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Impact of Lower Thames Crossing on The Whitecroft Care Home

Psychiatric report

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1 Summary

- 1.1.1 This report examines the potential impact of the Lower Thames Crossing (LTC) on the mental health of current and future residents of The Whitecroft Care Home (WCH) in its present location.
- 1.1.2 The LTC will necessitate a period of construction works in the proximity of the care home, and will result in large roads carrying high traffic volumes close to the care home.
- 1.1.3 Several lines of research indicate that ambient noise levels have substantial effects on the well-being and behaviour of people with dementia. Any increased noise levels from the LTC are likely to result in a deterioration in the behaviour of residents, an increase in their level of stress, and an adverse impact on their use of the external spaces within the perimeter of the care home site. One study found that increased ambient noise is associated with an increase in the rate of hospital admissions.
- 1.1.4 Acoustic mitigation may go some way to minimise the impact inside the care home provided that external doors and windows are kept closed. It is difficult to see how mitigation measures could be effective if windows are opened in order to allow fresh air to circulate. The use of air conditioning will add to noise levels.
- 1.1.5 Care home residents with dementia who may manage to leave the care home perimeter unescorted would be at increased risk of injury in road traffic accidents. This is a risk of major significance, but could be mitigated to some extent by increasing the perimeter security of the care home.
- 1.1.6 Air quality is reported as being unlikely to be affected by the project and therefore, if that is correct, it is unlikely that changes in air quality will have an effect on residents' well-being. If not correct, much research indicates that poorer air quality can have adverse effects on cognitive function.
- 1.1.7 If the WCH remains in its present location, any adverse effects of ambient noise and changes in air quality will continue to have an impact on residents indefinitely.
- 1.1.8 In assessing the impact of relocation of the home on the well-being of existing residents at the time of relocation, it is necessary to weigh the negative effects of the disturbance against the positive effects of what could be an improved environment if relocated temporarily or permanently elsewhere. A temporary relocation will involve two moves, with a correspondingly greater negative impact. A permanent relocation would involve only one move, and would have the enduring benefit of a potentially improved environment elsewhere. Relocation involves a risk of harm of major significance. Two relocations (for example to a temporary location during the works and then return to the previous location) will involve greater risk than one relocation. As the works are estimated to take 5-6 years, and the average survival for a care home resident is about 3 years, it is likely that two

different groups of residents would be exposed to the risk of relocation if the care home returned to its original site.

2 Introduction

- 2.1.1 National Highways has submitted an application for development consent in relation to the Lower Thames Crossing (LTC), a major infrastructure development which will provide a major new road crossing the Thames to the east of the existing Dartford Crossing. The proposed route will pass close to The Whitecroft Care Home (WCH), a residential care home for elderly people, owned and managed by Runwood Homes Group. If the development goes ahead, it is anticipated that there will be a period of construction works, culminating in a motorway with three traffic lanes in each direction running very close to WCH. In addition, other existing roads in the vicinity will be altered, including the A13, the A1089, and Stanford Road (A1013).
- 2.1.2 The present report first considers the various factors which might impact on the present and future care and welfare of residents and staff at the WCH, and then considers how these might apply to the construction phase and operational phase of LTC.

3 The author

- 3.1.1 Dr Series has been a consultant in the psychiatry of old age since 1995 and remains so. He is a registered medical practitioner with the General Medical Council and is on the GMC's specialist register in old age psychiatry. He is approved under section 12 of the Mental Health Act 1983 (MHA), an Approved Clinician, and trained and approved as a Deprivation of Liberty (DOLS) assessor. He is a medical member of the First Tier Tribunal (Mental Health), a Fellow of the Royal College of Psychiatrists, and a member of the Faculty of Law, University of Oxford. From 1991 to 2014 he was honorary senior clinical lecturer in the Department of Psychiatry at the University of Oxford. Dr Series has considerable experience in providing expert reports to civil and criminal courts, and to the court of protection. He holds a DM (research degree) from the University of Oxford and an LLM in Law Applied to Medical Practice from the Cardiff University and the Bond-Solon certificate witness practice.
- 3.1.2 Further details of his experience and qualifications are provided in the appendix.

4 Material considered

- 4.1.1 This report relies on:
- a site visit by this author on 10/07/2020
 - access to TR010032 - Lower Thames Crossing Examination Library
 - Journal articles as cited below
 - Institute of Environmental Management and Assessment (IEMA) Guide to: Determining Significance For Human Health In Environmental Impact Assessment (November 2022)

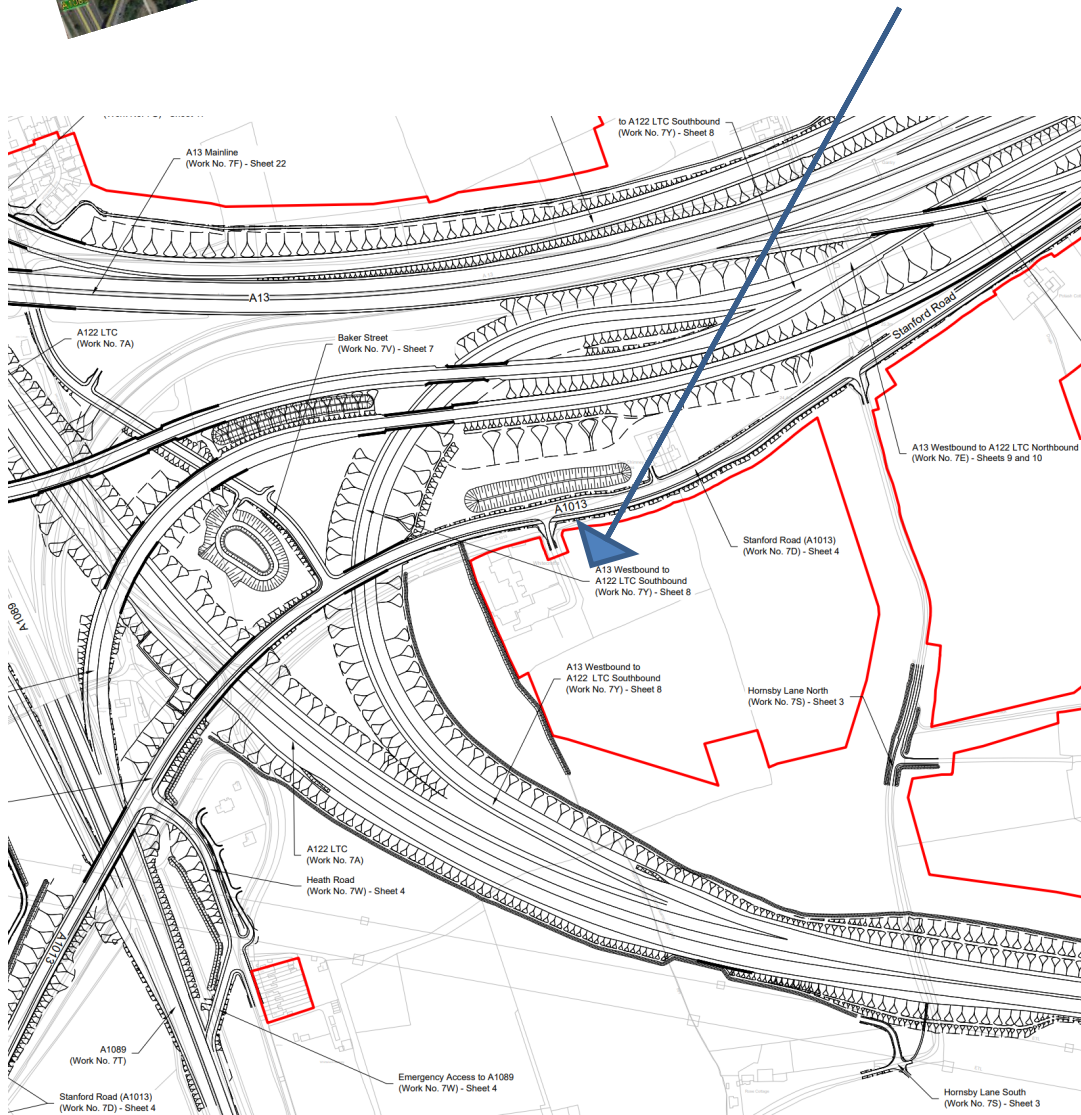
- Institute of Environmental Management and Assessment (IEMA) Guide to: Effective Scoping of Human Health in Environmental Impact Assessment (November 2022)
- Air Quality Review: Lower Thames Crossing DCO Air Quality Assessment (May 2023). A Report prepared by Air Quality Consultants for CSA Architecture re the Whitecroft Care Home
- Report by Acoustics Consultants in Sound and Vibration on The Whitecroft Care home 19-0003-R3 (21 February 2023)

5 Proposed road scheme

- 5.1.1 It is proposed that the LTC will pass the Whitecroft care home at approximately 250 m to the west at the closest point. A link road is proposed to pass within 50 m of the care home and three further link roads are proposed to the north for care home, located between the care home and the A13. The A1013 is to be realigned just north of the care home.



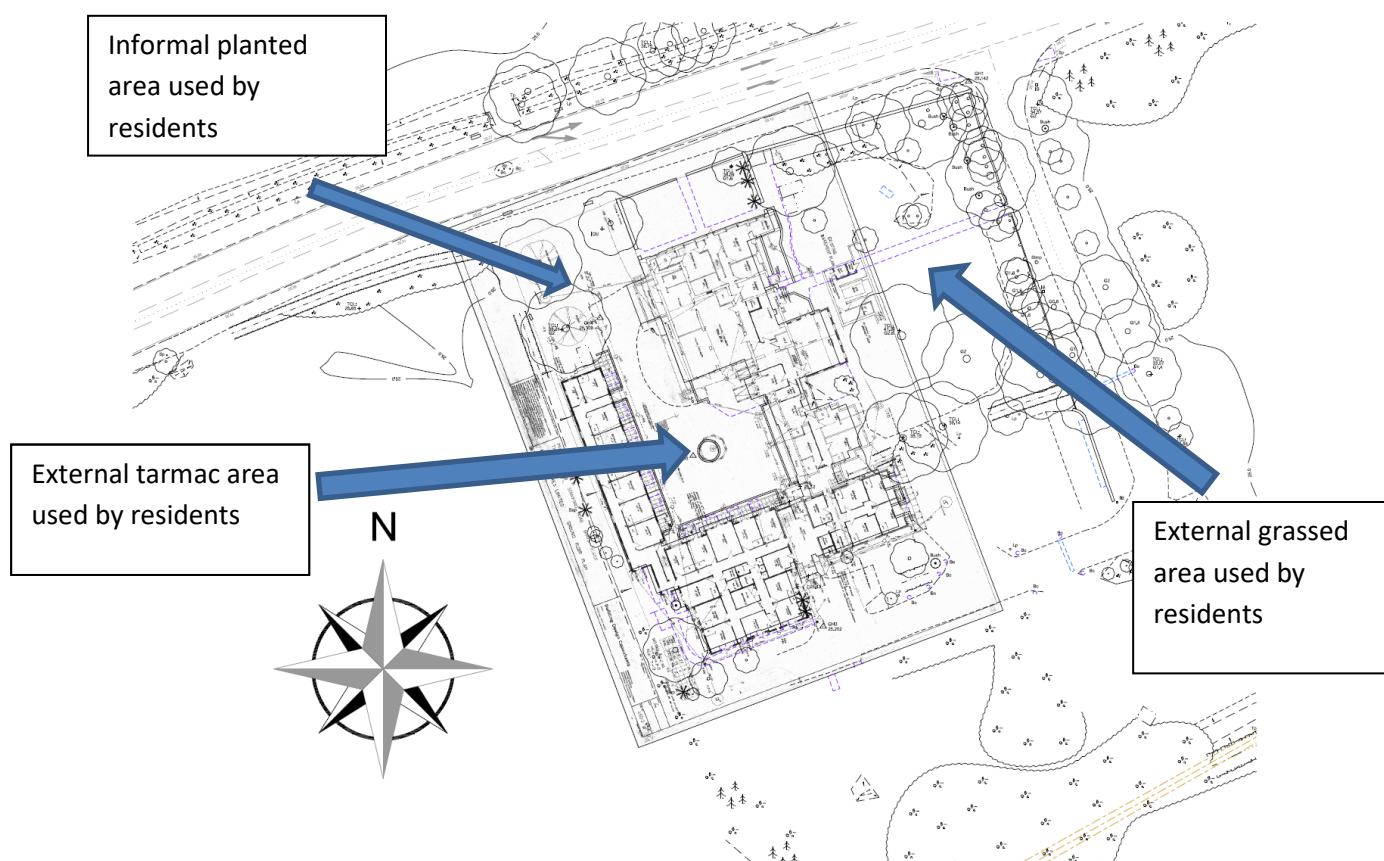
Position of Whitecroft care home.
 The photograph has been rotated to approximately the same orientation as the plan below.



Detail of the second plan within PDB-003. The Whitecroft care home is shown approximately in the centre of the detail.

6 Whitecroft care home

- 6.1.1 WCH is a residential care home for elderly people, including those living with dementia. It is sited in an open agricultural setting. Many of the bedrooms look out over open fields. Hornsby Lane runs approximately 350 m to the east, and Baker Street runs approximately 240 m to the west of the care home. A dual carriageway, the A1089, runs approximately 400 m west of the care home.
- 6.1.2 WCH has up to 56 residents. Of these, as at 05/06/2020, 21 were assessed as having medium dependency levels (19 with dementia, 2 according to Barthel score¹). As at 28/07/2020 there were 30 residents living at Whitecroft care home with dementia, of whom 11 were regarded as having mild dementia and 19 with moderate or complex dementia.



- 6.1.3 As shown in the plan above, WCH has three distinct external areas which can be accessed by residents for recreational activities, sitting, or meeting visitors. One (the central courtyard extending to the northern boundary of the care home site) has a tarmac surface which is

¹ The Barthel scale provides an Index of Activities of Daily Living scored on 10 items assessing the level of assistance required for such daily activities as management of bladder and bowels, feeding, dressing, mobility, dressing and bathing, which yields a score from 0-20, with lower scores indicating increased disability.

particularly suitable for wheelchair users. The other (to the east of the building) is laid to grass.



View of external secure hard-surfaced area from perimeter fence



View looking across perimeter wall into the grassed external space



View from corridor
looking west



View from corridor
looking north across
central tarmac area

Internally, bedrooms and corridors have windows which may face outwards, many overlooking the surrounding fields or facing other external spaces.

7 Nature of dementia

7.1.1 Dementia is a common but devastating condition which affects approximately 5% of all those aged 65 or more. It is rare below the age of 65. The risk of developing dementia increases steadily with increasing age over 65.

7.1.2 Dementia is a clinical syndrome which is defined by the World Health Organisation in ICD 10 as follows:

Dementia is a syndrome due to disease of the brain, usually of a chronic or progressive nature, in which there is impairment of multiple higher cortical functions, including memory, thinking, orientation, comprehension, calculation, learning capacity, language and judgement. Consciousness is not clouded. Cognitive impairments are commonly accompanied, and occasionally preceded, by deterioration in emotional control, social behaviour or motivation. This syndrome occurs in Alzheimer's disease, in cerebrovascular disease and in other conditions primarily or secondarily affecting the brain.

7.1.3 It can be seen from this definition that dementia can arise from a number of different types of brain disorder. The most common cause of dementia is Alzheimer's disease, which was first described over a hundred years ago, and is characterised by well-recognised pathological changes in the brain. The second most common cause is known as vascular dementia which is due to one or another type of impairment in the blood supply to the brain. There are many other types of dementia; all produce cognitive impairment which progresses over time and steadily erodes the person's ability to make appropriate decisions for themselves, to care for themselves, and to keep themselves safe. In the UK, the majority of people with dementia will at some point require care in a care home. Not all residents of care homes have dementia, but it is one of the most common reasons for admission to a care home. As care home residents are generally older people, even if they did not have dementia at the time of entry, they are at risk of developing dementia over time.

7.1.4 All types of dementia are progressive, usually over a period of a few years. As dementia worsens, the person requires increasing amounts of support with daily living, and their ability to understand the environment around them diminishes. For many people, the earliest changes are problems with memory, although the person will usually be able to continue to do most things relatively independently or with a little help for several years after the onset of the condition.

7.1.5 By definition dementia erodes cognitive function, which refers to a group of mental functions such as thinking, remembering, understanding, using language, communicating, orientating oneself, concentrating, and decision-making. In most normally mentally healthy people the brain has a substantial cognitive reserve, meaning that under normal conditions only a part of the brain's capacity is used, so that it is possible for a normally healthy person to deal with new circumstances and environments using the extensive spare capacity of the brain to understand and respond appropriately. In a person with dementia, the spare capacity (cognitive reserve) is progressively lost, so that a person with dementia may have great difficulty in adapting to change or understanding what has happened. This can result in

abnormal and dysfunctional behaviours such as increased confusion, irritability, and challenging behaviours when a person with dementia is placed in an unfamiliar situation. Relatively small changes in external conditions can have large effects on people with dementia.

8 Care needs of people with dementia

- 8.1.1 People with dementia require different kinds of care at different stages of the disease. In the early stages, the impact on one's ability to maintain one's own personal hygiene and make decisions for oneself is relatively small, and little care may be required. As the disease progresses, more care is required in many different domains. In relation to personal care, the ability to maintain personal hygiene and continence is usually gradually lost, creating a dependency on others. In relation to the management of one's affairs, assistance will nearly always be required, often supported by such instruments as a Lasting Power of Attorney or a Court deputyship order. People with dementia will eventually experience difficulty feeding themselves properly. This difficulty arises from many causes: obtaining food, paying for it, cooking or preparing it, eating it. In the later stages of dementia, sufferers are likely to need encouragement and support to eat and drink.
- 8.1.2 Although dementia is primarily a disease of the brain, it also has profound effects on the body. As the disease progresses, control of body functions such as continence is lost, balance and walking is affected, and body mass and strength is lost. People with dementia may lose the ability to swallow, so that food may pass into the lung causing choking and pneumonia, which is a common cause of death. If no other physical cause intervenes, dementia itself leads to death.
- 8.1.3 People with dementia are generally older and may also have other health conditions. Many have impairments of sight or hearing, and these add to the functional impairment experienced as a result of dementia.
- 8.1.4 At the present time dementia is an incurable condition in the vast majority of cases. Medication is available for Alzheimer's disease which can have a limited beneficial effect on symptoms but is not known to affect prognosis. The medical management of vascular dementia consists largely of managing the vascular risk factors such as blood pressure, cholesterol, and smoking. It is thought that this may have some limited effect on reducing the rate of progression, but the benefit has not actually been demonstrated in clinical trials.
- 8.1.5 By the time that a person with dementia enters a care home it is likely that he or she has significant needs for assistance with personal care, maintaining a safe environment, managing their personal and financial affairs. There may often be physical problems as well, such as restricted mobility and impaired sight or hearing. A person with dementia in a care home becomes progressively more dependent on carers for every aspect of daily life.
- 8.1.6 Care needs are not limited to the support of bodily integrity. People with dementia have the same needs as anyone else to enjoy a peaceful environment in which they can live out their final years of life, see friends and relatives, and, so far as their condition allows, participate

in social and other activities. Because of the limitations imposed by the disease, it can be difficult for staff to provide engaging activities, but authorities agree that it is important to stimulate the mind so far as possible. One modern implementation of this is known as cognitive stimulation therapy, which seeks to provide focused stimulation of a kind which is appropriate for sufferers. All care homes need to provide a programme of activities for residents.

- 8.1.7 People with dementia enjoy access to external space, just as others do. Indeed, it could be argued that access to external space is even more important for a person with dementia as their ability to enjoy and appreciate the range of internal activities which normally healthy people do is very limited: a person with dementia may not be able to understand newspapers, books, television, but they may derive great pleasure from the sensation of fresh air and pleasant smells such as those found in a sensory garden.
- 8.1.8 Clearly, it is essential for a care home to ensure that its residents are safe. People with dementia may not be able to ensure their own safety and may lack an appreciation of risks. They may lack traffic sense. It is not the case that all people with advanced dementia have restricted mobility. A mobile person with moderate to severe dementia can present particular difficulties for carers in ensuring their safety at all times. They may not understand the need to remain in the care home, and some people with dementia will try to leave. Almost all dementia care homes have some form of security on external doors and windows to prevent residents leaving without appropriate support. Nevertheless, it is difficult to ensure that a purposeful resident is always unable to leave the building, and therefore it is important to ensure that the external space is as secure as possible, for example with a perimeter fence.

9 Design principles for environments for dementia

- 9.1.1 Much attention has been given to the design of both internal and external environments appropriate for people with dementia (Van Hoof et al, 2010).
- 9.1.2 People with dementia gradually lose the ability to engage with the environment around them in the way that others are able to do. Dementia causes difficulties in interpreting the visual world. Objects may not be recognised for what they are. As memory fades, familiar spaces no longer look familiar. It becomes difficult for the person affected to remember how to get from one place to another. The sense of smell is often reduced or lost. An appreciation of risk is reduced or lost. Written or spoken language, including notices, are no longer understood. With increasing age, sight, strength and balance often diminish. The combination of these factors makes it progressively more difficult for people with dementia to comprehend and interact appropriately with the world around them, and therefore it is critical that the design of environments for dementia takes into account the considerable cognitive limitations of residents.
- 9.1.3 Given these changes, it is essential to ensure that the environments in which people with dementia are cared for are safe, calm, quiet and pleasant places. People with dementia can

still enjoy sensory aspects of the environment such as the pleasure of fresh air or sunshine, and can experience and enjoy tactile responses to materials. Access to suitable outdoor space is essential. There should be areas to sit or walk outside safely. Sensory gardens contain plants which are chosen for their properties such as appearance or scent. One study (Edwards et al, 2023) has demonstrated an improvement in quality of life scores for care home residents with dementia of more than 10%, while depression and mean agitation scores decreased by almost half when a therapeutic garden was provided.

10 Effect of noise

10.1 Literature review

10.1.1 The direct effect of sound energy on human hearing is well established and accepted, and has led to protective legislation requiring head protectors to be worn in some environments. There are statutory limits on permitted levels of amplification for music equipment.

10.1.2 Both direct and indirect effects of noise are examined in the WHO document Guidelines for Community Noise. The adverse effects of noise discussed by WHO include hearing impairment, speech intelligibility, sleep disturbance, physiological functions such as hypertension and ischaemic heart disease, mental illness, impaired performance of cognitive tasks, and annoyance, producing social and behavioural effects. The authors note that specific subgroups of the population may be more vulnerable to the adverse effects of noise than others. Examples given of particularly vulnerable groups include 'those with particular diseases or medical problems (e.g. high blood pressure); people in hospitals or rehabilitating at home...people with hearing impairment...and the elderly in general. People with impaired hearing are the most adversely affected with respect to speech intelligibility.'

10.1.3 Clark and Stansfeld (2007) have reviewed the impact of transportation noise on health and cognitive development. They identified that noise exposure could give rise to annoyance, may have an effect on hypertension and coronary heart disease, may cause sleep disturbance, and can impact on psychological health measures such as symptoms of anxiety and depression. In children, the large-scale RANCH study comparing the effect of road traffic and aircraft noise on children's cognitive performance in the Netherlands, Spain, and the UK found a linear exposure effect relationship between chronic aircraft noise exposure and impaired reading comprehension and recognition memory, after taking a range of socio-economic and confounding factors into account (Stansfeld et al, 2005).

10.1.4 Hayne and Fleming (2014) have provided a useful review of this area in relation to people with dementia. They state:

People with dementia are particularly affected by the acoustic environment. While people with dementia might have normal hearing, they can lose the ability to interpret what they hear accurately. As such, the amount, type and variety of noise a person with dementia is exposed to needs to be carefully regulated, as over or under exposure to noise can cause confusion, illusions, frustration and agitation.

3.1 Hearing of Elderly People with Dementia

Hearing, along with eyesight, is one of the first senses to be affected by age and starts to degrade by the age of 40. High frequency pitches are the first to become less audible, with a lesser sensitivity to lower frequency sound (11). The ability to understand normal conversation is usually not affected at first, but when combined with the presence of background noise, comprehension may be decreased.

Most older people lose hearing ability and learn to compensate by a combination of lip reading, increased attention and extrapolation from the parts of sentences they can hear (11). For a person with dementia, this compensation becomes problematic, resulting in the need to minimise meaningless background noise and reverberation (12, 13).

3.2 Physiological Effects

Of all the senses, hearing is the one that has the most significant impact on people with dementia in terms of quality of life. This is because dementia can worsen the effects of sensory changes by altering how the person perceives external stimuli, such as noise and light. As hearing is linked to balance this also leads to a greater risk of falls either through loss of balance or through an increase in disorientation as a result of people trying to orientate themselves in an environment that is over-stimulating and noisy.

High noise levels can lead to stress reactions such as anxiety, confusion, increased heart rate, blood pressure and fatigue from over stimulation (14, 15). Noise has also been demonstrated to delay wound healing, decrease weight gain (16) and impair immune function (17), with the effect of noise on medical and behavioural health being magnified for a person with dementia (18).

3.3 Psychological Effects

Research has indicated that persons with moderate to severe dementia may have a limited capacity to understand and interpret their environment (19, 20). It is challenging to understand and provide proper stimulation for those with dementia. Much of the research that has been conducted supports the theory that too little or too much stimulation is often the underlying source of agitation and disruptive behaviour (21, 22). The most common problematic behaviours encountered in residential aged care include complaining, cursing and verbal aggression, general restlessness, repetitive sentences, negativism, constant calls for help, wandering and trying to escape, pacing, inappropriate dressing, strange noises, hoarding, repetitive mannerisms, screaming, strange movements and hiding things(23).

An examination of case studies by Gerdner, Buckwalter and Hall (24) found that environmental noise is a likely cause for increased agitation in select individuals with dementia, suggesting a potential relationship between sound and agitation (24). Support of this relationship was subsequently found by Joosse (25), who also suggested

that accumulated noise exposure could be used to predict agitation among people with dementia in residential care.

10.1.5 In a review of design of facilities for dementia Hayne and Fleming (2014) identify traffic noise as a significant contributor to unnecessary noise. They comment:

Generally, dementia care facilities should be located away from *major* external noise sources as listed in Table 1 [Table 1 gives examples of unwanted noise generators, of which the first one cited is External activities: Road traffic]. If this cannot be accomplished, bedrooms, activity areas and social spaces should be located so that they are screened from intruding noise sources.

10.1.6 Human behaviour is affected by a very wide range of variables both internal (such as mood state, mental health, personality) and external (such as the built environment, light, and noise), which makes studies of the impact of particular variables on behaviour difficult to carry out and interpret. There have been relatively few studies which investigate empirically the effect of noise on nursing home residents or people with dementia.

10.1.7 In one observational study of agitation in eight different nursing units in four nursing home facilities Joosse (2012) found that 16% of the variance in levels of agitation was accounted for by the cumulative sound level. This was a statistically significant contribution.

10.1.8 Another observational study of agitation in nursing homes by Cohen-Mansfield and Werner (1995) identified noise as a factor which could increase residents' requests for attention and aggression. Agitated behaviours included pacing and wandering, screaming and other strange noises, constant requests for attention, repetitious mannerisms, inappropriate handling of things are picking things, and strange movements. Aggressive behaviours included hitting, kicking, and cursing.

10.1.9 A study of traffic noise in Madrid by Linares et al (2017) found that there was a linear correlation between traffic noise and dementia-related hospital admissions, the relative risk of an admission being 1.15 (1.11-1.20) for every 1 dB increase in Leq_d (equivalent diurnal noise level). The Madrid study suggests that the increased traffic noise may lead to an increase in dementia-related hospital admissions.

10.1.10 Although there do not appear to be any published studies on the effect of constructional noise on people with dementia, it would appear likely that the adverse effects of noise on measures of agitation and quality of life would apply as least as strongly to constructional noise as to traffic noise during the construction period. Furthermore, constructional noise is likely to be less predictable than ongoing traffic noise and there may be periods when it is

very loud due to intermittent use of heavy machinery, which is likely to add to the distress of residents.

11 Effects of light

- 11.1.1 Light pollution will occur both during the construction phase as much of the work will need to be carried out during hours of darkness (Project Description at 2.7.49-2.7.51) and during the operational phase to illuminate the new roads and associated areas.
- 11.1.2 Research data on the adverse effects of ambient light in people with dementia are lacking, but it is well recognised that sleep patterns are often disturbed in people with dementia, so that it would appear likely that factors such as high levels of ambient light at night would further impair sleep in this vulnerable population.

12 Effects of air quality

- 12.1.1 Block et al (2012) provide a detailed review of research on the effects of air pollution on brain health. They review a wide range of potential mechanisms by which air pollution may impair brain function. They point out that air pollution is a complex mixture of components that includes particulate matter (PM); ozone, carbon monoxide, sulfur oxides, nitrogen oxides, methane, and other gases, volatile organic compounds (e.g., benzene, toluene, and xylene), and metals (e.g., lead, manganese, vanadium, iron). Although the brain mechanisms involved in changes in brain function are poorly understood, they may include neuroinflammatory processes, microglial activation, and changes in brain proteins associated with neurodegenerative disorders.
- 12.1.2 A number of studies have attempted to examine the effect of air pollutants on incidence of either cognitive impairment or dementia.
- 12.1.3 In a study of the effect of air pollution (AP) and traffic noise on cognitive function, Tzivian et al (2017) found that high noise exposure increased the association of air pollution with impairments of cognitive function. They state:

Our study suggests that AP and road traffic noise might act synergistically on cognitive function in adults. Participants exposed to high level of noise showed a stronger association between AP and cognitive function, and the association between noise and cognitive outcomes was restricted to those with high AP exposure.
- 12.1.4 Weuve et al (2012) found that exposure to both coarse and fine particulate air matter were associated with significantly faster cognitive decline.
- 12.1.5 In a large UK Biobank study of >50,000 participants Parra et al (2022) found 'consistent associations of PM_{2.5} with greater risk of all-cause dementia (HR = 1.17, 95% CI: 1.10, 1.24) and AD (HR = 1.17, 95% CI: 1.06, 1.29). NO₂ was also associated with greater risk of any

incident dementia (HR = 1.18, 95% CI: 1.10, 1.25), AD (HR = 1.15, 95% CI: 1.04, 1.28) and VAD (HR = 1.18, 95% CI: 1.03, 1.35).

- 12.1.6 In a study of Swedish data Wu et al (2022) found that long-term exposure to ambient air pollution was associated with a significantly elevated risk for cognitive impairment among older adults, and air pollution almost doubled the risk for dementia incidence among people with cognitive impairment.
- 12.1.7 In a US study, Bishop et al (2022) found that 'a 1 µg/m³ increase in average PM_{2.5} concentrations increases the probability of receiving a new dementia diagnosis by the end of the decade by an average of 2.15 percentage points (pp).'
- 12.1.8 In a study from Canada Chen et al (2016) concluded that living close to heavy traffic was associated with a higher incidence of dementia.
- 12.1.9 Jung et al (2015) showed in a Taiwan cohort of 95 690 individuals aged 65 years or older between 2001 and 2010, robust associations between increased risk for Alzheimer's disease and long-term exposures to ozone O₃ and fine particulate matter PM_{2.5} above current US Environmental Protection Agency (EPA) standards.

13 Traffic safety

- 13.1.1 Some people with more advanced dementia but who retain a significant degree of mobility like to wander. They share the normal human desire to walk around, but may lack a sufficient understanding of where they are and the environmental risks. Some people with dementia do not want to be in a care home but nevertheless have to be there in order to be cared for safely. They may wish to leave the premises, not understanding why they need to be there. It is therefore necessary to ensure that they can be safely contained within the premises. While attention to ensuring that exits and entrances of the building are kept closed is possible, it is more difficult to secure the boundary of the site without imposing an unsightly high secure boundary which would block the view of the surroundings. The proximity of the road development to the care home is therefore a significant risk to the safety of residents. The existing roads which pass close to the care home are relatively quiet local roads. The proposed new roads would be much busier and present much greater danger to a confused resident who might manage to reach them.
- 13.1.2 In terms of the significance matrix, all of the population is highly sensitive to road risk, and the potential magnitude of that risk is high in the event of an incident.

14 Effect of relocation

- 14.1.1 Research on the impact of relocation on people with dementia and those living in care homes is complicated by the wide variety of reasons for which people are moved. In an extensive review of the literature on relocation and the elderly, Castle (2001) found that in general, where the relocation is driven by the need to move a person from one situation to

another with a more appropriate level of care, then the overall effect is more likely to be beneficial, while if the need for relocation arises from factors external to the individual, then the negative impact is more likely to predominate. Factors associated with successful relocation included relocation teams who are able to work with the residents and staff involved to prepare them for the move, assessment tools, and any improved aspects of the environment of the receiving facility compared to the original environment.

- 14.1.2 Two relocations (for example to a temporary location during the works and then return to the previous location) will involve greater risk than one location. As the works are estimated to take 5-6 years, and the average survival for a care home resident is about 3 years, it is likely that two different groups of residents would be exposed to the risk of relocation if the care home returned to its original site after completion of the works.
- 14.1.3 The population under consideration has high sensitivity to relocation, and the effects of relocation are also likely to be high, constituting an issue of major significance.

15 Effects during construction phase

- 15.1.1 I understand that National Highways has indicated a 5 to 6 year construction programme for Compound 7 next to the site, currently scheduled for 2025-2030. During this phase the impact on residents of WCH is likely to be very substantial. There may also be commercial effects which are outside the scope of this report, although as a psychiatrist I can comment that I would be reluctant to recommend to patients contemplating a placement in a care home one which was likely to be exposed to such a substantial project of works.

15.2 Effects of air Quality

- 15.2.1 It appears likely that the level of noise and air pollution will be higher during the construction phase of the LTC than afterwards. Heavy Duty Vehicles have higher emissions compared to Light Duty Vehicles and private cars.² The need to move heavy vehicles, very large quantities of materials, to dig, and to operate heavy machinery will inevitably generate considerable noise and larger particulates. It is understood that the base/depot for the works will be constructed close to the care home, so there are likely to be high levels of heavy traffic flow in this area.
- 15.2.2 I note in APP-143 at 5.6.3 that during the construction phase, 'Given the size of the Project and the location of receptors, the overall dust risk potential is rated 'large' (based on DMRB LA 105 (Highways England, 2019) classification) according to Table 5.2, and the receiving

² <https://laqm.defra.gov.uk/review-and-assessment/tools/emissions-factors-toolkit.html>

environment sensitivity is 'high' up to 100m from construction activities according to Table 5.3.' I understand that Whitecroft Care Home is within 100m of construction activities.

- 15.2.3 APP-143 at 5.6.21 comments: 'PM2.5 has not been modelled as a separate pollutant but is considered through the results of the PM10 modelling, as PM2.5 is a component of PM10. There are no receptors where predicted annual mean PM10 concentrations are in excess of 25µg/m³ in the Project opening year. The annual mean AQS objective for PM2.5 is 25µg/m³. 5.6.22 It is therefore concluded that the impacts during the construction phase will not lead to a significant effect on local air quality on human health receptors.'
- 15.2.4 Although I lack expertise in the analysis of air quality, I note that the AQC Report for WCH suggests that during the construction phase, total concentrations of NO₂ and PM₁₀ will not exceed the Objective levels at receptor LTC262, which I understand covers the area of WCH, although levels of PM_{2.5} have not been modelled. Although this might appear to provide some reassurance, the Bishop study cited above found an increased risk of dementia at much lower levels of PM_{2.5} than those in the annual mean AQS objective.
- 15.2.5 As a matter of common experience, clean fresh air can produce a sense of well-being and calm, while polluted air may contribute to a sense of pressure and tension. Outside space is now designed into dementia facilities as the beneficial effects on those with dementia are well recognised.

15.3 Effects of noise

- 15.3.1 APP-150 deals with Noise and Vibration. According to Table 12.60, construction noise impacts would be not significant. Construction road traffic noise impacts and construction vibration impact would be not significant in some areas, but of significant adverse impact in others during 2025-30. I am unable to discern from the Applicant's ES if it considers that WCH would be affected.
- 15.3.2 According to the Acoustics report for Runwood Homes Ltd 'The ES contains insufficient detail to support its claims that the care home is not subject to significant adverse effects.'
- 15.3.3 As a psychiatrist it is outside my expertise to comment on the likely magnitude of the noise and vibration impact during construction or operational phases. The question of whether any noise or vibration is within statutory limits is also outside my expertise.
- 15.3.4 I have described above research findings that people with dementia (which will include many of the residents of WCH) are more sensitive to undue levels of noise than people without dementia. Noise can lead to stress, confusion, increased heart rate and blood pressure, increased complaining, agitation, verbal aggression, attempts to escape, pacing, screaming, and other negative behaviours as well as an increased rate of hospital admissions.

Indoor spaces

- 15.3.5 In terms of the generic indicative EIA significance matrix (table 4.1 in Institute of Environmental Management and Assessment (IEMA) Guide to: Determining Significance For Human Health In Environmental Impact Assessment (November 2022)) a care home population such as that discussed here has high sensitivity to changes in the environment because of the very limited ability of people with dementia to understand and adapt to changes.
- 15.3.6 Most of the WCH population will experience an adverse impact if noise is excessive internally, while the impact for residents with rooms on the west facing façades may experience medium levels of adverse impact when they are in their rooms. However, as most residents will spend much of the day in communal areas outside their own rooms there will not be a clear demarcation between those who have rooms on the side of the building facing away from traffic and those who have rooms facing the traffic. The magnitude of the impact will depend on the magnitude and timing of any increase in noise.
- 15.3.7 Some of the work will be carried out outside standard working hours (2.7.331-2.7.333), which if near the care home is likely to interfere with sleep patterns of residents.
- 15.3.8 The Acoustics Report comments on the possibility of mitigation of the increased noise level by modification of the building such as increasing glazing performance, introducing secondary glazing, introducing attenuated ventilation openings or mechanical ventilation (Acoustics Report para 6.4-6.7). But however effective the acoustic insulation of doors and windows might be, most of the benefit will be lost if the doors or windows are opened. Particularly in hot weather it is of considerable psychological and physiological benefit to be able to arrange a natural flow of air through the building. While air conditioning can go some way to improve the quality of air, it is likely to add to the ambient noise level, and lacks the feel of a current of fresh air, which residents are likely to be aware of, even if their level of dementia makes it difficult for them to express this verbally.

Outdoor spaces

- 15.3.9 In respect of the outdoor spaces, mitigation measures applied to the building are likely to have no impact on noise or air quality. Existing outdoor spaces are likely to become noisier and less pleasant, even if levels remain within statutory limits. For people already struggling to understand speech, both because of hearing impairment and cognitive impairment from dementia or other causes, the increased level of ambient noise will further impair their comprehension of speech. This will make conversation more difficult and less enjoyable.
- 15.3.10 Reference is made at 2.3.146-2.3.152 of the Project Description to landscaping of mounds which are said to 'provide noise attenuation and soften views of the junction for the surrounding communities'. It is difficult to see how these would assist the noise levels in

WCH unless they are sited in between the source of the noise and the care home building and its immediate environs.

15.3.11 The Health and Equalities Impact Assessment in APP-539 at 7.9.21 comments:

One of the NSRs identified in Table 7.29 relates to the Whitecroft Care Home, located at Orsett, Thurrock. The care home provides elderly and dementia care; residents are likely to have very different sensitivities to changes in noise level. The noise assessment identifies that unmitigated reasonable worst case construction noise levels at this receptor are predicted to have a moderate or greater impact during the daytime and during the night-time, with a maximum exceedance of 7.3dB(A) above the daytime SOAEL and a maximum exceedance of 10.5dB(A) above the night-time SOAEL. A range of BPM measures are identified for this location specifically, including acoustic screening between construction works (including compounds and haul routes) and the care home (which in itself is anticipated to result in up to a 10dB reduction in noise at this location. With the inclusion of BPM mitigation measures secured through the REAC (Application Document 6.3, ES Appendix 2.2), daytime construction noise at this NSR would be suitably controlled to a level where it would not constitute a significant effect.

15.3.12 At 7.9.51, para c, of the Health and Equalities Impact Assessment in APP-539, in relation to daytime noise, it is stated that:

The distribution of changes in noise in relation to the proportion of the population aged 70 and over is recorded as neutral. Of the 58 care homes located within the noise impact area for the DIA, four would experience a decrease in road traffic noise levels. These are all located within Thurrock and include the Whitecroft Care Home. Two care homes would experience an increase in road traffic noise levels; these are both located within Tonbridge and Malling. As previously noted in reference to the construction assessment, people in care homes may experience a variety of conditions, including dementia, and may be more sensitive to changes in noise level.

15.3.13 Moreover it is acknowledged at 7.9.52 that:

Health effects as a result of changes in noise levels (for example annoyance and sleep disturbance) would be experienced differentially across the population according to level of sensitivity.

15.3.14 Table 7.34 in that document cites WCH as experiencing a beneficial effect on noise level.

15.3.15 I understand that the Applicant proposes a number of measures to reduce noise nuisance during preliminary works (REAC Table 2.1 in 6.3 ES Appendix 2.2 Annex C, Noise and Vibration):

- Best Practicable Means as defined under Section 72 of the Control of Pollution Act 1974 would be employed during the construction phase to reduce noise nuisance. These would include measures such as:

- installing and maintaining hoarding around the construction areas likely to generate noise
- keeping site access routes in good condition with condition assessments onsite to inspect for defects such as potholes
- turning off plant machinery when not in use
- maintaining all vehicles and mobile plant such that loose body fittings or exhausts do not rattle or vibrate
- using silenced equipment where available, in particular silenced power generators and pumps
- no music or radios would be played for entertainment purposes outdoors onsite
- planning site layout to ensure that reversing is kept to a reasonably practicable minimum
- reversing manoeuvres would be supervised by a trained banksman/vehicle marshal to ensure that they are conducted safely and concluded quickly.

15.3.16 Noise mitigation measures identified for the operational phase of the Project are summarised at 7.9.45 of the 7.10 Health and Equalities Impact Assessment.

15.3.17 I note the conclusion of the Acoustics Report (8.3) that:

The ES contains insufficient information on the methods of attenuation of both operational noise (in terms of potential deterioration of noise reducing road surfaces over time) and construction noise (in terms of what actual mitigation will be employed and what the calculated noise level is with the mitigation in place). Without this information, there can be little confidence that the claimed attenuation will actually be achieved and maintained in practice.

15.4 Effects of relocation

15.4.1 This is discussed above at section 14.

15.5 Traffic safety

15.5.1 This is likely to be a greater consideration during the construction phase, when heavy vehicles are moving close to the home with only temporary safety barriers.

16 Effects during the operational phase

16.1 Effects of air quality

16.1.1 As noted above, clean fresh air can produce a sense of well-being and calm, while polluted air may contribute to a sense of pressure and tension.

16.2 Effects of light pollution

16.2.1 As noted above, increased levels of ambient light at night may worsen the sleep patterns which are already disturbed in people with dementia.

16.3 Effects of noise

16.3.1 The effects of noise on vulnerable older people, particularly those with dementia, will depend on the magnitude and timing of any increases in noise. Although the applicant states that WC H may even experience a beneficial effect of noise level, this is disputed. It is outside my expertise to comment on this.

16.4 Effects of relocation

16.4.1 This is discussed above at section 14.

16.5 Traffic safety

16.5.1 Traffic safety is clearly an important consideration, and despite reasonable perimeter safety experience suggests that there may be occasions, albeit few, when a determined resident may breach the perimeter unsupervised and put themselves at risk from traffic through poor awareness of risk due to dementia. For this reason, it is preferable not to site care homes near busy roads.

17 Conclusions

17.1.1 Frail elderly care home residents, particularly those with dementia, are at risk of the adverse impact of increased noise levels, increased light levels, increased air pollution, and risk from

traffic. Although these factors may be worse during the construction phase, the increased traffic noise in proximity to major roads (if such be the case) will have an enduring effect.

- 17.1.2 Any increase in noise is likely to reduce the quality of life of residents. Research suggests that the impact of this may be apparent as changes in behaviour, with increased agitation, restlessness, and vocalisation. There may be increased levels of aggression, and an increased rate of admission to hospital for dementia-related problems. There may be adverse effects on physical health as well as mental health.
- 17.1.3 Although acoustic insulation measures may go some way to mitigating the increased level of noise in the internal spaces of the care home, the benefit of mitigation will be much reduced if doors or windows are opened. Residents currently benefit from and are aware of the passage of fresh air from open doors and windows, and this benefit would be lost if air conditioning were used for ventilation instead of open windows.
- 17.1.4 Air quality is reported as being unlikely to be affected by the project and if that is correct it is unlikely that changes in air quality will have an effect on residents' well-being.
- 17.1.5 Access to external spaces is critical for the well-being of residents for recreational purposes and for meeting friends and family. It will be extremely difficult to achieve any substantial mitigation of air or noise pollution in external spaces.
- 17.1.6 Some residents will be at risk of leaving the building unescorted, but lacking the skills to keep themselves safe, put themselves at risk. The proximity of major roads will heighten the risk of road traffic accidents for these people. In terms of the EIA significance matrix, the significance of risk of traffic accidents is major (population of high-sensitivity and high impact in the event of an incident).
- 17.1.7 In assessing the impact of relocation of the home on the well-being of existing residents, it is necessary to weigh the negative effects of the disturbance against the positive effects of what could be an improved environment if relocated temporarily or permanently elsewhere. A temporary relocation will involve two moves, with a correspondingly greater negative impact. A permanent relocation would involve only one move, and would have the enduring benefit of a potentially improved environment elsewhere.
- 17.1.8 As an old age psychiatrist, I would be reluctant to suggest to patients and their families that a care home located close to a major traffic interchange should be considered, for all the reasons set out above.

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19 DECLARATIONS

I DR HUGH SERIES DECLARE THAT:

- 1 I understand that my duty in providing written reports and giving evidence is to help the Court or tribunal, and that this duty overrides any obligation to the party by whom I am engaged or the person who has paid or is liable to pay me. I confirm that I have complied and will continue to comply with my duty.
- 2 I confirm that I have not entered into any arrangement where the amount or payment of my fees is in any way dependent on the outcome of the case.
- 3 I know of no conflict of interest of any kind, other than any which I have disclosed in my report.
- 4 I do not consider that any interest which I have disclosed affects my suitability as an expert witness on any issues on which I have given evidence.
- 5 I will advise the party by whom I am instructed if, between the date of my report and the trial, there is any change in circumstances which affect my answers to points 3 and 4 above.
- 6 I have shown the sources of all information I have used.
- 7 I have exercised reasonable care and skill in order to be accurate and complete in preparing this report.
- 8 I have endeavoured to include in my report those matters, of which I have knowledge or of which I have been made aware, that might adversely affect the validity of my opinion. I have clearly stated any qualifications to my opinion.
- 9 I have not, without forming an independent view, included or excluded anything which has been suggested to me by others, including my instructing lawyers.
- 10 I will notify those instructing me immediately and confirm in writing if, for any reason, my existing report requires any correction or qualification.
- 11 I understand that;
 - my report will form the evidence to be given under oath or affirmation;
 - questions may be put to me in writing for the purposes of clarifying my report and that my answers shall be treated as part of my report and covered by my statement of truth;
 - the court or tribunal may at any stage direct a discussion to take place between experts for the purpose of identifying and discussing the expert issues in the proceedings, where possible reaching an agreed opinion on those issues and identifying what action, if any, may be taken to resolve any of the outstanding issues between the parties;

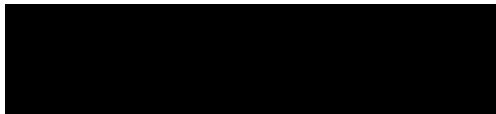
- the court or tribunal may direct that following a discussion between the experts that a statement should be prepared showing those issues which are agreed, and those issues which are not agreed, together with a summary of the reasons for disagreeing;
- I may be required to attend court or tribunal to be cross-examined on my report by a cross-examiner assisted by an expert;
- I am likely to be the subject of public adverse criticism by the judge if the Court or tribunal concludes that I have not taken reasonable care in trying to meet the standards set out above.

12 I have read Part 35 of the Civil Procedure Rules, the accompanying practice direction and the Guidance for the instruction of experts in civil claims and I have complied with their requirements.

13 I am aware of the practice direction on pre-action conduct. I have acted in accordance with the Code of Practice for Experts.

20 STATEMENT OF TRUTH

I confirm that I have made clear which facts and matters referred to in this report are within my own knowledge and which are not. Those that are within my own knowledge I confirm to be true. The opinions I have expressed represent my true and complete professional opinions on the matters to which they refer.



Consultant old age psychiatrist

21 APPENDIX: My experience and qualifications

- 21.1.1 I am a Consultant old age psychiatrist at Oxford Health Foundation NHS Trust or its precursor organizations and have been so since 1995. I have over 20 years' experience of assessing and treating older people with mental health problems. I am registered as a medical practitioner with the General Medical Council (GMC) and have been so since 1984 (number 2987703). I hold a current Licence to Practise and am listed in the GMC Specialist Register in old age psychiatry. I am approved under section 12(2) of the Mental Health Act, and as an Approved Clinician under section 145(1). I am trained and approved as a Deprivation of Liberty safeguards assessor, and undertake annual refresher training to maintain my approval.
- 21.1.2 Until 2014 I was Honorary Senior Clinical Lecturer in the Department of Psychiatry, University of Oxford, and taught and examined medical students in psychiatry. Since 2014 I have been a member of the Faculty of Law in the University of Oxford, where I regularly lecture and teach BCL students and others.
- 21.1.3 I am a medical member of the Mental Health Tribunal (First tier) and sit on panels about 40 days a year. I was a member of the executive committee of the MHT Members' Association (2014–2015).
- 21.1.4 I became a Member of the Royal College of Psychiatrists by examination in 1990 and was elected a Fellow in 2006. I was a Member of Council of the College and Chair of the South Eastern Division of the Royal College of Psychiatrists until 2017. I was an elected member of the executive committee of the Faculty of Old Age Psychiatry (2009–2012), Regional Adviser for the Oxford Deanery (2012–2014), Regional Representative in old age psychiatry (2002–2009), and a Trustee of the Royal College (2012–2014). I am registered with the College for CPD and remain up to date with annual appraisal.
- 21.1.5 My primary medical qualification is MB, BS (University of London, 1984). My further qualifications are MA (University of Oxford, 1984, following a BA from Oxford in 1981), DM (a research degree from the University of Oxford, 1997; my DM thesis was on research into the serotonergic systems of the brain), and FRCPsych (election to Fellowship of the Royal College of Psychiatrists in 2006). My research is in law and ethics in psychiatry, and psychopharmacology (the study of drugs as they relate to psychiatric disorders). I have published over 40 specialist papers and book chapters.
- 21.1.6 I hold the degree of LLM in Legal Aspects of Medical Practice (Cardiff University, Distinction, 2012). My dissertation was on the interface of the MHA and MCA). I received the Cardiff University–Bond Solon expert witness certificate in 2011 (Civil Procedure) and 2012 (Criminal Procedure). I am listed in the UK Register of Expert Witnesses. Last year I prepared about 100 reports for courts, split approximately 30 per cent for the claimant, 30 per cent for the defendant and 40 per cent as single joint expert.
- 21.1.7 I held a Wellcome Trust training fellowship (1990–1993), and was a Visiting Research Fellow at Johns Hopkins University, Baltimore (1990–1991). I was a clinical supervisor and academic

tutor to medical students at Oxford Health NHS Trust, and was Associate Medical Director of the Trust (2004–2009).

21.1.8 I regularly lecture and teach psychiatrists, GPs, nurses, social workers, solicitors, and students of both law and medicine on psychiatry, particularly on its medico-legal aspects.

21.1.9 I have given evidence to the Law Commission on Deprivation of Liberty and have been a member of working groups at the Department of Health developing the Code of Practice for the amended Mental Capacity Act.

21.1.10 A full CV, including recent publications, can be found on my website at www.oxep.co.uk.