

**AN EVALUATION OF THE IMPACT OF THE ABERDEEN  
WESTERN PERIPHERAL ROUTE (MURTLERoute) ON  
THE CAMPHILL COMMUNITIES IN BIELDSIDE,  
ABERDEEN: PSYCHOLOGICAL AND POLICY  
PERSPECTIVES**

**FINAL REPORT**

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**November 2005**

## Contents

### *Report author's background*

#### **Executive Summary**

<b>1</b>	<b>Evaluating the impact of the Aberdeen Western Peripheral Route (Murtle Route) on the Camphill communities in Bielside, Aberdeen</b>	<b>8</b>
1.1	<i>Background</i>	8
1.2	<i>Report Purpose and Approach</i>	9
<b>2</b>	<b>The needs of pupils and villagers attending the Steiner School Murtle Estate and Newton Dee</b>	<b>13</b>
2.1	<i>Sources of information</i>	13
2.2	<i>The Camphill communities</i>	14
2.3	<i>Children's needs and characteristics</i>	15
2.4	<i>Needs of Newton Dee villagers</i>	17
<b>3</b>	<b>National context of the work of the Camphill communities</b>	<b>21</b>
3.1	<i>Trends in prevalence of people with complex needs</i>	21
3.2	<i>Trends in educational policy</i>	21
3.3	<i>Policy and adult provision</i>	23
3.4	<i>The future of the Camphill communities</i>	24
<b>4</b>	<b>Environmental influences on the Camphill communities of people with developmental disabilities</b>	<b>26</b>
4.1	<i>Environmental stress and developmental disability</i>	26
4.2	<i>The impact of noise on the Camphill communities: General principles</i>	29
4.3	<i>Effect of noise during construction</i>	32
4.3.1	Construction noise during Stage 1	36

4.3.1.1	Murtle Estate	36
4.3.1.2	Newton Dee	37
4.3.1.3	Comment on Stage 1 of construction	37
4.3.2	Construction noise during Stage 2	38
4.3.2.1	Murtle Estate	38
4.3.2.2	Newton Dee	39
4.3.2.3	Comment on Stage 2 construction	41
4.3.3	Construction noise during Stage 3	41
4.3.3.1	Murtle Estate	41
4.3.3.2	Newton Dee	42
4.3.3.3	Comment on Stage 2 and 3 construction	43
4.3.3.4	Comment on internal noise levels in main educational and therapeutic complex during construction	44
4.3.4	Overview of noise impact during construction	45
4.4	<i>Impact of noise during operation of the road</i>	50
4.4.1	Murtle Estate	51
4.4.1.1	Outdoor noise	51
4.4.1.2	Indoor noise	54
4.4.2	Newton Dee	59
4.5	<i>Contact within the community</i>	60
4.6	<i>Communication between Camphill and relevant bodies</i>	61
5	<b>Conclusions</b>	<b>62</b>

**Appendix A – Construction Noise Information**

**Appendix B – Operational Noise Information**

## ***Report author's background***

Professor Hogg (BA Hon; PhD) is a Chartered Psychologist (British Psychological Society) and Research Professor specialising in intellectual disability at the University of Dundee, Scotland, where he is Director of the White Top Research Unit. He is consultant and professional advisor to a wide range of local, national and international agencies. He acted as consultant on profound and complex disabilities to the Scottish Executive's national review of intellectual disability services. He was a member of the Scottish Executive *National Care Standards Committee*, specifically chairing the working party on care standards for people with intellectual disabilities. In England he is an advisor to the Department of Health on research developments arising from the recent English White Paper on intellectual disability services.

He is a Fellow of the Royal Society of Medicine and past-Chair and present International Secretary to the Society's *Forum on Intellectual Disability*. He is also a member of the *International Association for the Scientific Study of Intellectual Disability* of which he was made a Fellow in 2002. He has recently led an international working party on behalf of the *World Health Organisation* on issues to do with health and policy with respect to ageing and intellectual disability, reporting on the outcome to WHO in Geneva. He has also participated in mini-White House conferences in the USA on care guidelines with respect to intellectual disability and dementia.

Professor Hogg has developed and directed services for people with intellectual disabilities, including pre-school children and adults with multiple disabilities. He has undertaken research in the field of developmental disabilities for thirty-six years. He has published over 200 books, chapters and papers in national (UK) and international journals on a wide range of topics embracing educational and social provision for people with developmental disabilities, including seminal texts on profound and multiple disability and on ageing and intellectual disabilities. His research work has been supported by the Department of Health, Department of Education and Science, the Scottish Chief Scientist's Office, the European Union, UK research councils, and a wide range of charitable foundations including Mencap, Enable (Scotland), Capability Scotland, the Foundation for People with Learning Disabilities and the Rowntree Trust.

Professor Hogg is Chair of Governors and Co-founder with his wife of PAMIS (Profound & Multiple Impairment Service) a voluntary organisation working with parents of sons and daughters with profound and multiple disabilities to improve services. He has also acted as a citizen advocate for the past 12 years for a woman with intellectual disabilities resident in a local long stay hospital.

In 1994 Professor Hogg acted as an expert witness in Ireland in the seminal case of Paul O'Donohue Vs. the Irish State, the first of ten cases in which he has been, or is at present, involved. All are concerned with educational provision for children or young adults with complex disabilities and autism, including Asperger syndrome. He has also contributed to reviews of subsequent service provision agreed in some of these cases.

## Executive Summary

This report has been commissioned as part of the Environmental Impact Assessment for the Aberdeen Western Peripheral Route (AWPR) (Murtle Route) being undertaken by Jacobs Babbie. This work is being conducted on behalf of Aberdeen City Council, Aberdeenshire Council and the Scottish Executive.

**It is important at the outset to be explicit about the scope of this report:** The report is concerned only with evaluating the impact of the AWPR on the Camphill communities *should* the road be built in their vicinity. It in no way addresses the questions of whether such a road is required, or whether this is the appropriate location. Decisions regarding these issues will be taken by the responsible authorities in the context of the overall transport and economic requirements of the north east of Scotland. *The author, therefore, expresses no views as to whether the route should or should not pass between the Camphill communities or the viability of these communities operating in accordance with the Steiner philosophy.*

The report provides an evaluation of the potential impacts of the proposed AWPR on the pupils and villagers of the Camphill communities in Murtle Estate and Newton Dee, located to the west and east of the scheme respectively, during both the proposed three year construction period and subsequently in its operation. The emphasis in the report is on the effect of noise on the pupils of Murtle Estate and villagers living in Newton Dee. However, attention is also drawn to the importance of visual change in their environment, including the activity of construction vehicles, and considerations of health and safety.

In the preceding Interim Findings report (January 21 2005) particular concern was expressed regarding the impact of construction on children attending the Murtle Estate school, although the impact on villagers in Newton Dee was also acknowledged. The effect of operation of the road also raised concerns. The view taken in that report was, however, that these impacts could be mitigated and that the two communities could continue to

support both children and adults.

In response to the concerns expressed by the *Save Camphill* group, the proposed programme of construction has been radically altered. While the overall period of construction of the entire AWPR remains unchanged, by extending the period of construction in the vicinity of the Camphill communities to three years, the impact on the communities has been significantly reduced. This reduction is achieved through a variety of measures, not least the plan to undertake work involving unacceptably high levels of noise during school holidays. A wide range of additional mitigation measures have in addition been outlined.

In the present report the evaluation process again considered certain aspects of the existing baseline environment at Murtle Estate and Newton Dee and has compared this with how these would alter both during and after construction of the AWPR. This comparison is set in the context of what is known about environmental stress and individuals with complex disabilities. The overall conclusion is that impact of the AWPR on Murtle Estate is significant and potentially negative in its effects. The impact on Newton Dee is viewed as considerably less serious than is the case for Murtle Estate. Although the construction and operation of the AWPR will impinge on villagers, the detrimental effects would not require the extensive adjustments that would be needed at Murtle Estate. These are stated in a series of recommendations that in the writer's judgement would be required should the road be constructed at this location if the school is to continue its work. They include physical changes with respect to the location of facilities, preparation and support of children and staff and stringent, independent risk assessments.

If these adaptations are made, then Murtle Estate would be able to continue providing the educational and therapeutic programmes to meet the needs of *most* of the vulnerable children referred by parents and local authorities. It would certainly be possible to deliver a high quality service that would benefit the children and fulfil wider national educational and care standards. Should further improvements be achieved in mitigating the effects of the road, then clearly the detrimental effects noted in this report would be further

ameliorated. Whether the impact described would retain sufficient of the conditions and ethos that members of the communities regard as essential to the viability of a Steiner-inspired community, must be commented on by members of the Camphill communities. Here we are predicting that in the context of national educational priorities, which include maintaining independent residential schools that continue to meet the needs of vulnerable children, this author's judgement is that Murtle Estate school can continue to provide such a service, but with considerable adjustment and support being required. Newton Dee will also remain viable, the impact of construction and operation of the AWPR being considerably less than for Murtle Estate. Again, however, an active process of change management is called for.

# **1 Evaluating the impact of the Aberdeen Western Peripheral Route (Murtle Route) on the Camphill communities in the Bielside area of Aberdeen**

## *1.1 Background*

This report has been commissioned as part of the Environmental Impact Assessment for the Aberdeen Western Peripheral Route (AWPR) (Murtle Route), which is being undertaken by Jacobs Babbie. This work is being conducted on behalf of Aberdeen City Council, Aberdeenshire Council and the Scottish Executive. These bodies are the funding Partners for the delivery of the AWPR, with the Executive taking the lead role in developing the scheme as a trunk road.

The concept of the AWPR was initiated by Grampian Regional Council in the late 1980s/early 1990s, with development focusing on a route to connect the A90 to the south of Aberdeen to the A96 Aberdeen to Inverness Road. At that time preliminary design work was done on a number of options for the route, one of which passed between the Camphill communities at Bielside, Aberdeen. The implications of this route for the Camphill communities were the subject of an earlier report<sup>1</sup>. As a consequence of this work the Murtle Route was adopted as the preferred route, and in 2002 agreement was reached with the Scottish Executive to develop this route as a trunk road.

As part of this development, which included moving the route of the road to reduce the direct physical impact on the Camphill communities, it was considered necessary to undertake further evaluation of the potential, particular impacts of the scheme proposals on the Camphill communities. These impacts were initially addressed in an earlier Interim Findings report which referred to the preliminary stage of development of the scheme proposals at that time<sup>2</sup>. This earlier report is superseded by the present report. The scheme proposals have now been developed in greater detail, leading to this final report. Figure 1 shows the relationship between the two

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<sup>1</sup> Halcrow Fox (1996) *Proposed Aberdeen Western Peripheral Road Route Option 14: Camphill Special Needs Study: Final Report*. Edinburgh: Halcrow Fox.

<sup>2</sup> Hogg, J. (2005) *An Evaluation of the Impact of the Aberdeen Western Peripheral Route on the Camphill Communities in Bielside, Aberdeen: Psychological and Policy Perspectives: Interim Findings*. Edinburgh: Scottish Executive.



Camphill communities at Bielside and the proposed route, and Figure 2 shows the other Camphill communities in the wider area of the Dee Valley.

The Interim Findings report noted that in the light of its conclusions, further work on the proposed construction plan and mitigation measures concerned with construction and operation of the AWPR would be undertaken. This work has been carried out and the relevant information has been supplied leading to revision of the Interim Findings Report.

### *1.2 Report Purpose and Approach*

The purpose of this report is to examine the potential impacts of the proposed Aberdeen Western Peripheral Route (AWPR) (Murtle Route) on the pupils and residents of the Camphill communities in the Bielside area of Aberdeen. It sets out to use the available evidence-base on the effects of environmental factors, particularly noise, on the psychological well-being of children and adults with complex developmental disabilities. Here the term *well-being* is used to cover both the mental health of an individual and his or her subjective experience of the quality of their life. While adverse changes in mental health may lead to diagnosable psychiatric conditions such as depression, poorer well-being may also be reflected in individuals becoming distressed or unhappy without such a change constituting a specific psychiatric condition.

Concerns regarding the anticipated effects on the well-being of pupils and villagers, from the perspective of the community, stated by *Camphill Medical Practices Ltd*<sup>3</sup> are that the AWPR would:

- *‘Exacerbate the very complex medical and social problems of many residents, such as asthma, allergies and epileptic conditions’*
- *‘Devastate the safe and tranquil environment – crucial to the success of Camphill’s therapies with residents who are often overly sensitive, stressed by noise and have sleeping difficulties – with major construction work, then heavy traffic’*

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<sup>3</sup> *The Threat to the Camphill communities*: <http://www.savecamphill.org.uk/threat.htm>

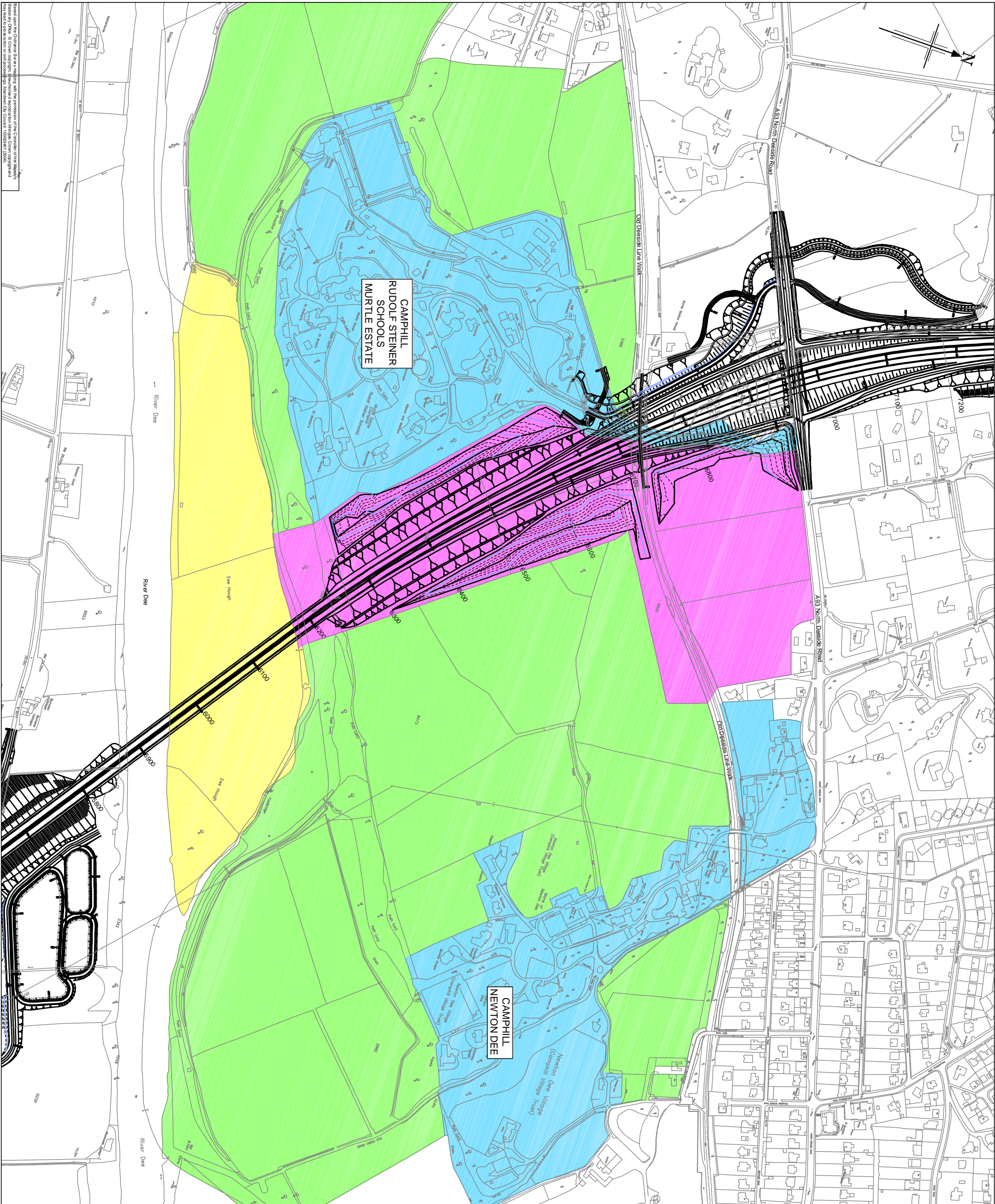


Figure 1

- Legend**
- Buildings/Residential/Amenity Areas (Owned by Camp Hill Organisations)
  - Open Areas (Owned by Camp Hill Organisations)
  - Open Areas (Tenanted by Camp Hill Organisations)
  - Areas not Owned or Tenanted by Camp Hill Organisations

0	Revised	Version of revision	Date	Author	Approved
0	Issue				

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Location Plan

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Client: DAVENHAM

Project No: 10001

Drawing No: 0

Figure 1

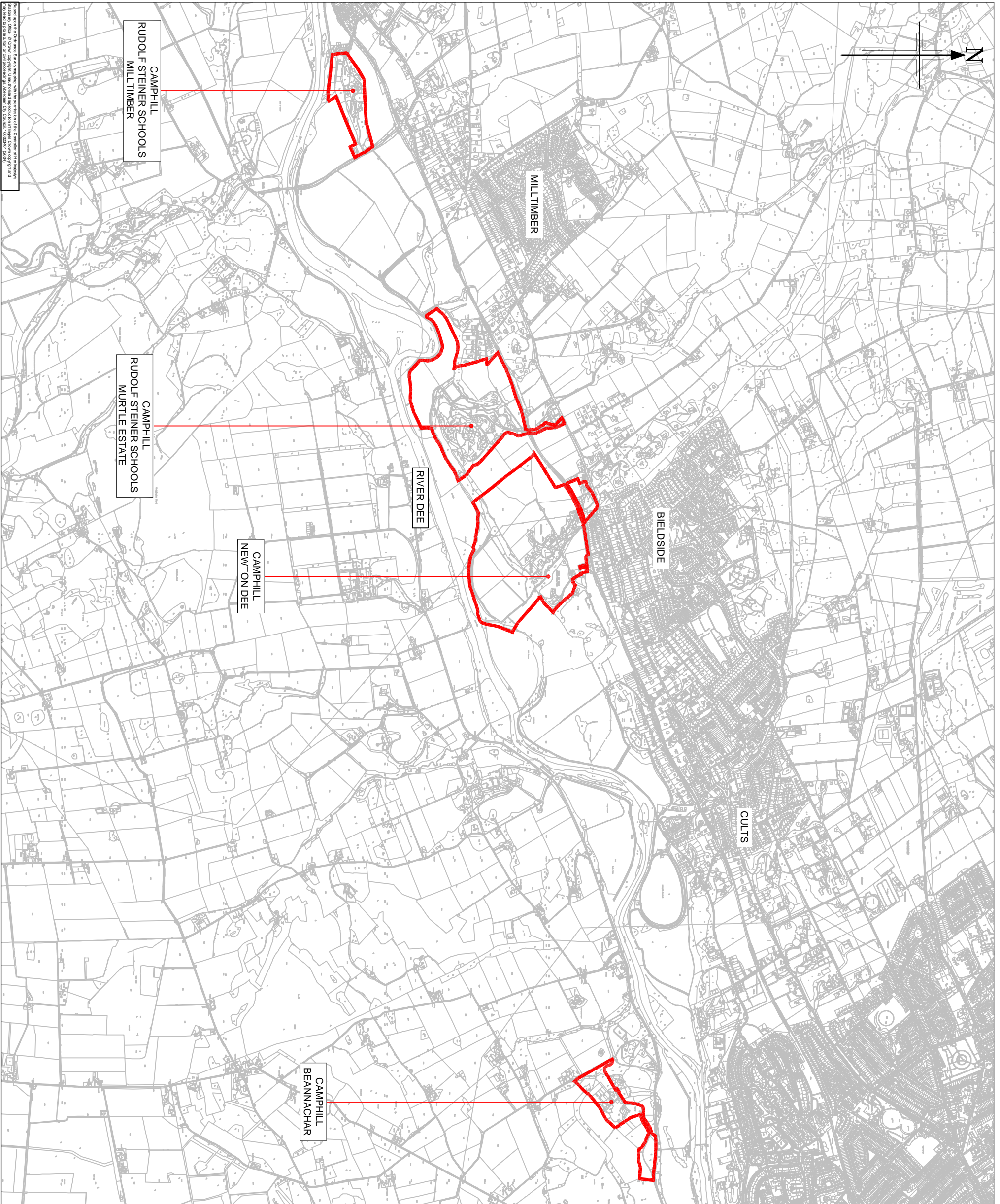
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Figure 2

— Area of Ownership



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CAMP HILL  
RUDOLF STEINER SCHOOLS  
MILLTIMBER

CAMP HILL  
RUDOLF STEINER SCHOOLS  
MURTLE ESTATE

CAMP HILL  
NEWTON DEE

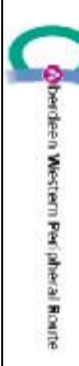
CAMP HILL  
BEANNACHAR

MILLTIMBER

RIVER DEE

BELDSIDE

CULTS



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Plan of Primary Camp Hill Residential Facilities

Drawing title: FINAL

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Figure 2  
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Other anticipated problems that have been raised by representatives of the community relate more to the overall ethos and reputation of this community and predict the total destruction of the community, i.e. that the road would... *'Destroy the work, home, health, safety and recreation facilities of the residents.'* (Ref. 3.) We understand that this impact is being evaluated by the communities themselves. Comments in this report consider the consequences of the road being built at Bielside not from the perspective of its impact on Steiner facilities, but from that of their viability as, respectively, a residential school and residential village.

It should be added that the Camphill communities themselves have supplied no further information that might have contributed to this revised report, particularly in the following areas:

- systematically seeking the views of pupils, residents, staff and co-workers on the AWPR proposals. This was not possible as the *Save Camphill Campaign* indicated that they were studying this issue themselves and considered it unethical for others to engage in such study
- gaining a full and detailed understanding of the therapeutic practices within Murtle Estate and Newton Dee. This was not possible as the *Save Camphill Campaign* were unable to provide the information requested at the time of writing
- considering the impacts of major roads on other Camphill communities, specifically Delrow in Hertfordshire, an adult facility which is close to the M1; and the Shieling School in Hampshire, a children's facility close to the A31. This was not possible as the *Save Camphill Campaign* advised that they did not wish contact to be made with these facilities.

The report begins by describing the needs of the children and adults in, respectively, the Camphill Rudolph Steiner School, Murtle Estate, and in the Newton Dee community (**Section 2**), set against the background of the community's philosophy. The two communities are viewed separately, as both demographically and with respect to the needs of pupils and villagers there are important distinctions to be made. In passing, however, we should add that

from the perspective of those who support the individuals, those in both locations are seen as making up a single community embraced by the same philosophical ethos. Reference is also made to a second Camphill Rudolph Steiner School at Camphill Estate, Milltimber Brae, situated two miles to the west of Murtle Estate. This second school is viewed as part of the overall Camphill community in this area and has a close relationship with Murtle Estate. It is not immediately affected by construction or operation of the AWPR, however, and has not therefore been considered in the present assessment. Other Camphill residential facilities in this area are also considered to be sufficiently far from the proposed route not to be affected should it be built on the Murtle Route.

In **Section 3**, the school and adult community are considered from the perspective of national policy in this field as set out in various *Scottish Executive* documents. Understanding this policy context is critical. Decisions regarding building of the AWPR will also be made within the framework of other segments of *Scottish Executive* policy and in the interests of an integrated policy approach they both need to be considered.

In **Section 4**, the principal evidence is summarised with respect to environmental factors which influence the behaviour, psychological well-being and health of people with the pattern of developmental disabilities represented in the two communities. We then evaluate the potential impact of the AWPR on pupils and villagers in the light of this information and information that has been provided by Jacobs Babbie on the construction and operation of the road.

Conclusions are offered in **Section 5** from two perspectives:

- The first perspective might be referred to as the *conventional service model*. Two questions can be posed:
  - a. Can a small residential school for children with complex disabilities provide education and support for pupils throughout the construction period and subsequent operation of the AWPR, in line with national educational policy?

- b. Can a community such as that in Newton Dee continue to enjoy living and working in its present setting during these two phases of the AWPR?

Note that here we are viewing the school and Newton Dee as effectively self-contained services comparable in fundamental respects to other such facilities in Scotland specifically, and the UK in general.

- The second perspective is that of the Camphill movement itself and those responsible for the school and Newton Dee who work through, and in, the context of this philosophy. Here both entities make up a single community in which those who live in them can freely interact. The overall site is considered to have intrinsic qualities essential to the Camphill communities and development of those who live there. The present quiet and natural environment is viewed as critical to achieving the aspirations of such communities.

It is, however, acknowledged that given the complexity of this situation, the picture drawn through this process will inevitably deal in probabilities rather than certainties.

## **2 The needs of pupils and villagers attending the Steiner School Murtle Estate and Newton Dee**

### *2.1 Sources of information*

Information has been collected principally through:

- a. Interview with Mr Alan Pilkington (Head of Services, Neighbourhood Services (Central), Aberdeen City Council Social Work Department) (August 23 2004)
- b. Interviews with Dr Stefan Geider (Medical Officer, Camphill communities, Aberdeen) (August 23 2004; September 15 2004; September 22 2004)
- c. Interviews with co-workers in the Murtle Estate school and children's homes, notably Mr. Vincent D'Agostino (Administrator), Ms. Betty Marx (Teacher and Senior Staff Member), Mr. Bernard Menzinger (Teacher Co-ordinator), Ms. Veronica Goichon (Therapist & House Co-ordinator) and Ms Birte Stenzen (House Co-ordinator) (September 22 2004)
- d. Interview with a pupil of Murtle Estate school (September 22 2004)
- e. Interviews with five villagers living in the Newton Dee Community (15 September 2004) and associated co-workers
- f. Meetings with the AWPR road team, principally Mr Derick Murray (Managing Agent) and Mr Cliff Buchan (Assistant Managing Agent), members of the Jacobs Babtie team including Mr Andrew Mackay (Principal Engineer), Ms Julia Wallis (Technical Director) and representatives of the Scottish Executive Enterprise, Transport and Lifelong Learning Department – Trunk Roads: Design and Construction Division (July 27 2004; September 31 2004)
- g. Construction and operational noise level information was provided by Jacobs Babtie and is included in Appendices A and B
- h. Communications with Professor Barry Carpenter (Head Teacher & Chief Executive, Sunfield (residential) School, Worcester
- i. Communications with Mr Michael Gibson (Scottish Executive Education Department) and Mr Alan Dixon (Chief Executive, Capability Scotland) regarding educational policy with respect to residential schools
- j. Documentation provided by Murtle Estate and Newton Dee

- k. A review of relevant research and clinical literature related to the impact of noise and other stressor on children and adults with complex development disabilities
- l. Visits to observe the Murtle Estate and Newton Dee classrooms and workshops and horticultural areas

The author wishes to express his appreciation to all those who have contributed their time and knowledge.

## *2.2 The Camphill communities*

We noted above the two perspectives that may be taken on the Camphill communities when considering the impact of construction and operation of the AWPR. In contrasting provision of conventional services with the Camphill movement's own vision of the community, we must emphasise that the former perspective is not entirely consistent with that of members of Camphill Rudolf Steiner Schools and Newton Dee. These communities are not considered to be *services* in the conventional sense by those who work in them. Those in Newton Dee view the unpaid co-workers as interdependent with villagers. The two sites and their environs are seen as a totality with a negative impact on one having inevitable consequences for the other.

The philosophy realised in this setting is that of Rudolf Steiner, and as is well known, the worldwide Camphill movement began in 1940 in Camphill House, Aberdeen, founded by Dr Karl König. The holistic approach to education, therapy and care employed is referred to as *Curative Education*<sup>4</sup> or *healing education*. Here physical, mental and spiritual development is seen as entirely interdependent, and educational and therapeutic activity is directed to enhancing all three. Therapeutic and health care support is informed by Steiner's anthroposophical view of human beings, which views treatment as having to take into account the whole person's emotional and spiritual life<sup>5</sup> as well as their health care needs. A wide range of specific therapies realise this

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<sup>4</sup> Camphill Rudolph Steiner Schools (ND) *Curative Education: Camphill's holistic approach to education therapy and care*. Bielside, Aberdeen: Camphill Rudolph Steiner Schools.

<sup>5</sup> Bopp, A. et al. (2003) *Anthroposophical Medicine: Its nature, its aims, its possibilities*. Dornach: Medical Section, School of Spiritual Science.



vision<sup>6</sup> and a full account of the curriculum is available<sup>7</sup>.

### *2.3 Children's needs and characteristics*

The information presented is based on that originally provided in September 2004 as no updated details have been presented. However, although there will have been minor changes in the intervening period, the broad characteristics of the children will have remained very similar. The information used here is in its essentials consistent with that provided in a subsequent report undertaken on behalf of the *Save Camphill Campaign*<sup>8</sup>. It is worth adding, too, that should construction of the road take place at Bielside, there will have been further changes in the composition of the school although the characteristics of the children attending will have remained broadly similar.

As of September 2004, 12 girls and 19 boys attended the school on the Murtle Estate. This total was made up of 25 residential school places and six day pupils. The overall number of 31 pupils at the time of collecting the information (22 September 2004) had increased by May 2005 to 36 (29 residential pupils and seven day pupils)<sup>9</sup>.

Other children, approximately 20, come to the Murtle Estate medical centre for medical and therapeutic treatment and are invariably supervised by a parent or carer.

The 31 children originally described ranged in age from 8-18 years (average 14.1 years). They had been resident between 1 and 10 years (average 3.6 years). Attention should be drawn to an important feature of the duration of time children had spent at the school. Of the ten children who had attended

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<sup>6</sup> Camphill Rudolph Steiner Schools (ND) *Therapies at the Camphill Rudolph Steiner Schools*. Bielside, Aberdeen: Camphill Rudolph Steiner Schools.

<sup>7</sup> Camphill Rudolph Steiner Schools (ND) *Camphill Rudolf Steiner Schools Aberdeen for Children and Young People in Need of Special Care*. Bielside, Aberdeen: Camphill Rudolph Steiner Schools.

<sup>8</sup> Brown, R. (2005) *Preliminary Examination of the Effects of the Proposed Aberdeen Western Peripheral Route on the Camphill Communities, Aberdeen*. Aberdeen: Save Camphill Campaign.

<sup>9</sup> Letter from Save Camphill Campaign to the Chief Executive, Aberdeen City Council, May 19 2005.

for *one year*, eight were in their teens. Thus, the school is making provision for some young people for whom other forms of educational provision have failed over a lengthy period of time. The oldest child, who was 18 years, was admitted near the end of his school career at the age of 17 years. One implication of this pattern of admission is that during the teen years, and especially during this stage of children's lives, the significant and complex needs of a small number cannot be met by local authority education departments.

Twenty nine of the 31 children had learning disabilities. In UK terminology *learning disability* refers to what historically would have been known as *mental handicap* or in US terminology would be described as *mental retardation*. The two remaining children had significant social-emotional problems with marked challenging behaviour. Again, with respect to terminology, *challenging behaviour* has become the accepted term for what in the past would be referred to as *behavioural problems* or *maladaptive behaviour*. However, all children had needs which went beyond 'simple' learning disability or social-emotional problems. Thirteen had autistic spectrum disorders (ASDs), 11 associated with learning disability as defined above and two with Asperger syndrome. Twenty-three children displayed significant challenging behaviour and seven had severe sleep problems. Among the former, physical aggression, self injurious behaviour and Attention Deficit Hyperactivity Disorder (ADHD) were present. Specific challenging behaviours can be extremely dangerous, as was the case with one 14 year old boy whose physical aggression had been seen to be life-threatening to others and who, given the opportunity, will throw stones at moving vehicles. Such behaviour was thought to result from situations in which he was unable to communicate feelings of distress and manage them in constructive ways. Several children tended to wander outside the estate, sometimes necessitating their return by the police. Some of these children were reported to be attracted by traffic and mechanical activities, although no specific information was available on the frequency of behaviour related to such attraction.

A number of specific genetic syndromes were represented. These were of particular significance as some of the work cited in the following section was

concerned with the impact of environmental stress on individuals with these syndromes. Two children had Angelman syndrome, two Fragile-X syndrome, three Down syndrome, and one Tourette syndrome. Accessible information on such syndromes is readily available<sup>10</sup>. These syndromes are associated with a range of behavioural difficulties and characteristics known as *behavioural phenotypes*, and the implications of them are relevant to the impact of the AWPR on the children. Both diagnosed and possible undiagnosed Foetal Alcohol syndrome is also represented.

In addition to these behavioural and psychological features, most children had complex health care needs including incontinence, asthma, chronic constipation and sensitivities to medication.

As noted above, for all children there had been a pattern of failure and instability in the services they had received. In some cases four or five schools will have been attempted. In some, but by no means all instances, family stress had compounded the impact of such instability. Suspected or documented abuse, both physical and sexual had been reported. These have a profound effect on some children, resulting in low self-esteem, poor mental health and can lead to high anxiety and depression in some. Attention should be drawn to the two boys with Asperger syndrome. They are particularly vulnerable to the development of severe mental health problems during their teens, including a risk of suicidal behaviour.

#### *2.4 Needs of Newton Dee villagers*

Newton Dee is a community of 88 villagers (36 women and 52 men, as of September 2004) supported by unpaid co-workers who live in the community and over 20 paid staff who live outwith Newton Dee. Eighty six had learning disabilities. On average they had lived there for 25 years. This ranged from a residence of between three months and 44 years. The three individuals who had lived there for 44 years had in fact done so since the village's opening in 1960. The age of the villagers ranged from 25-79 years (average 51 years).

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<sup>10</sup> The CaF Directory of Specific Conditions and Rare Disorders 2002. London: Contact a Family ([www.cafamily.org.uk](http://www.cafamily.org.uk)). The directory is updated regularly and contains a useful introductory article on behavioural phenotypes ([www.cafamily.org.uk/behaviour.html](http://www.cafamily.org.uk/behaviour.html)).

Nearly a quarter, 20 villagers, were over 60 years of age. Eleven men and three women joined the permanent villagers for day placements. Such placements have increased over the past ten years. This group was somewhat younger, with an average age of 37.6 years (range 27-53 years). Referrals came from both local authorities and family members. A small number of individuals had left Newton Dee. In some cases this had been enabled by new opportunities for them to live in the community resulting from changing community care policy. Some had developed age-related conditions such as dementia and it had not been possible to meet their needs in Newton Dee.

While national policy has promoted care in the community, for many years the population of Newton Dee has remained stable. Recently there had been an increase in referrals and there is now a waiting list. This may partly reflect continuing parental demand, but also possibly increased flexibility of referrers in the statutory sector.

At the time information was collected (September 15 2004), a detailed breakdown on the characteristics of villagers was not available. In contrast to the children for whom typically thorough assessments were available, many adults may have lived in the community for decades without a full diagnostic assessment. For example, it was reported that there were villagers considered to have autistic spectrum disorders, although this condition was not formally diagnosed but informally inferred from their behaviour, e.g. ritualistic behaviour and extreme sensitivity to noise. Others are thought likely to have Fragile-X syndrome with concomitant sensitivity to environmental disruption. One man whose case was reviewed in detail responded to stress by extremely challenging behaviour, e.g. throwing chairs and tearing his clothes. He also tended to approach any new person. Twenty people living in Newton Dee were reported to be very likely to make such approaches.

As with the children, the disabilities of villagers were reported to be complex with dual diagnosis, i.e. learning disabilities and mental health problems. Five villagers were reported to be vulnerable to being sexually abused and perpetrating sexual abuse. There were also individuals with Down syndrome who are particularly vulnerable to early on-set Alzheimer disease but continue

to live in Newton Dee until they require full nursing care.

If construction and operation of the AWPR is to have an impact on the mental health of villagers in Newton Dee, then it is in the area of *affective disorders* that this is most likely to occur, i.e. with respect to depression and anxiety. For older people in the general population, depression is a common condition in later life. Nevertheless, there is evidence that major depression is not more common among people over the age of 65 years than among their younger peers<sup>11</sup>. This author notes, however, the prevalence of adjustment disorders and depression linked to social and health factors in older people, and emphasizes that these are both important and treatable.

That the same stressors may have an impact on some older people with learning disabilities is to be expected. Nevertheless, a recent review of depression, ageing and learning disability concludes by saying: '*There is virtually no scientifically-based evidence regarding any aspect of depression in older adults... (with learning disabilities)... Epidemiological, clinical, treatment or outcome information is totally absent.*'<sup>12</sup> Thus, we do not know whether older people with developmental disabilities are more or less likely to be affected by environmental stress than older people in the general population. In addition, there is no evidence that older people with learning disabilities are vulnerable to trauma when major residential changes occur in their lives<sup>13</sup>. However, the studies on which this comment is based are of relocation from long stay institutions to community homes, and do not tell us anything about relocation from, for example, a desired residence (e.g. the family home) to a less desired residence.

It may be suggested that age in itself may not be a significant factor in villagers' response to construction and operation of the road. What would probably have an impact would be their pre-existing vulnerability with respect

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<sup>11</sup> Prasher, V. (2003) Depression in ageing individuals with intellectual disabilities. In P.W. Davidson, V.P. Prasher & M.P. Janicki (eds.) *Mental Health, Intellectual Disabilities and the Ageing Process*. Oxford: Blackwell, pp. 51-66.

<sup>12</sup> Prasher, V. (2003) Depression in ageing individuals with intellectual disabilities. In P.W. Davidson, V.P. Prasher & M.P. Janicki (eds.) *Mental health, Intellectual Disabilities and the Ageing Process*. Oxford: Blackwell, pp. 51-66.

<sup>13</sup> Hogg, J., Moss, S. & Cooke, L. (1988) *Ageing and Mental Handicap*. London: Crook Helm.

to any present mental health difficulties coupled with general stress arising from noise and disruption of routine.

At present it is difficult to characterise as fully as we would wish the detailed picture of Newton Dee villagers' needs. Overall these can be considered in relation to an ageing population amongst whom there are a number of people with complex and challenging behaviour and whose characteristic behaviour might make them vulnerable in situations in which they encountered significant environmental change.

### **3 National context of the work of the Camphill communities**

As noted in **Section 1**, it is not desirable to view the Camphill communities in isolation from national policy as set out by the *Scottish Executive* and trends related to complex disability. The significance of the impact of the AWPR on residential special educational provision can only assist decision making regarding the road if seen in this framework.

#### *3.1 Trends in prevalence of people with complex needs*

There is a consensus that the prevalence of people with complex needs in the population is increasing. Studies in the UK, USA and New Zealand of babies born before full-term, i.e. premature babies of 1500 grams or less, indicate increased survival and an increased probability of complex disabilities. Increased prevalence of autism has also been reported, although it is an open question as to whether this reflects changes in assessment methods and increase in detection or a real increase in incidence. Although difficult to quantify, it is anticipated that the prevalence of children with complex disabilities of the sort catered for by Murtle Estate School will increase in the coming years.

#### *3.2 Trends in educational policy*

Parental choice with respect to what are referred to as “placing requests” in independent special schools has been reinforced by legislation enacted in the recent ‘The Education (Additional Support for Learning) Scotland Act (2004)<sup>14</sup>. Section 22 of the Act refers to such placing requests, i.e. where a parent requests a specific school placement. The right to make such a request (described in detail in Schedule 2 of the Act) applies to requests for placement of a child in an independent special school, such as a Camphill School. In such cases where the local authority cannot make appropriate provision and subject to other circumstances *‘...it is the duty of the authority...to meet fees and other necessary costs of the child’s attendance at the specified school.’*

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<sup>14</sup> Scottish Executive (2004) The Education (Additional Support for Learning) (Scotland) Act (2004): A Guide for Parents. Edinburgh: Scottish Executive.  
[www.scotland.gov.uk/library5/education/esa04gp-asp](http://www.scotland.gov.uk/library5/education/esa04gp-asp)

(p.31). (Circumstances are stated in which such placing requests can be refused by the local authority and admitting a child remains dependent on the school management's decision.) During consultation on the Bill<sup>15</sup>, opposition was voiced that if parents had the option to go for independent special schools this would not be considered compatible with inclusion; however, others argued that parents should have this choice if “...*the school would be able to offer specialist support to the pupil not available elsewhere.*” (p.25.) Importantly, “*Representatives from independent special schools were worried that once this comes into force schools may be overwhelmed by the demands for places.*” (p.25.)

Legislative support for parent choice of independent special schools coupled with trends indicative of increased complexity of need, suggest that far from being an anachronism made redundant by educational inclusion policy, independent residential special schools have a key role to play in the spectrum of future provision. It is worth remarking that in England one of the country's most prestigious residential special schools, Sunfield School in Worcestershire, which caters for children directly comparable to those attending the Camphill-Rudolf Steiner Schools, is at present embarking on a ten-year programme of expansion. This reflects a judgement that increased and improved provision – not contraction – will be required over that period. The head teacher and chief executive of this school, Professor Barry Carpenter, considers that such schools are in reality making a major contribution to the inclusion agenda as the children catered for would otherwise be totally excluded from the educational system due to its inability to support such pupils<sup>16</sup>. Discussion with the Scottish Executive Education Department (see above, Section 2.1) indicates that the Department's view is that provision under the new Act will *not* result in increased placing requests with respect to independent residential schools. However, even if this proves to be the case, such requests may increase because of increased prevalence of children with complex needs whose needs cannot be met in local authority

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<sup>15</sup> Scottish Executive (2003) *Report of the Consultation on the Draft Additional Support for Learning Bill*. Edinburgh: Scottish Executive. [www.scotland.gov.uk](http://www.scotland.gov.uk)<sup>12</sup> <http://www.sunfield-school.org.uk>

<sup>16</sup> Personal communication, 28 September 2004



provision. The author's own view is that the downward trend in referrals to independent residential schools over the past 12 years (replicated in the Bielside Camphill Schools where there has been a 38% decrease in placements since the Halcrow Fox Report (Ref. 1)), will at the very least be checked. Indeed, there is a probability of an increasing rate of referral in the light of the new legislation. This will occur because of (a) parents exercising their right under the new educational legislation to choose independent residential schools for their children, and (b) the increased prevalence of children with complex disabilities who cannot be catered for in local authority schools.

### *3.3 Policy and adult provision*

Increased survival among people with learning disabilities has also been established leading to a growing population of older people who outlive their parents. Half of this population now have a life expectation comparable to the rest of the population. Those with Down syndrome are vulnerable to developing Alzheimer disease from the age of 30 onwards while others have a normal life expectancy and will live to develop age-related illness comparable to the rest of the population.

Scottish Executive policy<sup>17</sup> is directed to the social inclusion in the community of adults with learning disabilities, i.e. they should have the opportunity to live in ordinary housing with appropriate support, where possible be employed, and be able to access all community facilities available to the general population. Nevertheless, the need for special provision and support when required is acknowledged. Importantly, a strong emphasis is placed on personal choice as to where a person wishes to live. With respect to Newton Dee, there can be little doubt that villagers who can indicate directly where they wish to live would choose to remain in Newton Dee. The five villagers interviewed all clearly expressed the view stated by one of their number when asked if they would wish to leave if the AWPR was built: "*Why would we want to leave? This is our home!*" In addition, there is a waiting list of three people

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<sup>17</sup> Scottish Executive (2000) *The Same as You? Scottish Executive Review of learning disability services*. Edinburgh: Scottish Executive.

wishing to join the community. The waiting time is reported to be two years. Irrespective of the AWPR being built, and in the light of the social inclusion agenda and diminishing resources available to maintain the village, our view is that Newton Dee will continue to support its present ageing population for some years to come, against a background of slowly declining numbers. This decline will result not only from a lower level of referrals and mortality, but because Newton Dee is unable to provide the necessary care for elderly people with learning disabilities who have high nursing needs, relocating them to nursing homes.

### *3.4 The future of the Camphill communities*

It is important in considering future trends to bear in mind that the present predictions are based on differing assumptions regarding the quite separate effects of (a) epidemiological trends, and (b) legislation and policy in Scotland. To summarise: There is a predicted increase in the prevalence of children with complex needs. Although the aspiration of the Scottish Executive Education Department is for these children to receive their education in local authority schools, parents now have the right to apply for education in independent residential schools. The author's view is that more will avail themselves of this option. Taken together, the two trends will lead to independent schools maintaining and increasing their intake of children with complex needs.

With respect to adults, Scottish Executive policy directs that except in a limited number of cases (e.g. individuals with learning disabilities with forensic needs) adults should live in ordinary community settings as described in paragraph 3.3 above. Referrals to village communities will typically be resisted and will decline. Despite greater longevity of people with learning disabilities and an increase in overall prevalence of people 50+ years, it is not predicted that this will feed through to increased referrals to such communities.

Therefore, Murtle Estate will continue to have a numerically small but important part to play in the spectrum of educational provision for children with highly complex needs. It is predicted that this role will increase in the

coming years.

Newton Dee will continue to provide for its present villagers for many years, but due to implementation of the community care agenda leading to fewer referrals, we would anticipate a slow contraction of numbers as villagers leave or die and are not replaced by new referrals. With respect to the AWPR if constructed, this overall picture indicates that the Newton Dee community and road would have to co-exist for several years to come.

## 4 Environmental influences on the Camphill communities of people with developmental disabilities

### 4.1 Environmental stress and developmental disability

The impact of environmental stress on the mental health and well-being of people with learning disabilities is well documented<sup>18</sup>. In addition, studies of extreme stress in areas affected by conflict, e.g. the Gaza strip and Northern Ireland, demonstrate just how damaging such events can be. In general terms we take this as read. Any individual may be positively or adversely affected by stressful events. This applies to people with learning disabilities generally, but is especially the case for those with complex needs where there is increased vulnerability to stress arising from an inability to control, modulate or “gate”, sensory input<sup>19</sup>. This in turn may lead to increased anxiety, alarm and avoidance of the stressful situation, which may be realised in seriously violent or self-injurious behaviour. For some individuals such a pattern of responding is viewed as *Sensory defensiveness syndrome*<sup>20</sup>.

A wide variety of stressors have been described in the literature on mental health and learning disability. Among the principal ones noted in a recent consensus document on this topic the following are<sup>21</sup>:

- a. *transitional influences*: movement within a service from one house to another or day activity to another. How much control *does* a person with learning disabilities have over changes in a service when policy dictates change whether for resource or for philosophical reasons?
- b. *developmental transitions*: e.g. the onset of puberty or the start of menstruation or age-related changes that reduce physical and/or

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<sup>18</sup> Rush, A.J. & Frances, A. (eds.) (2000) Treatment of psychiatric and behavioral problems in mental retardation: Expert Consensus Guidelines Series. *American Journal of Mental Retardation*, **105**, 159-228.

<sup>19</sup> Dunn, W. (2001) The sensations of everyday life: Empirical, theoretical, and pragmatic considerations. *American Journal of Occupational Therapy*, **55**, 608-620.

<sup>20</sup> Stagnitti, K., Raison, P. & Ryan, P. (1999) Sensory defensiveness syndrome. *Australian Occupational Therapy Journal*, **46**, 175-187.

<sup>21</sup> Rush, A.J. & Frances, A. (eds.) (2000) Treatment of psychiatric and behavioral problems in mental retardation: Expert Consensus Guidelines Series. *American Journal of Mental Retardation*, **105**, 159-228.

mental capacity

- c. *environmental*: stress arising from work or occupational pressures, an unstimulating *or* over demanding environment, or adverse living circumstances, e.g. noisiness, overcrowding
- d. *social influences*: lack of good, supportive relationships; hostility and rejection; destabilising contacts, e.g. intermittent contact with a family member; emotional, physical or sexual abuse (including bullying, taunting, exclusion and exploitation)
- e. *physical ill health*: problems arising from the consequences of sensory and/or physical disability, acute or chronic illness
- f. *frustration* due to inability to communicate needs and wishes, absence of choice, awareness of own limitations

Clearly the impact of the construction and operation of the AWPR might lead to stressors in a number of these categories. While (c – *environmental stress*) is the most obviously relevant, enforced changes in lifestyle (a – *transitions*), and changes in social behaviour due to curtailment of activities (d- *social influences*) might also play a part.

Although the issue of noise is only one part of the Camphill communities' concerns regarding construction and operation of the AWPR, special consideration is given in this report to the consequences of increased noise for individuals with developmental disabilities. It is well known that the sensory sensitivity of people with autism, who constitute approximately one-third of children living in Murtle Estate, differs from that of the wider population<sup>22</sup>. It is not the case, however, that this invariably means they are hypersensitive to sensory stimulation, and some individuals may exhibit lowered sensitivity to some forms of stimulation. For a minority of people with autism *Hyperacusis* has been observed, i.e. a high level of sound sensitivity between 40dB-50dB or

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<sup>22</sup> Watling, R.L., Deitz, J. & White, O. (2001) Comparison of sensory profile scores of young children with and without autism spectrum disorders. *American Journal of Occupational Therapy*, 55, 416-423.

lower<sup>23</sup>. However, not all sounds of the same loudness will cause discomfort, but only those within a certain frequency range. *Central hyperacusis* refers to an inability to tolerate certain sounds which are not necessarily loud<sup>24</sup> and can be experienced by children with autism<sup>25</sup>. The proportion of children with autism who experience hyperacusis varies, a recent paper suggesting 18%. There are no well-validated treatments for hyperacusis, although desensitisation to noise<sup>26</sup> and explanation of the origins of a given noise<sup>27</sup> have been advocated (points which we return in our recommendations below). It is important to add that hyperacusis is not unique to children with autism and may be experienced by other individuals with development disorders as well as members of the wider population. With respect specifically to people on the autistic spectrum with Asperger syndrome, their ability to shut out, or “gate” sensory input has been shown to be impaired<sup>28</sup>.

A further concern must be the impact of noise on communication between children and villagers and co-workers/staff. Background noise is known to affect people with developmental disabilities, notably those on the autistic spectrum, by interfering with speech<sup>29</sup>. Both the level of background sounds and the characteristics of the noise affect speech reception by those with autistic spectrum disorders<sup>30</sup>. Levels of noise in this study tend to be well in excess of the World Health Organisation’s (WHO’s) 55dB(A) outdoor threshold (see WHO guidelines in paragraph 4.2 below). Here levels of 60dB(A) and 70dB(A) were involved in the study. In addition, such studies, because of the need for control of signal-to-noise ratio, take place under

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<sup>23</sup> Schwade,S. (1995) Shedding light on supersensitive hearing: What to do when even small noise sounds like the big bang. *Prevention*, **47**, 90-96.

<sup>24</sup> Barnes, N.M. & Marriage, J. (1995) Is central hyperacusis a symptom of 5-hydroxytryptamine (5-HT) dysfunction? *Journal of Laryngology & Otology*, **109**, 915-921.

<sup>25</sup> American Speech-Language Hearing Association (1995) Hyperacusis. *ASHA*, **37**, 53-54.

<sup>26</sup> Schwade,S. (1995) Shedding light on supersensitive hearing: What to do when even small noise sounds like the big bang. *Prevention*, **47**, 90-96.

<sup>27</sup> Borsel,J.V., Curfs,L.M. & Fryns,J.P. (1997) Hyperacusis in Williams syndrome: A sample survey study. *Genetic Counseling*, **8**, 121-126.

<sup>28</sup> McAlonan,G.M., Daly,E., Kumari,V., Critchley,H.D., van Amelsvoort,T., Suckling,J., Simmons,A., Sigmundsson,T., Geenwood,K., Russell,A., Schmitz,N., Happe,F., Howlin,P. & Murphy,D. (2002) Brain anatomy gating in Asperger’s syndrome. *Brain*, **125**, 1594-1606.

<sup>29</sup> Boatman,D., Alidoost,M., Gordon,B., Lipsky,F. & Zimmerman, W. (2001) Tests of auditory processing differentiate Asperger’s syndrome from high-functioning autism. *Annals of Neurology*, **50**, S95.

<sup>30</sup> Alcántara,J.I., Weisblatt,E.J.L., Moore,B.J.C. & Bolton,P.F. (2004) Speech-in-noise perception in high-functioning individuals with autism or Asperger’s syndrome. *Journal of Child Psychology and Psychiatry*, **45**, 1107-1114.

laboratory conditions and do not involve everyday noise such as traffic noise; nor do participants in such studies have the opportunity to move away from sources of sound that affect the intelligibility of speech. Nevertheless, speech intelligibility must remain a key concern in this evaluation.

Finally, during construction and to lesser extent during operation of the road, there will be both social and visual disruption in the lives of pupils and villagers. With respect to the former, there will be construction work and workers in close vicinity to both communities, involved in tasks related to the road construction. These may in differing degrees and for different individuals be disturbing for some individuals while attracting others. For some, the construction workers and their activities will be seen as threatening. It is not possible in any way to predict let alone quantify such social impacts. However, in making our recommendation regarding construction should this proceed, measures designed to minimize adverse experiences or consequences are suggested. During construction there will also be a visual impact created by vehicles, construction machinery and very apparent activity. This again will be attractive to some individuals who will express interest in what is happening, while others will be disturbed and threatened. Again, should road construction proceed, we offer recommendations designed to alleviate difficulties arising. Among these is a consideration of safety of children and villagers. During operation of the road less overt disruption will be apparent, but again the flow of traffic, in addition to creating noise, will have a visual impact in the vicinity of both school and village, again with potential adverse consequences. Our recommendations also consider how these may be ameliorated.

#### *4.2 The impact of noise on the Camphill communities: General principles*

The overall methodology adopted in this report is to relate international guidelines on noise levels and their effects to projected noise levels during both construction and operation of the AWPR. However, it is acknowledged that some of the children and the villagers will be adversely affected by noise at thresholds below those specified for the wider, typical population. This is taken into account by looking for a “cushion” between the recommended

thresholds and the projected noise levels, i.e. the latter must fall discernibly below the former for them to be considered tolerable. There is no precise way of quantifying this “cushion” for the full range of sensitivities that may be represented in individuals who in future live in the two communities. Nevertheless, in adopting this approach the way in which conclusions are drawn are transparent and specific.

Understanding of the effects of noise on people generally is still limited. For the present purpose, however, such information provides a baseline against which to set the possible effects of the construction and operational phases of the AWPR on individuals who are significantly more vulnerable to the effects of noise than their peers without developmental disabilities.

While most sources of environmental noise are usually outdoors, transmission into buildings may also have detrimental effects. We therefore also review the impact of the estimated noise levels on the lives of the children and villagers in indoor settings during day and night time.

The specific effects of noise on a wide range of functions and activities are reviewed in the World Health Organization (WHO) document *Guidelines for Community Noise*<sup>31</sup>. This report focuses on areas of particular concern with respect to the impact of the AWPR on the present communities. In each of the following sections the general concerns and recommendations of WHO are summarised<sup>31</sup>. Figures from Jacobs Babtie’s construction and operational noise level assessments are then reviewed against these recommendations. The particular additional vulnerabilities of pupils and residents living in the Murtle Estate and Newton Dee are then considered in relation to the impact of the AWPR against this background, which is principally concerned with the responses of people without disabilities.

Both children and adults can be adversely affected by noise when undertaking complex tasks, particularly with respect to reading, attention, problem solving and memorising material. Sudden noises can result in disruption of on-going

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<sup>31</sup> Berglund, B., Lindvall, T. & Schwela, D.H. (1999) *Guidelines for Community Noise*. Geneva: World Health Organization.



activity. Aircraft noise in particular can lower school performance on a range of tasks. The WHO report recommends that schools and day care centres should not be located near major noise sources, such as highways, airports, and industrial sites. Under such conditions direct effects on children's stress as measured physiologically have been reported, while adults make more errors at work and possibly are more prone to accidents.

The specific WHO recommendations with respect to both internal and external noise levels in schools and day centres (the nearest point of comparison to Newton Dee), are clearly spelled out with particular reference to the critical effects of noise on speech interference, disturbance of comprehension and reading acquisition, communication and annoyance: *'To be able to hear and understand spoken messages in classrooms, the background sound level should not exceed 35dB  $L_{Aeq}$  during teaching sessions. For hearing impaired children, a still lower sound level may be needed... for outdoor playgrounds the sound level of the noise from external sources should not exceed 55dB  $L_{Aeq}$ , ...'*

Given the nature of the special needs of both pupils and villagers it is essential to go beyond these educational and work-related effects of noise and to assess the likely impact of construction and operation on their mental well-being during these phases. The view expressed in the WHO report on the effects of environmental noise on mental health is that while such noise may not directly cause mental illness, it can intensify and accelerate the development of such conditions. No specific noise levels are recommended, however, with respect to the effects of noise on vulnerable individuals' mental health. Social and behavioural effects of noise are acknowledged to be the outcome of a range of factors that go beyond noise itself, and include social and psychological influences. Attention is drawn particularly to noise above 80dB(A) which may also reduce helping behaviour and increase aggression. It is noted: *'There is particular concern that high-level continuous noise exposures may increase the susceptibility of schoolchildren to feelings of helplessness.'*

### 4.3 *Effect of noise during construction*

It is important to emphasise that the information provided for this report with respect to the proposed programme of road construction differs in important respect to the preliminary information used in the original, Interim Findings report. Now three principal stages of construction of the AWPR are suggested (with Stages 2 and 3 overlapping), further sub-divided into specific activities at various points on the planned route in the vicinity of Murtle Estate and Newton Dee. These changes have the aim of ameliorating the consequences for the Murtle Estate pupils and Newton Dee villagers, and their respective co-workers and staff, predicted in the Interim Findings report, by reducing the noise levels that would be experienced during construction.

The principal differences relate to:

- The noisiest construction activities are now scheduled during school holidays
- A sequence of construction activities has been devised to minimise and where possible progressively lower intrusion by noise
- Greater specificity is provided with respect to noise mitigation measures and the sequencing of their introduction during construction
- Greater specificity is provided with respect to use of construction plant
- A considerably longer period of construction is proposed in the Murtle Estate/Newton Dee environs in order to accommodate the above changes
- The information on noise levels takes into account factors that will tend to increase noise estimates, e.g. the addition of present ambient sound levels and allowance for the nature of the noise generated during construction, referred to as “*a noise characterisation factor*”, to be applied where work is “*intermittent, tonal or impulsive in nature*” [BS5228:Part 1: 1997].

*In drawing the present, revised conclusions on the impact of noise and other forms of intrusion, the writer is taking into account guarantees that in line with standard construction practice, what is proposed will be included in the contract documents, monitored on site during construction and actions taken to bring noise levels etc. within the limits indicated here and in Jacobs Babbie's fuller statement (See Appendix A).*

With respect to the work undertaken in the school holidays, the impact of construction on those living during these periods on Murtle Estate need only be assessed with respect to levels that are required during road construction for the general population, as there will be no children with special needs resident. It is assumed that those living in Murtle Estate during school holidays are representative of the general population to whom the WHO guidelines apply. Noise levels at the residential locations within Murtle Estate closest to construction activity during such periods would typically be between 50dB(A) and 55dB(A), prior to consideration of the noise characterisation factor, which would not apply at Murtle Estate during such periods, and prior to consideration of any mitigation measures. These noise levels are appreciably below the environmental noise level of 75dB(A),  $L_{Aeq\ 12\ hrs}$ , that would typically apply to construction works. However, noise levels with respect to villagers who live permanently in Newton Dee remain of concern and will be evaluated.

Finally, in the Interim Findings report, noise levels across the two sites were considered, i.e. levels at residences near the proposed road as well as those further away. Here we adopt a more critical approach basing judgements on reference points most likely to be affected by road construction and operation, i.e. those in closest proximity, specifically:

- Murtle Estate:
  - *Robert Owen House*, a residential facility for special needs children and co-workers, which is most exposed to construction noise originating from the north and east of Murtle Estate

- *St Ternan's*, a residential facility for special needs children and co-workers, which is most exposed to construction noise originating from the south and east of Murtle Estate
  - Newton Dee:
    - *Dolphin*, a residential facility for special needs adults, which is most exposed to construction noise originating from the north and west of the village
    - *Michael Chapel*, a community facility, which is most exposed to construction noise originating from the south and west of the village

In passing, the obvious should be stated, that the further away other houses and facilities are on Murtle Estate and in Newton Dee village, the less the noise from the construction work and operation of the road will be.

The following comments consider three principal stages of road construction with respect to their impact on pupils in Murtle Dee and villagers in Newton Dee respectively. The three main stages and their phases are listed below and are described more fully in Appendix A. The duration of each and their timescales are given in the Gantt Chart titled '*Camphill Noise Assessment Construction Programme*' (See Appendix A)

- Stage 1: Advance contract work: (July to December Year -1)
  - Partial excavation of Murtle cutting to provide temporary access
- Stage 2: Works north of River Dee floodplain: (February Year 1 to December Year 3)
  - Phase 1: Partial widening of A93, Murtle Estate Access
  - Phase 2: Old Deeside Line Footbridge (west), Murtle Estate Access Diversion & Murtle Burn diversion and demolition of properties

- Phase 3: Old Deeside Line Footbridge (completion); and existing rail bridge
  - Phase 4: Partial excavation between A93 and Old Deeside Line Walk
  - Phase 5: A93 widening and bridge including temporary diversion of A93
  - Phase 6: Completion of Murtle cutting, excavation between A93 and Old Deeside Line Walk and River Dee Bridge north abutment
  - Phase 7: Road works and Landscaping
- Stage 3: Works on River Dee floodplain (April Year 1 to November Year 3)
  - Phase 1: Providing temporary access
  - Phase 2: Bridge piling
  - Phase 3 Bridge piers
  - Phase 4: Bridge deck (partial) and piling completion
  - Phase 5: Removal of temporary access
  - Phase 6: Bridge deck (completion) and bridge finishes
  - Phase 7: Roadworks

Construction noise levels for various activities have been assessed during each of the construction phases noted below. From this assessment a number of activities have been identified that result in higher noise levels than is considered desirable at the Murtle Estate properties. The noise levels at these Murtle Estate houses will be higher than in the Newton Dee village. As a key point of reference, therefore, we include noise levels at *Robert Owen House* and *St. Ternan's* on Murtle Estate and *Dolphin* and *Michael Chapel* in Newton Dee. The summary tables for noise levels at these four locations are presented in Appendix A for each phase of construction activity. The tables present technical details including source noise levels, distances from construction activity, the unmitigated noise level (dB(A)), reduction due to mitigation, the noise characterisation factor and the final noise level. (For definitions of these terms see Appendix A.) It is the last noise level which is critical to the present assessment and it is this figure that is cited below.

In order to minimise the impact on the communities during term times, and pending further discussion with the Camphill communities, the periods for which construction work is undertaken will be restricted to 8.30am-12.30pm and 1.00pm - 5.00pm (eight hours) with no weekend working. This would be extended to 7.30am - 12.30pm and 1.00pm – 6.00pm in the week during school holidays and 7.30am-12.30pm on Saturday. Construction work could be suspended on days when specific outdoor activities were planned, with agreement between the Camphill communities and the Scheme Promoter on such dates being made in advance of construction works commencing.

In the following sections (Sections 4.3.1-4.3.3) the noise levels specified are those that result from specific construction activities. It is, however, important to note that in any given period of time the overall noise level at a given location will be higher, as this will be a function of multiple construction activities and the existing ambient noise. The baseline noise level in Murtle Estate is 41.6dB(A) and in Newton Dee is 43.8dB(A). In addition, Stage 2 and Stage 3 work carried out at the same time will also have an additive effect. These three components of overall noise (baseline plus Stage 2 noise plus Stage 3 noise) are presented in Appendix A as a series of combinations applying progressively as the construction programme proceeds.

In each of the sections in which we comment on the noise levels during construction in Stages 1, 2 and 3, i.e. Sections 4.3.1.3, 4.3.2.3 and 4.3.3.3, we consider these raised combined levels in relation to the construction noise. Reference should be made to Appendix A for the full details.

#### *4.3.1 Construction noise during Stage 1*

##### *4.3.1.1 Murtle Estate*

Stage 1 of construction entails advanced contract work (Year -1) adjacent to the south east corner of Murtle Estate. (See Figure C1 in Appendix A.) This work entails excavation of Murtle cutting to provide temporary access to the floodplain. Here earthworks operations are the greatest source of noise with a maximum of 70.4dB(A) at *Robert Owen House* during initial excavation works and 57.6dB(A) at *St Ternan's*. This work will be undertaken and

completed during the course of the school holiday and will not therefore impact on the pupils of Murtle Estate.

Completion of initial earthworks will provide bunds of approximately 4m in height, running parallel with the eastern boundary of Murtle Estate and western boundary of Newton Dee, affording considerable noise attenuation. In addition, further reduction in noise would result from the depth of the cutting having been lowered by some 3m. Work on the main earthworks following the initial work in the summer holidays would result in noise levels at *Robert Owen House* and *St Ternan's* of 46.6dB(A) falling to 39.6dB(A), and 41.1dB(A) falling to 34.1dB(A), respectively.

#### 4.3.1.2 Newton Dee

During the period of initial earthworks the noise levels at *Dolphin* and *Michael Chapel* would be 50.3dB(A) and 48.1dB(A) respectively. The main earthworks would result in noise levels at *Dolphin* and *Michael Chapel* of 34.1dB(A) falling to 27.1dB(A), and 32.1dB(A) falling to 25.1dB(A), respectively.

#### 4.3.1.3 Comment on Stage 1 of construction

With respect to noise levels at Murtle Estate and Newton Dee during Stage 1 of construction, there can be no immediate effect on the pupils of the former as construction activity is carried out in school holidays when combined noise levels (construction plus baseline noise levels) reach 70.4dB(A) at *Robert Owen House* and 57.7dB(A) at *St Ternan's*. The combined noise level at the most sensitive receptors in Newton Dee falls discernibly below the WHO level of 55dB(A) for external noise and other than during earthworks (51.2dB(A) at *Dolphin*) is below 50dB(A). Across the remainder of Newton Dee the noise level would continue to decrease providing still lower intrusion. We would not regard noise as being significantly intrusive for this group of villagers.

### 4.3.2 Construction noise during Stage 2

Stage 2 of construction covers works north of the River Dee floodplain: (Year 1 to Year 3), i.e. from north of the River Dee crossing to just north of the A93 (See Figure C2 in Appendix A). A full description appears in Appendix A.

#### 4.3.2.1 Murtle Estate

Phase 1: Partial widening of A93, Murtle Estate/Murtle Den Access: The anticipated outdoor noise level at *Robert Owen House* will be 48.9dB(A) and at *St Ternan's*, 39.7dB(A).

Phase 2: Partial Construction of Old Deeside Line Footbridge (west), Murtle Estate Access Diversion & Murtle Burn diversion; demolition of properties: Demolition and excavation works are proposed to be undertaken during the school holiday period. During remaining works the noise level at *Robert Owen House* is 53.6dB(A) while for *St Ternan's* the figure will be considerably lower, at 44.4dB(A).

Phase 3: Old Deeside Line Footbridge (completion) and demolition of the present rail bridge: Again, the demolition work would be carried out during the school holiday period. Subsequent earthworks will result in noise levels at these two properties of 47.8dB(A) and 41.1dB(A) respectively, while concreting operations will result in noise levels of 53.6dB(A) and 44.4dB(A) respectively.

Phase 4: Partial excavation between A93 and Old Deeside Line Walk: Earthworks operations will yield a noise level at *Robert Owen House* of 45.6dB(A) and at *St Ternan's* of 40.5dB(A). Should rock have to be excavated these figures would rise respectively to 47.6dB(A) and 42.5dB(A), the lower level of the works providing substantial noise mitigation. Should rock occur at a higher level than expected, resulting in higher noise levels then alternative methods of excavation would be undertaken or works conducted during school holidays.



Phase 5: A93 widening and bridge completion, including temporary diversion of A93: Work during this phase entails earthworks, rock excavation, concreting and road works. Taking the maximum and minimum noise levels across these activities the ranges for *Robert Owen House* and *St Ternan's* are respectively 47.2dB(A)-42.5dB(A) and 42.8dB(A)-38.5dB(A).

Phase 6: Completion of the excavation south of the Old Deeside Line Walk, including infilling of over-excavation; completion of earthworks between the A93 and Old Deeside Line Walk; and concreting the River Dee north abutment: For *Robert Owen House* and *St Ternan's* the noise levels fall within a relatively tight range. The highest noise level is at the outset of excavation south of the Old Deeside Line Walk at *Robert Owen House* at 48.3dB(A) falling to 41.3dB(A) as work progresses. During rock excavation the level is 47.6dB(A). For the other activities noise levels range between 45.6dB(A) and 30.8dB(A). For *St Ternan's* the highest noise level occurs during concreting the river abutment, 54.1dB(A), ranging between 42.5dB(A) and 30.2dB(A) during other activities in this phase. With respect to either property, should noise associated with rock excavation threaten to rise above these levels, then alternative methods of excavation would be undertaken or this work conducted during school holidays.

Phase 7: Road works: During roadworks and landscaping noise levels fall from 44.7dB(A) to 38.9dB(A) at *Robert Owen House* and 50.6dB(A) to 40.6dB(A) at *St Ternan's*.

#### 4.3.2.2 Newton Dee

Phase 1: Partial widening of A93 and Murtle Estate/Murtle Den Access: For *Dolphin* the final noise level is 36.4dB(A) while for *Michael Chapel* the level is 34.7dB(A).

Phase 2: Partial Construction of Old Deeside Line Footbridge (west), Murtle Estate Access Diversion & Murtle Burn diversion; demolition of properties: Noise levels in Newton Dee would tend to fall below those at Murtle Estate. For *Dolphin* across the range of construction activities (i.e. earthworks,

concreting and property demolition) noise levels would be between 49.6dB(A) to 41.0dB(A) and for *Michael Chapel* 47.8dB(A) and 39.2dB(A).

Phase 3: Old Deeside Line Footbridge (completion) and demolition of the present rail bridge: Noise levels at *Dolphin* during demolition of the bridge would be 47.2dB(A) and for *Michael Chapel*, 45.3dB(A). During subsequent earthworks the respective figures would be 39.9dB(A) and 37.9dB(A) while during concreting they would be respectively to 42.4dB(A) and 40.4dB(A).

Phase 4: Partial excavation between A93 and Old Deeside Line Walk: During earthworks the respective predicted figures for *Dolphin* and *Michael Chapel* would be 39.3dB(A) and 37.4dB(A) respectively and during rock excavation, 41.3dB(A) and 39.4dB(A).

Phase 5: A93 widening and bridge completion, including temporary diversion of A93: During the sequence of earthworks, rock excavation, concreting and roadworks, the range of noise levels at *Dolphin* would range from 39.7dB(A) to 35.7dB(A) and at *Michael Chapel* 36.1dB(A) to 34.1dB(A).

Phase 6: Completion of the excavation south of the Old Deeside Line Walk, including infilling of over-excavation; completion of earthworks between the A93 and Old Deeside Line Walk; and concreting the River Dee north abutment: Across the five sub-phases of activity noise levels at *Dolphin* range from 41.3dB(A) to 23.3dB(A) and for *Michael Chapel* from 39.4dB to 21.4dB. With respect specifically to excavation south of the Old Deeside Line Walk noise levels drop from 31.9dB to 24.9dB(A) at *Dolphin* and 30.5dB(A) to 23.5dB(A) at *Michael Chapel*.

Phase 7: Road works: During the final stage of roadworks and landscaping the noise level at *Dolphin* would be 43.3dB(A) to 37.9dB(A) and at *Michael Chapel* 41.4dB to 36.3dB(A).

#### 4.3.2.3 Comment on Stage 2 of construction

Since it is the combined noise from the baseline, Stage 2 and Stage 3 construction noise levels that is of relevance here, we will discuss the impact of combined noise below in Section 4.3.3.3.

#### 4.3.3 Construction noise during Stage 3

Stage 3 of construction covers works within the River Dee floodplain: (Year 1 to Year 3), and consists of seven phases (See Figure C3 in Appendix A). A full description appears in Appendix A.

##### 4.3.3.1 Murtle Estate

Phase 1: Partial Piling and Concreting of River Dee Bridge north abutment: the noisiest activity during this phase is the partial piling work for the north abutment. Here the construction activity results in noise levels of 42.0dB(A) at *Robert Owen House* and at *St Ternan's*, which is close to this activity, of 54.1dB(A). This work would be undertaken in the school holidays. Subsequent work undertaken during term time involving concreting of the northern abutment would result in noise levels of 42.0dB(A) and 54.1dB(A) respectively.

Phase 2: Piling piers River Dee Bridge: with appropriate screening, noise levels at *Robert Owen House* would fall from 40.9dB(A) to 37.7dB(A) and at *St Ternan's* from 53.1dB(A) to 49.0dB(A).

Phase 3: Concreting of River Dee Bridge Piers: concreting work in this phase would result in noise levels at *Robert Owen House* of 40.9dB(A) falling to 37.7dB(A). At *St Ternan's* the comparable figures would be 53.1dB(A) falling to 49.0dB(A).

Phase 4: Partial concreting of River Dee Bridge Deck and completion of piling of River Dee Bridge north abutment: Again, following the north-south progression of work on the bridge deck, levels at *St Ternan's* will reduce from 53.1dB(A) to 48.1dB(A) during concreting. The respective figures for *Robert Owen House* would be from 40.9dB(A) to 37.0dB(A). Completion of the

remaining piling work at the River Dee Bridge north abutment will be undertaken during school holidays.

Phase 5: Removal of temporary access: The noise level at *Robert Owen House* would be 43.8dB(A) and at *St Ternan's*, with appropriate screening, 50.8dB.

Phase 6: Completion of River Dee Bridge deck and bridge: Noise levels during this work would be 42.0dB(A) at *Robert Owen House* and 54.1dB(A) at *St Ternan's*.

Phase 7: Roadworks: At both *Robert Owen House* and *St Ternan's* noise levels would reduce as roadworks progressed from north to south, from 44.0dB(A) to 39.0dB(A) at the former and, with appropriate screening, from 51.1dB(A) to 50.1dB(A) at the latter.

#### 4.3.3.2 Newton Dee

Phase 1: Partial Piling and Concreting of River Dee Bridge north abutment: During piling, the period of noisiest activity, the noise level at *Dolphin* would be 46.1dB(A) and at *Michael Chapel*, 44.4dB(A). Partial concreting of the north abutment would result in noise levels of 41.1dB(A) and 39.4dB(A).

Phase 2: Piling River Dee Bridge: With appropriate screening, noise levels at *Dolphin* would be 41.1dB(A) to 40.0dB(A) and at *Michael Chapel* 47.9dB(A) to 47.7dB(A).

Phase 3: Concreting of River Dee Bridge Piers: concreting work in this phase would result in noise levels at *Dolphin* of 41.1dB(A) falling to 40.0dB(A). At *Michael Chapel* the comparable figures would be 47.9dB(A) falling to 47.7dB(A).

Phase 4: Partial concreting of River Dee Bridge Deck and completion of piling of River Dee Bridge north abutment: Again, following the north-south progression of work on the bridge deck, levels at *Dolphin* will reduce from 41.1dB(A) to 39.4dB(A) during concreting and would be 46.1dB(A) during piling. The respective figures for *Michael Chapel* would be from 47.9dB(A) to 47.5dB(A) and 44.4dB(A).

Phase 5: Removal of temporary access: At *Dolphin* the predicted noise level is 44.0dB(A) and at *Michael Chapel*, 50.1dB(A).

Phase 6: Completion of River Dee Bridge deck concreting: The predicted noise levels during this work would be 41.1dB at *Dolphin* and 39.4dB(A) at *Michael Chapel*.

Phase 7: Roadworks: Predicted noise levels would be range from 43.1dB(A) to 41.4dB(A) at *Dolphin* and between 49.5dB(A) and 41.5(A)dB at Michael Chapel.

#### 4.3.3.3 Comment on Stage 2 and 3 of construction

Though noise levels from individual construction activities during both Stage 2 and Stage 3 fall well within the WHO 55dB(A) threshold, the effects of combining noise levels from different simultaneous activities with baseline levels results in elevated noise levels, as shown in Appendix A. The Appendix details each of the combinations of activities in terms of their resulting noise level at the identified receptors, and these combinations are numbered sequentially as they would occur during the indicative construction programme.

With respect to Murtle Estate, Combinations 4, 5, 8, 9, 10, 11, 12 and 18 occur during school holiday periods, and there can be no immediate effect on the pupils.

Of the remaining combinations it can be seen that there are periods of work which would approach the WHO 55dB(A) threshold at *Robert Owen House*. This occurs particularly at Combinations 6, 7, 13, 14 and 15, which together have a duration of 33 weeks. For *St Ternan's* there are also periods when this threshold is approached, specifically Combinations 6, 7, 13, 14, 15, 16, 17, 21, 22 and 23 which have a duration of 94 weeks. It is noted that during the course of some of these periods the noise levels will show some variation to lower levels.

However, if we take these key properties as indicative of the impact of noise on the east and south of Murtle Estate, it is at a level that leads to concern regarding the impact on some children. When considered together with the overall disruption that will be apparent, we consider these periods of construction will impact adversely on some children. The effect of combined noise will diminish appreciably throughout the remainder of Murtle Estate. Nevertheless, intensive preparation and support of all children will be required, and this issue is addressed in our recommendations.

With respect to Newton Dee noise levels generally fall near or below 50dB(A) at both *Dolphin* and *Michael Chapel*. Exceptions will be found for *Dolphin* at Combinations 10 and 11, which together have a duration of 4 weeks, and for *Michael Chapel* at Combinations 10, 11 and 12, which together have a duration of 5 weeks, though none exceed 55dB(A). Noise levels will drop across the rest of the campus, and in some areas be only slightly above the present baseline measure.

#### 4.3.3.4 Comment on internal noise levels in main educational and therapeutic complex during construction

In order to consider the internal noise level during construction in the central educational/therapeutic complex, the assessment was based on one of the cases during term time where both *Robert Owen House* and *St Ternan's* were at their highest levels, specifically Combination 6. This indicated that the typical noise level at the first floor level, with an open window, would be  $L_{Aeq}$  36.1dB(A) and with window closed, 26.1dB(A). Figures for other properties in this complex would be similar. The former figure is just above the WHO classroom level of 35dB(A), while the latter falls well within that threshold.

In addition to the effects of noise levels pupils will also experience a variety of forms of intrusion associated with construction, i.e. progressive visual change to the landscape and use of mechanical plant will be apparent, and again management of the effect of these intrusions is dealt with in our recommendations.

#### 4.3.4 Overview of noise impact during construction: Comment and recommendations

In the Interim Findings report we noted periods of time during which noise levels during construction were in excess of the 55dB(A) outdoor level recommended by WHO, even with proposed mitigation measures. Serious concerns were expressed regarding the consequences of such intrusion. The construction programme proposed and summarised above brings noise levels when the children are in residence to, or within, that threshold at the sites nearest to construction activity for most of the construction period. This level reduces as we move away from such activity across the site. The period during the day when construction activity is to be undertaken is timed to coincide with when most school-activity (although by no means all) would be carried out indoors in classrooms and elsewhere. Construction activity would also be suspended on days when specific outdoor activities were planned, with agreement between the Camphill communities and the Scheme Promoter on such dates being made in advance of construction works commencing (*clarity is required here if misunderstandings are to be avoided – see Recommendation 11*).

The proposed reconfiguring of the construction programme goes a considerable way to mitigating the effect of this activity. Set against these gains, however, is the fact that these are achieved at the cost of doubling the time for which construction would be undertaken in the Murtle Estate/Newton Dee environs. This entails a longer period for which pupils and co-workers would have to adjust to and cope with any stress arising from construction, although the overall level of intrusion would be appreciably less.

Despite this overall improvement to the situation, concern remains that at a limited number of locations at various times there will be a small number of children who will be significantly adversely affected by construction activities. As noted in the Interim Findings report, it is impossible to quantify the number and identify such vulnerable children. With respect to those with autistic spectrum disorders, our preceding comments on sensory sensitivity and hyperacusis would indicate that there will be a few for whom construction

activities would be stressful. We have not been provided with any information on children vulnerable in this respect, but given that all children experience busy roads, traffic noise, and indeed the noise of construction activities on site, Camphill co-workers should be able to identify such vulnerable children on the basis of past adverse reactions. The same applies, in reality, to the majority of the non-autistic children, i.e. any typical stressors should be known by staff.

The Interim Findings report noted: *“Further review of construction phasing and methodology will be undertaken in conjunction with further development of the design. This will include reviewing the construction sequence to address specifically construction noise. Any such review would be undertaken in conjunction with an evaluation of the impact of individual pupils or villagers to update assessment.”* (p.28).

The review and reconfiguration of construction has been undertaken, as described above. No review of the impact on *individual* children has been undertaken at this stage in the assessment process, as children who are currently resident may not be living at Murtle Estate when construction begins. **Recommendation 1**, below, deals with the assessment of the impact of construction on individual children prior to commencement of construction activities.

Overall the impact of construction on the pupils of Murtle Estate is predicted to be less than was suggested in the Interim Findings report. Nevertheless, the conclusion there still stands: there will be some children for whom the period of construction is a significant stressor, the behavioural and emotional consequences of which may not be preventable. In **Recommendation 2** we suggest that if this route is chosen for the AWPR, the small number of children seriously affected should be reviewed in order that their difficulties can be addressed, either therapeutically, or by a move elsewhere within the immediate Camphill community.



For the majority of the children, *as in any setting where children live, learn and play*, a detailed programme of preparation for the construction and operation of the road is suggested in **Recommendation 3**.

The high motivation and commitment of staff working in Murtle Estate may be deemed by some to make *additional* support and advice during construction unnecessary. **Recommendation 4** deals with the issue of support.

Liaison between those involved in the building of the road and staff and management of Murtle Estate would need to be formalised and is considered further in **Recommendation 5**. Continued attention to mitigation of the impact of the construction of the road is urged in **Recommendation 6**.

The following recommendations are made to all those who would be engaged in and responsible for mitigating the effects of construction of the road and its subsequent operation on children, villagers, and indeed co-workers and staff. This primarily involves those who live and work in the Camphill communities, the relevant departments within Aberdeen City Council (i.e. education and social work) and the Scottish Executive. The particular inputs and configuration of these various agencies would have to be determined in the light of Camphill's expressed needs for support in realising the recommendations.

**Recommendation 1:** In the light of the new information on construction of the AWPR, an assessment should be made of children for whom there is a significant probability that their well-being will be adversely affected. This will need to be undertaken near to the time at which construction would begin.

**Recommendation 2:** In the light of such assessment, decisions should be taken as to whether with appropriate support the child can be maintained in Murtle Estate, or whether a move to the school located at Camphill Estate, Milltimber, should be effected.

**Recommendation 3:** While the majority of children would remain on site during construction of the AWPR, every effort should be made to familiarise them with the projected activities at the various locations and the sources of sound. The author hesitates to suggest specific ways in which this might be done. However, in the context of outside events impinging on a local authority school it is likely that school project work about the road would be undertaken, e.g. visiting the construction site with the opportunity to understand the sources of noise and disruption. Familiarisation with site managers and workers would give a human face to what might seem an inexplicable series of potentially frightening events and social intrusions.

**Recommendation 4:** Staff should be consulted on possible additional support they may require, either as individuals or groups of individuals, or with respect to direct support for the children. It is important that this issue should be considered and raised by grassroots staff and not determined by management or senior figures in the communities.

**Recommendation 5:** The overall situation for pupils and staff of Murtle Estate during three years of construction is potentially fraught and if not managed properly will result in increased and damaging stress. Steps should be taken to ensure that a forum is developed in which issues can be addressed and resolved. In the light of the history of the past discussion between the Camphill communities and those associated with the building of the AWPR, an experienced mediator or moderator acceptable to both parties should be involved.

**Recommendation 6:** Should a decision to proceed with the Murtle Route be taken, there should be a further full review of the proposed construction plan with respect to considering further noise and visual impact mitigating measures taking into account consequences anticipated by staff and management of Murtle Estate. Specifically we would recommend that:

- it should be a requirement for work between the River Dee and the A93 that the quietest available construction plant should be utilised, in

keeping with the noise levels anticipated within the construction noise assessment discussed here

- temporary screening be provided both to the east of Murtle Estate and to the west of Newton Dee village immediately on commencement of works and maintained while works are continuing

**Recommendation 7:** An independent assessment of the health and safety implications of each phase of construction should be commissioned from the *Royal Society for the Prevention of Accidents*, or equivalent, and its implications embedded in the operational procedures for both school and constructors.

In the Interim Findings report it was noted (p. 32) that the anticipated impact of external ambient noise during construction on villagers living in Newton Dee would be appreciably less than for pupils in Murtle Estate. The reconfigured proposals for constructing the AWPR described in Appendix A reinforce this view. The reduced impact of noise on Murtle Estate and the programming of the construction phases during term time yields further reductions in noise for Newton Dee.

It is impossible to preclude adverse effects for adult villagers, although we would seriously question whether these would be the result of noise *per se*. It is possible that ongoing construction activities will adversely affect and/or attract some individual villagers. This possibility is reflected in **Recommendation 8**, below. With respect to overall management of change during the construction phase, **Recommendations 9-14** essentially parallel those made above for Murtle Estate.

**Recommendation 8:** Co-workers and staff should assess in the light of the planned and then on-going construction work vulnerable individuals for whom additional support would be required.

**Recommendation 9:** Every effort should be made to familiarise villagers with the activities at the various locations and the sources of sound by developing project work associated with the road, e.g. study of maps, walking

the route, viewing videos of construction activity etc. could be carried out in order to enhance understanding of the sources of noise and disruption. Familiarisation with site managers and workers would be advantageous and would assist those working on site to communicate more comfortably with villagers.

**Recommendation 10:** Co-workers and staff should be consulted on possible additional support they may require, either as individuals or groups of individuals, or with respect to direct support for the villagers. As with those working in Murtle Estate, it is important that this opportunity should be considered and raised by grassroots staff and not determined by management or senior figures in the communities.

**Recommendation 11:** It is accepted that construction of the road will impinge on villagers and co-workers. Steps should be taken to ensure that a forum is developed in which issues can be addressed and resolved. In the light of the history of the past discussion between the Camphill communities and those associated with the building of the AWPR, a mediator or moderator acceptable to both parties should be involved.

**Recommendation 12:** Should a decision to proceed with the Murtle Route be taken, there should be a full review of the proposed construction plan with respect to considering further noise and visual impact mitigating measures taking into account consequences anticipated by staff and management of Newton Dee.

**Recommendation 13:** An independent assessment of the health and safety implications of each phase of construction should be commissioned from the *Royal Society for the Prevention of Accidents*, or equivalent, and its implications embedded in the operational procedures for both school and constructors.

#### 4.4 *Impact of noise during the operation of the road*

Details of free-field noise levels assessed at a height of 1.5m above ground level by the  $L_{Aeq, 16hrs}$ , time period employed in the WHO standards are

presented in Appendix B. The noise levels are based on predictions regarding the road noise plus measured present ambient background noise of 41.6dB(A) for Murtle Estate and 43.8dB(A) for Newton Dee. The predictions are based on traffic flows in 2025, anticipated to be an 18-hour 2-way flow of 35,615 vehicles, of which 9.3% will be HGV, and take account of mitigation measures including use of a quiet road surface that will reduce traffic noise, and noise barriers at various locations. The external noise levels at Murtle Estate are presented as noise contours in Figure 3, and for Newton Dee in Figure 4, each figure also identifying the various buildings present, which include residential, community, therapeutic and workshop/commercial premises.

#### 4.4.1 Murtle Estate

##### 4.4.1.1 Outdoor noise

Figure 3 shows a number of buildings on Murtle Estate falling in areas where the noise level is  $\leq 50\text{dB(A)}$  (i.e. yellow area) or  $\leq 45\text{dB(A)}$  (i.e. dark green area). Among these are *Tourmalin*, *Pyrite*, *Rose Cottage*, *Camphill Hall*, *Camphill Medical Practice*, *St. Andrew's* and *St. Bride's*. Noise levels ( $L_{Aeq, 16\text{hrs.}}$ ) for specific properties around the southern and eastern boundaries and along the estate access road are listed in Table 1. A range is presented as the noise level varies between façades.

Table 1 – External (Free-field) Noise Levels at Selected Locations

Type of Facility	Name	External Noise Level (dB(A))
Pupil/Staff Shared Residential Facility	Robert Owen House	47.0-50.2
	Mignon & Columbine	45.9-49.9
	St Ternan's	46.7-51.6
Educational/Therapeutic Facility	Beech Workshop	45.9-54.2
	Murtle Workshop	44.4-51.9
	Studio/Metal Workshop	43.8-50.9
	Amber Kindergarten	45.9-52.5
	Rowan Workshop	46.6-49.6
Staff Only Residential Facility	Railway Cottage*	47.3-57.0
	St Brendan's	46.0-52.6
	Coracle	44.1-50.7
	Juniper	45.8-50.7
	Fedelma	46.9-55.4
	St Machar's	46.6-52.3
	Omar	44.6-50.5
Heatherdee	44.9-50.5	

\* Indicates that property concerned lies outwith the main Murtle Estate area, being north of the disused Deeside Railway Line.

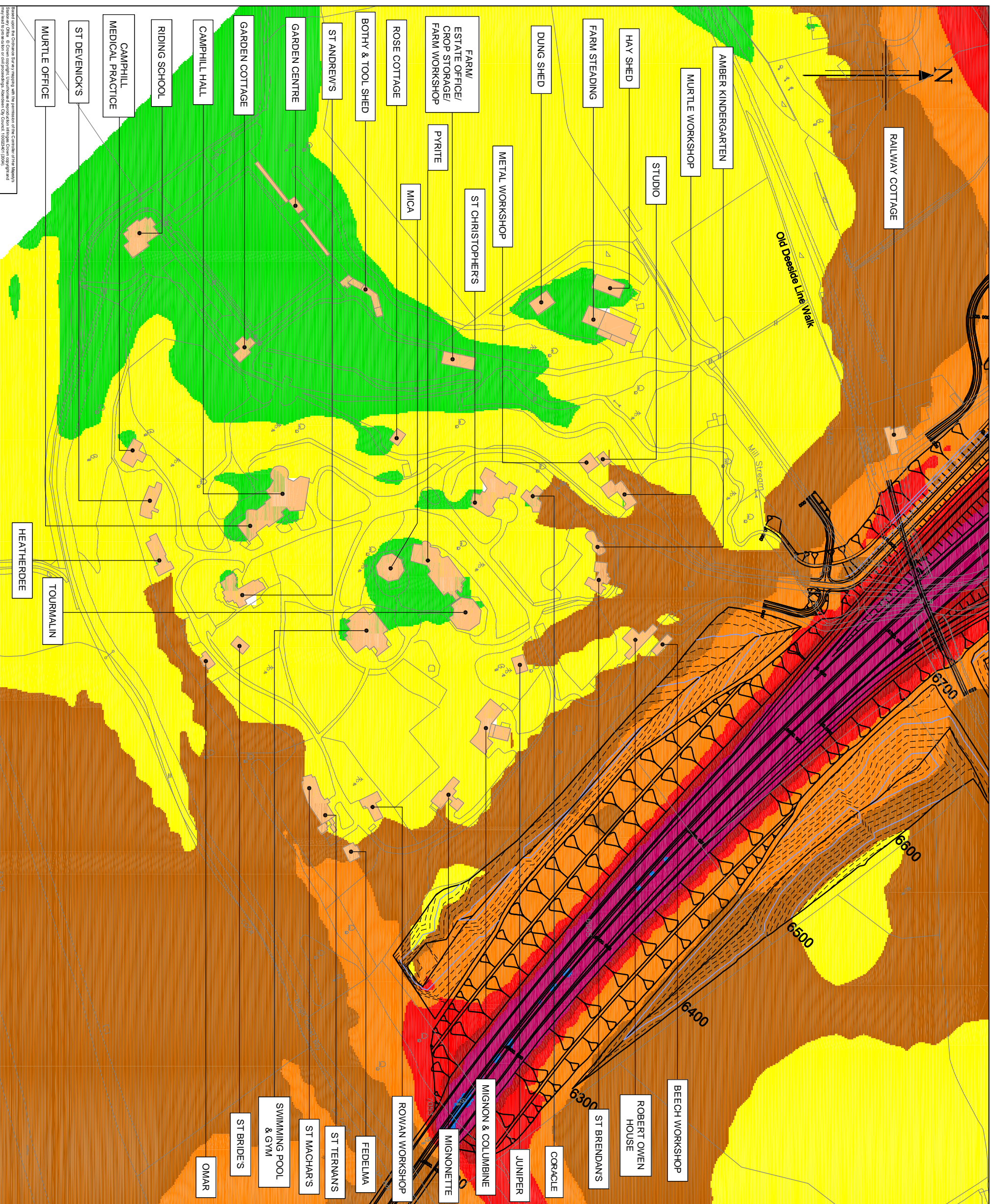


Figure 3

Legend

Murrie Estate Buildings	Leqeq (hours) at 1.5m above ground level
Up to 35.0 dB	Blue
35.0 to 40.0 dB	Light Blue
40.0 to 45.0 dB	Light Green
45.0 to 50.0 dB	Green
50.0 to 55.0 dB	Light Yellow
55.0 to 60.0 dB	Yellow
60.0 to 65.0 dB	Orange
65.0 to 70.0 dB	Red-Orange
70.0 to 75.0 dB	Red
75.0 to 80.0 dB	Dark Red

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Rev	Description	By	Checked	Approved
0	Issue for approval			

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**Camphill School, Murrie Estate**  
 2025 Operational Noise

Project name: FINAL  
 Date: 11/09/24  
 Drawing No: 2025-01  
 Drawing Title: Operational Noise  
 Drawing Scale: 1:1000  
 Drawing Date: 11/09/24  
 Drawing No: 2025-01  
 Drawing Title: Operational Noise  
 Drawing Scale: 1:1000  
 Drawing Date: 11/09/24

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Figures 3

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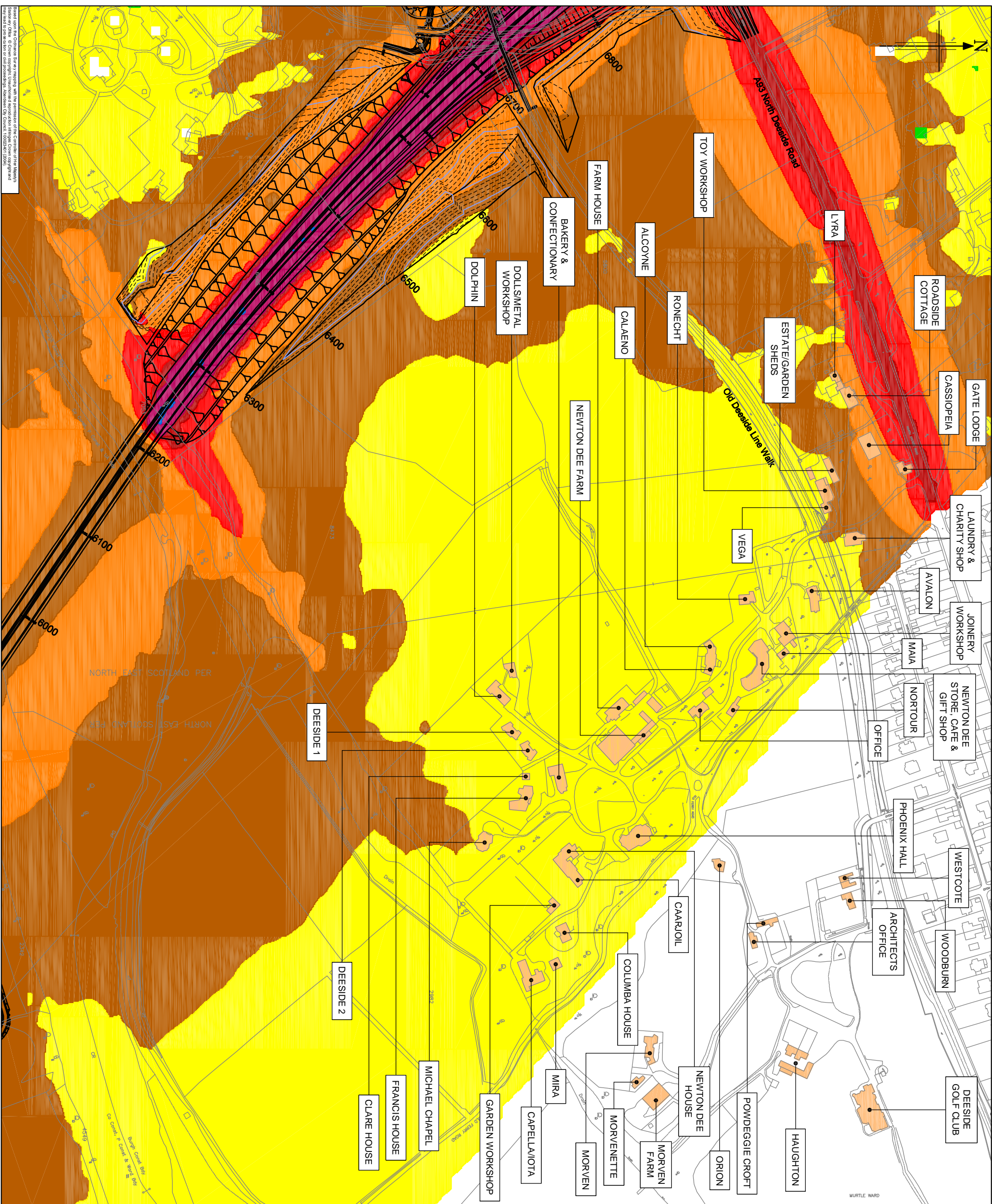


Figure 4

Newton Dee Buildings

Color	Noise Level (dB)
Lightest Yellow	Up to 35.0 dB
Light Yellow	35.0 to 40.0 dB
Yellow	40.0 to 45.0 dB
Light Orange	45.0 to 50.0 dB
Orange	50.0 to 55.0 dB
Dark Orange	55.0 to 60.0 dB
Red-Orange	60.0 to 65.0 dB
Red	65.0 to 70.0 dB
Dark Red	70.0 to 75.0 dB
Black	75.0 to 80.0 dB

Laeq (16hours) at 1.5m above ground level

Rev	0	Revision	Reason for revision	Date	Checked	Approved
<p><b>JACOBS BABTIE</b></p> <p>2025 Operational Noise</p> <p>Newton Dee Village</p> <p>2025 Operational Noise</p> <p>FINAL</p>						
<p>0</p>						

This drawing is not to be used in any other project without the prior written consent of Jacobs Babtie. All terms and conditions apply.

Attention should be drawn to two groups of buildings in which noise spillage impinges. The first follows the line of the present Murtle Estate access road e.g. *St. Brendan's, Coracle, Robert Owen House, Amber Kindergarten, Murtle Workshop, Juniper* and *Mignon & Columbine*. The second is to the east of the River Dee crossing and includes *Fedelma, St. Ternan's, St. Machar's, Omar,* and *Heatherdee*.

These properties, on the façade with the highest noise level, fall at or well below the WHO threshold for external noise of 55dB(A). Table 1 also breaks down the properties with respect to their use. The three workshops are essentially used for internal activities, while seven properties (excluding *Railway Cottage* which is too far off campus to be considered of concern) are staff houses. *Robert Owen House, Mignon & Columbine* and *St. Ternan's*, however, are houses shared by pupils and staff. In addition, it would be expected that, as with any nursery facility, children attending *Amber Kindergarten* will spend some time out of doors.

Set against these noise levels it should be noted that the majority of Murtle Estate will experience substantially below the 50-55dB(A) level as shown in the yellow and dark green areas of Figure 3. It is in this area, where there is a clear “cushion” between the WHO threshold and predicted noise, that most formal and informal activities take place.

Before considering the implications of these revised noise levels for the operation of Murtle Estate, we will briefly comment on their possible effects on communication between children and children and adults. With respect to intelligibility of speech in these locations of Murtle Estate, it is worth noting that with respect to noise levels and speech intelligibility, with a speaker-to-listener distance of about 1 m, the WHO reports that speech in relaxed conversation is 100% intelligible in background noise levels of about 35dB(A), and can be understood fairly well in background levels of 45dB(A), i.e. a level only slightly above the present ambient levels in Murtle Estate. With more vocal effort, speech can be understood when the background noise level is about 65dB(A). The predicted levels in the noisier areas of Murtle Estate will decrease intelligibility for some children unless, to use the WHO term, greater



vocal effort is made by their speech partner. This will apply particularly along the eastern and southern areas identified above and at the Old Deeside Line Footbridge. Children with autism, but others too, may experience reduced ease of conversation in the relatively high-noise areas.

The conclusions of the Interim Findings report were based on a clear cushion between the WHO 55dB(A) threshold and predicted noise levels. At some locations in the vicinity of the properties noted in Table 1 this cushion has been eroded, though at no point does the level exceed the WHO threshold. On some façades of these properties the level is appreciably below that threshold with a clear cushion of up to 10dB(A) (i.e. Omar and Heatherdee) or more (e.g. Coracle). This situation suggests that noise levels in the eastern and south eastern sectors remain potentially stressful to some children, though possibly to fewer than originally anticipated. In some areas noise levels remain in a range in which outdoor communication might be affected. Our original conclusions with respect to the wider area of Murtle Estate are reinforced by the re-estimated noise levels (Figure 3) that intrusion from operational road noise will have little effect in most of the area of Murtle Estate.

If noise levels in the area of the properties described in Table 1 are considered to impact adversely on a significant number of children (which this author thinks unlikely), then attention should be given to some reconfiguration of property locations. This would entail a combination of siting new buildings to replace those in the areas identified or changes of use that would preclude children *having* to travel within the 50-55dB(A) zones. *However*, this recommendation (**Recommendation 14**) applies only to those properties in which there are direct impacts on children in their immediate living areas (i.e. *Robert Owen House, Mignon & Columbine* and *St. Ternan's* and *Amber Kindergarten*) and is premised on a careful assessment of possible adverse effects on individual children.

It is not possible to comment in detail on the location of outdoor educational, therapeutic and recreational activities throughout Murtle Estate. However, our view is that throughout most of Murtle Estate noise levels fall sufficiently

below the WHO threshold, even taking into account the sensory sensitivity of this group, not to interfere with positive engagement in such outdoor activities for most children. However, on-going observation and assessment of children will be critical (**Recommendation 15**), and the possibility that a small number may have to be relocated to the school at Camphill Estate, Milltimber, cannot be precluded. The presence of the road will also present increased risks to children who may be attracted to it or who may inadvertently stray on to it via slip roads. Again we recommend a full, independent risk assessment (**Recommendation 16**).

**Recommendation 14:** The impact of outdoor noise levels on children using and accessing *Robert Owen House, Mignon & Columbine* and *St. Ternan's* as well as *Amber Kindergarten* should be determined. The necessity of relocating or changing the use of these properties should be determined by co-workers in Murtle Estate in consultation with children should noise levels and other forms of disruption be considered to have adverse effects on any pupils.

**Recommendation 15:** The impact of the increased noise levels on all children should be assessed through observation, and in cases of any adverse effect on their well-being, appropriate support strategies put in place.

**Recommendation 16:** An independent assessment of the health and safety implications of the operation of the road should be commissioned from the *Royal Society for the Prevention of Accidents*, or equivalent, and its implications embedded in the operational procedures for the school.

#### 4.4.1.2 Indoor noise

##### *Effect of noise in residential properties*

Table 2 presents noise levels at selected residential properties where pupils live. These are the key properties for which outdoor noise levels on the façade with the highest noise level fell between 50-53dB(A). These are presented for day-time and night-time with both an open window and a closed, single-glazed window. A further reduction may be achieved through use of double glazing. The ground-floor assessment is based on a height of 1.5m above

external ground, and first floor levels are based on a height of 3.5m above external ground. For a full technical comment on the table see Appendix B. Noise levels are presented for *Robert Owen House, Mignon & Columbine* and *St. Ternan's*.

Table 2 – Internal Noise Levels at Selected Residential Properties Used by Murtle Estate Pupils

Name	Level	Internal Noise Level (dB(A))			
		Open Window*		Closed Window*	
		Day	Night	Day	Night
Robert Owen House	Ground	34.5-37.7	24.5-27.7	24.5-27.7	14.5-17.7
	First	36.3-40.2	26.3-30.2	26.3-30.2	16.3-20.2
Mignon & Columbine	Ground	33.4-37.4	23.4-27.4	23.4-27.4	13.4-17.4
	First	35.1-39.7	25.1-29.7	25.1-29.7	15.1-19.7
St Ternan's	Ground	34.2-39.1	24.2-29.1	24.2-29.1	14.2-19.1
	First	35.2-42.5	25.2-32.5	25.2-32.5	15.2-22.5

*\*The range of noise levels given relate to predictions for different building façades.*

The critical, but not only, aspect of internal noise is its effect on the children's sleep, particularly given the acknowledged difficulties that some children have in this respect (See Section 4.2). WHO observations on sleep disturbance are therefore particularly pertinent: *“Measurable effects of noise on sleep begin at  $L_{Aeq}$  levels of about 30dB. However, the more intense the background noise, the more disturbing is its effect on sleep. Sensitive groups mainly include the elderly, shift workers, people with physical or mental disorders and other individuals who have difficulty sleeping.”* It is recommended that if sleep problems are to be avoided when noise is continuous, the equivalent ambient noise should not exceed 30dB(A) indoors. Not unexpectedly, specific loud noises also affect sleep and their occurrence should also be taken into account, with 45dBmax not being exceeded. However WHO suggests that for those prone to sleep disturbance, a lower (but unspecified level) should be set.

Predicted internal night-time noise during operation of the road in the three key Murtle Estate properties (Table 2) on the first floor with windows closed fall well within the WHO guideline. With windows open, however, these figures fall closer to WHO threshold for *Robert Owen House, Mignon & Columbine* and *St. Ternan's*. With windows open, the minimum-maximum range across the properties is 23.4dB(A) – 32.5dB(A), falling in the case of *St*

*Ternan's* above the WHO threshold.

With windows closed, then, the noise levels fall well within WHO guidelines for typical individuals and would be unlikely to affect children sleeping on the first floor of these properties. With bedroom windows open, however, though noise levels are generally predicted to comply with WHO guidance for acceptable conditions promoting good sleep for typical children, such levels would have the potential to create sleep disturbance for several of the Murtle Estate pupils. In the event of sleep disturbance, sensitive children may have to move to bedrooms facing away from the source of the noise.

In discussion with staff of Murtle Estate, the question was raised as to why closure of windows should be forced on children and staff, denying them the opportunity to choose how they wished to live. This question cannot be answered here, but the point should be made that with present night-time noise levels and the vulnerability of children to sleep disturbances, it is highly probable that staff would have no option but to close the windows. Given the understandable significance this has for staff, the view expressed in **Recommendation 14** applies here, i.e. that with the addition of *St. Ternan's* to the noted properties, consideration needs to be given to possible relocation.

Staff and co-workers, too, sleep in these houses and elsewhere on Murtle Estate. Here WHO levels applicable to the general population apply, and even with the bedroom window open, sleep disruption would not be anticipated (Table 2).

With respect to daytime and evening, the WHO suggests a figure of 35dB ( $L_{Aeq, 16hrs}$ ) for internal environments to avoid annoyance. As may be seen in Table 2, with windows closed, noise levels fall consistently within the WHO threshold at ground and first floor levels for all three key properties. With windows open, however, internal noise levels close to or above the WHO threshold, reaching 40.0dB(A) on the first floor of *Robert Owen House* and 42.5dB(A) on the first floor of *St Ternan's*. Again, we suggest consideration of **Recommendation 14**.

Co-workers, for whom Murtle Estate is also home, as well as staff, will also find their internal living environment affected by increased noise (Table 3). With open windows, the noise levels during the day and night typically span or exceed the respective WHO thresholds of 35dB(A) and 30dB(A). With windows closed, levels generally fall within the thresholds for both day and night. The undesirable overall consequence for staff is that they will be subjected to slightly higher levels of noise which they will only be able to mitigate through keeping windows closed.

Table 3 – Internal Noise Levels at Selected Residential Properties at Murtle Estate Used by Staff Only

Name	Level	Internal Noise Level (dB(A))			
		Open Window*		Closed Window*	
		Day	Night	Day	Night
St Brendan's	Ground	33.5-40.1	23.5-30.1	23.5-30.1	13.5-20.1
Coracle	Ground	31.6-38.2	21.6-28.2	21.6-28.2	11.6-18.2
Fedelma	Ground	34.4-42.9	24.4-32.9	24.4-32.9	14.4-22.9
	First	35.4-43.6	25.4-33.6	25.4-33.6	15.4-23.6
Heatherdee	Ground	32.4-38.0	22.4-28.0	22.4-28.0	12.4-18.0

*\*The range of noise levels given relate to predictions for different building façades.*

#### *Effect of noise in educational and therapeutic properties*

Table 4 presents noise levels at selected educational and therapeutic properties falling in the eastern and southern areas where noise is predicted to be highest. Again, for a full technical comment in the table see Appendix B.

With respect to internal noise generated by the operational phase of the AWPR, the WHO recommendation for schools has been used. The relevant bench mark is a maximum noise level of 35dB(A) during teaching sessions.

Table 4 – Internal Noise Levels at Selected Educational/Therapeutic Properties Used by Pupils

Name	Category	Internal Noise Level (Daytime) (dB(A))	
		Open Window*	Closed Window*
Beech Workshop (see Note 1)	Ground Floor	33.4-41.7	23.4-31.7
	First Floor	35.9-42.4	25.9-32.4
Murtle Workshop (see note 2)	Ground Floor	31.9-39.4	21.9-29.4
	First Floor	33.4-39.8	23.4-29.8
Studio/Metal Workshop	Ground Floor	31.3-38.4	21.3-28.4
Amber Kindergarten	Ground Floor	33.4-40.0	23.4-30.0
Tourmalin	Ground Floor	32.2-33.1	22.2-23.1
Pyrite	Ground Floor	30.8-33.1	20.8-23.1
	First Floor	31.8-34.3	21.8-24.3
Mica	Ground Floor	30.9-31.8	20.9-21.8
Rowan Workshop	Ground Floor	34.1-37.1	24.1-27.1

*\*The range of noise levels given relate to predictions for different building façades.*

*Note 1 – Beech Workshop is elevated above surrounding ground level*

*Note 2 – Murtle Workshop is believed to be single story to north and east*

For all four workshops the ground floor noise levels with windows open exceed the WHO threshold of 35dB(A). With windows closed they fall within the threshold. It is not possible to determine whether the nature of the work is such that raised levels of noise will interfere with, for example, noise generating activities such as wood working, or whether the nature of the work will demand open windows for comfort at certain times of year.

With open windows in *Amber Kindergarten*, internal noise levels exceed the WHO threshold, being between 33.4dB(A)-40.0dB(A). With windows closed, levels fall within WHO guidelines to 23.4dB(A)-30.0dB(A). Again, it must be questioned whether the constraint of permanently closed windows is acceptable in a nursery setting and we draw attention to **Recommendation 14** with its suggestion that relocation of certain properties should be considered should the AWPR be built at this location.

However, the position is clearer for the principal educational complex which with respect to external noise falls well within the  $\leq 50$ dB(A) contour with a clear zone of  $\leq 45$ dB(A) between the buildings (see Figure 3). Internal noise levels for *Tourmalin*, *Pyrite* and *Mica* fall well within the WHO recommendation at ground floor level with windows closed. The noise levels also fall within the WHO threshold with windows open, though whether there

is a sufficient “cushion” for children who may be sensitive to noise needs to be assessed. We would not anticipate overall that the levels would have detrimental educational or therapeutic consequences in these facilities.

#### 4.4.2 Newton Dee

With respect to Newton Dee, it may be seen from Figure 4 (noise distribution map) that the area of the site where buildings are located falls within the level  $\leq 50\text{dB(A)}$  area (yellow). Our original conclusion stands regarding the effect of operation of the road. There we indicated that daytime noise levels for Newton Dee are lower overall than for Murtle Estate. Some adults may be adversely affected by the higher noise levels in certain locations while working outdoors. However, the projected noise levels are close to the existing ambient noise levels, resulting in less disturbance for Newton Dee than for Murtle Estate, due to the increased distance of the former from the road. In addition, many of the villagers work indoors, e.g. in the bakery and woodwork shop. In the latter, far higher levels of machine specific noise occur intermittently and have not been reported to be detrimental to villagers.

As a consequence of the lower external noise levels, it is anticipated that internal noise, both during the day and night would fall within acceptable noise levels as specified by the WHO. Noise levels for two key properties closest to the sources of noise are presented in Table 5.

Table 5 – Internal Noise Levels at Selected Properties at Newton Dee

Name	Level	Internal Noise Level (dB(A))			
		Open Window*		Closed Window*	
		Day	Night	Day	Night
Dolphin (Residential)	Ground	32.6-35.4	22.6-25.4	22.6-25.4	12.6-15.4
	First	33.7-36.3	23.7-26.3	23.7-26.3	13.7-16.3
Michael Chapel (Community Facility)	Ground	31.8-36.5	21.8-26.5	21.8-26.5	11.8-16.5
	First	32.2-38.0	22.2-28.0	22.2-28.0	12.2-18.0

*\*The range of noise levels given relate to predictions for different building façades*

With respect to the residential facility, *Dolphin*, night-time noise levels with the window open or closed fall well within the 30dB(A) threshold suggested by WHO that would not result in disrupted sleep in the general population. Day-time noise with windows closed also falls well with the 35dB(A) threshold,

though with windows open this is exceeded in some parts of the facility. Nevertheless, should the AWPR be built, Newton Dee villagers and co-workers will have to make adjustments to a clear change in their environment. It is important that they have the opportunity to raise and resolve issues arising, and a similar suggestion as that in **Recommendation 17** (below) is made which would involve those responsible for administration of the road, i.e. the Scottish Executive.

#### 4.5 *Contact within the community*

As noted in Section 1, the Murtle Estate, Newton Dee, and the Camphill school to the west of Murtle Estate (Milltimber) are viewed as a single community by those who study, work and live in them. Though contact between these groups is evident, the extent to which these communities are *functionally integrated* is difficult to determine. The principal physical linkage, which is all that need concern us here, is along the Old Deeside Line Walk to the north of Murtle Estate and Newton Dee. It is understood that this facility is to be maintained on its current route following completion of AWPR, although temporary closure and re-routing will be required during the construction phase. There is therefore no permanent loss of the existing physical linkage between the sites and provision to maintain the link will be made with the building of a secure bridge over the AWPR.

With respect to noise levels on this bridge, where the Old Deeside Line Footbridge crosses the AWPR, the noise level is estimated as  $L_{Aeq, 16 \text{ hrs}}$ , 68dB(A). The design of this bridge has been developed to provide visual screening of the AWPR from the Old Deeside Line Walk and further reduction of sound levels could only be achieved by complete enclosure of the walk over the length of the bridge. Since the noise level at this location is well in excess of the WHO 55dB(A) threshold, consideration may be given to building a separate, enclosed, dedicated link between Camphill and Newton Dee, should this be considered appropriate in further discussion of mitigation measures.

The area between Milltimber and Murtle Estate school is cut by a busy road, the B979. Linkage between Murtle Estate and Newton Dee involves crossing



or at least walking along the access roads into each community. Pupils and villagers who are independent travellers also have access to the extremely busy A93 to the north of the communities. Physical connections, then, are restricted, and other forms of joint activity, e.g. social events, can be effected through vehicular travel between the communities. As noted in **Recommendations 13** and **16** an independent risk assessment will be essential if the AWPR is located between the Camphill communities, and this should recognise the current safety concerns of the present access to roads as well as the impact of the AWPR.

#### *4.6 Communication between Camphill and relevant bodies*

It is important that during operation of the road, children, co-workers and parents have the opportunity to deal with any issues of concern that may arise. **Recommendation 17** suggests a working group to consider and raise such issues with the bodies responsible for operation of the road.

**Recommendation 17:** In the event of the road becoming operational, a forum should be developed in which issues arising from the operation of the road can be addressed with the relevant agencies responsible. This should comprise pupils, villagers, co-workers, and family members. Such a forum would benefit from support from an independent mediator or moderator.

## 5 Conclusions

The impact of the AWPR on the Camphill communities at Bieldside is significant and potentially negative in its effects. This is acknowledged in the attention paid to minimizing the impact of construction on both children of Murtle Estate and the villagers of Newton Dee. Similarly, the overall design of the road and its environs have been undertaken to keep noise and visual distraction during operation to as low a level as feasible. The significant impact of the road is also acknowledged in this report both explicitly and implicitly – explicitly with respect to Murtle Estate by drawing attention to noise levels that would create difficulties for some children, and implicitly in the recommendations which set out to suggest ways in which the adverse impact of the road during construction and operation might be mitigated.

The fundamental questions relate to whether the extensive mitigation of the impact of the road through the programme of construction and design, plus the measures to facilitate adaptation described here, would ensure the continued viability of the communities. With respect to Newton Dee we anticipate that should the road be built the community will be viable in its present physical form, i.e. no significant adaptations will need to be made to buildings or where they are located. Help will be needed to assist villagers to come to terms with the reality of the road and to learn to live with it, but we do not foresee any profound qualitative change in the way the community functions or its overall ethos.

The situation with respect to Murtle Estate however is more significant. Five overarching areas of change resulting from the impact of the road were identified:

- For the school to remain viable relocation of facilities away from the eastern and southern borders of the estate would be called for. Here the word “facilities” has been employed because this may be effected by changing the use of vulnerable buildings, i.e. for children to move elsewhere on the site to, possibly, new-build houses, their old

residences being used for non-residential purposes or residents unaffected by the increased noise.

- As well as physical change, there would be some measure of change of outdoor usage of the campus. We do not anticipate that in the main, central area of the campus activities at present conducted will be precluded for most children. Outdoor therapy, education and recreation would continue as before. While we do not believe education and therapy conducted indoors will be directly affected, living conditions will be slightly changed; the impact of night-time noise with windows open was cited as an example of a significant loss of choice by co-workers should they be forced to keep their windows closed.
- A thorough appraisal of the implication of road construction and operation for the safety of the children would be imperative and might lead to changes in the level of freedom that they now enjoy, although it should be noted that at present children can walk out on to a busy main road (the A93) and indeed into Aberdeen itself.
- For a small number of children, road noise and its disruption might affect their well-being and relocation to the school at Camphill Estate might be required. It has been noted in a separate report prepared on Camphill School by Dr May that Murtle Estate does not at present accept all children referred, as the school is considered unable to provide a suitable service and vulnerability to the road would not be the only exclusion criterion.
- With respect to the entire social ecology of Murtle Estate with its relationships between children, co-workers and staff, and with friends and colleagues from Newton Dee, there would have to be a period of radical readjustment in which, in the writer's view, would require considerable support.

If these adjustments were made, then Murtle Estate would be able to continue providing the educational and therapeutic programmes to meet the needs of

most of the vulnerable children referred by parents and local authorities. It would certainly be possible to deliver a high quality service that would benefit the children and fulfil wider publicly specified standards. Should further improvements be achieved in mitigating the effects of the road, then clearly the detrimental effects noted in this report would be further ameliorated. Whether the impact described would retain sufficient of the conditions and ethos that members of the communities regard as essential to the viability of a Steiner-inspired community, must be commented on by them. Here we are predicting that in the context of national educational priorities, which include maintaining independent residential schools that continue to meet the needs of vulnerable children, Murtle Estate school would be able continue to provide such a service, but with considerable adjustment and support being required. Newton Dee will also remain viable, the impact of construction and operation of the AWPR being considerably less than for Murtle Estate. Again, however, an active process of change management will be called for.

## **Appendix A – Construction Noise Information**

## **Camphill Assessment Construction Noise Assessment**

### **Overview**

#### Construction Stages

The construction noise assessment has been prepared by assessing particular activities that would require to be undertaken as part of the construction of the Aberdeen Western Peripheral Route in the Murtle Estate area, which has been defined as extending from the River Dee in the south to the A93 in the north. These activities are shown diagrammatically on Figures C1, C2 and C3, with each figure corresponding to a different stage of the works. These stages are, respectively:

- Stage 1: Which involves formation of a temporary access to the River Dee flood plain, and is expected to take place as an advance works contract.
- Stage 2: Which involves works north of the River Dee flood plain, including earthworks, bridgeworks and roadworks at a variety of locations between the escarpment north of the River Dee and the A93.
- Stage 3: Which involves works on the flood plain, including bridgeworks and roadworks for the River Dee Bridge.

The sequences of these stages are shown in more detail in the accompanying programme, which represents a possible approach to the construction of the works in this area, and should be considered as indicative rather than definitive.

#### Assessment Locations

The construction assessment has considered four particular locations. These are:

- Robert Owen House in Murtle Estate, which is a residential facility occupied by pupils at Camphill School. This location is the residential facility considered to be most exposed to construction noise originating from the north and east of Murtle Estate.
- St Ternans in Murtle Estate, which is also a residential facility occupied by pupils at Camphill School. This location is the residential facility considered to be most exposed to construction noise originating from the south and east of Murtle Estate.
- Dolphin in Newton Dee, which is also a residential facility occupied by residents of Newton Dee Village. This location is the residential facility considered to be most exposed to construction noise originating from the north, west and south of Newton Dee Village.
- Michael Chapel in Newton Dee, which is a community facility considered to be most exposed to construction noise originating from the south of Newton Dee Village.

#### Description of Works and Construction Constraints

Each of the construction stages is described in more detail below. It should be noted that certain activities have been identified as resulting in higher noise levels at sensitive receptors than would be desirable, and therefore these works will be restricted to only being carried out during periods of school holidays. Where this is the case specific reference will be made to this restriction within the description provided.

It should also be noted that it is proposed that, outwith school holiday periods, works will only be permitted over a limited working day, in order to provide periods free from construction noise. Pending further discussions with Camphill Schools, the working day anticipated is 8.30am to 12.30pm and 1.00pm to 5.00pm. These working hours could be adjusted to better match periods of activities within Camphill Schools by agreement. It would also be expected that agreement could be made to suspend construction activities on the days of specific school or community events within Murtle Estate or Newton Dee that are held out-of-doors, where the dates had been agreed in advance between the Camphill communities and the Scottish Executive.

It is proposed that the working week, outwith school holiday periods, would be Monday to Friday only, with no weekend working, for construction activities between the River Dee and the A93. During school holiday periods it is proposed that the working day would be extended to be 7.30am to 12.30pm and 13.00pm to 18.00pm over Monday to Friday of the working week, and 7.30am to 12.30pm on Saturday, with no other work permitted at the weekend.

### Accompanying Information

The first part of the accompanying tables provides an indicative assessment of the noise levels at each of these properties associated with individual activities. The second part of these tables provides an assessment of the combination of these individual noise levels, which correlates to the indicative programme. It should be noted that this combination process is based on the loudest façade for each activity concerned, which are not necessarily the same façades, and therefore this approach is likely to over-estimate the noise level at any given location.

### **Noise Levels**

#### Noise Sources

It should be noted that within this assessment noise levels are quoted as  $L_{Aeq}$  and are based on plant types used for different construction activities as contained within BS5228:Part 1:1997 and the Update of Noise Database for Prediction of Noise on Construction and Open Sites, published by the Department for Environment, Food and Rural Affairs in 2005.

The noise levels quoted are not directly comparable with the threshold levels proposed within the World Health Organisation guidelines, which are based on  $L_{Aeq}$  over a 16 hour period. To achieve comparable levels a correction of approximately -3dB(A) would apply for an 8-hour working day period of activity and approximately -2dB(A) for a 10-hour working day period of activity.

#### Noise Characterisation Factor

It should also be noted that BS5228: Part 1:1997 suggests that a noise characterisation factor of +5dB(A) may be applied where work is 'intermittent, tonal or impulsive in nature'. While this description would not apply to much of the construction work anticipated, and historically has not been used for assessment of construction noise on other major road projects, it has been adopted in this assessment in order to provide additional consideration for individuals with particular vulnerabilities that may be present within Murtle Estate or Newton Dee.

#### Baseline Noise Levels

The noise levels presented include the existing weekday baseline noise environment, which is  $L_{Aeq, 16 \text{ hrs}}$ , 41.6dB(A) in Murtle Estate and  $L_{Aeq, 16 \text{ hrs}}$ , 43.8dB(A) in Newton Dee.

#### Adjustments to Noise Levels

Noise levels are presented in summary form on a series of tables attached at the end of this paper, and reference is specifically made where adjustments to base noise levels are proposed, either from the incorporation of mitigation measures or by application of the noise characterisation factor.

## **Stage 1 – Temporary Access (Advance Contract)**

In order to provide an access through the works to the flood plain area to enable construction plant to access the area of the River Dee Bridge, it is proposed to partially excavate the Murtle Cutting, including over-excavation of a section of the base of the cutting to enable an access route to be formed within the cutting at a level below the proposed finished road level. This work would be carried out as an advance contract prior to the main contract, so that the access route was available for use immediately on commencement of the main contract. In order to maintain pedestrian safety the Old Deeside Line Walk would be temporarily closed on commencement of the advance works contract and would remain closed until the new permanent provision in this area was completed as part of the main works contract. Users of the Old Deeside Line Walk would be diverted along alternative routes to the A93 east and west of the area concerned. In order to provide a temporary outfall during construction works a culvert would be placed under the existing Murtle Estate access road during a school holiday period. The advance works contract would be expected to be carried out commencing in mid-year of the year before the main contract, and is referred to as Year -1 in the accompanying programme. The area of these works is shown on Figure C1.

The main activities required at this stage are fencing of the site area to provide security, followed by excavation works, with excavated material being placed either in permanent landscape bunds or in temporary stockpiles as appropriate. The earthworks operations are the noisiest activity, and are considered to be excessively noisy in relation to Murtle Estate. It is therefore proposed that the initial earthworks, which would involve excavation of an estimated 80,000m<sup>3</sup> and placement of this material in landscape bunds, be carried out during the school summer holiday period. The duration of these initial earthworks is estimated as 5 weeks for 2 excavators operating simultaneously.

Completion of the initial earthworks would provide landscape bunds typically 4m in height, which would provide significant noise attenuation, and in addition the ground level within the cutting would have lowered by some 3m on average. It is therefore considered that the formation of these bunds would provide noise mitigation of approximately -10dB(A) on formation, increasing to approximately -20dB(A) as the ground level of the cutting continues to reduce. The early formation of these landscape bunds affords the opportunity for the associated landscape planting to also be carried out as part of the advance contract, which would afford earlier benefits of landscape screening. Where the bunds do not provide the full level of screening required, additional screening would be erected to provide the minimum noise mitigation required.

Completion of the earthworks would continue following the summer holiday period with a single excavator, and is estimated to extend over a period of some 19 weeks following the 5 week period for the initial earthworks, during which time the noise levels would reduce due to increasing mitigation from the deepening cutting, enabling deployment of a second excavator when sufficient noise mitigation was achieved within the overall depth of the cutting.

It is noted that the main contract works entail the demolition of the existing Camphill Bookshop. While arrangements on this issue have not been the subject of discussions at this time, should a replacement building be required to be constructed within Murtle Estate or Newton Dee, it is anticipated that this would take place during the period of the advance works. However, it is not anticipated that construction of this building would raise particular concerns in terms of construction noise, as a number of new buildings have been constructed within both Murtle Estate and Newton Dee in recent times.



## **Stage 2 – Works North of the Flood Plain**

### General

The main contract works north of the River Dee flood plain are anticipated to entail a number of different stages which would be undertaken sequentially. These are:

- Phase 1: Formation of new accesses to Murtle Estate and Murtle Den, together with a new channel for Murtle Burn, and widening of the A93 west of these accesses.
- Phase 2: Excavation of a section of the Old Deeside Line Walk and construction of the western elements of the new Old Deeside Line Footbridge over the new access to Murtle Estate, together with tie-in operations to the new access within Murtle Estate and demolition of properties south of the A93.
- Phase 3: Completion of the remainder of the new Old Deeside Line Footbridge.
- Phase 4: Partial excavation between A93 Bridge and Old Deeside Line Footbridge.
- Phase 5: Excavation for the A93 Bridge, construction of the bridge and widening of the A93.
- Phase 6: Filling of over-excavation of Murtle Cutting to permanent road level and completion of Murtle Cutting; completion of River Dee Bridge north abutment; completion of excavation between A93 Bridge and Old Deeside Line Footbridge.
- Phase 7: Roadworks and landscaping works between the River Dee Bridge and the A93.

These works would be expected to commence early in Year 1 of the main contract, and the area of these works is shown in Figure C2. Further details on these phases is given below:

### Phase 1

The works in Phase 1 would include fencing of the site, earthworks and road works. No mitigation measures are proposed in relation to these works.

The duration of the Phase 1 works is estimated as 8 weeks.

### Phase 2

The works in Phase 2 would include excavation of a section of the Old Deeside Line Walk, followed by construction of the west abutment and western pier of the Old Deeside Line Footbridge. On completion of these works, including all finishes works to the bridge deck, the Murtle Estate access would be diverted to its new permanent position and the other minor works in the area would also be completed, enabling the Murtle Burn to be diverted. It is anticipated that the properties south of the A93 directly affected by the works would be demolished during this Phase.

Both the excavation works and demolition works give rise to noise levels that are considered to be excessively noisy in relation to Murtle Estate, although they are each relatively short in duration. It is therefore anticipated that they would be carried out during school holiday periods. No further mitigation measures are proposed in relation to these works.

The remaining activities would continue during school term-time, and it is not considered necessary to require mitigation measures in relation to these works.

To minimise disruption it is proposed that the works to divert the Murtle Estate access, and the other minor works in this area, also be undertaken during a school holiday period. A final activity during this phase would be the completion of a new boundary wall separating Murtle Estate from the construction site. This would provide visual screening and noise mitigation, both during further construction works and during the operational phase of the road. It would also assist in maintaining security of the site and satisfy road safety objectives by preventing headlight glare from the access road confusing drivers on the adjacent slip road.

Due to the need to carry out both early and late works within this phase during school holiday periods, the duration of Phase 2 is estimated as 19 weeks.

### Phase 3

The works in Phase 3 would include completion of the remainder of the Old Deeside Line Footbridge, which would require excavation in the area of the bridge and demolition of the bridge above the existing Murtle Estate access.

The demolition works give rise to noise levels at Robert Owen House that are considered to be excessively noisy in relation to Murtle Estate, although they are relatively short in duration. It is therefore anticipated that demolition would be carried out during a school holiday period, most likely the same holiday period used towards the end of the Phase 2 activities. No further mitigation measures are proposed in relation to these works.

The remaining activities would continue during school term-time, and it is not considered necessary to require mitigation measures in relation to these works.

The duration of the Phase 3 works is estimated as 29 weeks, of which the earthworks would be expected to last for 2 weeks.

### Phase 4

The works in Phase 4 would include partial excavation of the area between the A93 Bridge and the Old Deeside Line Footbridge. It is anticipated that this would be excavated in such a manner as to provide a haul route to the area south of the Old Deeside Line Walk beneath the Old Deeside Line Footbridge. However, the earthworks would be shaped in such a way as to provide a detention area and settlement ponds for any surface water runoff from higher areas of land, thus minimising the volume of run-off entering the section of works south of the Old Deeside Line Footbridge.

It is not considered necessary to require mitigation measures in relation to these works.

It is possible that rock may be encountered at the base of this excavation, which would result in higher noise levels at Robert Owen House. The lower level at which such excavations may occur would be anticipated to provide noise mitigation of -10dB(A). The volume of rock expected is limited and the duration of its excavation would be relatively short. Should it be encountered at higher levels then alternative excavation techniques could be employed, such as blasting with small charges in a large number of holes in order to minimise noise and vibration disturbance. Alternatively, the excavation of rock in this area could be delayed until a school holiday period if it was considered that noise levels for the particular excavation method proposed would be higher than desirable.

The duration of the Phase 4 works is estimated as 5 weeks, of which the rock excavation may be 1 week in duration.

### Phase 5

The works in Phase 5 would include diversion of the A93 to a temporary alignment south of its current location; excavation in the area of the future A93 bridge and also to the north of the A93 to enable a haul route northwards to be formed; construction of the A93 bridge; and widening of the A93.

In recognition of the temporary southwards diversion of the A93, and the associated slight movement of traffic towards Murtle Estate and Newton Dee, albeit at lower traffic speeds, it is proposed that a temporary screen be erected on the southern verge of the temporary diversion, to provide both visual screening and noise mitigation.

It is possible that rock may be encountered at the base of this excavation, which would result in higher noise levels at Robert Owen House. The lower level at which such excavations may occur, together with the screening required for general excavation, would be anticipated to provide noise mitigation of -10dB(A). The volume of rock expected is limited and the duration of its excavation would be relatively short. Should it be encountered at higher levels then alternative excavation techniques could be employed, such as blasting with small charges in a large number of holes in order to minimise noise and vibration disturbance. Alternatively, the excavation of rock in this area could be delayed until a school holiday period if it was considered that noise levels for the particular excavation method proposed would be higher than desirable.

It is not considered necessary to require mitigation measures in relation to the remaining works in this phase.

The duration of the Phase 5 works is estimated as 44 weeks, of which the earthworks would be expected to last for 5 weeks, bridgeworks for 30 weeks and roadworks, including construction of the temporary diversion, for 9 weeks.

### Phase 6

The works in Phase 6 would be expected to include widening of the Murtle Cutting to its permanent width; filling of the over-excavation within the Murtle Cutting to the permanent road level and completion of the River Dee bridge north abutment; and completing the excavation between the A93 Bridge and the Old Deeside Line Footbridge.

In order to minimise any noise nuisance associated with the works involved in widening of the Murtle Cutting south of the Old Deeside Line Footbridge it is proposed that these be carried out during a school holiday period. As landscape bunds will already be in place, no further mitigation measures are proposed in relation to these works.

The infilling operations would occur at depth within the cutting, which together with the bunds and the additional screening may be expected to provide noise mitigation of the order of -20dB(A). No further mitigation measures are proposed in relation to these works.

It is not considered necessary to require mitigation measures in relation to the concreting operations for the north abutment.

It is not considered necessary to require mitigation measures in relation to the completion of the excavation between the A93 and the Old Deeside Line Footbridge. It is possible that rock may be encountered at the base of this excavation, which would result in higher noise levels at Robert Owen House. The lower level at which such excavations may occur would be anticipated to provide noise mitigation of -10dB(A). The volume of rock expected is limited and the duration of its excavation would be relatively short. Should it be encountered at higher levels then alternative excavation techniques could be employed, such as blasting with small charges in a large number of holes in order to minimise noise and vibration disturbance. Alternatively, the excavation of rock in this area could be delayed until a school holiday period if it was considered that noise levels for the particular excavation method proposed would be higher than desirable.

The commencement of Phase 6 is dependent on the construction works within the River Dee floodplain being largely complete, so that the temporary access may be removed. Filling operations can commence in tandem with incremental raising of the north abutment level. There is then a break in works until the River Dee Bridge deck is complete, following which final earthworks in this Phase will be completed.

The duration of the Phase 6 works is estimated as 58 weeks, during which construction would only take place for 23 weeks. The works for the completion of the River Dee Bridge north abutment and filling of the Murtle Cutting over-excavation would progress in parallel but not simultaneously.

## Phase 7

The works in Phase 7 would include roadworks and landscaping works in the area between the River Dee bridge and the A93. This includes drainage works, road surfacing, road finishes such as traffic signs, road markings and safety fencing.

It is not considered necessary to require mitigation measures in relation to these works, as the depth of the cutting at which works would take place, together with the bunds and the additional screening may be expected to provide noise mitigation of the order of -20dB(A). This mitigation would reduce for works at higher levels, such as slip roads, but these will typically be further removed from the assessment locations.

The duration of the Phase 7 works is estimated as 18 weeks.

## **Stage 3 – Works within the Flood Plain**

### General

The main contract works within the River Dee flood plain are anticipated to entail a number of different stages which would be undertaken sequentially. These are:

- Phase 1: Fencing of construction site, formation of temporary access, partial piling and concreting of the River Dee Bridge north abutment.
- Phase 2: Piling of bridge piers.
- Phase 3: Concreting of bridge piers.
- Phase 4: Partial concreting of bridge deck.
- Phase 5: Landscaping within flood plain and removal of temporary access.
- Phase 6: Completion of concreting of bridge deck.
- Phase 7: Roadworks on the River Dee Bridge.

These works would be expected to commence early in Year 1 of the main contract, and the area of these works is shown in Figure C3. Further details on these phases is given below:

### Phase 1

The works in Phase 1 would include fencing the construction site within the River Dee floodplain and the works necessary to complete the temporary access route to the flood plain.

Prior to completing the temporary access it is anticipated that materials would be delivered into the flood plain by crane from within the Murtle Cutting, and that access for operatives would be taken by foot. The initial work would involve erecting a fence to maintain security of the site during the works, following which a landing point for a temporary bridge would be formed on the south side of the Murtle Burn. The landing point for the northern side of the temporary bridge would be the base of the northern abutment. This would be formed by excavating to the required piling level, retaining this excavation on the downslope side by a bored pile cut-off wall where required to prevent erosion of material to the flood plain in the event of heavy rainfall.

Following completion of excavation to the piling level, main piles would be placed, again using bored piling techniques. On completion of the piling the abutment would be brought up to minimal level to form the northern landing point of the temporary bridge. It is anticipated that the temporary bridge would be a Bailey Bridge type, which would be capable of being readily craned into position. Following placement of the temporary bridge the access route would be completed within the flood plain to provide continuous access during the period of construction of the River Dee Bridge.

The noisiest activity during this phase are the piling works. It is therefore proposed that these works be carried out during the school holiday period. No further mitigation measures are proposed in relation to these works.

The duration of the partial piling operations for the north abutment is estimated as 2 weeks. These can therefore be carried out within the first holiday period available. The remaining activities would continue during school term-time, and it is not considered necessary to require mitigation measures in relation to these works.

The duration of Phase 1 activities is estimated as 5 weeks.

## Phase 2

The Phase 2 activities would involve piling operations at the locations of each of the 5 bridge piers on the north side of the River Dee. This would be anticipated to entail placing two large diameter bored piles at each pier location.

The noise levels associated with the piling works reduce progressively from the Pier 5, the northern pier, to Pier 1, the southern pier. It is proposed that screening of these operations be undertaken as a mitigation measure, which would be required to provide a reduction of -5dB(A) as a minimum.

The piling works are proposed to progress sequentially, with no more than one location being undertaken at any time. Each location is estimated to take two weeks to complete piling operations, and therefore the duration of the Phase 2 works is estimated as 10 weeks.

## Phase 3

The works in Phase 3 would include concreting of the bridge piers, which are anticipated to be in-situ concrete. It is anticipated that work would proceed simultaneously at Piers 1 and 4, and also at Piers 2 and 3, with Pier 5 being completed last.

It is not considered necessary to require mitigation measures in relation to these works.

The duration of the Phase 3 works is estimated as 6 weeks.

## Phase 4

The works in phase 4 would include partial construction of the bridge deck for the River Dee Bridge. This would comprise the southwards facing section of the main span, which would be extended to mid-span length, and all of the bridge deck between Pier 1 and Pier 5. The section of the bridge deck between Pier 5 and the north abutment would be formed at a later stage. To progress the work efficiently it is anticipated that 4 bridge spans would be progressed simultaneously, although the activities would be staggered, so that concreting work, which is the noisiest activity, would only be undertaken on one span at a time. The spans from Pier 1 south and between Pier 1 and Pier 2 are anticipated to have the longest duration to complete, and it is anticipated that the spans between Pier 2 and Pier 5 would be completed within the same overall time period as those extending from Pier 1.

The noise levels at St Ternan's from the concreting work would reduce progressively from the northern extent of the bridge deck to the southern extent of the bridge deck. It is not considered necessary to require mitigation measures in relation to these works.

It is also anticipated that during this phase the remaining piling works at the River Dee Bridge north abutment would be completed during appropriate school holiday periods. No further mitigation measures are proposed in relation to the piling works.

The duration of the Phase 4 works is estimated as 62 weeks, during which completion of piling works at the River Dee north abutment are estimated to have a duration of 12 weeks.

### Phase 5

The works in Phase 5 would include landscaping the base of the piers within the flood plain, reinstatement of the flood plain area and removal of the temporary access route.

The noisiest activity during this phase would be earthworks associated with reinstatement and removal of the temporary access. In relation to St Ternan's it is proposed that screening of these operations be undertaken as a mitigation measure, which would be required to provide a reduction of -5dB(A) as a minimum.

The duration of the Phase 5 works is estimated as 5 weeks.

### Phase 6

Following completion of certain of the Phase 6 works in the area north of the River Dee flood plain, ie the filling of the over-excavation within Murtle Cutting and completion of the River Dee Bridge north abutment, this phase would involve completion of the River Dee bridge deck, and erection of parapets and waterproofing of the bridge deck along the River Dee Bridge.

It is not considered necessary to require mitigation measures in relation to these works.

The duration of the Phase 6 works is estimated as 23 weeks.

### Phase 7

The works in Phase 7 would include roadworks on the River Dee Bridge. This includes road surfacing and road finishes such as traffic signs, road markings and safety fencing.

The noisiest of these activities is expected to be the surfacing works on the bridge deck. In relation to St Ternan's it is proposed that screening of these operations be undertaken as a mitigation measure, which would be required to provide a reduction of -5dB(A) as a minimum for activities close to St Ternan's. As the activities move further away the need for this mitigation reduces.

The duration of the Phase 7 works is estimated as 14 weeks.

### **Combinations of Activities**

The noise levels at each assessment location for various combinations of activities are shown in the accompanying tables. From these tables it can be seen that:

- During school term-time noise levels at the two assessment locations within Murtle Estate typically range between 47dB(A) and 54dB(A), including the noise characterisation factor.
- During the same time period noise levels at the two assessment locations within Newton Dee typically range between 47dB(A) and 50dB(A), including the noise characterisation factor.
- During school holidays noise levels at the two assessment locations within Murtle Estate typically range between 50dB(A) and 56dB(A), excluding the noise characterisation factor. For comparison purposes, if this were included the range would be between 55dB(A) and 61dB(A).
- During school holidays noise levels at the two assessment locations within Newton Dee typically range between 49dB(A) and 54dB(A), including the noise characterisation factor.

## **Discussion**

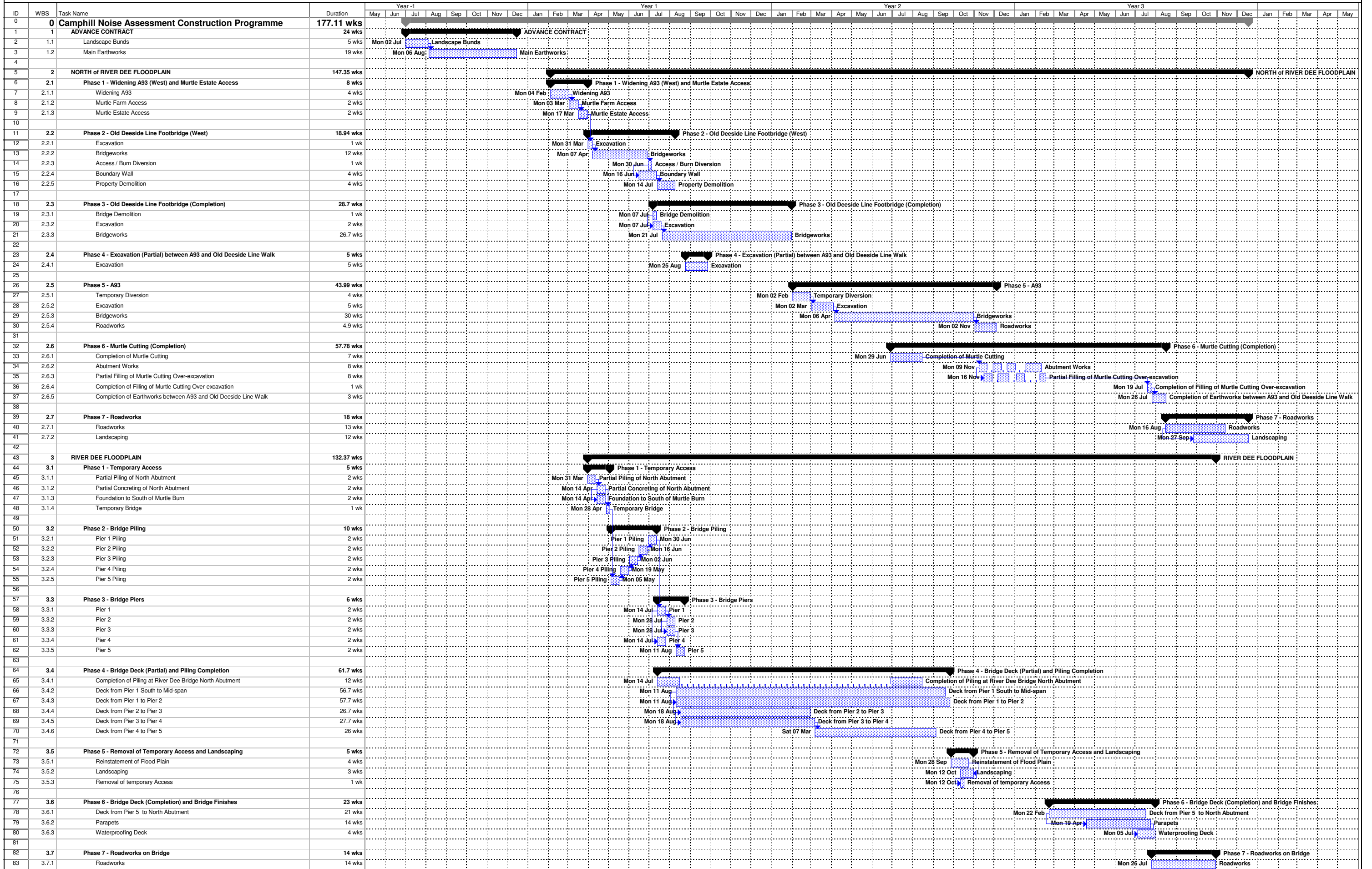
The overall construction period is estimated as 171 weeks in the area between the River Dee and the A93, of which some 24 weeks would be undertaken as advance works and some 147 weeks would be undertaken as part of the main works contract.

Should it be established that higher noise thresholds for construction activities would be acceptable, for example by reference to noise levels considered acceptable for buildings constructed within Murtle Estate and Newton Dee, it would be possible to reduce the overall programme period by enabling a greater number of activities to proceed simultaneously. While this would increase the resulting noise levels, albeit to a level that experience showed to be acceptable, it could significantly reduce the time period over which individuals were exposed to noise from construction activities.

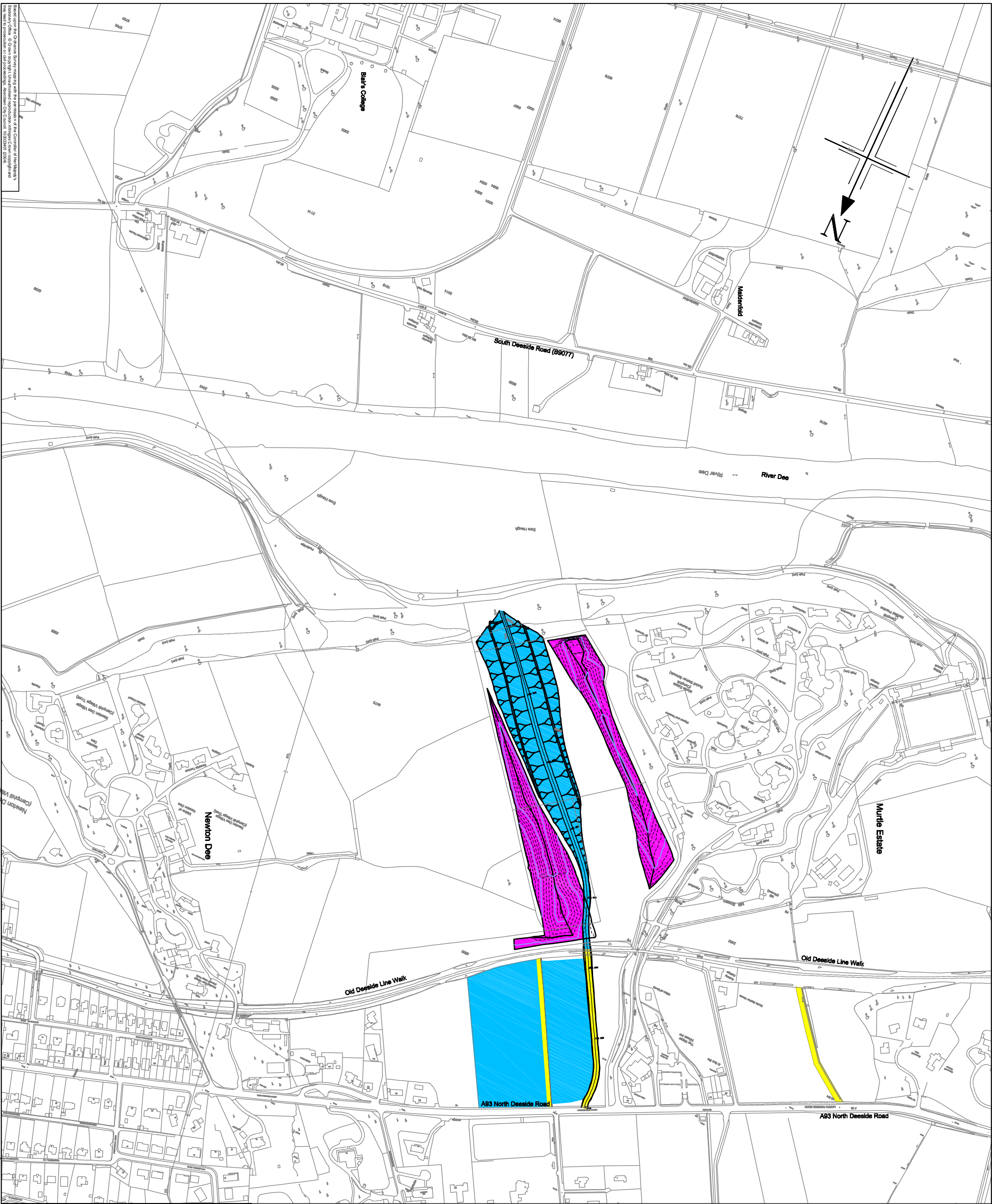
Reference has been made for the use of screens to provide noise mitigation. Various alternatives exist to achieve this, for example erecting fixed screens around work locations, or focussing screens at key noise generation centres such as compressors, generators and engines, which could even be housed. An alternative, or even an additional provision, would be the provision of temporary screening where beneficial at the top of the escarpment at Murtle Estate's and Newton Dee's boundaries. This would provide both visual and noise screening of construction works, and could be the subject of further discussion with the Camphill communities. On completion of construction this barrier could remain in place if desired by the Camphill communities, or be removed to return the current long-range views over the River Dee valley available around the periphery of these sites.

## **Control Measures**

Working time periods and environmental noise restrictions are a standard feature of road construction contracts, and would be included within the contract for the Aberdeen Western Peripheral Route. This will enable any agreed working time restrictions and noise level requirements to be stipulated, and provide a basis for subsequent monitoring during construction. It is also anticipated that the Employer's Representative's on site will maintain an active monitoring role of construction activities in this area, including a continual presence during construction activities to see that the contractual requirements are being met. It is also proposed that the contractor provide a weekly programme of activities within this area two weeks in advance, which could be the subject of discussion at a weekly consultation meeting with representatives of the Camphill communities, should they be agreeable to this proposal. This will enable a continuing awareness of forthcoming activities to be achieved throughout the construction period.







Drawing Number  
**Figure C1**

- Advance Contract Construction Phasing**
- █ Diversion of Pedestrians to A93 following closure of Old Deeside Line Walk; Access route to Murtle cutting
  - █ Landscape Bunds following initial excavation within Murtle cutting
  - █ Advance excavation in Murtle cutting and temporary stockpiling of excavated materials

Rev	0	Revision	Project at a glance	Date	02/08/2024
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<p><b>Camphill Construction Assessment</b>          Stage 1          (Advance Works)</p>					
<p>Drawing title: FINAL</p>					
<p>Scale: 1:5000 (A1, 1:5000 (A1)) Date: 02/08/2024</p>					
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<p>Figure C1</p>					
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Figure C2

- Works Phasing**
- █ Phase 1  
Partial Widening of A93  
Murrie Dam Access  
Murrie Estate Access  
Murrie Burn Channel
  - █ Phase 2  
Old Deeside Line Walk Footbridge (West)  
Murrie Estate Access Diversion  
Murrie Burn Diversion  
Property Demolition
  - █ Phase 3  
Old Deeside Line Walk Footbridge (Completion)  
Railway Bridge Demolition
  - █ Phase 4  
Partial Excavation between A93 and Old Deeside Line Walk
  - █ Phase 5  
A93 Widening and Bridge, including Temporary diversion of A93
  - █ Phase 6  
Completion of Murrie cutting, Landscape bunds, excavation between A93 and Old Deeside Line Walk and River Dee Bridge north abutment
  - █ (Not illustrated) Phase 7  
Road Works
  - █ Advance Works Previously Completed

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**Camphill Construction Assessment**  
 Stage 2  
 (Works north of River Dee Floodplain)

Rev	Description	By	Checked	Approved
0				

Project name: **FINAL**

Scale: 1:2000 (A1, 1:20000 (A3))

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Figure C2

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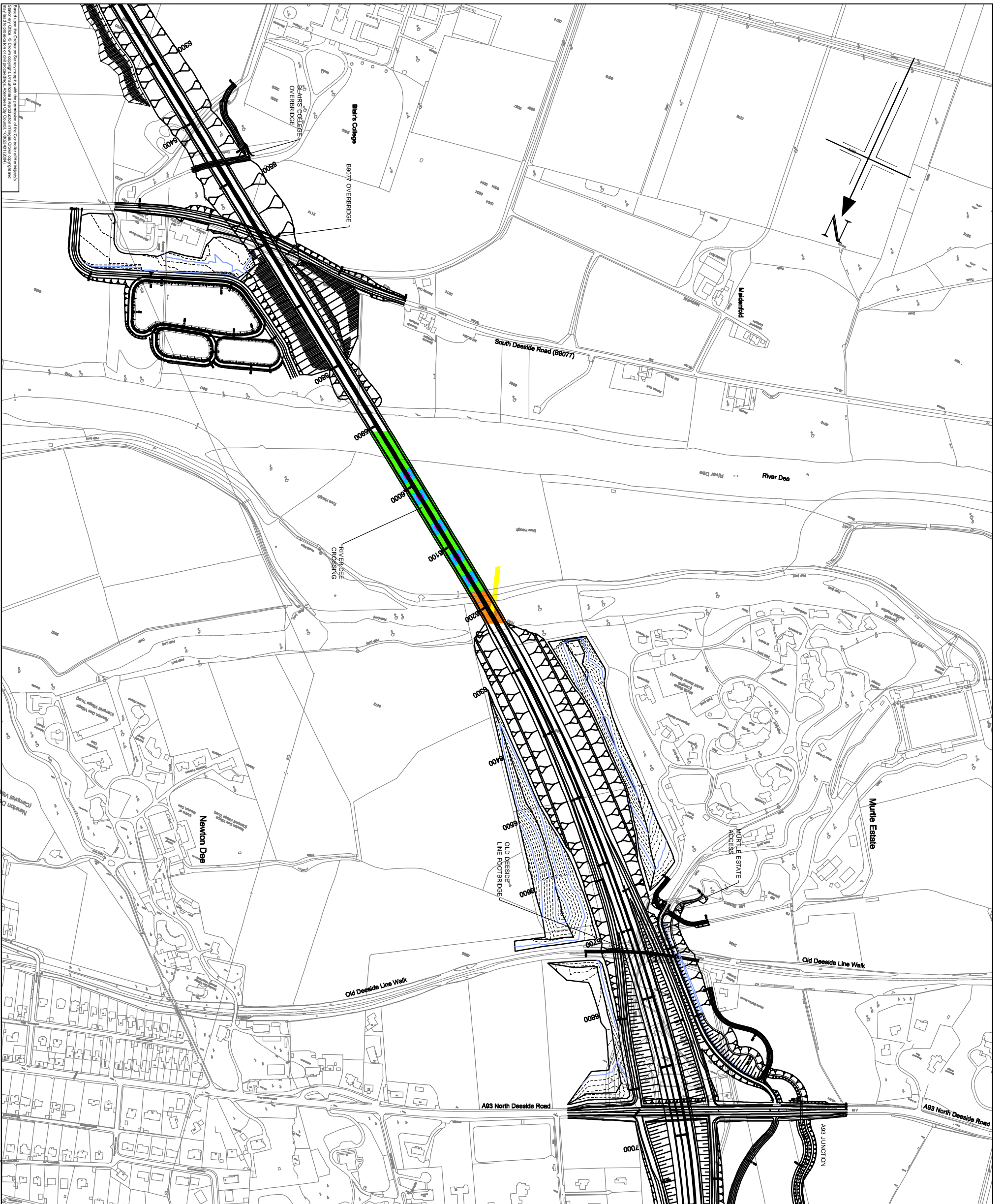


Figure C3

- Works Phasing**
- █ Phase 1  
Temporary Access to Floodplain,  
including partial piling of River Dee  
Bridge north abutment
  - █ Phase 2  
Bridge piling
  - █ Phase 3  
Bridge piers
  - █ Phase 4  
Bridge Deck (partial)
  - (Not illustrated) Phase 5  
Removal of temporary access
  - █ Phase 6  
Bridge Deck completion
  - (Not illustrated) Phase 7  
Roadworks on Bridge

0	Revision	Number of revisions	Date	Author	Approved
0					

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**Camphill Construction Assessment**  
 Stage 3  
 (Works within River Dee Floodplain)

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 Date: 15/02/2011 15:00:00.00  
 Drawing number: 00000  
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 Drawing sheet: 0

**Figure C3**

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**Aberdeen Western Peripheral Route  
Camphill Noise Assessment Summary Tables**

**General**

The following references should be read in conjunction with the tables presented below:

\* Noise characterisation adjustment does not apply at Murtle Estate as works undertaken during school holiday period

# No specific mitigation measures proposed

§ Noise characterisation factor deducted during combination process as period of works concerned is during school holiday period

It should be noted that the calculation of unmitigated noise level includes elements of both soft ground attenuation or topographic screening from ground/buildings.

**Construction Noise at Individual Locations**

**Stage 1**

Activity	Location	Source Noise Level (L <sub>Aeq</sub> @10m)	Distance (m)	Unmitigated Noise Level (dB(A))	Reduction due to Mitigation (dB(A))	Noise Characterisation (dB(A))	Final Noise Level (dB(A))
Initial Earthworks* (Two excavators)	Robert Owen House	83	30	70.4	0*	0*	70.4
	St Ternan's		90	57.6	0*	0*	57.6
	Dolphin		370	45.3	0 <sup>#</sup>	+5	50.3
	Michael Chapel		480	43.1	0 <sup>#</sup>	+5	48.1
Main Earthworks (One then two excavators)	Robert Owen House	80/83	130	51.6 to 54.6	-10 to -20	+5	46.6 to 39.6
	St Ternan's		170	46.1 to 49.1	-10 to -20	+5	41.1 to 34.1
	Dolphin		380	39.1 to 42.1	-10 to -20	+5	34.1 to 27.1
	Michael Chapel		480	37.1 to 40.1	-10 to -20	+5	32.1 to 25.1

## Stage 2

Activity	Location	Source Noise Level (LAeq@10m)	Distance (m)	Unmitigated Noise Level (dB(A))	Reduction due to Mitigation (dB(A))	Noise Characterisation (dB(A))	Final Noise Level (dB(A))
<b>Phase 1: Partial Widening of A93 and Murtle Estate/Murtle Den Access</b>							
Earthworks	Robert Owen House	80	200	43.9	0 <sup>#</sup>	+5	48.9
	St Ternan's		470	34.7	0 <sup>#</sup>	+5	39.7
	Dolphin		680	31.4	0 <sup>#</sup>	+5	36.4
	Michael Chapel		830	29.7	0 <sup>#</sup>	+5	34.7
<b>Phase 2: Partial Construction of Old Deeside Line Footbridge</b>							
Earthworks*	Robert Owen House	80	180	50.6	0 <sup>#</sup>	0*	50.6
	St Ternan's		450	41.4	0 <sup>#</sup>	0*	41.4
	Dolphin		670	38.0	0 <sup>#</sup>	+5	43.0
	Michael Chapel		820	36.2	0 <sup>#</sup>	+5	41.2
Concreting	Robert Owen House	78	180	48.6	0 <sup>#</sup>	+5	53.6
	St Ternan's		450	39.4	0 <sup>#</sup>	+5	44.4
	Dolphin		670	36.0	0 <sup>#</sup>	+5	41.0
	Michael Chapel		820	34.2	0 <sup>#</sup>	+5	39.2
Demolition of Properties* (Two pulverisers)	Robert Owen House	81	240	52.3	0 <sup>#</sup>	0*	52.3
	St Ternan's		500	46.5	0 <sup>#</sup>	0*	46.5
	Dolphin		660	44.6	0 <sup>#</sup>	+5	49.6
	Michael Chapel		810	42.8	0 <sup>#</sup>	+5	47.8
<b>Phase 3: Completion of Old Deeside Line Footbridge</b>							
Demolition of Existing Bridge*	Robert Owen House	78	180	51.8	0 <sup>#</sup>	0*	51.8
	St Ternan's		440	44.6	0 <sup>#</sup>	0*	44.6
	Dolphin		620	42.2	0 <sup>#</sup>	+5	47.2
	Michael Chapel		770	40.3	0 <sup>#</sup>	+5	45.3
Earthworks	Robert Owen House	80	150	42.8	0 <sup>#</sup>	+5	47.8
	St Ternan's		410	36.1	0 <sup>#</sup>	+5	41.1
	Dolphin		570	34.9	0 <sup>#</sup>	+5	39.9
	Michael Chapel		720	32.9	0 <sup>#</sup>	+5	37.9

Activity	Location	Source Noise Level (LAeq@10m)	Distance (m)	Unmitigated Noise Level (dB(A))	Reduction due to Mitigation (dB(A))	Noise Characterisation (dB(A))	Final Noise Level (dB(A))
Concreting	Robert Owen House	78	180	48.6	0 <sup>#</sup>	+5	53.6
	St Ternan's		450	39.4	0 <sup>#</sup>	+5	44.4
	Dolphin		570	37.4	0 <sup>#</sup>	+5	42.4
	Michael Chapel		720	35.4	0 <sup>#</sup>	+5	40.4
<b>Phase 4: Partial Excavation between A93 and Old Deeside Line Walk</b>							
Earthworks	Robert Owen House	80	210	40.6	0 <sup>#</sup>	+5	45.6
	St Ternan's		470	35.5	0 <sup>#</sup>	+5	40.5
	Dolphin		610	34.3	0 <sup>#</sup>	+5	39.3
	Michael Chapel		760	32.4	0 <sup>#</sup>	+5	37.4
Rock Excavation	Robert Owen House	92	210	52.6	-10	+5	47.6
	St Ternan's		470	47.5	-10	+5	42.5
	Dolphin		610	46.3	-10	+5	41.3
	Michael Chapel		760	44.4	-10	+5	39.4
<b>Phase 5: A93 Bridge and Completion of A93 Widening</b>							
Earthworks	Robert Owen House	80	360	40.2	0 <sup>#</sup>	+5	45.2
	St Ternan's		620	35.8	0 <sup>#</sup>	+5	40.8
	Dolphin		730	32.7	0 <sup>#</sup>	+5	37.7
	Michael Chapel		880	31.1	0 <sup>#</sup>	+5	36.1
Rock Excavation	Robert Owen House	92	360	52.2	-10	+5	47.2
	St Ternan's		620	47.8	-10	+5	42.8
	Dolphin		730	44.7	-10	+5	39.7
	Michael Chapel		880	41.1	-10	+5	36.1
Concreting	Robert Owen House	78	400	37.5	0 <sup>#</sup>	+5	42.5
	St Ternan's		660	33.5	0 <sup>#</sup>	+5	38.5
	Dolphin		750	30.7	0 <sup>#</sup>	+5	35.7
	Michael Chapel		900	29.1	0 <sup>#</sup>	+5	34.1
Roadworks	Robert Owen House	80	400	39.5	0 <sup>#</sup>	+5	44.5
	St Ternan's		660	35.5	0 <sup>#</sup>	+5	40.5
	Dolphin		750	32.7	0 <sup>#</sup>	+5	37.7
	Michael Chapel		900	31.1	0 <sup>#</sup>	+5	36.1

Activity	Location	Source Noise Level (LAeq@10m)	Distance (m)	Unmitigated Noise Level (dB(A))	Reduction due to Mitigation (dB(A))	Noise Characterisation (dB(A))	Final Noise Level (dB(A))
<b>Phase 6: Completion of Earthworks and Completion of River Dee Bridge North Abutment</b>							
Excavation South of Old Deeside Line Walk* (One then two excavators)	Robert Owen House	80/83	60	58.3 to 61.3	-10 to -20	0*	48.3 to 41.3
	St Ternan's		150	47.2 to 50.2	-10 to -20	0*	37.2 to 30.2
	Dolphin		490	36.9 to 39.9	-10 to -20	+5	31.9 to 24.9
	Michael Chapel		580	35.5 to 38.5	-10 to -20	+5	30.5 to 23.5
Infilling Over-Excavation South of Old Deeside Line Walk	Robert Owen House	80	170	45.8	-20	+5	30.8
	St Ternan's		190	53.1	-20	+5	38.1
	Dolphin		400	38.3	-20	+5	23.3
	Michael Chapel		500	36.4	-20	+5	21.4
Earthworks between A93 and Old Deeside Line Walk	Robert Owen House	80	210	40.6	0 <sup>#</sup>	+5	45.6
	St Ternan's		470	35.5	0 <sup>#</sup>	+5	40.5
	Dolphin		610	34.3	0 <sup>#</sup>	+5	39.3
	Michael Chapel		760	32.4	0 <sup>#</sup>	+5	37.4
Rock Excavation between A93 and Old Deeside Line Walk	Robert Owen House	92	210	52.6	-10	+5	47.6
	St Ternan's		470	47.5	-10	+5	42.5
	Dolphin		610	46.3	-10	+5	41.3
	Michael Chapel		760	44.4	-10	+5	39.4
Concreting River Dee North Abutment	Robert Owen House	78	370	37.0	0 <sup>#</sup>	+5	42.0
	St Ternan's		240	49.1	0 <sup>#</sup>	+5	54.1
	Dolphin		410	36.1	0 <sup>#</sup>	+5	41.1
	Michael Chapel		500	34.4	0 <sup>#</sup>	+5	39.4
<b>Phase 7: Roadworks and Landscaping</b>							
Roadworks	Robert Owen House	80	100-390	53.9 to 39.7	-20 to 0	+5	38.9 to 44.7
	St Ternan's		180-650	45.6 to 35.6	0 <sup>#</sup>	+5	50.6 to 40.6
	Dolphin		400-730	38.3 to 32.9	0 <sup>#</sup>	+5	43.3 to 37.9
	Michael Chapel		500-880	36.4 to 31.3	0 <sup>#</sup>	+5	41.4 to 36.3

### Stage 3

Activity	Location	Source Noise Level (LAeq@10m)	Distance (m)	Unmitigated Noise Level (dB(A))	Reduction due to Mitigation (dB(A))	Noise Characterisation (dB(A))	Final Noise Level (dB(A))
<b>Phase 1: Partial Piling and Concreting of River Dee Bridge North Abutment</b>							
Piling*	Robert Owen House	83	370	42.0	0*	0*	42.0
	St Ternan's		240	54.1	0*	0*	54.1
	Dolphin		410	41.1	0 <sup>#</sup>	+5	46.1
	Michael Chapel		500	39.4	0 <sup>#</sup>	+5	44.4
Concreting	Robert Owen House	78	370	37.0	0 <sup>#</sup>	+5	42.0
	St Ternan's		240	49.1	0 <sup>#</sup>	+5	54.1
	Dolphin		410	36.1	0 <sup>#</sup>	+5	41.1
	Michael Chapel		500	34.4	0 <sup>#</sup>	+5	39.4
<b>Phase 2: River Dee Bridge Pier Piling</b>							
Piling	Robert Owen House	83	420-610	40.9 to 37.7	-5	+5	40.9 to 37.7
	St Ternan's		270-430	53.1 to 49.0	-5	+5	53.1 to 49.0
	Dolphin		410-470	41.1 to 40.0	-5	+5	41.1 to 40.0
	Michael Chapel		490-500	47.9 to 47.7	-5	+5	47.9 to 47.7
<b>Phase 3: Concreting of River Dee Bridge Piers</b>							
Concreting	Robert Owen House	78	420-610	35.9 to 32.7	0 <sup>#</sup>	+5	40.9 to 37.7
	St Ternan's		270-430	48.1 to 44.0	0 <sup>#</sup>	+5	53.1 to 49.0
	Dolphin		410-470	36.1 to 35.0	0 <sup>#</sup>	+5	41.1 to 40.0
	Michael Chapel		490-500	42.9 to 42.7	0 <sup>#</sup>	+5	47.9 to 47.7
<b>Phase 4: Partial Concreting of River Dee Bridge Deck and Completion of Piling of River Dee Bridge North Abutment</b>							
Concreting	Robert Owen House	78	420-660	35.9 to 32.0	0 <sup>#</sup>	+5	40.9 to 37.0
	St Ternan's		270-480	48.1 to 43.1	0 <sup>#</sup>	+5	53.1 to 48.1
	Dolphin		410-500	36.1 to 34.4	0 <sup>#</sup>	+5	41.1 to 39.4
	Michael Chapel		490-510	42.9 to 42.5	0 <sup>#</sup>	+5	47.9 to 47.5
Piling*	Robert Owen House	83	370	42.0	0*	0*	42.0
	St Ternan's		240	54.1	0*	0*	54.1
	Dolphin		410	41.1	0 <sup>#</sup>	+5	46.1
	Michael Chapel		500	39.4	0 <sup>#</sup>	+5	44.4



Activity	Location	Source Noise Level (LAeq@10m)	Distance (m)	Unmitigated Noise Level (dB(A))	Reduction due to Mitigation (dB(A))	Noise Characterisation (dB(A))	Final Noise Level (dB(A))
<b>Phase 5: Removal of Temporary Access and Landscaping</b>							
Earthworks	Robert Owen House	80	400	38.8	0 <sup>#</sup>	+5	43.8
	St Ternan's		250	50.8	-5	+5	50.8
	Dolphin		410	39.0	0 <sup>#</sup>	+5	44.0
	Michael Chapel		470	45.1	0 <sup>#</sup>	+5	50.1
<b>Phase 6: Completion of River Dee Bridge Deck Concreting</b>							
Concreting	Robert Owen House	78	370	37.0	0 <sup>#</sup>	+5	42.0
	St Ternan's		240	49.1	0 <sup>#</sup>	+5	54.1
	Dolphin		410	36.1	0 <sup>#</sup>	+5	41.1
	Michael Chapel		500	34.4	0 <sup>#</sup>	+5	39.4
<b>Phase 7: Roadworks</b>							
Roadworks	Robert Owen House	80	370-660	39.0 to 34.0	0 <sup>#</sup>	+5	44.0 to 39.0
	St Ternan's		240-480	51.1 to 45.1	-5 to 0	+5	51.1 to 50.1
	Dolphin		410-500	38.1 to 36.4	0 <sup>#</sup>	+5	43.1 to 41.4
	Michael Chapel		490-510	44.5 to 36.6	0 <sup>#</sup>	+5	49.5 to 41.5

### Combination of Noise Levels

Combination	Activities	Robert Owen House		St Ternan's		Dolphin		Michael Chapel	
		Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels
<b>1*</b> (5 wks)	Stage 1 – Initial Earthworks	70.4*	<b>70.4*</b>	57.6*	<b>57.7*</b>	50.3	<b>51.2</b>	48.1	<b>49.5</b>
	Baseline	41.6		41.6		43.8		43.8	
<b>2</b> (19 wks)	Stage 1 – Main Earthworks	46.6 to 39.6	<b>47.8 to 43.7</b>	41.1 to 34.1	<b>44.4 to 42.3</b>	34.1 to 27.1	<b>44.2 to 43.9</b>	32.1 to 25.1	<b>44.1 to 43.9</b>
	Baseline	41.6		41.6		43.8		43.8	
<b>3</b> (8 wks)	Stage 2: Phase 1 – Earthworks	48.9	<b>49.6</b>	39.7	<b>43.8</b>	36.4	<b>44.5</b>	34.7	<b>44.3</b>
	Baseline	41.6		41.6		43.8		43.8	
<b>4*</b> (1 wk)	Stage 2: Phase 2 – Earthworks	50.6*	<b>51.6*</b>	41.4*	<b>54.6*</b>	43.0	<b>49.3</b>	41.2	<b>48.1</b>
	Stage 3: Phase 1 – Partial Piling of North Abutment	42.0*		54.1*		46.1		44.4	
	Baseline	41.6		41.6		43.8		43.8	
<b>5*</b> (1 wk)	Stage 2: Phase 2 – Concreting	48.6 <sup>b</sup>	<b>50.1*</b>	39.4 <sup>b</sup>	<b>54.5*</b>	41.0	<b>48.9</b>	39.2	<b>47.8</b>
	Stage 3: Phase 1 – Partial Piling of North Abutment	42.0*		54.1*		46.1		44.4	
	Baseline	41.6		41.6		43.8		43.8	
<b>6</b> (2wk)	Stage 2: Phase 2 – Concreting	53.6	<b>54.1</b>	44.4	<b>54.8</b>	41.0	<b>46.9</b>	39.2	<b>46.1</b>
	Stage 3: Phase 1 – Partial Concreting of North Abutment, or Stage 3: Phase 1 – Foundation South of Murtle Burn	42.0		54.1		41.1		39.4	
	Baseline	41.6		41.6		43.8		43.8	
<b>7</b> (9 wks)	Stage 2: Phase 2 – Concreting	53.6	<b>54.1 to 54.0</b>	44.4	<b>53.9 to 51.5</b>	41.0	<b>46.9 to 46.7</b>	39.2	<b>49.7</b>
	Stage 3: Phase 2 – Piling of River Dee Bridge Piers 5 to 2	40.9 to 38.4		53.1 to 49.9		41.1 to 40.3		47.9	
	Baseline	41.6		41.6		43.8		43.8	
<b>8*</b> (1 wk)	Stage 2: Phase 2 – Access Completion	50.6*	<b>51.3*</b>	41.4*	<b>50.3*</b>	43.0	<b>47.3</b>	41.2	<b>49.8</b>
	Stage 3: Phase 2 – Piling of River Dee Bridge Pier 1	37.7 <sup>b</sup>		49.0 <sup>b</sup>		40.0		47.7	
	Baseline	41.6		41.6		43.8		43.8	

Combination	Activities	Robert Owen House		St Ternan's		Dolphin		Michael Chapel	
		Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels
<b>9*</b> (1 wk)	Stage 2: Phase 3 – Railway Bridge Demolition	51.8*	<b>52.3*</b>	44.6*	<b>50.9*</b>	47.2	<b>49.4</b>	45.3	<b>50.7</b>
	Stage 3: Phase 2 – Piling of River Dee Bridge Pier 1	37.7 <sup>b</sup>		49.0 <sup>s</sup>		40.0		47.7	
	Baseline	41.6		41.6		43.8		43.8	
<b>10*</b> (1 wk)	Stage 2: Phase 2 – Property Demolition	52.3*	<b>53.5*</b>	46.5*	<b>56.0*</b>	49.6	<b>52.8</b>	47.8	<b>53.8</b>
	Stage 2: Phase 3 – Excavation	42.8 <sup>b</sup>		36.1 <sup>s</sup>		39.9		37.9	
	Stage 3: Phase 3 – Concreting of River Dee Bridge Piers 1 to 4	37.0 <sup>b</sup>		48.7 <sup>s</sup>		43.6		50.9	
	Stage 3: Phase 4 – Completion of Piling at River Dee bridge North Abutment	42.0*		54.1*		46.1		44.4	
	Baseline	41.6		41.6		43.8		43.8	
<b>11*</b> (3 wks)	Stage 2: Phase 2 – Property Demolition	52.3*	<b>54.4*</b>	46.5*	<b>56.0*</b>	49.6	<b>52.9</b>	47.8	<b>53.9</b>
	Stage 2: Phase 3 – Concreting	48.6 <sup>b</sup>		39.4 <sup>s</sup>		42.4		40.4	
	Stage 3: Phase 3 – Concreting of River Dee Bridge Piers 1 to 4	37.0 <sup>b</sup>		48.7 <sup>s</sup>		43.6		50.9	
	Stage 3: Phase 4 – Completion of Piling at River Dee bridge North Abutment	42.0*		54.1*		46.1		44.4	
	Baseline	41.6		41.6		43.8		43.8	
<b>12*</b> (1 wk)	Stage 2: Phase 3 – Concreting	48.6 <sup>b</sup>	<b>50.4*</b>	39.4 <sup>s</sup>	<b>55.7*</b>	42.4	<b>50.2*</b>	40.4	<b>52.6*</b>
	Stage 3: Phase 3 – Concreting of River Dee Bridge Pier 5	35.9 <sup>b</sup>		48.1 <sup>s</sup>		41.1		47.9	
	Stage 3: Phase 4 – Completion of Piling at River Dee bridge North Abutment	42.0*		54.1*		46.1		44.4	
	Stage 3: Phase 4 – Concreting Decks	32.7 <sup>b</sup>		44.0 <sup>s</sup>		40.0		47.7	
	Baseline	41.6		41.6		43.8		43.8	
<b>13</b> (1 wk)	Stage 2: Phase 3 – Concreting	53.6	<b>54.2</b>	44.4	<b>55.1</b>	42.4	<b>48.1</b>	40.4	<b>51.9</b>
	Stage 3: Phase 3 – Concreting of River Dee Bridge Pier 5	40.9		53.1		41.1		47.9	
	Stage 3: Phase 4 – Concreting Decks (Deck at Pier 1)	37.7		49.0		40.0		47.7	
	Baseline	41.6		41.6		43.8		43.8	

Combination	Activities	Robert Owen House		St Ternan's		Dolphin		Michael Chapel	
		Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels
<b>14</b> (5 wks)	Stage 2: Phase 3 – Concreting	53.6	<b>54.7 to 54.5</b>	44.4	<b>54.1 to 50.7</b>	42.4	<b>48.0 to 47.7</b>	40.4	<b>50.1 to 49.9</b>
	Stage 2: Phase 4 – Excavation	45.6		40.5		39.3		37.4	
	Stage 3: Phase 4 – Concreting Decks	40.9 to 37.0		53.1 to 48.1		41.1 to 39.4		47.9 to 47.5	
	Baseline	41.6		41.6		43.8		43.8	
<b>15</b> (16 wks)	Stage 2: Phase 3 – Concreting	53.6	<b>54.1 to 54.0</b>	44.4	<b>53.9 to 50.3</b>	42.4	<b>47.3 to 47.0</b>	40.4	<b>49.9 to 49.6</b>
	Stage 3: Phase 4 – Concreting Decks	40.9 to 37.0		53.1 to 48.1		41.1 to 39.4		47.9 to 47.5	
	Baseline	41.6		41.6		43.8		43.8	
<b>16</b> (9 wks)	Stage 2: Phase 5 – Earthworks	45.2	<b>47.8 to 47.2</b>	40.8	<b>53.6 to 49.6</b>	37.7	<b>46.3 to 45.9</b>	36.1	<b>49.5 to 49.3</b>
	Stage 3: Phase 4 – Concreting Decks	40.9 to 37.0		53.1 to 48.1		41.1 to 39.4		47.9 to 47.5	
	Baseline	41.6		41.6		43.8		43.8	
<b>17</b> (18 wks)	Stage 2: Phase 5 – Concreting	42.5	<b>46.5 to 45.7</b>	38.5	<b>53.5 to 49.4</b>	35.7	<b>46.1 to 45.6</b>	34.1	<b>49.5 to 49.2</b>
	Stage 3: Phase 4 – Concreting Decks	40.9 to 37.0		53.1 to 48.1		41.1 to 39.4		47.9 to 47.5	
	Baseline	41.6		41.6		43.8		43.8	
<b>18*</b> (7 wks)	Stage 2: Phase 5 – Concreting	37.5 <sup>§</sup>	<b>50.3* to 47.2*</b>	33.5 <sup>§</sup>	<b>55.4* to 54.7*</b>	35.7	<b>49.2 to 48.9</b>	34.1	<b>50.7 to 50.4</b>
	Stage 2: Phase 6 – Completion of Earthworks at Murtle Cutting	48.3* to 41.3*		37.2* to 30.2*		31.9 to 24.9		30.5 to 23.5	
	Stage 3: Phase 4 – Completion of Piling at River Dee bridge North Abutment	42.0*		54.1*		46.1		44.4	
	Stage 3: Phase 4 – Concreting Decks	35.9 <sup>§</sup> to 35.0 <sup>§</sup>		48.1 <sup>§</sup> to 43.1 <sup>§</sup>		41.1 to 39.4		47.9 to 47.5	
	Baseline	41.6		41.6		43.8		43.8	
<b>19</b> (5 wks)	Stage 2: Phase 5 – Concreting	42.5	<b>47.5</b>	38.5	<b>51.5</b>	35.7	<b>47.2</b>	34.1	<b>51.1</b>
	Stage 3: Phase 5 – Temporary Access Removal	43.8		50.8		44.0		50.1	
	Baseline	41.6		41.6		43.8		43.8	

Combination	Activities	Robert Owen House		St Ternan's		Dolphin		Michael Chapel	
		Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels	Individual Levels	Combined Levels
<b>20</b> (1 wk)	Stage 2: Phase 5 – Roadworks	44.5	<b>48.2</b>	40.5	<b>51.6</b>	37.7	<b>47.4</b>	36.1	<b>51.2</b>
	Stage 3: Phase 5 – Temporary Access Removal	43.8		50.8		44.0		50.1	
	Baseline	41.6		41.6		43.8		43.8	
<b>21</b> (4 wks)	Stage 2: Phase 5 – Roadworks	44.5	<b>50.4 to 47.5</b>	40.5	<b>54.5 to 44.3</b>	37.7	<b>46.3 to 44.8</b>	36.1	<b>45.7 to 44.5</b>
	Stage 2: Phase 6 – Concreting North Abutment or Infilling of Murtle Cutting	48.3 to 41.3		54.1 to 30.2		41.1 to 24.9		39.4 to 23.5	
	Baseline	41.6		41.6		43.8		43.8	
<b>22</b> (9 wks)	Stage 2: Phase 6 – Concreting North Abutment or Infilling of Murtle Cutting	48.3 to 41.3	<b>49.1 to 44.5</b>	54.1 to 30.2	<b>54.3 to 41.9</b>	41.1 to 24.9	<b>45.7 to 43.9</b>	39.4 to 23.5	<b>45.1 to 43.8</b>
	Baseline	41.6		41.6		43.8		43.8	
	Stage 3: Phase 6 – Concreting Deck	42.0		54.1		41.1		39.4	
<b>23</b> (21 wks)	Baseline	41.6	<b>44.8</b>	41.6	<b>54.3</b>	43.8	<b>45.7</b>	43.8	<b>45.1</b>
	Stage 2: Phase 6 – Infilling of Murtle Cutting	30.8		38.1		23.3		21.4	
<b>24</b> (1 wk)	Baseline	41.6	<b>41.9</b>	41.6	<b>43.2</b>	43.8	<b>43.8</b>	43.8	<b>43.8</b>
	Stage 2: Phase 6 – Earthworks between A93 and Deeside Walkway	45.6		40.5		39.3		37.4	
<b>25</b> (3 wks)	Stage 3: Phase 7 – Roadworks	44.0 to 39.0	<b>48.8 to 47.7</b>	51.1 to 50.1	<b>51.9 to 51.1</b>	43.1 to 41.4	<b>47.2 to 46.7</b>	49.5 to 41.5	<b>50.7 to 46.4</b>
	Baseline	41.6		41.6		43.8		43.8	
	Stage 2: Phase 7 – Roadworks	44.7 to 38.9		50.6 to 40.6		43.3 to 37.9		41.4 to 36.3	
<b>26</b> (11 wks)	Stage 3: Phase 7 – Roadworks	44.0 to 39.0	<b>48.4 to 44.8</b>	51.1 to 50.1	<b>54.1 to 51.1</b>	43.1 to 41.4	<b>48.2 to 46.4</b>	49.5 to 41.5	<b>51.0 to 46.3</b>
	Baseline	41.6		41.6		43.8		43.8	
	Stage 2: Phase 7 – Roadworks	44.7 to 38.9		50.6 to 40.6		43.3 to 37.9		41.4 to 36.3	
<b>27</b> (2 wks)	Baseline	41.6	<b>46.4 to 43.5</b>	41.6	<b>51.1 to 44.1</b>	43.8	<b>46.6 to 44.8</b>	43.8	<b>45.8 to 44.5</b>
	Stage 2: Phase 7 – Roadworks	44.7 to 38.9		50.6 to 40.6		43.3 to 37.9		41.4 to 36.3	

## **Appendix B – Operational Noise Information**

## Camphill Assessment Operational Noise Assessment

### General

The noise levels have been assessed in terms of the  $L_{Aeq, 16 \text{ hours}}$  parameter, which is the parameter used by the World Health Organisation. The location of Murtle Estate and Newton Dee are shown on Figure 1, and Figure 2 shows other Camphill facilities in the wider area. These facilities are considered to be sufficiently remote from the proposed scheme as not to warrant noise assessment.

### External Noise Levels

External noise levels are shown as free-field noise levels, assessed at a height of 1.5m above ground level, and are presented as noise contours on Figure 3 and 4. Figure 3 shows the noise levels within Murtle Estate, based on a combination of the predicted noise levels with the measured weekday  $L_{Aeq, 16 \text{ hrs}}$  baseline noise level of 41.6dB(A). Figure 4 shows the noise levels within Newton Dee, based on a combination of the predicted noise levels with the measured weekday  $L_{Aeq, 16 \text{ hrs}}$  baseline noise level of 43.8dB(A). These figures identify the various buildings present within each of these facilities, which are a mix of residential, community, therapeutic and workshop/ commercial premises.

It may be seen from Figure 3 that within Murtle Estate there are areas around the eastern and southern site boundaries, and along the estate access road, that lie within the noise level range of  $L_{Aeq, 16 \text{ hrs}}$  50dB(A) to 55dB(A). A more detailed summary of the noise levels at specific property locations within this area is provided on the table below, and it should be noted that a range is generally quoted, as the noise level will vary depending on which façade of the property is under consideration. This reflects the fact that the building itself will provide appreciable local noise screening in the area concerned:

Table 1 – External (Free-field) Noise Levels at Selected Locations

Type of Facility	Name	External Noise Level (dB(A))
Pupil/Staff Shared Residential Facility	Robert Owen House	47.0-50.2
	Mignon & Columbine	45.9-49.9
	St Ternan's	46.7-51.6
Educational/Therapeutic Facility	Beech Workshop	45.9-54.2
	Murtle Workshop	44.4-51.9
	Studio/Metal Workshop	43.8-50.9
	Amber Kindergarten	45.9-52.5
	Rowan Workshop	46.6-49.6
Staff Only Residential Facility	Railway Cottage*	47.3-57.0
	St Brendan's	46.0-52.6
	Coracle	44.1-50.7
	Juniper	45.8-50.7
	Fedelma	46.9-55.4
	St Machar's	46.6-52.3
	Omar	44.6-50.5
Heatherdee	44.9-50.5	

\* Indicates that property concerned lies out-with the main Murtle Estate area, being north of the disused Deeside Railway Line.

It may be seen from Figure 4 that within Newton Dee the community areas typically experience noise levels below  $L_{Aeq, 16 \text{ hrs}}$  50dB(A).

The noise level has also been assessed at the Old Deeside Line Footbridge, where this crosses the AWPR. The noise level at this location is estimated as  $L_{Aeq, 16 \text{ hrs}}$ , 68dB(A). The design of this bridge has been developed to provide visual screening of the AWPR from the Old Deeside Line Walk, however further reduction of sound levels could only be achieved by complete enclosure of the walk over the length of the bridge, which has not been considered appropriate at this location. It would be possible to provide a separate, enclosed, dedicated link between Camphill and Newton Dee, should this be considered appropriate in further discussion on mitigation measures.

### Internal Noise Levels

Internal noise levels at a number of buildings have been calculated for conditions where a window is partially open and when a window is closed. It is assumed within the calculation that the windows are single-glazed, and greater reductions may be achieved where double-glazing is present. Internal noise levels have been calculated for each level of occupancy that is believed to be present in each of the buildings concerned, based on photographic records of buildings within the site. The ground-floor assessment is based on a height of 1.5m above external ground, and first floor levels are based on a height of 3.5m above external ground.

Noise levels at each floor level are presented for day-time conditions (D), and for residential facilities night-time conditions (N), with the latter calculated by a deduction of -10dB(A) from the day-time noise levels. The levels quoted include an addition of +2.5dB(A) to represent the façade effect, followed by a deduction of -15dB(A) for a partially open window and -25dB(A) for a closed window. In addition to the noise levels at the properties quoted in the table presented for external noise levels, internal noise levels have also been quoted for other specific properties elsewhere within Murtle Estate and Newton Dee.

Noise levels are presented in three tables, the first covering the particular residential properties used by pupils within the 50dB(A) to 55dB(A) external noise area identified above; the second covering educational and therapeutic locations both within this same area and at certain specific locations elsewhere within Murtle Estate; and the third covering particular properties within the area identified that are used by staff only. As the noise levels are generally reasonably low in terms of a standard noise assessment, which is what would apply to locations where staff only are present, this latter table presents results for a representative sample of these locations.

Table 2 – Internal Noise Levels at Selected Residential Properties at Murtle Estate Used by Pupils

Name	Level	Internal Noise Level (dB(A))			
		Open Window		Closed Window	
		Day	Night	Day	Night
Robert Owen House	Ground	34.5-37.7	24.5-27.7	24.5-27.7	14.5-17.7
	First	36.3-40.2	26.3-30.2	26.3-30.2	16.3-20.2
Mignon & Columbine	Ground	33.4-37.4	23.4-27.4	23.4-27.4	13.4-17.4
	First	35.1-39.7	25.1-29.7	25.1-29.7	15.1-19.7
St Ternan's	Ground	34.2-39.1	24.2-29.1	24.2-29.1	14.2-19.1
	First	35.2-42.5	25.2-32.5	25.2-32.5	15.2-22.5



Table 3 – Internal Noise Levels at Selected Educational/Therapeutic Properties at Murtle Estate Used by Pupils

Name	Category	Internal Noise Level (Daytime) (dB(A))	
		Open Window	Closed Window
Beech Workshop (see Note 1)	Ground Floor	33.4-41.7	23.4-31.7
	First Floor	35.9-42.4	25.9-32.4
Murtle Workshop (see note 2)	Ground Floor	31.9-39.4	21.9-29.4
	First Floor	33.4-39.8	23.4-29.8
Studio/Metal Workshop	Ground Floor	31.3-38.4	21.3-28.4
Amber Kindergarten	Ground Floor	33.4-40.0	23.4-30.0
Tourmalin	Ground Floor	32.2-33.1	22.2-23.1
Pyrite	Ground Floor	30.8-33.1	20.8-23.1
	First Floor	31.8-34.3	21.8-24.3
Mica	Ground Floor	30.9-31.8	20.9-21.8
Rowan Workshop	Ground Floor	34.1-37.1	24.1-27.1

Note 1 – Beech Workshop is elevated above surrounding ground level

Note 2 – Murtle Workshop is believed to be single storey to north and east

Table 4 – Internal Noise Levels at Selected Residential Properties at Murtle Estate Used by Staff Only

Name	Level	Internal Noise Level (dB(A))			
		Open Window		Closed Window	
		Day	Night	Day	Night
St Brendan's	Ground	33.5-40.1	23.5-30.1	23.5-30.1	13.5-20.1
Coracle	Ground	31.6-38.2	21.6-28.2	21.6-28.2	11.6-18.2
Fedelma	Ground	34.4-42.9	24.4-32.9	24.4-32.9	14.4-22.9
	First	35.4-43.6	25.4-33.6	25.4-33.6	15.4-23.6
Heatherdee	Ground	32.4-38.0	22.4-28.0	22.4-28.0	12.4-18.0

Table 5 – Internal Noise Levels at Selected Properties at Newton Dee

Name	Level	Internal Noise Level (dB(A))			
		Open Window		Closed Window	
		Day	Night	Day	Night
Dolphin (Residential)	Ground	32.6-35.4	22.6-25.4	22.6-25.4	12.6-15.4
	First	33.7-36.3	23.7-26.3	23.7-26.3	13.7-16.3
Michael Chapel (Community Facility)	Ground	31.8-36.5	21.8-26.5	21.8-26.5	11.8-16.5
	First	32.2-38.0	22.2-28.0	22.2-28.0	12.2-18.0

### General Comments

It should be noted that the above noise levels are based on the current model representation for noise barriers adjacent to the AWPR at various locations. Further development of the barrier arrangement may provide reduced noise levels within Murtle Estate, and will be the subject of continuing development. In addition, more detailed consideration and discussion of mitigation measures on the boundary between AWPR and the Camphill communities could provide further benefits.