest windfarms less than a kilometre from Tharpaland⁹.

Three windfarms were chosen to conduct these further windfarm studies:

- Hagshaw Hill, near Douglas
- Beinn An Tuirc, Argyll
- Deucheran, Argyll

A further control study in the Forest of Ae was conducted in order to investigate the possible contribution of the assessment methodologies to the observed effects in the windfarm studies. All of these studies are described in detail below.

⁹ Based on iteration as of that date – see Appendix 1: Scoping Response.

THE HAGSHAW HILL STUDY

Background

The Hagshaw Hill Study was carried out as the first part of a series of exploratory investigations of the subjective impacts of a windfarm on the experience of meditative retreaters in general, and on their ability to develop concentration in particular.

Six¹⁰ experienced meditative retreaters (see Appendix 2) participated as subjects in a systematic assessment of the impact of the turbine field at Hagshaw Hill windfarm on their ability to develop concentration and on their general experience. The subjects recorded the times they required to develop concentration and their other subjective experiences at 5 assessment points approaching and within the turbine field itself, including a baseline assessment at a substantial distance from the windfarm.

The schedule for the visit to Hagshaw Hill was pre-arranged with Scottish Power, the developers of the windfarm, and the purpose of the proposed study had been previously discussed with them. The time of arrival was scheduled for 3.00pm on Thursday 1st May 2003.

On the day of the visit, after exiting the M74 at Douglas, it was noticed on the approach to Cairn Lodge services that the turbines on Hagshaw Hill were moving. Immediately upon leaving the Services just outside Douglas, at approximately 2.15pm, a preliminary assessment site was found 7.5 km from the windfarm. At this point the group established baseline concentration times and subjective reports, after which they resumed the journey to Hagshaw Hill.

However, just before entering Douglas, a few miles from Hagshaw Hill, it was noticed that the turbine field was not operating; the turbine blades were stationary. Upon arrival at the windfarm the site engineer explained that the turbines had been turned off from 'central control' 13 minutes prior to the group's arrival (at 2.47pm), because there was no need for their electricity at that time and because of insufficient wind speed on top of the hill.

The group of six – none of whom had ever visited a windfarm before – requested to visit the turbine field anyway, and were escorted there by the site engineer together with Venerable Kelsang Tharchin and Kelsang Malaya. The group then remained within the turbine field for around 45 minutes, looking at the stationary turbines and surrounding views while noting their impressions and experiences of this. They then left the site, unable to carry out their proposed investigation.

However, shortly before rejoining the M74 on the homeward journey, it was noticed that some of the turbines on Hagshaw Hill were now operating. The group of eight then immediately returned to the site engineer's office and requested access to the windfarm as previously arranged. The request was granted. Observing the windfarm layout on his computer monitor, the engineer confirmed that the turbine field (or at least part of it) was now operating. He then patiently accompanied the group into the

¹⁰ The group of six subjects was accompanied by Kelsang Malaya and Venerable Kelsang Tharchin, who facilitated but did not themselves participate in the study.

windfarm site once again. During the next few hours, the assessments were carried out at the remaining 4 assessment points approaching and within the turbine field.



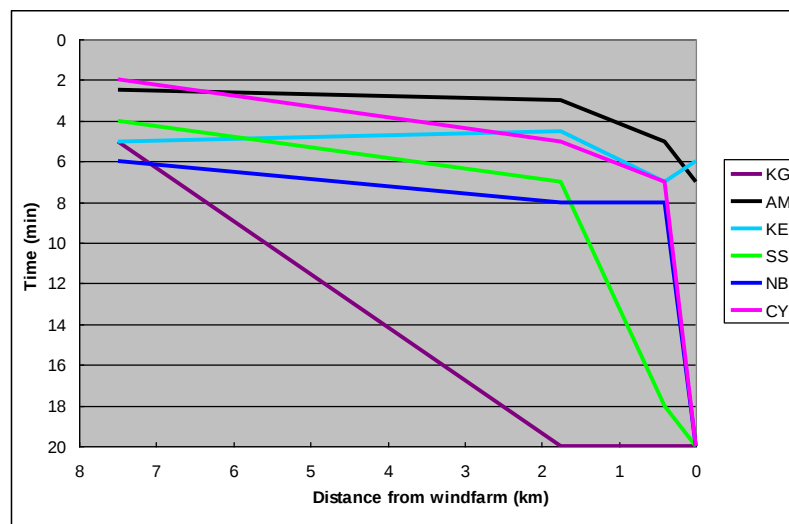
Fig. 4 *Subjects doing subjective assessment at Hagshaw Hill windfarm*

Results

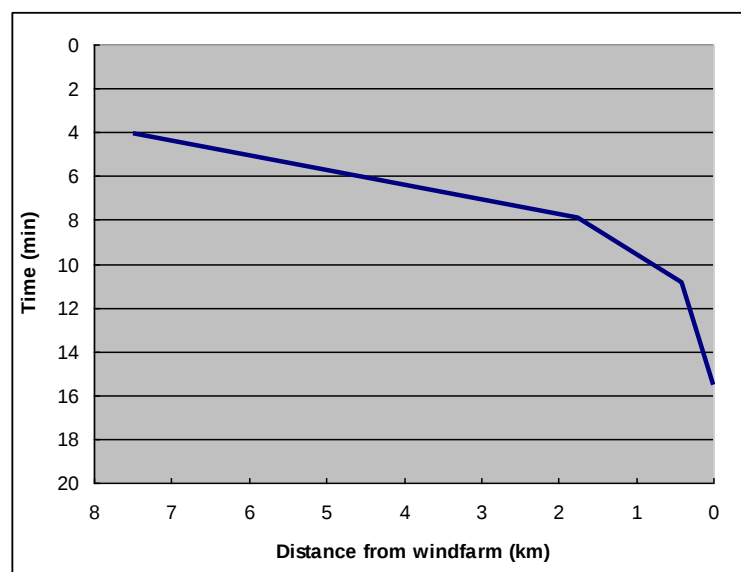
On the Ability to Develop Concentration

The results of this study indicate that there was an overall average increase of 7 minutes and 33 seconds in the time required by the subjects to reach the criterion of 21 successive inhalations and exhalations of the breath observed without a break in concentration (N.B baseline time for assessment point 1 at 7.5 km was an average of 4 mins 33 secs). This indicates a sharp decline of 74% in subjects' original ability to develop concentration over the 4 assessment sites used in this study, especially at the 3rd and 4th assessment sites, approx. 400m from and within the turbine field respectively.

Hagshaw Hill Windfarm



Graph 3 Time taken to reach criterion of concentration (min) / Distance from windfarm



Graph 4 Average time taken to reach criterion of concentration (min) / Distance from windfarm

On Subjective Experience

The subjective reports of the participants in this study are presented verbatim below. These reports show the extent to which the participants were affected by the windfarm, not just within the turbine field itself, but on the approach to the field as well, - at a considerable distance from the field and even before the turbines were visible.

These adverse effects can best be described as traumatic, and indeed, some of the 6 participants reported experiencing negative after-effects up to three days after the Hagshaw Hill experience. The effects experienced on the day are more than enough to account for the steadily diminishing ability of experienced meditators to develop even the small degree of concentration represented by the criterion measure, on the approach to and within the turbine field.

SUBJECTIVE REPORTS

The initials in parenthesis indicate the subjects name, and where a description of a particular assessment point is omitted or combined, this indicates either that the subject did not record their experience at this point or this description covers more than one assessment point.

The Hagshaw Hill Study - (SS)

(1) Observations and experiences at assessment point 1 - 7.5 km from turbine field

"I feel calm and relaxed. My mind is concentrated. Just by looking at the view, my mind absorbs into the landscape and becomes very peaceful, clear and open."

(2) Observations and experiences at assessment point 2 on return to windfarm upon noticing that turbines now operational - 1.75 km from turbine field

"Mind is buzzing and agitated. Concentration is reached with effort but does not have the clarity or quality of previous meditation. Afterwards I do not feel peaceful."

(3) Observations and experiences at assessment point 3 - 400m from nearest turbine

"My heart feels tight, and I have sharp pains in my head, which is buzzing. My balance is affected and I am dizzy. I find the whooshing noises of the blades of the windmills are disturbing, the tone and type of action of the blades become painful to hear and invasive. They stand beautiful and terrible like polished weapons."

(4) Observations and experiences at assessment point 4 - at the first turbine

"I look to the view away from the turbines to the landscape and there is a real sense of relief comes with this. But my mind cannot fully relax and open as before but continues to feel the background turbulence and disruption of the windmills unsynchronised movements and sounds churning the atmosphere around me. When I turn round again the impact on seeing them is even worse and I dread it."

(5) Observations and experiences at assessment point 5 - within the turbine field

"Concentration not reached..."

"...I feel really uncomfortable, tense, agitated and stressed. I want to

leave and suddenly feel really tired by it all and strangely depressed. The noise is pervasive; the pitch is low, thumping, painful and penetrating. The movement of all the blades moving at different times all around me is nauseating. I am now having sharp pains in my heart and palpitations. I want to leave immediately and have to return to the car and stop looking at the windmills...

“...I look away towards the nearest trees. I have never appreciated a tree so much before. It is gentle to look at. It doesn’t take anything from me but gives me everything. I feel some peace looking but the atmosphere around me is too disturbing to really relax.”

(6) Any other comments

“(Next Morning, Friday 02.05.03) In meditation session, still having problems with concentration. My mind is still agitated and buzzing. My concentration is scattered...

“(Saturday 03.05.03 Midnight) Still having pains in my heart. My mind has a background disturbance like the snow effect you see on television, when the station is not turned in. I found when reading I couldn’t focus properly and was missing out words and sentences and frequently losing my position on the page. I noticed I am extremely sensitive to sound today and small repetitive sounds are unbearable e.g. I found the noise of the water pump in the Gompa¹¹ really disturbing and normally I don’t notice it. Concentration has still not completely returned...

“(Wednesday 07.05.03) Still having pains in heart, concentration is improving but not yet back to normal.”

¹¹ ‘Gompa’ refers to the Meditation Room.

The Hagshaw Hill Study - (AM)

(1) Observations and experiences at assessment point 1 - 7.5 km from turbine field

“Mind quite calm and concentrated.”

(2) Observations and experiences at assessment point 2 on return to windfarm upon noticing that turbines now operational - 1.75 km from turbine field

“At this point begin to feel a slight pressure in my head but generally feel fine. Had a small walk outside car and looked at landscape, mind quite peaceful.”

(3) Observations and experiences at assessment point 3 - 400m from nearest turbine

“At this point began to feel slightly sick. Could hear the noise produced by the turbines. Found it unpleasant when looking at the moving turbines but when I looked away to the landscape on my right I felt much more peaceful. It is disturbing to look at the turbines and the complete opposite to what I usually feel when looking into the landscape. It makes me want to look away rather than out into the landscape. It does not induce a peaceful state of mind but I find it disturbs my mind, compared with looking out into the open landscape where my mind expands in response to the open environment and can rest at peace...”

“...The noise of the turbines disturbs the peace of the landscape, they seem very out of place. It is very difficult to see beyond the turbines to see the distant landscape and the vast sky as they seem to dominate the whole view. When standing outside the car at this stage I found it very noisy, as I would imagine it is like to stand near an airplane with its propellers moving.”

(4) Observations and experiences at assessment points 4/5 – amongst the turbines

“Difficult to concentrate with the constant noise, like an engine with occasional noises. Mind much less peaceful. Feeling slightly sick again. Getting out of the car the noise is even greater, it is very disturbing and I don't want to stand near the turbines as it is even louder...”

“...Can't even look out towards the landscape in the other direction as the noise and large moving shadows of the turbines on the ground I find very distracting. The shadows moving are very disturbing visually like a constant flicker type effect. Find I can't enjoy looking at the landscape and don't want to be in the landscape with them. I find myself very glad to be leaving the area where the turbines are and whilst travelling back down the hill I feel quite relieved to be leaving the windfarm site. I am able to look at the landscape without feeling so disturbed as at this point I can't see or hear any turbines and the landscape becomes peaceful again.”

The Hagshaw Hill Study - (KE)

(1) Observations and experiences at assessment point 1 - 7.5 km from turbine field

"Agitated by cars passing but otherwise quite calm. I feel quite sensitive, especially my head..."

"...Agitated by pylons – irritated by not being able to look at the countryside view without focusing on these pylons."

Observations and experiences when initially arrived at windfarm to find turbines non-operational

"The windmills look quite majestic but at the same time very dominant in the landscape. I have a sense of being lost among them because they are so huge and alien."

(2) Observations and experiences at assessment point 2 on return to windfarm upon noticing that turbines now operational – 1.75 km from turbine field

"I feel pain in my left temple. My head feels heavy and I feel pressure around the top half of my body- especially my head- slight tightness in chest - dizzy feeling..."

(Whilst walking outside) "... nausea - claustrophobia - tightening in my stomach - increased wind - burping incessantly - pain in my lower back."

(3) Observations and experiences at assessment point 3 - 400m from nearest turbine

"Visual impact as approaching is dizzying- watching blades go round and round is mesmerising – like you can't focus on anything else- very different experience from the ones that were previously not moving. I have this feeling like I want to stop them from going round and round and round..."

"...Heavy head- dizziness-dullness- distracted by whoosh of turbines- I can feel the blades cutting through the air- the repetitive sounds slice my concentration to bits- forcing me to start over again- I feel like I'm competing against this constant interruption."

(Looking at the wind turbines) "...Visually I'm mesmerised by them but simultaneously I really don't want to look at them at all. Quite a violent artificial visual effect compared to the rolling natural landscape..."

(Looking away from the wind turbines) "...There's no question that looking at the view without the turbines swirling is more peaceful- there's no constant moving things disturbing my mind..."

(Looking back at the wind turbines) *“...My eyes follow one blade after another and try to take in the other blades turning at different speeds- this has an agitating and dizzying effect on my mind. The shadows of the blades loom right across the landscape making it impossible to avoid the constant movement – constant disturbance and noise- relentless noise – it feels like I'm at an airport...”*

(While walking outside) *“...Noise intensifies – the peace of looking at a turbine-less view is disturbed by the constant cutting, slicing, and whooshing of the blades – so much so I feel compelled to stop looking away from them and turn to see where the noise is coming from – now on seeing them the pain in my chest increases- stomach tightening, breath shortens and becomes more shallow- I try to do some breathing meditation but fail.”*

(4) Observations and experiences at assessment point 4 – at the first turbine

“Noise very loud now - sharper cutting sounds - very disturbing to look at blades moving when so close to them - I feel like I'm being attacked by them - just want them to stop - reminds me of scary roller coaster rides at fairgrounds...”

“...Shadows cutting right through my body- feels like if I stood here for a long time I'd develop epilepsy or some kind of mental insanity - incessant noise - the closer I get I hear different noises - buzzing - droning like a motor - whooshing - cutting - slicing, - pain in my chest, shallow breath...”

“...Shadows more violent than actual blades - so intense - I have to move away from them - I actually put my hand out to protect myself - from a shadow!...”

(5) Observations and experiences at assessment point 5 – within the turbine field

“Increased pain in chest - lots of different noises now - also an occasional clanging noise - intermittent shadows also disturb my concentration...”

(Whilst walking outside) *“...Noises intensify - pain in chest - shallow breathing - tight stomach - anxiety-agitation - overriding feeling of just wanting to escape from them...”*

“...To look up at them and watch blades turning relentlessly is sickening - makes me feel dizzy - I can only look for a short time (10secs) before I have to look away. Standing right next to one - it drones, vibrates and buzzes slices and swooshes. Intense discomfort - just want to leave as soon as possible - aware of others suffering around me - even while looking at the clear part of landscape aware of swirling blades in the corner of my eye...”

“...Driving away I feel intense relief - I just want to get away as quickly as possible - that night when I close my eyes to sleep I see the wind farm and the swirling blades vividly.”

The Hagshaw Hill Study - (NB)

(1) Observations and experiences at assessment point 1 - 7.5 km from turbine field

“During meditation my mind was calm, but tending towards over-analysis, which was subdued somewhat during subsequent walking meditation as my mind settled on simple points of focus in the landscape: a distant hill, a line of telephone poles stretching across the field.”

Observations and experiences when initially arrived at windfarm to find turbines non-operational

“The irregularity of the spacing of the turbines, their orientation and blade position made for visual disarray, particularly where only a portion of the rotor blade was visible behind a hill. Even when static, I found that there was so much going on to do with the turbines that they dominated and dwarfed everything else within the visual field. It struck me that these turbines seemed like something from a Steinbeck novel or a photograph by Dorothea Lange. There was something elegant and desolate about the way they contrasted starkly with the rural environment.”

(2) Observations and experiences at assessment point 2 on return to windfarm upon noticing that turbines now operational - 1.75 km from turbine field

“During meditation, the intensity of my mindfulness was weaker than it had been previously. I had to begin again several times, each time counting 4-5 breaths before a break in concentration or major distraction. There was a definite sense of confusion and busyness in my head. I did not notice any significant difference in the quality of my walking meditation.”

(3) Observations and experiences at assessment point 3 - 400m from nearest turbine

“Again, tenuous mindfulness and a sense of confusion. At a certain point, the noise of the turbines seemed to increase considerably; at which point I felt a slight tightness in my chest. After the meditation, this tightness varied in intensity, increasing as I watched the turbines, loosening somewhat when I averted my gaze...”

“...During walking meditation, my mind was still calm, but I found it difficult to ignore the sounds of the turbines. Because of the randomly interweaving rhythms, the sound seemed strangely neither natural nor quite mechanical...”

“...I was very surprised by the more distant turbines, which were mostly hidden save the ends of the blades, which seemed to spin suddenly out of the hillside. I found my attention drawn to a non-operational turbine in the field, a static focal point amidst all of the movement.”

(4) Observations and experiences at assessment point 4 - at the first turbine

“I found it very disturbing to walk in or near the shadows, both with my eyes open and shut. I became very disorientated at this point, distracted by the many different kinds of noises and found it difficult subsequently to think clearly or to note down my observations coherently. I began to feel physically tense and weary with the strain of trying cope with this confusion.”

(5) Observations and experiences at assessment point 5 - within the turbine field

“After 25 minutes, I still had not succeeded in counting 21 successive breaths due to distraction and intense feeling of disorientation.”

(6) Any other comments

“Upon returning to Tharpaland on Thursday evening, I felt weary and nauseous throughout the evening. I slept lightly due to stomach pains and between 6 and 10 am was up periodically with vomiting and dry retching. By Sunday morning, the physical weakness had mostly passed.”

The Hagshaw Hill Study - (KG)

(1) Observations and experiences at assessment point 1 - 7.5 km from turbine field

“The first meditation in the car park next to the hotel takes me five minutes to develop concentration. After the meditation I go for a small walk, everything is clear and bright. I am enjoying the different contrasts between the blue skies and grey clouds. My mind feels very stretched out with the view.”

Observations and experiences when initially arrived at windfarm to find turbines non-operational

“I am enjoying the panoramic views very much, it is very peaceful, and with the turbines standing still it all seems very surreal. Because the windfarm is not in operation, we just walk around for a short while then leave. Shortly after leaving we notice that the windfarm starts up again.”

(3) Observations and experiences at assessment point 3 - 400m from nearest turbine

“The next meditation on the track of the windfarm, I have no concentration during the maximum time allocated, approximately 25 minutes. I then go for a walk around the windfarm and am aware of the different noises of the windfarm. Sometimes it sounds like someone is sawing a piece of wood and if I close my eyes and just listen to the noise, it seems similar to being on a train. When I look at the windfarm, my eyes becomes very busy and go from left to right uncontrollably and my mind seems to become very distracted...”

“...Whilst facing the opposite direction of the windfarm, I look out at the view, but this also seems distracting. The view seems to have lost its beauty because of the continuous noise. Even the shadows, which have cast over the ground, seem to increase the number of turbines.”

(4) Observations and experiences at assessment point 4 – at the first turbine

“Standing underneath the turbine, I can hear a noise similar to a car horn and sometimes a noise like a growl or plane flying by. Sometimes there is an occasional shudder and the noise of metal banging, as if a piece of machinery was not attached properly. I have the feeling as though I'm going through the cycle of a washing machine, with some money or keys left in a pocket. I am aware of my heart missing a few beats, which causes me some concern. Standing in-between two turbines, which face me, and which both face the same direction, I am aware I can hardly hear an aeroplane that is flying past, but I can see it very clearly.”

(5) Observations and experiences at assessment point 5 – within the turbine field

“The next meditation in the heart of the windfarm with maximum time allocated, approximately 25 minutes. There is no concentration. Throughout the meditation I am constantly distracted by loud noises, like a shotgun going off. After meditation I go for a walk, I feel very sleepy and shuddery inside. When I look at the view, the trees in the forest look as though they are moving due to the shadows of the propellers. The more I stand here at the top it seems to me as if the propellers speed up, compared to the bottom when they were just in the distance. I cannot wait to leave, I feel very rocked, mentally and physically. Even the next day I sleep for 12 hours and feel as though I have a hangover!”

The Hagshaw Hill Study - (CY)

(2) Observations and experiences at assessment point 2 on return to windfarm upon noticing that turbines now operational - 1.75 km from turbine field

“Mild pressure in head (top & forehead & behind right eye)...definite subtle movement (unsettling vibration) in heart area, feeling restless.”

(3) Observations and experiences at assessment point 3 - 400m from nearest turbine

“Increased pain & pressure in head & eye, unpleasant fluttering sensation at heart. Felt my mind absorb into hypnotic, trance-like state when focused on the moving turbines, momentary relief when looked away at natural scenery, but then dizzy, nauseous feelings washed over me in waves...”

“...Visual Impressions: harsh structures breaking the softness of the natural scenery, jagged blades on horizon churning air, earth (shadows) &...stomach!...”

“...(Walking outside) feeling mildly agitated, not inclined to look at turbines, but still acutely aware of their presence while looking away- very definite 'force' felt even with my back to them.”

(4) Observations and experiences at assessment point 4 - at the first turbine

“Acutely aware of squeaking, grating noises amidst constant 'swish' of blades with occasional rhythmic bass sounds which induced heart palpitations...Slicing sounds & flashing shadows felt penetrating, as if being lacerated at a subtle level...Pressure in the top of my head increased & moved to include intense, sharp pain in right ear...”

“...Feeling intense agitation & discomfort, found experience very disturbing emotionally, almost to the point of crying out in distress & primal urge to run away from site.”

(5) Observations and experiences at assessment point 5 - within the turbine field

“Impossible to concentrate.”

“...Very shaken, rattled & disorientated. Head pain, still sensation of slicing at head & heart with background nausea.”

“...Walk outside very brief, no desire to leave car. Feeling very uncomfortable only focused now on leaving site-PLEASE STOP!!!!

“...(Leaving the site) Gradual relief of symptoms as increased distance from site. Still headache & feeling 'frazzled' & drained, jaded & spaced-out, with mild nausea & lack of appetite (very unusual!).”

(6) Any other comments

“Feeling physically better, although not centred, with very poor concentration when meditating & slight, subtle pain at heart & top of head.”

“...Feeling very emotional all weekend, very sensitive (raw), mild depressive, negative moods- feeling unsettled, tense & easily irritated. Better after 3-4 days.”

THE ARGYLL STUDIES

Background

The Hagshaw Hill study was designed to assess some of the variables noted in the initial 3 windfarm experiences (at Dun Law and first visit to Beinn An Tuirc and Deucheran) in a systematic way with a small group of subjects (6 experienced meditative retreaters). The Argyll Study was designed to increase the precision of these assessments principally through using a larger group of subjects (12), more accurate measures, and a more detailed analysis of results.

Arrangements were made with Scottish Power to conduct this study at the Beinn An Tuirc and Deucheran windfarms on the Mull of Kintyre on Saturday 17th May 2003 and Sunday 18th May 2003, respectively. Because of forecasts of severe weather conditions over that weekend as well as forestry operations on the access tracks, an exploratory trip to the windfarm sites was made on Friday 16th May 2003 (by Venerable Kelsang Tharchin, Kelsang Malaya and DC) to assess vehicular access to the windfarms and to conduct several preliminary procedures (1) to select a number of assessment sites at varying distances on the access route leading to each of the windfarms and (2) to measure electro-magnetic field intensities associated with several turbines, their transformers and underground cables.

With the aid of a Global Positioning System (GPS), 5 assessment points on the forestry approach to Beinn An Tuirc (see map 1 – p29) and 4 on the forestry approach to Deucheran (see map 2 – p33) were selected at precise distances from the nearest turbine in each turbine field. At Deucheran, a further assessment method was added - walking from point 3 towards the windfarm, in order to assess the experience of walking into the windfarm from a distance. A precise system of recording other relevant background information, such as weather, topography, terrain, Ordnance Survey point, contour of land, other noise etc, was also established (see Appendix 3).

Twelve experienced meditative retreaters participated in the Argyll Study, 10 of whom currently live at Tharpaland. Ten of the subjects also recently completed a strict, silent 3-month meditative retreat at Tharpaland; the 11th and 12th subjects had completed ‘a 3-month retreat’ 1 year and 3 years ago respectively. At each of the assessment points approaching and within the two windfarms, the subjects assessed their abilities to develop concentration, recorded their subjective experience, and assessed the landscape impacts. Subjects were not told how many assessment points there were or how far they would be from the turbine fields.

Results

The results of this study are presented in three parts:

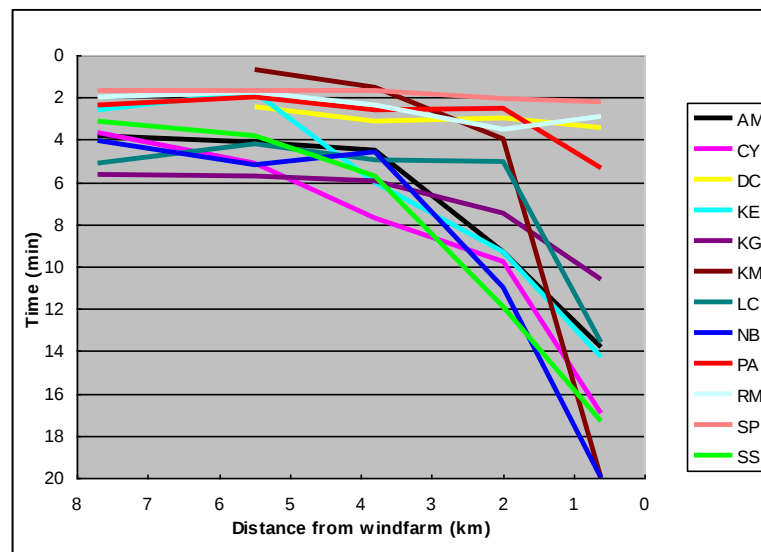
- *Concentration times at Beinn An Tuirc (BAT)*
- *Concentration times at Deucheran (DH)*
- *Subjective Experience at Beinn An Tuirc and Deucheran*

The first and second parts concern the times subjects required to reach the criterion of concentration at Beinn An Tuirc on Saturday and Deucheran on Sunday. The third part examines the subjects' reports of their subjective experiences during and after their wind farm visits.

On the Ability to Develop Concentration at Beinn An Tuirc (BAT)

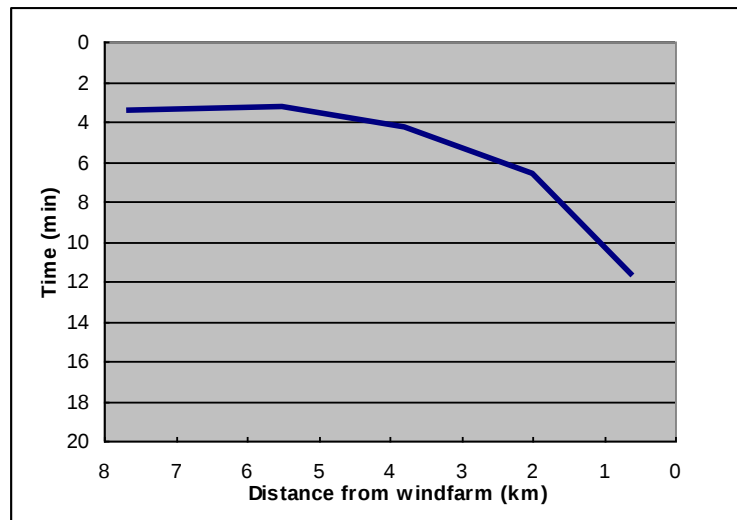
Concentration-times and other subjective assessments were carried out on Saturday at the five assessment points which were established the previous day at five locations approaching Beinn An Tuirc. The first assessment point was located at the edge of Glenbarr Village (7.7 km from Beinn An Tuirc), before entering the forestry approach to the windfarm itself. At this observation point baseline concentration times were determined. As the average times to reach the criterion of concentration (21 successive inhalations and exhalations of the breath without a break in concentration) for the first 2 assessment points – Glenbarr and just inside the forest – were virtually identical, these 2 points establish a valid base-line for comparisons made with subsequent assessment points.

Beinn An Tuirc Windfarm



Graph 5 Time taken to reach criterion of concentration (min) / Distance from windfarm

As in the Hagshaw Hill Study, the results of this part of the Argyll Studies indicates an overall average increase of 8 minutes and 30 seconds in the time required by the subjects to reach the criterion of 21 successive inhalations and exhalations of the breath observed without a break in concentration. This indicates an overall average decline of 73% in subjects' original ability to develop concentration over the 5 assessment points (see graph 6).



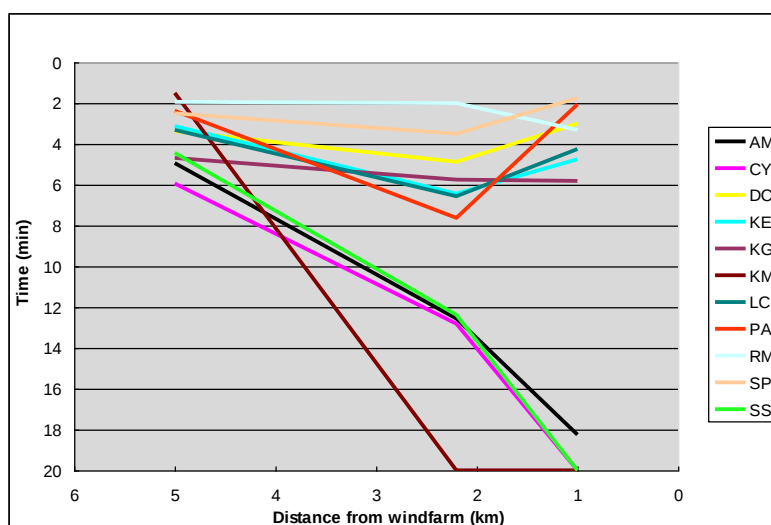
Graph 6 Average time taken to reach criterion of concentration (min) / Distance from windfarm

These results show a steadily diminishing ability to develop and maintain even the small degree of concentration represented by the criterion time. As all of the subjects in this study are experienced meditators, this result indicates the power of the adverse factors responsible for this decline to disrupt concentration, as indicated in the subjects' reports presented below (see pages 67-74).

On Ability to Develop Concentration at Deucheran (DH)

Concentration-times and other assessments were carried out on Sunday at the 3 assessment points which were established on the previous Friday at three locations approaching Deucheran. The average concentration time for assessment point 1 corresponds almost exactly (to within 3 seconds) to the average baseline concentration time established at Glen Barr Village on the previous day (Saturday), and can therefore be taken as a valid baseline for comparison made with other assessment points on the approach to Deucheran.

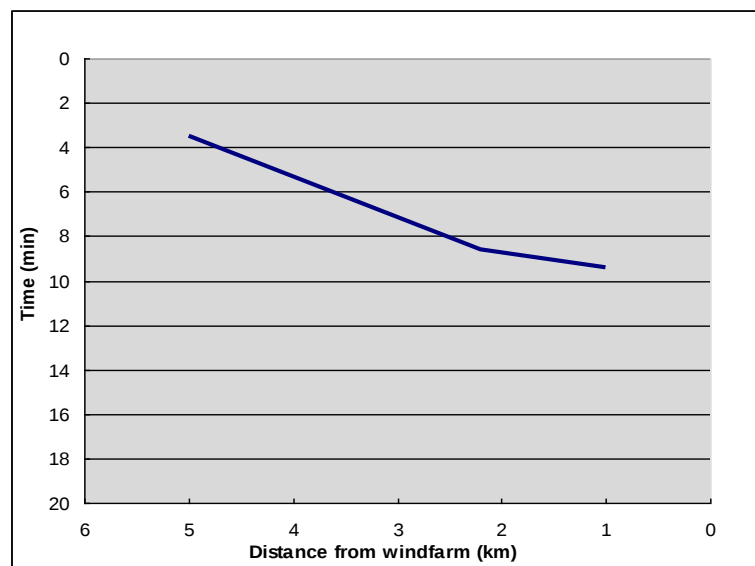
Deucheran Windfarm



Graph 7 Time taken to reach criterion of concentration (min) / Distance from windfarm

The configuration of the results obtained for the three assessment points approaching Deucheran is somewhat different from that observed the previous day approaching Beinn An Tuirc, although the final results are roughly similar.

As part of the preliminary procedures carried out on Friday, electro-magnetic field intensity readings were taken at the base of a turbine in both windfarms, and at a transformer at Beinn An Tuirc. It was not possible to take transformer readings at Deucheran because their transformers are not located at ground level, but in the nacelle at the top of the tower. However, it was possible to take readings directly over the underground cables at ground level at Deucheran on Friday, which indicated that a current was flowing through the cable at that time (Friday) and that the turbine was therefore generating electricity at that time. No magnetic field could be detected over the same cable upon arrival at Deucheran on Saturday, which suggests that the turbines at Deucheran may have been not generating measurable amounts of electricity at that time. If this was indeed the case, this could account for the different configurations in the two sets of data.



Graph 8 Average time to reach criterion of concentration/Distance from windfarm

The results of this part of the study indicate an overall average increase of almost 5 minutes and 54 seconds in the time required by the subjects to reach the criterion of 21 successive inhalations and exhalations of the breath observed without a break in concentration. This result indicates an overall average decline of 63% in subjects' original ability to develop concentration over the three assessment points.

On Subjective Experience at Beinn An Tuirc and Deucheran

The subjective data of this part of the study includes verbatim excerpts from the subjects' own reports for approaching, on site at Beinn An Tuirc and Deucheran windfarms, and after their visits. When considering the subjective data of this study, it

is important to take into account the characteristics of the twelve subjects who provided it, full details of which can be found in Appendix 2.

(1) Frequency Analysis of Psychological Factors Affecting Concentration

The subjective data shows a massive assault on subjects' ability to develop and sustain concentration by factors well-known within Buddhism to be amongst the principal obstacles to developing concentration, namely (1) Mental Excitement, (2) Mental Dullness and (3) Mental Sinking (See footnote 4 – p6), all of which the subjects in this study have been highly trained to identify and to control in their meditation practice. Their reports indicate a progressive gathering and intensification of these obstacles leading in many cases to a complete breakdown in ability to develop any concentration at all.

Examples of the 'symptoms' noted in the subjective reports (regarding approaching, on-site, and after the windfarm visits) were extracted and are presented below as the exact terms used by the subjects, showing the frequency each 'symptom' was reported. These tables show a remarkable similarity in the symptoms described.

<u>Psychological Factors Affecting Concentration</u>	<u>No. of times reported*</u>
<i>Loss/less/poor concentration</i>	13
<i>"Great effort"</i>	2
<i>"Total loss"</i>	2
<i>Mental Excitement</i> 1) "More Distractions" 2) "Scattered Thoughts" 3) "Agitated"	5 5 2
<i>"Mental Dullness"</i> 1) "Feeling Heavy" 2) "Tired/Fatigued/Drained" 3) "Feel Drunk" 4) "Feel Stoned" 5) "Slow/Lethargic"	7 4 5 1 1 1
<i>Mental Sinking</i> 1) "Lack Clarity/Foggy" 2) "Sinking" 3) "Spaced out" 4) "Cloudy & Obstructed"	5 3 3 1
<i>"Temporary long-term memory lapse/loss"</i>	4
<i>"Disoriented"</i>	3
Total of Reports of Psychological Factors Affecting Concentration	67

* 'No. of times reported' refers to the *total* number of times a symptom was reported *not* the total number of people who reported it. For example, 3 people may have reported one particular symptom several times, throughout the visits, giving a total of 12.

(2) Frequency Analysis of Physiological and Psychological Factors Affecting Concentration

The subjective reports also show the development of many physical symptoms and negative states of mind in relation to increasing proximity to the windfarm, as indicated below.

<u>Physical Symptoms</u>	<u>No. of times reported*</u>
Head	
1) "Pressure"	8
2) "Pain"	8
3) "Intense Pain"	1
Chest	
1) "Pressure"	9
2) "Pain"	7
3) "Intense Pain"	1
4) "Palpitations/Missed Beats"	2
Stomach	
1) "Sick/Nauseous"	9
2) "Pain"	1
3) "Incessant Burping"	1
4) "Very sick/retching"	2
Other	
1) "Breast Pain"	2
2) "Tightness – throat"	2
3) "Ear Ache"	1
4) "Tired/Drained"	2
5) "Faint Headed/Dizzy"	5
Total No. of Reports of Physical Symptoms	61
<u>Negative States of Mind</u>	<u>No. of times reported*</u>
"Confusion"	3
"Weak mindfulness"	2
"Strong sense of 'I' /Self-absorbed/ Egocentricity"	1
1) "Loss of self confidence"	1
2) "Discouragement"	1
3) "Sad"	1
4) "Emotional"	2
5) "Cried"	1
"Anxiety"	2
1) "Mentally troubled/disturbed"	1
2) "Discomfort & Disturbance/Distress"	3
3) "Mild panic/panic"	2
4) "Paranoia"	2
"Attachment"	1
"Anger"	3
1) "Irritable"	5
Other	
1) "Hypnotic/Mesmerized"	4
2) "Seduced"	1
3) "Optical illusions (hallucinations)"	1
Total No. of Reports of Negative States of Mind	37

(3) Frequency Analysis of Negative After Effects

One of the most surprising results of this study was the negative after-effects of the windfarm visits and the extent to which many of these persisted over the following days. Looking at the list of after-effects, and the actual excerpts from subjects' reports, it is clear that the adverse impacts experienced during the windfarm visits were deep and lasting.

<u>Negative After Effects</u>	<u>No. of times reported</u>
Mental state	
1) "Manic Energy/Madness"	9
2) "Loss/Degeneration of spiritual attitude and intention"	8
3) "Thoughts & feelings out of control"	1
4) "Pre-occupation with sex"	4
5) "Degeneration of mindfulness & concentration"	4
6) "Tired/Run down/Fatigue & Lethargy/Drained"	5
7) "Drugged/Hung over/Cut-off & Flat"	1
8) "Lack of concentration/Distracted"	3
9) "Impaired judgement"	1
10) "Paralysed/Freaked out"	3
Negative states of mind	
1) "Attachment (strong)"	1
1. "Jealousy"	1
2. "Selfishness"	1
2) Anxiety/Fear	
1. "Less self-confident"	3
2. "Very emotional"	1
3. "Cried"	3
4. "Fearful"	1
5. "Depression and despair"	1
6. "Subtle background paranoia"	2
3) "Anger"	
1. "Very irritable"	4
2. "Aggressive"	1
Behaviour	
1) "Out of control"	5
2) "Reckless Driving"	2
3) "Vulgar Conversation"	1
Other	
1) After Deucheran	
1. "Scared to go to bed"	1
2. "Disturbing dreams"	1
3. "Recurrent imagery of turbines"	1
4. "Dreamt back in windfarm"	1
5. "Temporary loss of long-term memory"	1
6. "Poor speech/memory co-ordination"	1
2) Next Few Days	
1. "Lots of background noise in mind"	1
2. "Heard turbine in meditation room"	1
3. "Feel have been traumatized"	1
4. "Feeling gone from meditation"	1
5. "Meditation and practice have taken a nose dive"	1
6. "My M.E. symptoms have returned"	1
Total No. of Reports of Negative After-effects	80

(4) Total Number of Effects (Symptoms) Reported

Total No. of Reports of Psychological Factors Affecting Concentration	67
Total No. of Reports of Physical Symptoms	61
Total No. of Reports of Negative States of Mind	37
Total No. of Reports of Negative After-Effects	80
Total No. of Reports of Adverse Effects	245

The examples given in this frequency analysis are by no means the only ones reported in the Argyll studies as many other symptoms that do not fit these categories were also reported. Notwithstanding this, 245 reports of adverse effects from two relatively brief windfarm visits by only 12 people can not be said to be an insignificant factor in the assessment of these windfarm impacts.

SUBJECTIVE REPORTS (Verbatim Excerpts)

Beinn An Tuirc

(1) Observations and experiences after meditation at assessment point 2A – 5.5 km from Beinn An Tuirc

“More difficult to concentrate, and feel a little tired. My mind is not as clear as before.”

(After walking outside car) “Feel pressure in my head building. The background of my mind is not clear, don’t feel so good.” (SS)

(2) Observations and experiences after meditation at assessment point 3A – 3.8 km from Beinn An Tuirc

“My head feels tense, like it’s under a lot of pressure, especially at either side of my head...”

(After walking outside car) “...Feel heavy, had difficulty to sustain concentration, mind scattering and easily distracted, fragmenting. Feel spaced out.” (SS)

(3) Observations and experiences after meditation at assessment point 4BB – 606m from Beinn An Tuirc

“No concentration. After over 15 minutes, still unable to keep object for more than a few seconds. Feeling quite dizzy and faint-headed at times. Forgot entirely where I was, and what I was doing, i.e. blanked out at one point...”

“...Terminated assessments at this point...Feeling unable to think or observe and record experiences clearly and slightly apprehensive about the possibility of this sense of losing control persisting and/or increasing upon remaining at or entering the windfarm site, I took the opportunity to return to Ardpatrik at this time with Tharchin.” (NB)

“I feel slightly dizzy and there is a pressure building in my head. I don’t think it’s altitude because I’ve popped my ears coming up here. I feel it in my forehead, crown and around my eyes and the bridge of my nose! It isn’t painful but it isn’t pleasant. It hasn’t seemed to affect my concentration, but the quality of meditation is different. It seemed “thicker”, not as clear, not as light, and not as easy as before. Mentally, I feel weary, just want to go home.” (SP)

(4) Observations and experiences during walking meditation at Beinn An Tuirc

“I feel dizzy and disorientated, my mind is so dull and numb. I feel like I’m at that point when I’ve been drinking and suddenly realise I’m drunk, and looking back at the world, as an observer, with that unusual clarity that comes moments before you pass out, when you sit and watch everything, you’re dizzy and disorientated, everything is happening around you but you’re not part of it, Time stands still and you’re trying not to lose consciousness. It’s an effort to walk, I’m too dull to think or resist the velvet blanket of dullness that I’m slipping into. I lose my place during Heart Sutra and have to start again but manage to complete it. I have a stronger sense of I than I have had for a long time. I am not thinking of others, I am preoccupied with my own suffering. I feel depressed.” (SS)

(5) Observations and experiences within windfarm at Beinn An Tuirc

“Didn’t complete Heart Sutra. Walking between the turbines, the sound of the blades was very loud – a cutting sound. There was also a very loud humming sound coming from the transformer at the base of the turbine. Walking away from the turbine, the transformer noise was more intrusive even when some distance away and fading. As noise from the first turbine faded I became aware of walking into another one but was unable to see it because of the fog. Now surrounded by noise: the cutting sound of the blades from two or more turbines and the humming of the transformer. Unable to tell which direction the new turbines were. Felt completely enveloped by the sound. A strong rush of emotion came over me and I felt like I could have cried. Then I felt very sad – there is no way that someone could do retreat in such conditions. Surrounded by sound I felt as if I was walking through a factory rather than open countryside. Even though I had 3 hoods up and the sound of the wind and rain was quite loud, the sound of the turbines was overwhelming.” (LC)

(6) Observations and experiences on way home to house from Beinn An Tuirc

“On the way home to the house, everyone in the car seems quite relieved but everyone seems to be a little high for some reason, as though they have just been to a rock concert or football match. I find my mind has changed. I feel much more boisterous. I am driving faster and am more aggressive. I also feel mischievous and less virtuous. Cheeky, much more external and cheeky.” (KG)

“Leaving site feeling relief which becomes like drunken ‘high’. Brash, bolshy and arrogant, uninhibited speech and behaviour. Tightness and pain still in head...”

“...Driving was reckless and careless. Felt drugged, aggressive. Nature of conversation very vulgar and crude. Dizzy and spaced.” (CY)

"We become quite manic in the car. The energy is weird. We joke about like we're drunk at a party and our humour is very gross and filled with innuendos. The driver of the car is driving dangerously, fast and unconcerned and we almost crash into the side of the road. The driver still drives too fast, but we quickly do a meditation in the car, the Heart Sutra, and immediately afterwards, she slows down." (SS)

"When meditating later found it very hard to concentrate. Could see faint images of rotating blades when I shut my eyes. Strong mental sinking during meditation." (DC)

(7) Observations and experiences that evening at house

"Was acting in a very uncontrolled manner, very excitable. Felt degeneration of concentration." (DC)

"Feeling very raw and sensitive, slight paranoia and very emotional. Cried. Wanting to find quiet corner and hide, seeking solitude, didn't want to be part of the group. Feeling confused and not like myself, very negative thoughts. Better after evening puja." (CY)

"As the evening wore on, we all seemed to chill out but were still quite manic. I felt quite rebellious and anti-establishment, anti-Dharma. I felt negative and cynical towards what I was doing spiritually." (SP)

"Still nausea and dizzy - sick feeling - quite disturbed - subtle body hurts - damaged - dipping in and out of negative states of mind - cropped up night before after first reconnaissance windfarm visit - tonight mega strong - super jealousy, anger, selfishness.....ego fighting with itself.....lost all confidence in myself - scared to go to bed...didn't want to do puja - considered abandoning my spiritual path - saw the alternative and dove down deeper into my deluded psyche...realised this was all about an assault against a balanced and peaceful way of living....." (KM)

Deucheran

(1) Observations and experiences at assessment point 2 – 2.2 km from Deucheran

“Can see both windfarms in distance. Movement of blades immediately grabs attention and provides a point of focus, rather than just surveying the landscape as a whole. The slower moving Deucheran turbines look quite majestic. When meditating found the image of the windmills popping into my mind and distracting me from the object of meditation. A lot harder to maintain concentration with this distraction.” (DC)

“Looking across at Beinn An Tuirc, my attention and focus was grabbed by the movement of the blades. I found the lack of synchronicity between the turbines very disturbing. After staring at it for a while I developed a headache and started to feel a bit queasy. Then when looking away I could see faint images of the blades overlaying the horizon where I was looking.” (DC)

“Had some pains in heart. Feel heaviness. Not feeling so good in stomach. I feel tired, drained, my eyes are heavy. I have slowed down and feel lethargic, like I’m functioning at a lower level of consciousness. A trance like state between sleep and consciousness. I have to resist closing my eyes. Mental dullness, sinking, head feels so heavy. Notice my posture is bad, my head hanging down. Feel my heart has slowed right down. Can’t be bothered to move. Can’t move my mind to single pointedness in meditation.” (SS)

(2) Observations and experiences during/after walking outside car at assessment point 3 – 1 km from Deucheran

“Felt an almost hypnotic, seductive pull towards the turbines as if the blades were slowly beckoning, yet feeling a contradictory, opposing force pushing against me at a subtle, physical level. This was very confusing emotionally and very unpleasant coupled with a very painful head.” (CY)

(3) Observations and experiences regarding looking at landscape and looking at Deucheran windfarm ahead

“Could see 8 turbines one of which was not operating. Found my eye drawn very strongly to the one which wasn’t moving. They completely dominated the view. Again, vision and mind more expansive when looking away. Looking towards the turbines keeps vision in the foreground – not possible to look beyond them.” (LC)

(4) Observations and experiences within windfarm at Deucheran

“Walked (reluctantly) to turbines (from point 4B). Still feeling hypnotic ‘pull’ from turbines, but intense pressure in head and heart pain. Very noisy, mechanical sounds and rhythmic ‘swoosh’ of blades. For me walking meditation was impossible. Began to feel very irritated at weather, irrationally agitated and anxious to leave...”

“...Very ‘ugly’ mood back in car, slicing, penetrating head pain to teeth. Feeling pretty nauseous now, distinct sensation of vibration at heart moving to and churning stomach.” (CY)

“I had no sense that I was walking through a forest but that it was an industrial area. The noise was very pronounced – a humming sound like that of an aeroplane in the clouds only it was constant and not fading away. This was combined with the swishing of blades at different times. There was constant noise. When I looked away my experience was dominated by the noise.” (LC)

(5) Observations and experiences on way home to house

“We drove back, much more slowly than before. But this time the driver got disorientated, and almost veered the car into the side of the road, but Kate grabbed the wheel. After this the driving went smoothly. We were much calmer than yesterday.” (SS)

“Driving took great effort to concentrate - felt unreal, like cartoon - feeling numb and careless about responsibility for others. Almost went off the road (due to minor distraction) on leaving the farm track!” (CY)

“When tried to meditate immediately a lot of pressure and noise in my head. Ringing and humming sound with a sensation/image of blades turning and swishing when I closed my eyes. Felt a little nauseous. I was unable to count past 2 or 3 and repeated 1 several times. Unable to clear the pressure when coming out of meditation - felt very tired.” (LC)

“Withdrawn, couldn’t concentrate in meditation...tried to think of next few weeks plans - could hardly remember - next week seemed a blank - quite unlike me to be like this.” (KM)

(6) Observations and experiences that evening at house (after Deucheran)

“Feeling ok on return, still a bit spacey and shaken. Subtle co-ordination in speech and memory very poor - forgetting words etc. Enjoyed a walk outside, clear horizon over waters. Observed subtle background paranoia thinking negative view of self and low confidence within group.” (CY)

“Returning to the house I felt very weak and nauseous - went to bed for a while. Later I tried to do the group puja but had to stop before half way through. When trying to concentrate I had a very unpleasant feeling. Some pressure in my head and felt as if my body was vibrating inside making me feel dizzy and sick. Stopped concentrating and just listened to the others. Went to bed immediately after - felt emotionally and physically drained...”

“...A couple of times during the night I dreamt I was pulled back into the middle of the Windfarm. I felt anxious and woke up immediately.” (LC)

“Very tired at night. Fell asleep (briefly), twice during meditation. Not myself tonight. Subdued.” (SS)

“Later that evening, I felt more depressed and upset than I have for a long time. I can’t describe what these feelings were connected to, they were just coming up again and again. Depression, despair. I couldn’t cope with being in company. In fact, during dinner I nearly burst into tears, it took a huge effort to remain there and not let it out...”

“...But afterwards I retired to my room and cried and cried. Sometimes, when these emotional surges come, they are connected to a powerful purifying meditation and I feel great afterwards, as though something has cleared, as though I have ejected some negative influences in my psyche. It’s like a release of something. But this time I just felt drained afterwards; flat, empty, no real relief. This sounds very melodramatic and when reading it back it seems like an over-reaction, written by some precious “lovey”. But this is what I was really going through...”

“...We had a group meditation later that evening. Usually, this clears any dark feelings, brings back a warm, positive view of things. But not this time. I kept falling asleep through it and just wanted to go to bed afterwards. Felt pretty dejected. Like I said, I don’t know why I felt like this, but I’m sure it wasn’t just because I was tired. I felt like I’d been traumatised in some way, which seems peculiar because I hadn’t felt traumatised during the actual visit to the windfarm. That night I dreamt of wind turbines, lots of weird gigantic metal shapes dotted around the land, all of them rotating at different speeds. One of them was made out of giant buckets!!” (SP)

After Effects

(1) Observations and experiences next morning before leaving for Tharpaland/Glasgow

“Still a bit resistant to do practice. Concentration still difficult to maintain. Just able to get through practice. Feel melancholy and sad for no real reason.”
(SS)

“Heavy mind – still not clear – just barely able to function for today but can’t do any forward planning... pain in eyes... memory lapsed –can’t remember last week, this week or next week’s tasks...my reality seems inverted...dizzy”
(KM)

(2) Observations and experiences that evening (Monday night)

“Very low, exhausted and overwhelmed by everything, on every level. Like extremely bad ‘hangover’.” (CY)

(3) Observations and experiences over following few days

“The next morning my concentration was even worse. I kept forgetting the words and losing my place in the sadhana. Mind scattered. Started to improve by the end of the day. Over the next few days I noticed it was difficult for me to structure and formulate words and sentences. I found it difficult to prepare my teaching, like my thought process was blocked. My mind continued to be unfocused and scattered for several days after this.” (SS)

“Very distracted mind. Meditation and practice have taken a nosedive.” (KG)

“Next day (Tuesday) - Feeling slightly better in morning (slept well), still ‘hungover’, intense sugar cravings. A bit raw and emotionally crippled and tearful. had to cancel patient. Unable to cope with normal daily activities. Feel ‘paralysed’ and irrationally fearful of people. Being overwhelmed by simple tasks which normally wouldn’t think twice about (e.g. phoning people etc)...”

“...Wednesday (3 days later) -Bit flat and lethargic but otherwise ok. Concentration in meditation better again but a bit absent-minded, forgetful and clumsy out with meditation...”

“...Felt ‘normal’ and clear again by Friday morning. Very relieved to have happy, clear mind again. Thought was going insane.” (CY)

“Last few days woke up every morning with muscle fatigue – M.E. symptoms are back and locked in... ..dizzy still and pains in chest, especially at heartalso at throatWed... ..stayed in bed all morning...had to have a bath to bring myself round...too much work to do... ..Thurs morning...stayed in bed ... fatigue ... and crown chakra headache, dizzy ... sick ... wiped ... hot ... fever...axe in my head.” (KM)

THE AE CONTROL STUDY

Background

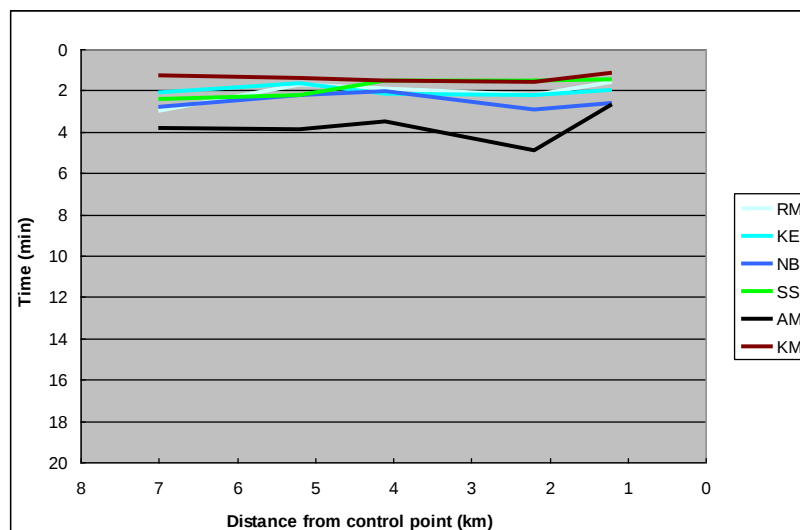
A control study was carried out in order to assess the possible effects of the assessment methodologies themselves on developing concentration and on subjective experience. The study was carried out on 31st May 2003 within the Forest of Ae at a series of assessment points between the foot of Queensberry Hill and Tharpaland, at a distance of 7 kms. This forest route was similar in distance and topography to the access routes to Beinn An Tuirc and Deucheran.

Six subjects participated in the control study, five of whom had participated in the Hagshaw Hill study and all of whom had participated in the Argyll studies. This group was therefore very representative of the groups who participated in the other two studies. The instructions, procedures and assessment methodologies were identical to those of the Hagshaw Hill and Argyll studies.

Results

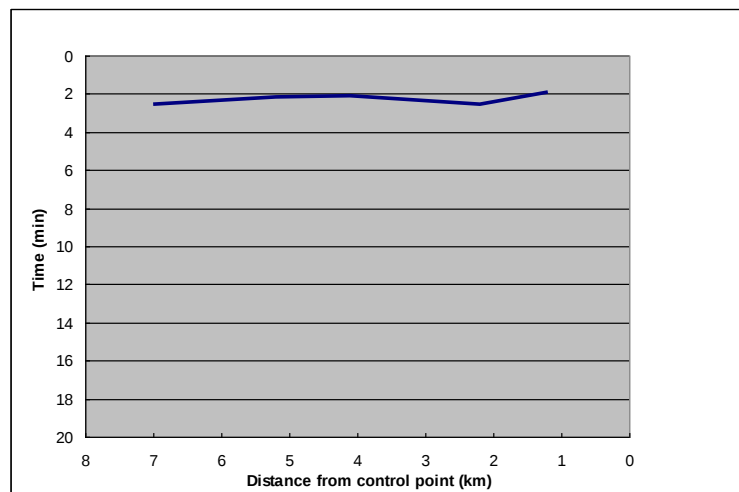
On the Ability to Concentrate

The Ae Control Study



Graph 9 Time taken to reach criterion of concentration (min) / Distance from windfarm

The control study results indicate a small *increase* in ability to develop concentration over the 5 assessment points. However, given the small number of subjects involved (6), this result is insignificant, and indicates that the assessment methodologies used in the Hagshaw Hill and Argyll studies probably did not affect the results of these studies, e.g. that they had no significant effect on participants' ability to develop and maintain concentration at the various assessment points observed in the studies.



Graph 10 Average time taken to reach criterion of concentration (min) / Distance from windfarm

2. *Subjective Experience*

In actual fact the subjective reports showed many of the usual effects experienced by the general population as well as meditative retreaters going into the natural landscape and countryside – that is, one of pleasant enjoyment and ease with a consequent increase in beneficial health effects, both physically and mentally.

Subjective Reports

The Ae Control Study – (SS)

(1) How did you feel prior to leaving the house to go into the Forest of Ae?

“I was dreading a bit the car trip, because it was in my mind that last time we got in a car we went to a windfarm. But, in general I felt clear, open and relaxed.”

(2) How did you feel on drive to baseline (Queensberry Hill – a 7 km drive from Tharpaland)?

“Comfortable and relaxed”

(3) Observations and experiences at Queensberry Hill baseline – 7 km from Tharpaland

“Feel calm, my mind is clear and spacious.”

(4) Observations and experiences during/after meditation at assessment point 1 – 5.2 km from Tharpaland

“Easy to concentrate, feel fresh , calm and relaxed”

(5) Observations and experiences during/after walking outside car at assessment point 1 – 5.2 km from Tharpaland

“The trees were quite large in this part of the forest. Although they towered above me I didn’t feel dwarfed by them. I didn’t feel in any way threatened by them. I was completely comfortable and felt safe. I enjoyed the walk outside.”

(6) Observations and experiences during/after meditation at assessment point 2 – 4.1 km from Tharpaland

“Had a problem with stop watch and opened my eyes too quickly and then had some pain in my head from this. This cleared when I walked about outside.”

(7) Observations and experiences during/after walking outside car at assessment point 2 – 4.1 km from Tharpaland

“Feel light and relaxed, I could just look at the landscape and daydream.”

(8) Observations and experiences during/after meditation at assessment point 3 – 2.2 km from Tharpaland

*“My mind is even clearer than before, wide and spacious.
I am very mellow.”*

(9) Observations and experiences during/after walking outside car at assessment point 3 – 2.2 km from Tharpaland

“When walking I notice the sound of the birds. Many different types of bird. They are chattering. I didn’t hear birds at the windfarms. I also notice many smells from the trees and vegetation. I didn’t notice this on the windfarms. I am happy to be here. I could just sit around for a while.”

(10) Observations and experiences during/after meditation at assessment point 4 – 1.2 km from Tharpaland

“Concentration is easy to reach. I Feel happy. My mind is bright and clear”

(11) Observations and experiences during/after walking outside car at assessment point 4 – 1.2 km from Tharpaland

“I am relaxed and jovial. Feel safe and trouble free. Easy going. Feel close to others.”

(12) Observations and experiences driving back to Tharpaland through forest

“I was enjoying the drive, looking at the view and enjoying being with everyone.”

(13) Observations and experiences near Tharpaland – during/after doing Heart Sutra

“Easy to do, walking slowly with good concentration.”

(14) Observations and experiences at Tharpaland itself

“Was very high and energised afterwards.”

(15) Observations and experiences next morning

“Felt relaxed”

The Ae Control Study – (RM)

- (1) How did you feel prior to leaving the house to go into the Forest of Ae?**

“Tired but good, a bit confused, but not giving it attention.”

- (2) How did you feel on drive to baseline (Queensberry Hill – a 7 km drive from Tharpaland)?**

“Fine”

- (3) Observations and experiences at Queensberry Hill baseline – 7 km from Tharpaland**

“Tired, distracted by ticking clock in car”

- (4) Observations and experiences during/after meditation at assessment point 1 – 5.2 km from Tharpaland**

“Tired but good”

- (5) Observations and experiences during/after walking outside car at assessment point 1 – 5.2 km from Tharpaland**

“Quite confusion. Getting confused as to what to do, but not too bad. Quite relaxed though. Generally calm and controlled. Got song stuck in my head.”

- (6) Observations and experiences during/after meditation at assessment point 2 – 4.1 km from Tharpaland**

“Tired, distracted by noisy birds.”

- (7) Observations and experiences during/after walking outside car at assessment point 2 – 4.1 km from Tharpaland**

“Nice. Clear enough. Still with song in head. Generally normal.”

- (8) Observations and experiences during/after meditation at assessment point 3 – 2.2 km from Tharpaland**

“Sleepy.”

- (9) Observations and experiences during/after walking outside car at assessment point 3 – 2.2 km from Tharpaland**

“Calm and relatively controlled. Lovely to space out.”

- (10) Observations and experiences during/after meditation at assessment point 4 – 1.2 km from Tharpaland**

“Nice but sleepy.”

- (11) Observations and experiences during/after walking outside car at assessment point 4 – 1.2 km from Tharpaland**

“Tingly forehead”

- (12) Observations and experiences driving back to Tharpaland through forest**

“Generally normal mind.”

- (13) Observations and experiences near Tharpaland – during/after doing Heart Sutra**

“Felt good.”

- (14) Observations and experiences at Tharpaland itself**

“Nothing special.”

- (15) Observations and experiences next morning**

“Normal.”

The Ae Control Study – (KM)

(1) How did you feel prior to leaving the house to go into the Forest of Ae?

“Looking forward to fresh air and exercise – been feeling very fatigued lately since Argyll trip – looking forward to getting some fresh energy in my muscles”

(2) How did you feel on drive to baseline (Queensberry Hill – a 7 km drive from Tharpaland)?

“Busy plotting areas but amazed at every new turn in the forest – all so different - all so beautiful”

(3) Observations and experiences at Queensberry Hill baseline – 7 km from Tharpaland

*“Feel warm, clear – nice energy flowing – back and arm muscles relaxing”
“Feels like we’re miles from anywhere. Just me and my mind.”*

(4) Observations and experiences during/after meditation at assessment point 1 – 5.2 km from Tharpaland

“So peaceful and beautiful. Warmth in arms is even more this time. Oozing energies down into my legs. Feels like I could sit here and carry on all day blissing out...beautiful majestic trees nearby.”

(5) Observations and experiences during/after walking outside car at assessment point 1 – 5.2 km from Tharpaland

“Peaceful...heart expanded. Heart delights to see fairy glade in forest. At ease. Energy flowing down into my legs as I walk. Nice breeze on my face. I feel great.”

(6) Observations and experiences during/after meditation at assessment point 2 – 4.1 km from Tharpaland

“Before mediation I felt a little stressed with planning and writing. Felt slightly sad. After meditation I felt sleepy and relaxed and most of negativity gone.”

(7) Observations and experiences during/after walking outside car at assessment point 2 – 4.1 km from Tharpaland

“Still a little irritated. I know its nothing to do with environment....its too beautiful...within seconds of walking into forest glades I felt good again. Would be happy to hang around here longer. Had a thought about living out here.”

(8) Observations and experiences during/after meditation at assessment point 3 – 2.2 km from Tharpaland

“Beautiful view. Excited at prospect of Tharpaland view around next corner. I feel relaxed and good.....mmmmmm”

(9) Observations and experiences during/after walking outside car at assessment point 3 – 2.2 km from Tharpaland

“Felt great. Expansive view. Could do with this everyday. Bit dreamy. Fairyland....If I could fly I would do so, straight off this hill...”

“I contemplated how this was such a bird sanctuary and haven - saw a deer.”

(10) Observations and experiences during/after meditation at assessment point 4 – 1.2 km from Tharpaland

“Looking at Tharpaland just warms my heart. Meditation seems easier as if I am bathing in the warm umbrella of Tharpaland. My heart feels pretty. Fresh summers evening..”

(11) Observations and experiences during/after walking outside car at assessment point 4 – 1.2 km from Tharpaland

“Felt wonderful. So quiet. My home and haven is ahead of me. Felt safe with that. Everyone seems great. Wee bit anxious about my mobile phone...”

“Tharchins caravan looks like a white jewel nestled in a green nest. James’ hut looks like a serious yogi’s abode. Am I biased? No.”

(12) Observations and experiences driving back to Tharpaland through forest

“I feel pleasantly tired – like after a nice drive out in countryside – like after a good meditation where all your muscles seem to go into line. Mind feels clear.”

(13) Observations and experiences near Tharpaland – during/after doing Heart Sutra

“Concentration easy...went straight through as usual. Walk felt fresh and clear.”

(14) Observations and experiences at Tharpaland itself

“Fatigue less now. Healing environment. Feel energised. Opposite of before trip. I think of all the jewels I found in the forest today –their many different colours and tones and sounds and I felt so grateful that I lived here and drank every day of its healing waters.”

(15) Observations and experiences next morning

“Muscles feel tired but like after a good aerobics class – not muscle fatigue as in M.E”

The Ae Control Study – (KE)

(1) How did you feel prior to leaving the house to go into the Forest of Ae?

“Irritated, angry, impatient, annoyed. Strong resistance to doing tests. (Hungry) Do Heart Sutra to try to combat these negative minds.”

(2) How did you feel on drive to baseline (Queensberry Hill – a 7 km drive from Tharpaland)?

“Still irritated and unhappy.”

(3) Observations and experiences at Queensberry Hill baseline – 7 km from Tharpaland

“Still irritated and agitated yet no physical pain other than a little sleepy and hungry.”

(4) Observations and experiences during/after meditation at assessment point 1 – 5.2 km from Tharpaland

“Feeling a little more relaxed; eat a sandwich; not so sleepy; quite easy to concentrate”

(5) Observations and experiences during/after walking outside car at assessment point 1 – 5.2 km from Tharpaland

“Swinging between being ok and feeling quite calm to being quite unhappy and disturbed by negative thoughts. It’s nice to feel breeze but then I start having a scratching fit (eczema). I feel a little disturbed by my skin yet no headaches.”

(6) Observations and experiences during/after meditation at assessment point 2 – 4.1 km from Tharpaland

“More distracted this time. I still feel distressed in spite of calm and peaceful environment”

(7) Observations and experiences during/after walking outside car at assessment point 2 – 4.1 km from Tharpaland

“I need to go for refuge (concentrate on imagined image of Buddha) because I feel overwhelmed with self-cherishing and feel unhappy. I can smell forest smells.”

(8) Observations and experiences during/after meditation at assessment point 3 – 2.2 km from Tharpaland

“Warm from the sun; feel better - wide open view good for my mind. Birds singing quite pleasant.”

(9) Observations and experiences during/after walking outside car at assessment point 3 – 2.2 km from Tharpaland

“My mood lifts because of the beautiful wide-open view - it’s gorgeous and the sun’s warm - something shifts and my mind feels happier and more calm. I don’t scratch and I feel more in control - thank goodness...”

“...I think it would be nice to live all alone up here in solitude- I realise that practically we already do.”

(10) Observations and experiences during/after meditation at assessment point 4 – 1.2 km from Tharpaland

“Feel ok – quite calm. Another lovely wide open view.”

(11) Observations and experiences during/after walking outside car at assessment point 4 – 1.2 km from Tharpaland

“Feel much better – much happier. I enjoy the peace. I enjoy the silence. I enjoy seeing no one and being in the middle of nowhere. The sky is beautiful, blue and wide. I stop to watch some flies on top of a green swamp. I feel calm. I watch birds fly”

(12) Observations and experiences driving back to Tharpaland through forest

“I look forward to returning home to Tharpaland. I am happy to be going home.”

(13) Observations and experiences near Tharpaland – during/after doing Heart Sutra

“Happy to do Heart Sutra – feel very focused and quite internal after these hours of silence, walking and meditation.”

(14) Observations and experiences at Tharpaland itself

“Feel anti-social yet I sit in the dining room anyway because I’m not ready to be on my own. I think I might do my practice in my room then I change my mind and do it with the others. I go to bed very early – I’m still feeling funny.”

(15) Observations and experiences next morning

“I sleep for 11 hours - so long too long - I thought I’d wake up early but I didn’t. I wake up. I feel heavy and dizzy. I have a cold shower and go to the Gompa – feel very concentrated - good practice - feel better”

The Ae Control Study – (NB)

(1) How did you feel prior to leaving the house to go into the Forest of Ae?

“I had been feeling a bit weak, with painful indigestion and stomach cramps all afternoon, so I had not looked forward eagerly to the trip and in fact was very tired. I went to rest about 10 minutes before we had been scheduled to set off, and struggled through the Heart Sutra with very bad concentration. But just before we went, Malaya had an urgent phone call, and so I had a quick 10 minute nap in the back seat of the car until she came back. When she returned, although I still had some stomach pain and slight grogginess from such a short sleep, I felt much better overall.”

(2) How did you feel on drive to baseline (Queensberry Hill – a 7 km drive from Tharpaland)?

“Very clear and deeply calm. I enjoyed looking at the forest farther away than I usually walk.”

(3) Observations and experiences at Queensberry Hill baseline – 7 km from Tharpaland

“Concentration smooth, but not very deep. A little sleepy and some indigestion from earlier today. Surprisingly few distracting thoughts in meditation. Is my alertness sharp enough?”

(4) Observations and experiences during/after meditation at assessment point 1 – 5.2 km from Tharpaland

“Biggest distraction: that I am so undistracted. Again, not incredibly strongly or deeply focused, but very little wandering to other thoughts/distractions.”

(5) Observations and during/after walking outside car experiences at assessment point 1 – 5.2 km from Tharpaland

“Mind remains calm and concentrated throughout walking meditation. A brisk walk up the track wakes me up again. The cool, still evenings is nice after such a hot day indoors...”

“...I enjoy walking where there is some open space, where the trees up the hill on one side are shorter than those on the other side of the road. My mind is slightly calmer here than on the part of the track that runs between two straight rows of very tall trees”

(6) Observations and experiences during/after meditation at assessment point 2 – 4.1 km from Tharpaland

“High-pitched ringing in my ears, making mediation somewhat multipointed (wondering what the sound is, whether it is outside or just my ears) but intensity of mindfulness is stronger this time. Indigestion has subsided. Physically I have everyday aches, but nothing unusual, and feeling fairly calm.”

(7) Observations and experiences during/after walking outside car at assessment point 2 – 4.1 km from Tharpaland

“Walking meditation very non-descript. Noticed some slight pressure in my chest, which released easily, just as I noticed it. Concentration a little patchy: I consider thoughts arising in my mind for a few moments, then a few moments simply considering the patterns of the trees without much alertness, then back again to more mindful observation of thoughts, and so on like that. All slight and quiet. Some soft buzzing in ears again when I return to the (stationary) car.”

(8) Observations and experiences during/after meditation at assessment point 3 – 2.2 km from Tharpaland

“Object of meditation (breath) very clear, mind quite good. Not a deep concentration. I find I'm shifting easily out of meditation. In past assessments (on previous days) even when my concentration has been good, it took a slow, careful coming-out. Now I pop out almost too easily. So it would seem that today's concentration, while clear is not deeply committed.”

(9) Observations and experiences during/after walking outside car at assessment point 3 – 2.2 km from Tharpaland

“The evening is so still and beautiful; my mind reflects it with a stillness. Both have a slight haze; cannot see far into the distance and thoughts are slightly blurred by the deep pleasantness of the late afternoon.”

(10) Observations and experiences at during/after meditation assessment point 4 – 1.2 km from Tharpaland

“Meditation now slightly deteriorating, there was some talking just before, it could be that. Some pressure in head. Just pushing too hard, it subsides when I remember to relax. At this point, the concentration is far less qualified than before, I am only very basically meeting the criteria of reaching 21 breaths, with no excellent concentration, only tenuous continuity of mindfulness”

(11) Observations and experiences during/after walking outside car at assessment point 4 – 1.2 km from Tharpaland

“Again, mindfulness not incredibly strong. Despite that, no disturbing thoughts or states of mind. Mostly idle distractions and getting lost in the scenery.”

“...We can see Tharpaland from a different perspective from this point. I can see straight ahead both Tharpaland's property and the points where the current proposal maps from last week's exhibition indicate the southern-most turbines would be placed, as well as the first few hills over which they would stretch. I'm struck with how small Tharpaland looks in relation to the forest already, and wonder what a contrast turbines might be.”

(12) Observations and experiences driving back to Tharpaland through forest

“It feels like a nice evening drive, nothing special or particularly noticeable. I'm still in a very peaceful and mellow mood.”

(13) Observations and experiences near Tharpaland – during/after doing Heart Sutra

“I have an under-current of too-strong analysis. Much clearer and easier than just prior to the journey, though.”

(14) Observations and experiences at Tharpaland itself

“Over a cup of tea when we returned, I was still feeling quite subdued, but the conversation is quiet and light. I noticed how tired those who hadn't been out looked, and that I was feeling significantly better than I had all day. During the group meditation my mind was very much as it often is at such times. I was glad to be in the session, and focused fairly well on the meaning, though not entirely without distraction. Afterwards, I found myself very tired. As it was 11 o'clock by that time, I did not begin any new work or spend much time thinking about the state of my mind but went to bed a little earlier than usual.”

(15) Observations and experiences next morning

“I woke up a little earlier than usual, and suddenly worried that I had left a skylight open in the house the day before. I got up and went to the conservatory to check whether it was still open. Relieved to see that it was closed, I went to the gumpa and did some practice. In general I had a very slow and restful morning and felt quite clear when I went down to the house to begin work, though slightly rushed when I found that I had taken more time than I should, and was going to the house a little late. Have felt calm and normal all day.”

The Ae Control Study – (AM)

- (1) How did you feel prior to leaving the house to go into the Forest of Ae?**

“Felt quite tired and mind quite busy.”

- (2) How did you feel on drive to baseline (Queensberry Hill – a 7 km drive from Tharpaland)?**

“Felt quite warm (muggy day) and not so peaceful.”

- (3) Observations and experiences at Queensberry Hill baseline – 7 km from Tharpaland**

“Mind a bit distracted, warm and tired. Body quite relaxed.”

- (4) Observations and experiences during/after meditation at assessment point 1 – 5.2 km from Tharpaland**

“Quite tired and relaxed, mind a bit distracted but some concentration.”

- (5) Observations and experiences during/after walking outside car at assessment point 1 – 5.2 km from Tharpaland**

“Short walk along track, getting colder, feel calmer.”

- (6) Observations and experiences during/after meditation at assessment point 2 – 4.1 km from Tharpaland**

“Mind quite peaceful”

- (7) Observations and experiences during/after walking outside car at assessment point 2 – 4.1 km from Tharpaland**

“Walked along track, very quiet and peaceful.”

- (8) Observations and experiences during/after meditation at assessment point 3 – 2.2 km from Tharpaland**

“Feeling a bit tired.”

(9) Observations and experiences during/after walking outside car at assessment point 3 – 2.2 km from Tharpaland

“Nice open landscape, beautiful and warm. Mind becoming more peaceful and spacious looking out into the open landscape and distant hills.”

(10) Observations and experiences during/after meditation at assessment point 4 – 1.2 km from Tharpaland

“Mind less distracted”

(11) Observations and experiences during/after walking outside car at assessment point 4 – 1.2 km from Tharpaland

“Short walk. Beautiful open landscape, enjoying being out in the country. Peaceful relaxing and calm.”

(12) Observations and experiences driving back to Tharpaland through forest

“Feel quite happy. The scenery is very beautiful, expansive and open.”

(13) Observations and experiences near Tharpaland – during/after doing Heart Sutra

“Concentration quite good.”

(14) Observations and experiences at Tharpaland itself

“Feel quite relaxed and peaceful, still a bit tired.”

(15) Observations and experiences next morning

“Feel fine, a bit tired.”

APPENDIX 5

FREQUENCY DISTRIBUTION

FREQUENCY DISTRIBUTION OF ADVERSE EFFECTS BY DISTANCE FROM THE TWO ARGYLL WINDFARMS

Introduction

The following tables (1-3) describe 3 frequency distributions of adverse experiences reported by the subjects at the various assessment points approaching two windfarms (*Beinn an Tuirc and Deucheran*) including (1) Psychological factors affecting concentration, (2) Physical symptoms and (3) Negative states of mind.

As would be expected, the greater number of these reports (74%) were made at the assessment points within a 2.2 km distance from the turbine fields. However, 26% of the reports were made at assessment points at a distance of 3.8 km or greater from the turbine fields and 6% of the reports were made at a distance of 8.6 km from the turbine field.

Psychological Factors Affecting Concentration

[illegible]

- * The coloured assessment points (e.g. 2A) were the names given to points at the indicated distances (i.e. 5.5 km) from the windfarms (Beinn An Tuirc and Deucheran)
Point 4 was 313 m from Deucheran (indicated here as .3 km) and point 4BB was 606 m from Beinn An Tuirc (indicated here as .6 km)
* Effects which related to viewing the turbines of Beinn An Tuirc from a distance of 8.6 km from point 2 (Deucheran)

Physical Symptoms

<u>Head</u>												
"Pressure"	1	4	5		4	2		3		1	3	2
"Pain"	2	2	2		2	1		2		4	2	1
<u>Chest</u>												
"Pressure"		3			1	1						
"Pain"	2	1				2						1
"Palpitations" / "missed beats"			1									
<u>Stomach</u>												
"Nauseous" / "sick"	2		4		1	2					1	1
"Pain"	1	1										
<u>Other:</u>												
"Breast pain"						1					1	
"Tightness in throat"								1				
"Earache"		1										
"Faint headed" / "dizzy"	1	4	3		2	2		2				
Assessment Point:*	4	4BB	3		3AA	2		3A		1	2A	2*
	0	.3	.6	1	2	2.2		3.8		5	5.5	8.6
Windfarm												
	Distance from windfarm (km)											

- * The coloured assessment points (e.g. **2A**) were the names given to points at the indicated distances (i.e. 5.5 km) from the windfarms (**Beinn An Tuirc** and **Deucheran**)
 Point **4** was 313 m from **Deucheran** (indicated here as .3 km) and point **4BB** was 606 m from **Beinn An Tuirc** (indicated here as .6 km)
 * Effects which related to viewing the turbines of Beinn An Tuirc from a distance of 8.6 km from point 2 (Deucheran)

Negative States of Mind

<u>Confusion</u>			2	1	1	1	2			
"Weak mindfulness"			2	3	1					
"Strong sense of 'I'"	1	1		1						
<u>Depression</u>										
"Loss of self-confidence"				1						
"Discouragement"	1			1	1		1			
"Sad"							1			
"Cried"			1							
<u>"Anxiety"</u>	2			1			1			
"Disturbed"	1		2				1			
"Distress"	1	1	2		1		1			
"Panic"					1		1			
"Paranoia"				1						
<u>"Anger"</u>					1					
"Irritability"	2	1	2	1	2					
<u>Other</u>										
"Hypnotic"	1		3		4		4			
"Seduced"			2							
"Optical illusion" / "hallucination"		1		3			2			
Assessment Point:*	4	4BB	3	3AA	2	3A	1	2A	2*	
Windfarm	0	.3	.6	1	2	2.2	3.8	5	5.5	8.6
	Distance from windfarm (km)									

* The coloured assessment points (e.g. 2A) were the names given to points at the indicated distances (i.e. 5.5 km) from the windfarms (Beinn An Tuirc and Deucheran)

Point 4 was 313 m from Deucheran (indicated here as .3km) and point 4BB was 606 m from Beinn An Tuirc (indicated here as .6km)

* Effects which related to viewing the turbines of Beinn An Tuirc from a distance of 8.6km from point 2 (Deucheran)

APPENDIX 6

STATISTICAL ANALYSIS

STATISTICAL ANALYSIS OF THE RELATIONSHIP BETWEEN DISTANCE FROM WINDFARM AND TIME TAKEN TO REACH CONCENTRATION IN MEDITATION

Several models of the above relationship were tested using simple regression analysis. The models are as follows, where M is the time taken to reach concentration in meditation, D is the distance from the windfarm, and e is a stochastic variable that represents an error term. a and b are constants.:-

1. Regression in Levels

$$M = a + bD + e$$

2. Regression in Logs of Levels

$$\ln M = a + b \ln D + e$$

3. Semilog Regression

$$M = a + b \ln D + e$$

4. Regression in differences between time taken at ground zero and time taken at observation distance.

$$\Delta M = b \Delta D + e$$

The results are tabulated below.

Table 1. Results of Regression Analysis

Model	constant(a)	slope(b)	t value (slope)	R ²	df
1. Levels	10.46	-1.205	5.677	0.266	89
2. Logs of Levels	1.998	-0.472	5.664	0.265	89
3. Semilog	9.713	-3.577	6.358	0.312	89
4 Difference*	0	-1.465	8.796	0.120	61

* Model 4 is constrained to have a zero constant.

The results show that the overall fit of the models tested, to the data, is low, with R² in the range 0.12 to 0.31, showing that the models are explaining only 12 to 31 % of the variance in the time taken to reach meditative concentration. However in cross-sectional studies of this type this is not uncommon, and is to be expected.

The important statistic is the value of the t statistic on the slope coefficient. This shows that in each model the estimate of the relationship between distance and time taken to achieve meditative concentration is significant beyond the 99% level of confidence. We can therefore place some reliance on the slope estimate as a reliable description of the nature of this relationship, and we can safely conclude that proximity to a windfarm does have a significant effect on meditative performance.

From these models we can derive

- (1) the expected time taken to reach meditative concentration at ground zero, at a windfarm of the turbine size and number and density of turbines, similar to those visited during the windfarm studies.
- (2) the distance from a windfarm, at which the time taken to reach meditative concentration returns to normal. Given a normal breathing rate of meditators of between 7 and 9 breaths per minute, the time taken to count 21 breaths with concentration would be between 3 and 2.5 minutes. Thus we can estimate the distance from the windfarm at which meditative concentration, as measured by the length of time it takes to count 21 breaths, is reduced to 3 and 2.5 minutes.

Table 2 below shows the results of this derivation using the estimated values of the coefficients, and their standard errors from the models above.

Table 2. Time (Tw) taken to achieve concentration at windfarm, and distance in kilometres (d₃) and (d_{2.5}) from windfarm required to achieve normal levels of concentration of 3min to 2.5 mins for 21 breaths.

Model	Tw (mins.)	d ₃ (km)			d _{2.5} (km)		
		<i>best estimate</i>	<i>upper</i>	<i>lower</i>	<i>best estimate</i>	<i>upper</i>	<i>lower</i>
1. Levels	10.5	6.25	8.75	4.4	6.7	10	5
2. Logs of Levels	7.4	6.75	18	4	9.9	33	6
3. Semilog	9.7	6.5	15.5	4.2	7.5	19	4.6
5. Difference*	11.7	5.9	8	4.8	6.3	8.4	5

From Table 2 above, we can see that the average retreator would take 10-11 minutes to achieve concentration if meditating close by or at a windfarm of the scale and density of those included in the study.

To be able to meditate normally, our best estimate with 95% probability is that the average retreaters would have to be between 6 and 10 kilometres away from the windfarm, and that the lower end of the range of distances at the 95% level of probability is of the order of 4-6 kilometres. Thus we can be 95% certain that the average retreaters should be no closer than 4-6 kilometres from a windfarm, and ideally should be at least 6-10 kilometres away.

Conclusion

The above models are based upon the effects of proximity to windfarms of the turbine size, number and density of the windfarms visited in the windfarm studies. If the size of turbines and their number and density increases, then we can be certain that the negative effects on meditation will increase, and the distance away from the windfarm to be free of effects would also increase.

At present we are unable to estimate statistically the precise effects on meditative retreaters of the windfarm of the size of turbine and number and density proposed for the area around Tharpaland. However we are aware that the proposals are for turbines that are twice the height and six times the shadow, of the turbines included in the windfarm studies that provided evidence for the above models. Also the number and density of the windfarm is several times greater than those of the windfarm studies. To estimate these effects will require a more sophisticated analysis than we are able to carry out at the present time given the data we have available. However we are confident any analysis will show that the distance required to ensure that meditative retreaters are unaffected by the larger turbines and more dense windfarm of the proposal will be much greater than 10 kilometres.

APPENDIX 7

HEALTH EFFECTS AT OTHER WINDFARMS

ADVERSE EFFECTS EXPERIENCED BY PEOPLE LIVING NEAR EXISTING WINDFARMS

The subjects participating in the three windfarm studies represent, not a general population, but the specific population of meditative retreaters who frequently attend retreats at Tharpaland. Because of their extreme sensitivity to the external environment, the adverse effects reported by these subjects might therefore be considered atypical with respect to the general population. However, many people living near windfarms have reported adverse effects and experiences that are very similar and, as indicated below, in many cases identical to those reported by the subjects of the three windfarm studies. The following is a selection of such reports.

Symptoms and other adverse experiences reported by the residents near Marton, Askam and Ireleth, near Barrow-in-Furness, England:

- *“a noise that you feel rather than hear.”*
- *“a feeling of pressure on the head and chest area.”*
- *“a feeling of breathing and heart beat wanting to keep in synch with the ‘noise’, and feelings of distress if this changes.”*
- *“Anxiety, annoyance, stress, irritation, anger.”*
- *“pains in head”*
- *“ear popping”*
- *“heart rate change”*
- *“heart moves in rhythm with the sounds of the turbines.”*
- *“breathlessness”*
- *“intensification of asthmatic condition”*
- *“crushing feeling”*
- *“distress”*
- *“difficulty to concentrate”*
- *“sleep disturbance”*
- *“loss of sleep”*
- *“Headaches, fatigue” – “one farmer working close by cannot be there for more than 2 hours because of just these symptoms” – he states “it does my head in””.*
- *“Made physically sick – nauseous in close proximity to the turbines.”*
- *“one resident is convinced, although not medically confirmed, that the brain haemorrhage she suffered is attributable to the turbines being close to her premises.”*

- *“complaints referring to the shadow flicker (above)...of nausea and dizziness.”*
- *“Those of us who are unfortunate enough to live closest to the turbines are experiencing a barrage of background noise pollution that is actually making some of those most affected physically sick.”*

Symptoms and other adverse experiences reported by residents in Laholm, Sweden

- *“The unbearable noise disturbance”*
- *“the shadows that drives them mad”*
- *“The visual effect is making you stressed”*
- *“People are becoming really ill”*
- *“I had to leave my house in January, 1999. I realized that I could not stay unless
I was willing to become ill”*
- *“By the end of 1998 I had high blood pressure”*
- *“...and every time I was on my way home from work or getting up in the morning
I was afraid, and I mean really afraid, that the wind might be negative”*
- *“Tension”*
- *“Stomach-ache”*
- *“Blood pressure”*
- *“Aggression”.*
- *“When the sound continued for more than a week due to the wind, I was literally
broken.”*

Darmstadt Manifesto (1998)¹⁵: Excerpt from a paper on wind energy signed by a group of 100 German academics which includes symptoms and other adverse experiences reported by residents in Germany:

- *“People are describing their lives as unbearable when they are directly exposed to the acoustic and optical effects of wind farms.”*
- *“There are reports of people being signed off sick and unfit for work.”*
- *“There is a growing number of complaints about symptoms such as pulse irregularities and states of anxiety which are known to be from the effects of infrasound.”*

¹⁵ Initiative Group “Darmstadt Manifesto on the Exploitation of Wind Energy in Germany”, 1998.

The above impacts that many people living near existing windfarms exhibit are much the same symptomology as the subjects who participated in the windfarm studies (see table below); the only difference being that the subjects, due to their spiritual training, are probably more sensitive to and aware of windfarm impacts and therefore quicker to experience them and quicker to identify them as such.

Symptoms	Windfarm environments		
	Sweden	Barrow in Furness	TIRC studies
Anger/Irritation/Aggression	Y	Y	Y
Annoyance	Y	Y	Y
Anxiety/Stress	Y	Y	Y
Blood pressure increased	Y		
Body vibration			Y
Breathing difficulties		Y	Y
Depression			Y
Difficulty concentrating		Y	Y
Disturbed sleep/insomnia	Y	Y	Y
Dizziness		Y	Y
Fatigue		Y	Y
Headache/head pressure	Y	Y	Y
Heart rate alterations		Y	Y
Loss of confidence			Y
Nausea		Y	Y
Unbearable/tormenting noise	Y	Y	Y
Noise that is felt, not heard		Y	Y
Pressure in chest		Y	Y
Pressure in ears			Y
Pain in stomach	Y		Y

NB. Where a 'Y' is omitted does not mean the residents of that area do not experience those symptoms but that they have not necessarily reported them in their literature or communication.