

21.03224.FUL: Appendix D – Consultation Response on behalf of Cambridge City Council Environmental Quality and Growth Team

PLANNING CONSULTATION RESPONSE

Responding Officer:	Greg Kearney
Date:	11-02-2022
Planning Ref No:	21/03224/FUL
Tascomi Ref No:	2204/21 & 2531/21
Description of Development:	<p>Cambridge Airport, Newmarket Road, Cambridge,</p> <p>Dismantling and removal of two existing radars and the construction of a new radar and other associated works.</p> <p><u>Environmental Impact Assessment Regulations 2017 (EIA Regs): Environmental Statement</u></p> <p>Amendment - Further information has been received relating to:</p> <ol style="list-style-type: none">1. Letter in response to consultation comments2. Noise report

Cross one:

- ☒ The development proposed is **acceptable** subject to the imposition of the condition(s)/informative(s) outlined below.
- ☐ The development proposed is **unacceptable** and should be refused for the reason(s) set out below.
- ☐ It is not possible to fully comment on the proposed development and the additional information set out below will be required in order to provide comments.

This memo should be read in conjunction with our previous (Environmental Quality and Growth - EQG) planning consultation response memos dated the 28-10-2021 (Planning Ref No: 21/03224/FUL & Tascomi Ref No: 2204/21) and 18-11-2021 (Tascomi Ref No: 2204/21), which were completed prior to review of the most recent additional information submissions.

However, where necessary any relevant and final comments / conclusions previously provided have been included. Therefore, this response memo supersedes all previous EQG memos and should be considered our final response to all environmental health related matters / issues.

List of required conditions/Informatives

- **Standard Condition:**

CE05AS - Unexpected Contamination

If unexpected contamination is encountered during the development works which has not previously been identified, all works shall cease immediately until the LPA has been notified in writing. Thereafter, works shall only restart with the written approval of the LPA following the submission and approval of a Phase 2 Intrusive Site Investigation Report and a Phase 3 Remediation Strategy specific to the newly discovered contamination.

The development shall thereafter be carried out in accordance with the approved Intrusive Site Investigation Report and Remediation Strategy.

Reason: To ensure that any unexpected contamination is rendered harmless in the interests of environmental and public safety (Cambridge Local Plan 2018 policy 33).'

- **Bespoke Conditions:**

Demolition / Construction and Operational Noise

1. Construction Environmental Management Plan & Working Hours

Save for construction activities of electrical contractors undertaking electrical cabling works on H16 and H17 radar, and cabin-fit on the H17 radar, all demolition and construction work shall only be carried out between 0800 hours to 1800 hours Monday to Friday inclusive, 0800 hours to 1300 hours on Saturdays and no time on Sundays, Bank or Public Holidays, except in instances that shall be agreed in advance in writing with the Local Planning Authority.

In all other respects, unless otherwise agreed in writing by the Local Planning Authority, the demolition, dismantling and construction works shall be carried out in accordance with the submitted CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN, date 17/05/2021 (Document Ref. No: RADAR/BD001CEMP, Version 01).

Reason: In the interests of safeguarding amenity in accordance with Policies 35 and 83 of the Cambridge Local Plan 2018.

2. H17 Radar Noise Insulation Condition

The embedded noise / sound insulation and mitigation attenuation measures to the elevated upper H17 radar motor cabin enclosure as detailed in the submitted '*Environmental Statement: Cambridge City Airport – Radar Replacement Project, July 2021*' and '*Noise Consultants Ltd - Response: Planning Consultation Response. Planning Ref. 21/03224/FUL, November 2021*' and all application drawings including '*rps drawing / document number. 20591-RPS-CBG-XX-DR-C-4010 P01 dated 01.07.2021 - titled H17 Radar Site - Elevated Cabin Proposed Noise Insulation Measures*', shall be fully implemented and retained thereafter.

For the avoidance of doubt the H17 Radar motor cabin enclosure shall be positioned so that cabin elevation facades B-C (as identified and detailed on submitted '*rps drawing / document number. 20591-RPS-CBG-XX-DR-C-4010 P01 dated 01.07.2021 - titled H17 Radar Site - Elevated Cabin Proposed Noise Insulation Measures*') are orientated and facing in a southerly / south easterly direction, away from Noise Sensitive Receptors / Residential Premises at Barnes Close.

Reason: In the interests of safeguarding amenity in accordance with Policies 35 and 83 of the Cambridge Local Plan 2018.

3. H17 Radar Operational Sound Verification Assessment Report

No later than two months prior to the commencement of operation of the H17 Radar (following commissioning) the methodology for a **Radar Operational Sound Verification Assessment** shall be submitted to and approved in writing by the Local Planning Authority

Within six months of the commencement of operation of the radar (following commissioning), the **Radar Operational Sound Verification Assessment** as approved shall be undertaken and the results submitted in writing for approval by the Local Planning Authority. The **Radar Operational Sound Verification Assessment** shall compare the Specific Sound Level, L_s arising from operation of the H17 Radar with the **Verification Noise Limits** set out in **Table 1** below.

Subject to access constraints, alternative measurement locations to those listed in **Table 1** can be used where the measurement locations are demonstrated to be equivalent in terms of H17 Radar noise immissions. This is subject to approval by the Local Planning Authority.

Table 1 - Verification Noise Limits, dB $L_{Aeq,T}$

Location	Easting	Northing	Reference Time, T_r	Verification Noise Limit, L_{s,T_r} averaged over Reference Time, T_r dB
A	548076.1	258792.1	15-min	34 dB ⁱ
B	548256.9	258516.3	15-min	34 dB ⁱ

i – measurements at least 3.5m from acoustically reflecting facades and structures

This condition must be read in conjunction with **Informative(s) [‘A’ and ‘B’]**

If the **Radar Operational Sound Verification Assessment** identifies that there is sufficient reason to suggest that the **Verification Noise Limits** set out in **Table 1** are being regularly exceeded further investigations will be undertaken, and a report shall be submitted in writing to the Local Planning Authority for approval within two (2) months to consider whether the **Operational Rating Level Limits** set out in **Table 2 [Condition 4]** are being exceeded, and if so the measures that the Applicant proposes to take, employing the best practical means, to ensure compliance with the **Operational Rating Level Limits** set out in **Table 2 [Condition 4]** together with a timescale for their implementation.

Reason for this Condition: In the interests of good environmental impact assessment practice, and to verify the H17 Radar noise immissions stated in the environmental statement.

4. H17 Radar Operational Noise Compliance Assessment Process

Following written notification (‘the written notification’) from the Local Planning Authority, and with reference to the **Noise Compliance Assessment Process** set out in **Informative C**, the Applicant shall undertake a **Noise Compliance Assessment** to determine the compliance of actual rating levels arising from operation of the H17 Radar with the **Operational Rating Level Limits** set out in **Table 2**.

Specific **Operational Rating Level Limits** set out in **Table 2** are set for complainant’s properties represented by Locations R1 – R33 [**Informative ‘D’**].

The **Noise Compliance Assessment** shall be commenced within twenty one (21) days of the written notification. The Applicant shall provide to the Local Planning Authority a copy of a **Noise Compliance Assessment Report** within two (2) months of the written notification.

If the **Noise Compliance Assessment Report** confirms non-compliance with the **Operational Rating Level Limits** set out in **Table 2**, the Applicant shall submit in writing for approval by the Local Planning Authority within four (4) months of the written notification a **Compliance Noise Investigation Report** setting out the results of an investigation into the reasons why there are exceedances of the **Operational Rating Level Limits** set out in **Table 2**, and measures that it proposes to take, employing the best practical means, to ensure compliance with the **Operational Rating Level Limits** together with a timescale for their implementation.

Following the written approval by the Local Planning Authority of the **Noise Compliance Investigation Report** the measures shall be implemented as proposed and thereafter retained.

Table 2 - Operational Rating Level Limits, dB $L_{Ar,Tr}$

Location	Period	Reference Time, T_r	Operational Rating Level Limit, $L_{Ar,Tr}$ averaged over Reference Time, T_r dB
Complainant's Property (R1-R16)	Daytime (0700-1900)	1-hour	43 dB ⁱ
	Evening (1900-2300)	1-hour	40 dB ⁱ
	Night (2300-0700)	15-min	36 dB ⁱⁱ
Complainant's Property (R17-R33)	Daytime (0700-1900)	1-hour	43 dB ⁱ
	Evening (1900-2300)	1-hour	36 dB ⁱ
	Night (2300-0700)	15-min	36 dB ⁱⁱ
Complainant's Properties Not Listed	Daytime (0700-1900)	1-hour	43 dB ⁱ
	Evening (1900-2300)	1-hour	36 dB ⁱ
	Night (2300-0700)	15-min	36 dB ⁱⁱ

i – free-field measurements at least 3.5m from the façade of the complainants property

ii – façade measurements above ground floor level, approximately 1m from the façade of the relevant floor of the building

This condition must be read in conjunction with **Informative(s) ['C', 'D' and 'E']**

Reason: In the interests of safeguarding amenity in accordance with Policies 35 and 83 of the Cambridge Local Plan 2018.

- **Bespoke Informative(s): A to E**

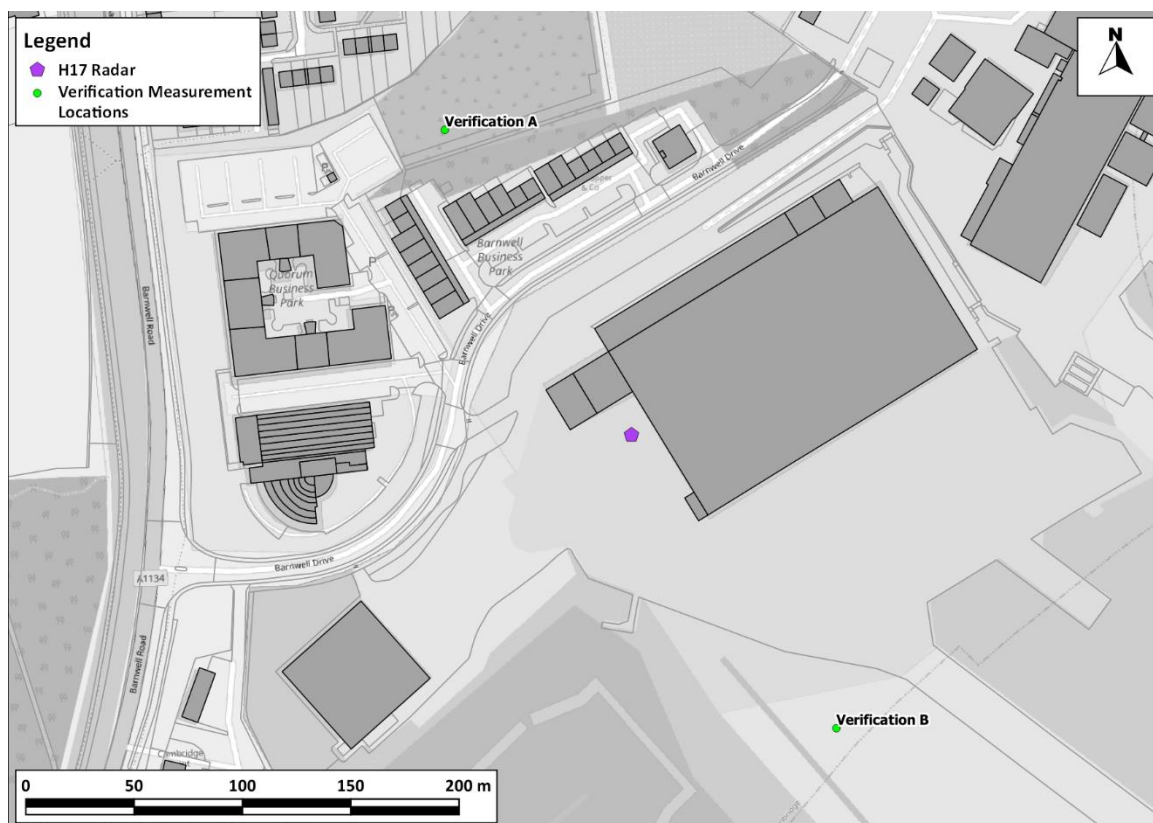
Informative A: Measurement Procedure

Measurement procedures should follow the methodologies set out in BS 4142:2014+A1:2019 'Methods for rating and assessment industrial and commercial sound', and shall include a record of meteorological conditions at appropriate times across the duration of the measurement. Meteorological data shall include wind speeds in metres per second, wind direction and rainfall.

Measurement equipment shall be enabled to collect data in one-third octave bands, including levels at 400Hz L_{Zeq} .

The location of the **Verification Noise Limits** set out in **Table 1 [Condition 3]**, are shown in **Figure 1**.

Figure 1 - Verification Noise Limits Monitoring Locations



Informative B: Verification Noise Level Determination

Where necessary, the measured **Ambient Sound Level**, $L_a = L_{Aeq,T}$ shall be corrected for influences of the **Residual Sound Level**, L_r to determine the **Specific Sound Level**, L_s arising from operation of the H17 Radar, adopting the procedures set out in BS 4142:2014+A1:2019 'Methods for rating and assessment industrial and commercial sound'.

Informative C: Noise Compliance Assessment Process

A **Noise Compliance Assessment** will only be required by the Local Planning Authority, if following an investigation by the Local Planning Authority, there is sufficient reason to suggest that the **Operational Rating Level Limits** set out in **Table 2 [Condition [4]]** are being exceeded at any dwelling which is lawfully existing or has planning permission at the date of this permission.

The **Local Planning Authority investigation** shall be undertaken by suitably qualified / competent officer(s) of the Local Planning Authority, and the investigation will include the completion of diary sheets, site visits and assessments, as required.

Should the **Local Planning Authority investigation(s)** identify that there is sufficient reason to suggest that the **Operational Rating Level Limits** set out in **Table 2 [Condition 4]** are being regularly exceeded at any dwelling which is lawfully existing or has planning permission at the date of this permission the requirements of **[Condition 4]** will then be instigated.

Informative D: Measurement Procedure

Measurement procedures should follow the methodologies set out in BS 4142:2014+A1:2019 'Methods for rating and assessment industrial and commercial sound' and shall include a record of meteorological conditions at appropriate times across the duration of the measurement. Meteorological data shall include wind speeds in metres per second, wind direction and rainfall.

Operational Rating Level Limits, $L_{A_{r,Tr}}$ during the Daytime (0700-1900) and Evening (1900-2300) periods apply to external amenity areas at dwellings which are lawfully existing or has planning permission at the date of this permission. The Daytime (0700-1900) and Evening (1900-2300) measurement locations shall be at least 3.5m from the façade of the complainant's property.

Operational Rating Level Limits, $L_{A_{r,Tr}}$ during the Night-time (2300-0700) period apply to levels above ground floor level, approximately 1m from the façade of the relevant floor of the complainant's property.

The properties which have specific **Operational Rating Level Limits** set out in **Table 2 [Condition 4]**, represented by Locations R1 – R33, are shown in **Figure 2** and **Figure 3**.

Figure 2 - Properties with Specified Operational Rating Level Limits

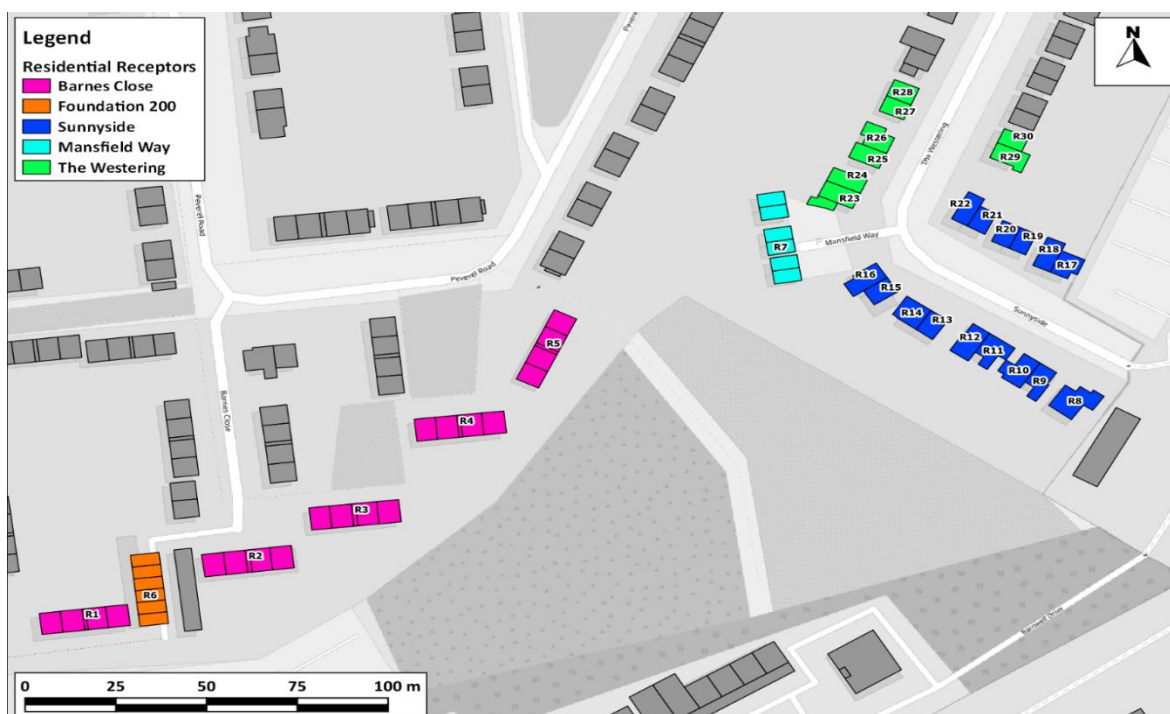
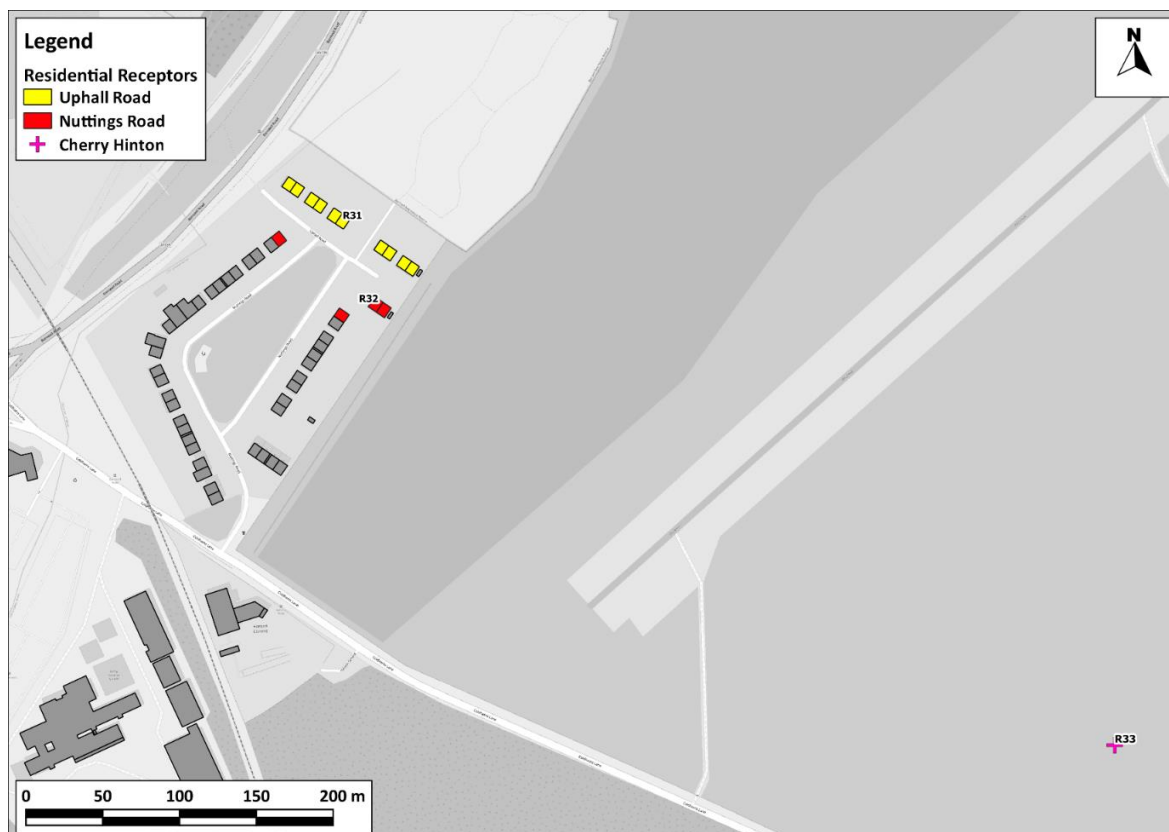


Figure 3 - Properties with Specified Operational Rating Level Limits (2)



Informative E: Operational Rating Level Determination

Where necessary, the measured **Ambient Sound Level**, L_a shall be corrected for influences of the **Residual Sound Level**, L_r to determine the **Specific Sound Level**, L_s arising from operation of the H17 Radar, adopting the procedures set out in BS 4142:2014+A1:2019 'Methods for rating and assessment industrial and commercial sound'.

The **Rating Level**, $L_{Ar, Tr}$ shall be determined from the **Specific Sound Level**, L_s adopting methodology advocated in BS 4142:2014+A1:2019 'Methods for rating and assessment industrial and commercial sound'. A character correction of +2dB shall be adopted unless there is sufficient justification to suggest that an alternative character correction is appropriate.

Notes:

Ambient sound level, $L_a = L_{Aeq, T}$ - equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, over time interval, T.

Residual sound level, $L_r = L_{Aeq, T}$ - equivalent continuous A-weighted sound pressure level of the residual sound over time interval, T.

Specific sound level, $L_s = L_{Aeq, T}$ - equivalent continuous A-weighted sound pressure level of the specific sound source over reference time interval, T_r .

Rating level, $L_{A, Tr}$ – specific sound level plus any adjustment for the characteristic features of the sound over reference time interval, T_r .

EIA Regulations 2017 – Amendment: further information / evidence

In response to our planning consultation response memo dated the 28-10-2021 (Planning Ref No: 21/03224/FUL & Tascomi Ref No: 2204/21) which contained a number of requests for ‘*Additional Information, Clarifications, Justifications and Assessment*’, mainly in relation to noise, the following additional information has been submitted under cover of a Vantage Planning letter dated 29th November 2021:

1. Vantage Planning Letter dated the 29th of November 2021, which provides specific response to the following matters which we requested clarification on:

- Development Proposals (including Alternatives)
 - H16 Alternative
 - Radome
- Health and Electromagnetic Radiation
- Annex Further information explaining decision to rule out an off-airport radar location
 - An addendum to the Alternative Sites Assessment (Appendix A3.1 of the ES)

2. Response: Planning Consultation Response. Planning Ref. 21/03224/FUL- November 2021, report No J20- 12041B/1/F1: Noise Consultants Ltd (noise related)

Three Spires Acoustics Ltd – Radar Assessment

In addition to the applicant's additional submissions, we the EQG / Env Health service of Cambridge City Council have also engaged the services of an acoustic consultant (Three Spires Acoustics Ltd) to independently to assess and advise on the potential noise impacts of the existing H16 and proposed H17 radar.

This was considered necessary due to local concern about the radar noise immissions from Cambridge Airport and the complexity of the nature and character of the noise from the H16 radar and therefore potentially the proposed H17 radar. The H16 radar has separately given rise to local noise complaints both to both Marshalls and the Commercial Environmental Health service of Cambridge City Council when it was in full operation.

In addition, noise objections to this H17 radar application have been received from local residents including objections / concerns raised by MAS Environmental (an acoustic consultancy acting on behalf of some of the objectors) regarding the acceptability / robustness of the submissions and noise impact assessment that has

been undertaken as part of the application. Residents are concerned that the proposed H17 radar will result in ongoing unacceptable adverse noise impacts.

The Council's acoustics consultants (Three Spires Acoustics Ltd) report '*Cambridge City Airport Radar Noise - Statutory Nuisance & Planning Assessment, Rev3 - 31/01/2022: Ref. No. TSA/ENA/2021/37*' (hereafter referred to as the '*Three Spires Report, Jan 2022 - EQG/CCC*') is enclosed, as it is considered relevant and is referred to throughout this memo.

1.0 Executive Summary

We have reviewed the further information set out above (additional information submitted under cover of a Vantage Planning letter dated 29th November 2021), together with the response and supplementary information previously provided on 20th October 2021 in response to a Great Cambridge Shared Planning (GCSP) service letter of 24th September 2021 requesting further information under the EIA Regulations 2017 in relation to the Environmental Statement (ES).

It is our view that the application is now fully in accordance with the EIA regulation requirements and the submitted ES with additional amendments / information etc includes all the necessary Env Health issues / topic area related information and impact assessments to allow us to make informed decision about the acceptability of the proposals.

The Environmental Quality and Growth (EQG) service fully support in principle the relocation of the existing H16 radar to the alternative H17 location as proposed, where it would be located further from local residential premises and will have less of an impact on local amenity / quality of life in terms of the main operational environmental impacts / effects such as shadow flicker and noise, when compared with the existing H16 radar when it was fully operating. Contaminated land and air quality impacts are negligible and acceptable.

We do not envisage any unacceptable adverse impacts on non-residential premises such as Commercial offices, other offices and work studios all of Barnwell Road / Drive, Peverel Road Allotment Gardens (Whitehill Allotment Society) and other recreational areas or areas of open space and the Abbey Meadows School.

In summary, having assessed the application submissions and having regard to the conclusions of the Councils' '*Three Spires Report, Jan 2022 - EQG/CCC*' report it is our view that operational noise from the proposed H17 radar will not give rise to any significant adverse impacts on the health and the amenity / quality of life of nearby residential premises.

Based on national planning practice guidance on noise it is concluded that the H17 radar noise immissions at residential receptors should not cause any change in the behaviour, attitude or other physiological responses. The radar noise may slightly affect the acoustic character of an area but not to the extent that there is a change in quality of life / amenity. If the noise exposure is at this level the national planning guidance action / advice is that no additional specific measures are required to manage the proposed radar noise in the prevailing acoustic environment.

Therefore, it is concluded that the proposed development is in accordance with NPPF paragraphs 174 e) and 185 a) and Cambridge Local Plan 2018 policies 35: Protection of human health and quality of life from noise and vibration and 83: Aviation development.

However, to ensure that the radar noise complies with the predicted noise rating levels as detailed in the submitted ES and to protect the quality of life / amenity of local residents, a number of bespoke operational noise conditions are recommended as detailed above.

2.0 Outline of the Proposals

The development proposal is comprised of the following three component parts / stages:

- Demolition and removal of the existing radar (the 'AR15 Radar') that is currently located to the south of the runway;
- Removal of the radar (the 'H16 Radar') that was constructed in Autumn 2020. This is located in the northern part of the Airport adjacent to Hangar 16, to the north of Hangar 17; and
- The construction of a new radar and associated infrastructure in the north-west of the Airport, immediately / adjacent to the west of Hangar 17, on an area of hard standing comprising unused apron space (the 'H17 Radar'), east of Hangar 21 and north of the recently constructed Ground Run Enclosure (GRE).

The ES states that a fully operational radar system is critical for the safe operation of the Airport and the safety of neighbouring communities. It detects the presence and position of aircraft in the wider airspace around the Airport so that aircraft landing and taking off can be safely coordinated and controlled by the Airport's air traffic controllers. The radar is critical to safety because the Airport operates in 'uncontrolled airspace' e.g., aircraft in the vicinity do not need to notify the Airport tower should they wish to enter the airspace above.

2.1 H17 Radar: as proposed (east of Hangar 21 and north of the GRE)

Marshall Aerospace and Defence Group Ltd (MADG) has undertaken an independent review of the radar siting, including looking at potential alternative locations to replace the H16 radar in the long-term. It is understood that at a residents' meeting on 25th January 2021, Marshall confirmed that whilst the H16 Radar was in the optimum location operationally, they recognised the concerns of residents and confirmed their intention to remove it (finding an alternative location) to reduce the effects that were occurring.

It is stated that the proposed replacement H17 radar will have no bearing on the capacity or number of flights using the Airport or overall operations, with a focus on the safety of aircraft and surrounding communities. The overarching purpose of the proposed replacement of the existing radar is to ensure the safe control of aircraft using the Airport and the airspace within the vicinity of the Airport.

Learning from the recent experience of complaints from local residents in relation to the H16 radar, Marshall commissioned detailed assessments / studies, including on

noise, landscape and visual impacts and shadow flicker. These studies have informed the decision on the siting of the proposed H17 radar, and it is concluded in the application submissions that it has been demonstrated that it will not give rise to unacceptable impacts on local residents and businesses and minimises any wider impacts on the environment.

These assessments, together with the assessment of other impacts are incorporated within an ES in support of the planning application.

Technical specialists have assessed the different impacts the proposals would have – covering the dismantling of the H16 radar, its reconstruction west of Hangar 17, the dismantling and removal of the AR15 Radar and the operational and land use effects of the proposed radar at its new site.

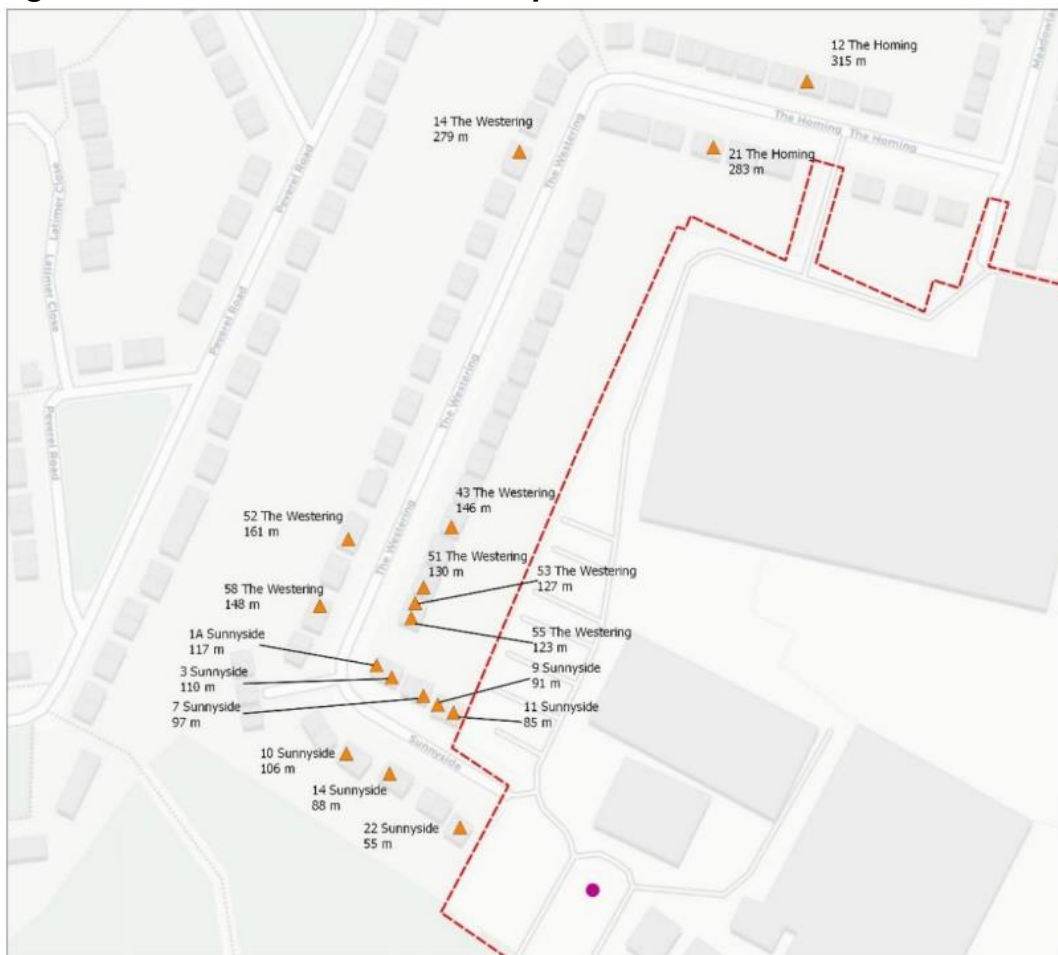
3.0 Environment Health Involvement to Date

Since the erection and operation of the H16 radar in the Autumn of 2020, Cambridge City Council's Environmental Health Commercial Team have received 12 separate complaints from residents living in the immediate vicinity of the radar, mainly from The Westering (approx. 100m to nearest garden boundary from centre of radar base - 120m to facades) and Sunnyside (approx. 45m to nearest garden boundary from centre of radar base).

The complaints received to date relate to operational noise (an audible tonal and fluctuating industrial type mechanical noise) and shadow flicker. The noise complaints are about noise disturbance / annoyance experienced mainly during the evening and night-time periods (when background noise levels are lower and when noise can have greater prominence with greater potential for adverse impact). The complaints relate to adverse impacts on the use and enjoyment of properties both external in gardens and inside, with reported incidents of sleep disturbance and associated health and wellbeing impacts.

Marshalls have also directly received complaints about the radar from local residents. Figure 1 below recreated from the ES shows the location of residential complaints (received by Marshalls – consistent with Council complaints) and relative distances to the H16 radar.

Figure 1: Relative distances of complaints to H16 Radar



Following notification of the noise complaints to Marshalls, they engaged an acoustic consultant to assess and advise on the radar noise in liaison with our Environmental Health service, and a package of noise mitigation measures were undertaken to the upper radar motor cabin (the main noise source) to reduce the noise levels experienced by local residents. Although this has resulted in measured noise improvements, noise complaints continued, and some residents report very little noticeable improvement, and they maintain that unacceptable adverse noise impacts continue when the H16 radar is in full operation especially during the evening and night-time.

The main source of the noise is understood to be two motors that rotate the radar antennae, which are located within the upper radar motor cabin immediately below the antennae. The noise annoyance / disturbance is caused by a relatively low level (in absolute dB value) mechanical motor type noise that is tonal (380 to 400Hz dominant frequency) with a degree of amplitude modulation (varies up and down in volume). The character of the noise is such that is readily identifiable and distinctive as the radar, and it can occur 24/7 when the H16 radar is operational.

The operational noise from the radar has been investigated separately as a potential statutory noise nuisance under separate legislation, the Environmental Protection Act 1990. However, to date it has not been possible to categorially establish that a noise

nuisance exists or is likely to occur. Although the H16 radar is currently not in constant use / full operation the potential for a statutory nuisance to arise continues and the matter remains open to investigation or could be reconsidered if circumstances change and the H16 becomes fully operational again.

It is important to emphasise that whilst statutory nuisance type issues such as noise can be considered alongside a broad range of factors that can impact on the pleasantness of a place, as part of general local quality of life / amenity, quality of life has a much lower threshold (higher protection standard) than that for statutory nuisance.

The statutory nuisance regime is not intended to secure a high level of amenity but is a basic safeguarding standard intended to deal with the most excessive emissions and impacts. Nuisance does not equate to loss of quality of life / amenity. Significant loss of amenity will often occur at lower levels of noise, than would constitute a statutory nuisance.

It is therefore important for planning authorities to consider properly, loss of amenity and impacts on quality of life from emissions in the planning process in its wider context and not from the narrow perspective of potential statutory nuisance. Broader quality of life / amenity issues therefore needs to be carefully considered under the planning regime.

There are opportunities to address problems like noise, given the duties placed on local authorities under the Environmental Protection Act 1990. Whilst this provides a good backstop option, it is certainly not ideal to start requiring alterations to recently completed developments in order to abate a nuisance when these could have been raised during the planning stage, with the aim of mitigating impacts to the higher standard of protection, that is the safeguarding of amenity / quality of life and ensuring any adverse impacts are mitigated to an acceptable level.

The planning regime is proactive whilst the statutory nuisance regime is mainly reactive.

4.0 Chapter 3 – The Development Proposals (including Alternatives)

Chapter 3 provides details of the proposed development itself and a summary of the alternatives considered.

The alternatives assessment including a more detailed Alternative Sites Assessment (Appendix 3.1) consider the following scenarios:

- Do Nothing
- Alternative Radar Siting
- Alternative Radar Design

4.1 An addendum to the Alternative Sites Assessment (Appendix A3.1 - ES)

Further to the Great Cambridge Shared Planning (GCSP) service letter of 24th September 2021 to the applicants planning agent requesting further information under the EIA Regulations 2017 in relation to the Environmental Statement, the following additional information was submitted under a covering letter dated 20th October 2021.

The Addendum includes:

- i) A further constraints plan showing key constraints within the airport boundary, such as the main and grass runways and the clear and graded areas either sides of these runways.
- ii) Further to paragraph 2.3 of the Alternative Sites Assessment, a letter from the Accountable Manager for the Aerodrome & Aviation Security Accountable at Cambridge City Airport, explaining the reasons for locating the radar within the airport (Appendix A1).
- iii) Further information supporting the choice of the H17 location of the radar in the area of land available in the north-west part of the airport over the alternative

4.2 EQG Comment: Reasonable Alternatives - Radar Site Location / Design

The comments made previously in our planning consultation memo dated the 18-11-2021 (Tascomi Ref No: 2204/21) in relation to this matter remain the same and these were as follows:

'Alternative Site Assessment (ASA)

EQG are not technical experts in aviation matters such as air navigation services / air traffic flow management and in particular safety or security and other constraints of the airspace above and around Cambridge Airport, which are considered by the applicant as Tier 1 key operational constraints that influence the suitability of possible alternative locations.

However, we offer the following comments.

Alternative Outside / Off-airport Locations

A letter from the Cambridge City Airport Director who is the Airport's 'Accountable Manager for the Aerodrome & Aviation Security' with responsibilities for Airport Safety and Compliance including Security, has been submitted.

This letter provides additional reasoning and justification as to why alternative radar sites outside the boundary of the airport e.g., an off-airport location is not acceptable to the applicant in term of overriding security concerns and requirements, which are considered paramount.

The main reasons detailed for a preferred on-site within the confines of the Airport boundary is compliance with EU Regulation 373(2017) which has been incorporated into the UK Civil Aviation Authority (CAA) regulations covering the security of Airport Facilities which 'requires an Airport to ensure the security of their facilities and personnel so as to prevent unlawful interference with the provision of services; this includes the security of operational data they receive, or produce, or otherwise employ, so that access to it is restricted only to those authorised.'

It is the airport directors view that a location on an airfield is infinitely more secure than an off-site location, which would not offer the level of security assurance required to satisfy the above requirements under EU Regulation 373(2017).

Other reasons why an off-airport location is less desirable are also detailed, including ease of access of airport personnel to undertake regular and emergency maintenance, as well as

availability of utilities required both to serve the radar and data communications infrastructure connecting the radar to the airport control tower.

In our view, the reasoning provided is noted and whilst security is paramount it appears to indicate that an off-site location is not impossible. The security issues may indeed be more challenging but with careful risk assessment and a high level of security measures and monitoring in place it may be an achievable option.

Whilst security is indeed a factor, what is important is not a lack of consideration of the potential significant environmental impacts of any off-site location, that may be available.

Key in the circumstances is the need to comply with the EIA regulations and in particular regulation 18. '(3) An environmental statement is a statement which includes at least— (d) a description of the reasonable alternatives studied by the developer, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the development on the environment;' and any additional information specified in Schedule 4 relevant to the specific characteristics of the particular development or type of development and to the environmental features likely to be significantly affected.

SCHEDULE 4 Information for Inclusion in ESs part 2, states, 'A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.'

An alternative off-airport location / site may for example totally negate any potential significant adverse impacts that may arise or reduce any potential residual adverse impacts further or to more overall acceptable levels when compared with the H17 radar. However, this is all unknown unless a comparison is undertaken.

The absence of detail in respect of the appropriateness of the sites scoped out of the ASA, or the acceptability of the evidence for or the need for a criteria-based comparison of the environmental effects, which demonstrates why the proposed H17 is the preferred location, requires the weighing up of the various determining factors under the EIA Regs requirements and is ultimately a difficult planning judgement.

Alternative On-airport Locations / Sites (micro-siting)

The document 'Cambridge City Airport Radar Replacement Project - Addendum to Alternative Sites Assessment, 15 October 2021' has previously been submitted as additional information.

The specific key constraints Tier 1: Safety and Operational Requirements - ensures location selection prioritises operational and safety requirements of the Airport e.g., radar operational optimisation (e.g. not in vicinity of the Main Runway and Grass Runway due to Obstacle Limitation Survey (OLS) contours and restrictions on the height of infrastructure) and Tier 2: Noise: prevent significant noise effects to sensitive receptors (noise buffer zone – considered minimum of 200m from any existing or consented residential property) in the immediate vicinity of the airport as detailed are noted and based on the evidence submitted, it is the applicants view that a location in the vicinity of Hangar 17 (within the far northwest of the Airport), is their preferred option on-site within the airport physical boundaries.

In terms of radar micro siting within the north-western area of the Airport that is considered the only suitable area for radar location on-site based on Tier 1 and 2 constraints, the Tier 3 environmental constraints of Landscape and Visual, and Shadow Flicker were also considered. Taking into account the existing hangars and infrastructure in this area, two potential locations within this north-western area were studied for landscape and visual and

shadow flicker and impacts, namely the car park of Hangar 21, and adjacent to Hangar 17 as per Figure 2-3 Micro-Siting Locations of the recent submissions.

It is stated that technical modelling and photomontage comparisons both confirm that with regards to micro-siting within this north western area, the H17 Radar is preferable in comparison to the H21 Radar location, which minimises any effects resulting from landscape and visual, and shadow flicker.

However, notwithstanding the 200 m noise buffer and the additional noise information etc that we have requested under our memo dated the 28-10-2021, it appears the H21 location would also increase the distance between the radar and noise sensitive residential receptors (which may reduce the potential for adverse noise impacts to arise further). We would therefore also ask why a comparison of the operational noise impacts associated with H21 have not been undertaken as well, in accordance with EIA Regs requirements / principles, in addition to comparing and minimising any effects resulting from landscape and visual, and shadow flicker, which appears to have been undertaken.

In terms of operational noise impacts, as a minimum it remains our view that the H16 location should be considered as a reasonable alternative location under the EIA Regs and some form of comparison of the noise impacts / effects of its operation with the proposed H17 location should be included in the ES, as requested under our memo dated the 28-10-2021.

Ultimately, the acceptability of the reasoning provided in relation to alternative locations / sites or indeed alternative radar design type and the comparison of the various environmental impacts / effects, is a balanced planning judgement.'

5.0 Air Quality – Chapter 6

In summary, no concerns or objection on air quality grounds. No conditions required.

The air quality comments made previously in our planning consultation response memo dated the 28-10-2021 (Planning Ref No: 21/03224/FUL & Tascomi Ref No: 2204/21) remain the same and these were as follows:

'Chapter 6 – Air Quality of the 'Environmental Statement: Cambridge City Airport – Radar Replacement Project July 2021' (Ref: LJ1011A-30-R03-030F) reviews the potential impact of the proposed dismantling and relocation of the city airport radars at both the construction and operational phases of the development on the Airport and surrounding area in terms of Air Quality. The report concludes:

- Vehicle movements associated with the construction and operational phase are well below the screening criteria of 100 AADT, therefore a detailed assessment is not required. The report concludes that the impact on air quality associated with vehicle emissions is not significant.*
- Measures to mitigate dust emissions during the construction phase will be dealt with via a Dust Management Plan which will form part of the proposed Construction Environment Management Plan (CEMP).*
- Section 6.4 confirms that there will be an emergency generator on site for use during 'short term mains power failure' which will be tested weekly for 5-10 minutes. The generator is located at an acceptable distance away from sensitive receptors. We recommend that operational hours of the generator are controlled via a condition.*
- Operational impacts of the development on air quality are not significant.*

The report / chapter conclusions are considered acceptable. Therefore, we have no objections on air quality grounds.'

6.0 Contaminated Land – Chapter 10 (Ground Conditions and Soils)

In summary, no objection on contaminated land grounds. A standard ‘Unexpected Contamination’ condition is recommended.

The comments made previously in our planning consultation response memo dated the 28-10-2021 (Planning Ref No: 21/03224/FUL & Tascomi Ref No: 2204/21) remain the same and these were as follows:

‘Chapter 10 - Ground Conditions and Soils of the submitted ‘Environmental Statement: Cambridge City Airport – Radar Replacement Project July 2021’ (Ref: LJ1011A-30-R03-030F) reports the assessment of likely significant effects of the Development Proposal, as described in Chapter 3: The Development Proposals, on the Airport and surrounding area in terms of Ground Conditions and Soils. The main focus of this Chapter is on potential effects as a result of the Development Proposal related to contaminated land.

The applicant engaged the City Council during pre-application and the issue of contamination was discussed. It is clear from these discussions, and from the application made here, that contamination is not a significant factor for this development.

However, the standard unexpected contamination condition is recommended as a highly precautionary measure.

Standard Condition:

CE05AS - Unexpected Contamination

If unexpected contamination is encountered during the development works which has not previously been identified, all works shall cease immediately until the LPA has been notified in writing. Thereafter, works shall only restart with the written approval of the LPA following the submission and approval of a Phase 2 Intrusive Site Investigation Report and a Phase 3 Remediation Strategy specific to the newly discovered contamination.

The development shall thereafter be carried out in accordance with the approved Intrusive Site Investigation Report and Remediation Strategy.

Reason: To ensure that any unexpected contamination is rendered harmless in the interests of environmental and public safety (Cambridge Local Plan 2018 policy 33).’

7.0 Health – Chapter 11

This Chapter reports the assessment of likely significant effects of the Development Proposal on the surrounding population in terms of health. The Chapter incorporates the local policy requirement for a Health Impact Assessment (HIA) which is integrated within the Environmental Impact Assessment.

The potential health effects associated with the proposed replacement H17 radar which have been included in this Chapter are:

- Annoyance, anxiety, and stress from noise;
- Anxiety and stress from visual impact;
- Annoyance, and the potential for epileptic seizure, from shadow flicker; and

- Electromagnetic radiation from the radar

Where health effects occur from aspect areas / topics which are covered by the ES, for example noise, visual impact, shadow flicker and electromagnetic radiation from the radar, it is confirmed that health has already been dealt within the relevant aspect chapter and are referenced in the overall health impact proforma described in this chapter.

7.1 EQG Comment: Health and Noise

It is agreed that the main potential impacts on human health are associated with in-combination health effects that could occur with specific regard to the principal in-combination effects of noise, visual, and shadow flicker.

We can only comment specifically on the potential health impacts associated with noise.

Chapter 11 and indeed Chapter 14 do not specifically detail the potential health impacts e.g. possible physical and psychological / mental wellbeing, that could arise if adverse noise impacts arise.

The various planning policies refer to potential noise impacts on “Health and quality of life”. The relationship between health and quality of life can be a complex one to explain. The Government’s Noise Policy Statement for England (NPSE, March 2010) states that:

‘The World Health Organisation defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity and recognises the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being.

*It can be argued that quality of life contributes to our standard of health. However, in the NPSE it has been decided to **make a distinction between ‘quality of life’** which is a subjective measure that refers to people’s emotional, social and physical wellbeing and **‘health’** which refers to physical and mental wellbeing.*

Where exposure to noise becomes noticeable or significant, this can result in changes to people’s behaviour, attitude or other physiological responses. Should the level of noise exposure become unacceptable the impacts can become far-reaching, fundamentally affecting quality of life and amenity issues, and potentially resulting in serious health and stress related problems and negative impacts on productivity and learning. For these reasons, it is fundamental that the relationship between noise sources and noise sensitive development is effectively and appropriately managed through the planning system, with the NPSE confirming that the solution could be more than simply minimising the noise.

There is a growing amount of research / evidence relating to the health impacts of noise, and on the dose response (reaction to increasing noise exposure) relationship between noise and health. Recent studies have identified a number of causal links between noise exposure and health impacts.

The ES uses BS 4142 to assess the significance of any noise impact / effects. The main impacts that are likely to arise are on amenity and quality of life, which typically affects people in two ways: annoyance, and sleep disturbance.

Annoyance is when noise impact disturbs a person's daily life, for example, through interrupting a conversation or causing distraction whilst resting or sleep disturbance. As such, annoyance will typically increase as noise exposure increases, though changes in the character of the noise tonal can also increase annoyance.

Sleep disturbance is one of the most common impacts described by people living with unacceptable levels of noise exposure. It can have a significant impact on quality of life, and people can typically feel a strong resentment where it is felt that their sleep has been disturbed.

In terms of physical and psychological health impacts these tend to be linked to hypertension and mental health and there is emerging research evidence on this matter for transport environmental noise but nothing conclusive for industrial noise dose-response relationships.

The links between certain noise and hypertension are fairly well established for transport noise sources, with research finding that exposure to noise events can place the body under stress, even if there is no conscious reaction to the noise. When stressed, the body releases hormones that may to varying degrees increase heart rate and blood pressure, with the link between high blood pressure and cardiovascular diseases etc, already well established for certain types of noise mainly transport related noise e.g. aircraft and road traffic as per WHO guideline levels.

Links between noise exposure annoyance and mental health have also been theorised / suggested, with studies identifying anxiety and depression as the most likely psychological symptoms. However, it is acknowledged by most of the search to date that further research is needed in this area.

Whilst there are undoubtedly negative health impacts arising from industrial type noise exposure, there is a great deal of uncertainty about the precise quantification of these impacts and at what dose – response and noise levels, such health impacts are likely to occur. Moreover, health impacts are more likely to be primarily associated with late evening and night-time noise should they arise.

Therefore, the noise impact assessment undertaken for the radar as an industrial type noise focuses on quality of life / amenity effects e.g. outcomes or changes to people's behaviour, attitude or other physiological responses as a result of noise as summarised in the Planning Practice Guidance (PPG)-Noise '*Noise Exposure Hierarchy Table*' recreated below as Table 1, based on the likely average response of those affected.

Table 1: Noise Exposure Hierarchy Table (PPG)-Noise)

Response	Example of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

There appears to be no decisive definition of what cumulative effects in EIA are and what they should cover. Cumulative and in combination effects are difficult and there is no specific methodology to undertake such assessment.

In relation to this chapter we agree as health impacts can be related to several topic areas, then it is necessary to consider the combined and cumulative effects as required by the regulations.

There is no evidence linking sleep disturbance to the difference between the rating level and the background sound level. The majority of not all of the guidance and research on sleep disturbance focusses on absolute levels of sound. This is for a particularly good reason and that is when individuals are asleep, they do not perceive sound in the same way as they do during the day. When we are asleep, we are not conscious of our own bodies and response to noise is more of an autonomic /

unconscious response. For the night period an external noise rating level limit of around 35dB would be in our view be highly precautionary.

As shown in the noise assessment (Chapter 14), during the daytime, evening and night-time periods, the predicted H17 Radar noise rating levels at all receptors (inclusive of a rating penalty for tonal characteristics), are lower than the associated derived background sound levels.

For the H17 radar the highest predicted external night-time radar rating levels are all below a rating level of 35dB and assuming a reduction of approximately 10 to 15dB across an openable window, this is likely to result in internal night-time noise levels of 20 to 25dB (as worst). These are considered extremely low noise levels even for noise that is industrial / commercial in nature.

Therefore, it is our view that significant adverse health effects are very unlikely, and we are reasonably confident that any residual adverse effects on sleep are unlikely to arise at such low levels of external H17 radar noise as predicted in this case. We conclude that there is no evidence base to indicate that unacceptable health impacts will arise.

7.2 EQG Comment: Health and Electromagnetic Radiation

The comments made previously in our planning consultation memo dated the 18-11-2021 (Tascomi Ref No: 2204/21) remain the same and these were as follows:

'A revised / amended ES - Chapter 11: Health has been updated and submitted.

The Radar Safety Certification (Impact of Electromagnetic Radiation on Personnel Safety) report by the radar manufacturer Thales is also now provided as Appendix 11.1 to the ES and graphics are included in the Chapter 11 showing the electromagnetic radiation field / beam and coverage pattern.

It is stated that the assessment reaffirms that a number of simulations concerning power density radiated by the STAR radar (which will comprise the operating H17 Radar) as outlined in the Impact of Electromagnetic Radiation report show that there is no risk at ground level to the public or airport employees from electromagnetic radiation at any distance from radar, given that the antenna will be installed at the top of a tower 35m meters high (with the radar beam forming area being horizontal at this height).

It is noted that the reference EMF / radiation levels to be respected as detailed in Appendix 11.1, both in average and peak values, given by the 'European Parliament Directive 2013/35/UE - Electromagnetic Fields' for "workers" and the 'European Community / Council Recommendation 1999/519/CE - on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz), are never achieved / exceeded at ground level.

Furthermore, it is stated in section 11.46 that the H17 Radar is located a minimum of 70m inside of the Airport boundary. Therefore, there will be no effects of radiation which will occur outside of the Airport boundary, as the potential area of influence is restricted to 24m.

In terms of the potential for cumulative effects due to electromagnetic radiation it is stated that notwithstanding that there is no receptor within the zone where electromagnetic radiation will occur, i.e. within 24m at the height of the beam forming area, there is also no other infrastructure (be that Airport infrastructure, electricity pylons etc), which emits

electromagnetic radiation which is located within this zone. It is concluded that there will be no cumulative effects relating to electromagnetic radiation.

The approach and EMF levels within the defined beams and zones as detailed in the ES is similar in principle to GCSP planning requirements for telecommunication / mobile phone masts application in terms of the submission of an 'International Commission for Non-Ionising Radiation Protection (ICNIRP) certificate of compliance' demonstrating compliance with maximum recommended levels of EMF radiation for base stations. The ICNIRP Guidelines on Limiting Exposure to Electromagnetic Fields are for the protection of humans exposed to radiofrequency electromagnetic fields (RF) in the range 100 kHz to 300 GHz. The submitted Radar Safety Certification (Impact of Electromagnetic Radiation on Personnel Safety) report by the radar manufacturer Thales appears to be the same type of document and has the same purpose.

As stated previously, any potential health issues related to the radar and generation of electromagnetic fields (EMF) a form of non-ionising radiation, is outside the remit / expertise of Environmental Health / EQG.

However, it is our view that the information now presented is acceptable and any EMFs associated with the radar are very unlikely to be a health risk to airport personnel, other employees off-site at Barnwell Drive or the general public in the area.'

8.0 Artificial Lighting: Landscape and Visual – Chapter 13

In summary, no concern / objection on artificial lighting grounds. A compliance condition for artificial lighting details and plans / submissions as proposed is recommended.

The comments made previously in our planning consultation memo dated the 28-10-2021 (Planning Ref No: 21/03224/FUL & Tascomi Ref No: 2204/21) remain the same and these were as follows:

'The effects from artificial lighting are considered under the heading 'Potential Night-time Effects and Lighting' in section 13.101. of Chapter 13 - Landscape and Visual.

It is stated that the Development Proposal will be illuminated in the same way as the existing H16 Radar, to include two 32 candela (approximately 402 lumen) red obstacle lights on the top of the H17 Radar, to ensure no collision with aircraft.

Additional pedestrian lighting would be located on the stair of the H17 Radar tower, however this would only be used 'on demand' in exceptional circumstances and thus very infrequently. The low intensity green LED lights that form part of the additional pedestrian lights indicate they are being charged. It is anticipated that access to the H17 Radar would be required once every three months and would be carried out during daylight hours. Any access after dark would be for fault rectification only and would be unlikely to occur after 1800hrs due to a lack of night shift cover. Various image of this lighting is shown in Figure 13.3: Image 1 showing normal lighting; Image 2 showing full illumination.

We agree with the assessment of artificial lighting impacts on human receptors and conclusion that under normal operating circumstances effects from the lighting would be negligible.

Due to the distance of approximately 200m to the nearest residential receptor we do not envisage any unacceptable intrusive artificial lighting spill or impacts on quality of life / amenity as a result of the normal operating lighting conditions detailed, which are very low level e.g. use of red obstacle lights on the top of the H17 Radar and the low intensity green LED charge

light. Full lighting would only be used in exceptional circumstances such as fault identification when access is required in periods of dark for safety purposes.

A condition could be imposed to control the level and use of operational artificial lighting to that detailed in the submissions.'

9.0 Noise – Chapter 14

This Chapter reports the assessment of likely effects of the proposals on the surrounding area in terms of noise and vibration from both the demolition, construction, and operational phases. Where appropriate, it also identifies measures to prevent, minimise or control likely adverse effects arising from noise.

9.1 Policy and Legislative Context, and Technical Guidance

Under this heading of Chapter 14 and other sections of the ES, reference is made to (with a summary of the content / purpose of each), to the following:

National Noise Policy

- Noise Policy Statement for England, Department for Environment, Food & Rural Affairs, 2010 (NPSE, 2010)

Local Noise Policy

- Cambridge City Council – The Cambridge Local Plan 2018: Policy 35
- Greater Cambridge Shared Planning – Sustainable Design and Construction: Supplementary Planning Document (GCSP-SPD, 2020) – relevant noise sections
- Local Plan - Policy 83: Aviation Development
- Cambridge East Area Action Plan (2008) - Policy CE/26: Noise

Technical Guidance - Noise

- British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Part 1: Noise' (2014)
- British Standard 5228-1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration' (2014)
- British Standard 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound' (BS 4142)
- British Standard 8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' and
- World Health Organization 'Guidelines for Community Noise'

9.2 EQG Comment: Noise - Policy / Legislative Context and Guidance

The '*Policy and Legislative Context, and Technical Guidance*' as detailed in the ES are relevant and acceptable. In terms of noise the following are also equally relevant:

National – Planning Policy

National Planning Policy Framework (NPPF)

The original National Planning Policy Framework (NPPF) was published in March 2012 with revised versions published in 2019 and July 2021. The NPPF is part of government reform to make the planning system less complex and more accessible, and to promote sustainable growth. It replaced previous national planning policies such as Planning Policy Guidance PPG24: Planning and Noise. In terms of noise the most relevant paragraphs are:

- **174 e)** which states, “*Planning policies and decisions should contribute to and enhance the natural and local environment by:*

*(e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of .. **noise pollution** ...”*

- **185 a)** which states, “*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from this development. In doing so they should:*

a. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development– and avoid noise giving rise to significant adverse impacts on health and the quality of life;”

Planning Practice Guidance (PPG) – Noise (Government Guidance)

The Government launched the PPG web-based resource in March 2014 and refreshed it in July 2019. The section on noise (PPG-Noise) provides tabulated descriptions of likely human response to noise exposure and example outcomes based on the noise effect categories introduced in the NPSE, 2010 based on the likely average response e.g. for No Observed Effect Level (NOEL), the Lowest Observed Adverse Effect Level (LOAEL) and the Significant Observed Adverse Effect Level (SOAEL). It also adds a fourth category termed Unacceptable Adverse Effect (UAE). All these effect levels are summarised in the ‘*Noise Exposure Hierarchy Table (PPG-Noise)*’, in Table 1: above.

The PPG-Noise recognises that due to the subjective nature of noise there is not a simple relationship between measured or predicted noise levels (numerical values) and the resultant impact and that this will depend on how various factors combine. The factors considered to be most relevant in this assessment are:

- The source and absolute level of the noise together with the time of day it occurs
- The spectral content of the noise (i.e. whether or not the noise contains particular high or low frequency content) and the general character of the noise (i.e. whether or not the noise contains particular tonal characteristics or other particular features),
- The local topology and topography – local arrangement of buildings, surfaces and the extent to which it reflects or absorbs noise.
- The existing or, where appropriate, planned character of the area
- The cumulative impacts of more than one source of noise;
- Whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this

may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary.

- In cases where existing noise sensitive locations already experience high noise levels, a development that is expected to cause even a small increase in the overall noise level may result in a significant adverse effect occurring even though little to no change in behaviour would be likely to occur.

The NPSE also states that it is not possible to have a single objective noise-based measure that defines SOAEL an indeed LOAEL or NOAEL that are mandatory and applicable to all sources of noise in all situations. Consequently, the SOAEL etc is likely to be different for different noise sources, for different receptors, in different locations (due to varying background noise levels) and at different times. It is acknowledged that further research is required to increase the understanding of what may constitute a significant adverse impact on health and quality of life from noise.

9.3 Noise Impact Assessment Methodology/Standard

BS4142:2014+A1:2019

In this case BS 4142 is considered the most appropriate significance of noise impact assessment methodology for the proposed radar which is an industrial noise source.

BS 4142 describes the methodology for rating and assessing sound of an industrial and/or commercial nature - existing, proposed, new, modified or additional source(s). The methods described use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

The standard describes the recommended methodology to measure and determine ambient, background and residual sound levels, and the rating levels of industrial/commercial sound. BS 4142: 2014 requires consideration of the level of uncertainty in the data and associated calculations.

BS 4142 refers to the sound produced by an assessed source at a sensitive receptor (e.g. outside a façade of a residential building) as 'specific' sound, in this case the proposed main source of noise the radar motor cabin enclosure. The specific sound level (radar cabin noise) is determined by calculating or measuring the equivalent continuous A-weighted sound pressure level of the source over the assessment time period 'T' (LAeq,T).

Where certain acoustic features are present in the source's sound at the assessment location, the Standard requires an acoustic feature correction to be added to the specific sound level to obtain the 'rating level'. Corrections can be included for any of the following acoustic features / characteristics of the sound:

- tonality,
- impulsivity,
- intermittency, and
- other sound characteristics that make it "readily distinctive".

The procedure contained in BS 4142 gives an indication of the degree of significance of any potential impact of sound by determining the margin by which the rating level

of the specific sound source exceeds the existing representative background sound level, examining also the context in which the sound occurs or will occur. The following key parameters are relevant:

- **'specific sound source'** is the sound source being assessed.
- **'specific sound level'**, is the sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
- **'residual sound'** is defined in BS 4142: 2014 as *"ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound"*. (without specific)
- **'ambient sound'** is defined in BS 4142: 2014 as *"totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far"*. It comprises the residual sound and the specific sound when present.
- **'rating level'** is the specific sound level plus any adjustment for the characteristics of the sound (tone, impulse, intermittent or other acoustic feature). The standard describes subjective and objective methods to establish the appropriate adjustment.
- **'background noise'** is the sound level at a given location and time, measured in the absence of intermittent noises, any other extraneous or sound sources under consideration.

The background sound level is the $LA_{90, T}$ of the residual sound level, and is the underlying level of sound. Measurements of background sound level should be undertaken at the assessment location where possible or at a comparable location.

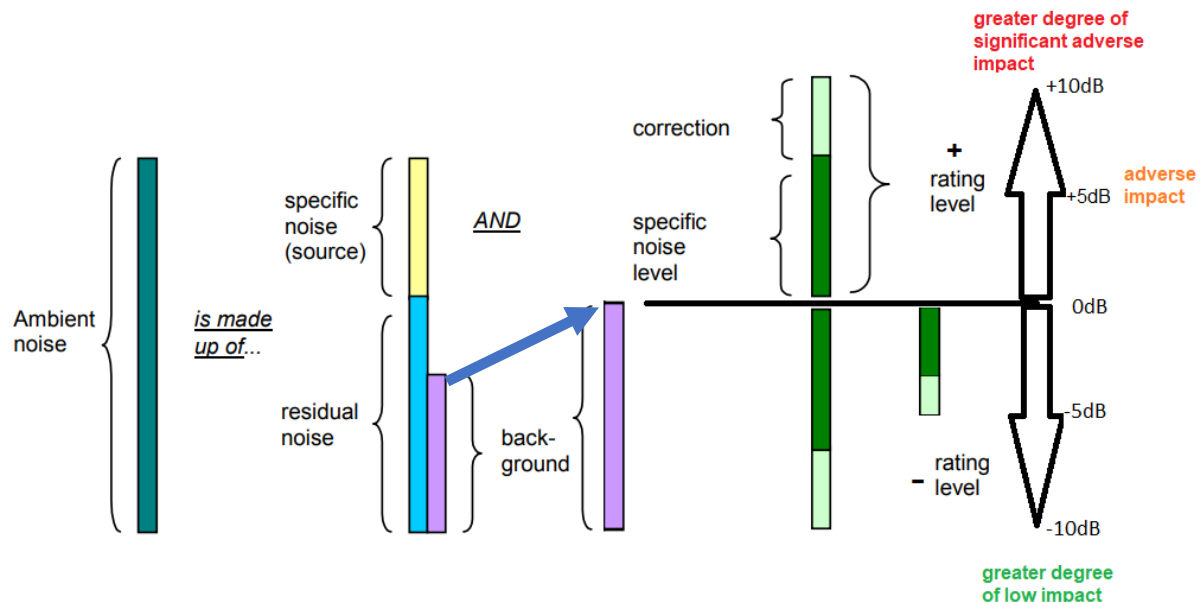
The magnitude / significance of any impact is assessed by comparing the rating level of the specific sound source with the background sound level. Typically, the greater the difference the greater the magnitude of the impact, depending on the context. The standard states (with emphasis):

- A difference of around **+10 dB or more** is likely to be an **indication of a significant adverse impact**, depending on the context.
- A difference of around **+5 dB** is likely to be an **indication of an adverse impact**, depending on the context.
- The lower the rating level is relative to the measured background sound level (**+4dB and lower**), **the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact**.
- Where the rating level does not exceed the background sound level (**0dB and below i.e. a minus level -1 to -5 to -10 and downwards**), this is an indication of the specific sound source having **a low impact, depending on the context**.

The BS 4142 impact assessment methodology can be difficult to fully understand, and Figure 2 below shows the relationship between different BS 4142 parameters and how a likely indication of the significance of the impact is derived.

For context, a 3dB change in noise level is commonly considered to be the smallest change perceptible to humans unless under controlled conditions, whilst a 10dB change corresponds to a subjective doubling of level.

Figure 2: Relationship between different BS 4142 parameters



The full BS 4142 assessments for the day, evening and night-time period for various receptors are included in Appendix A14.10 of the ES.

Greater Cambridge Shared Planning – Sustainable Design and Construction: Supplementary Planning Document (GCSP-SPD, 2020)

As already stated, the PPG-Noise recognises that due to the subjective nature of noise there is no a simple relationship between measured or predicted noise levels (numerical values) and the resultant impact and that this will depend on how various factors combine.

It is important to acknowledge that BS 4142 only gives an indication of the degree of significance of a potential impact of sound. It is not possible to offer a rigid prescriptive guidance on how to apply BS 4142. There are many factors, including local conditions and site-specific circumstances, that will help determine where in this range “acceptability” lies.

However in addition, with respect to Noise Generating Development (NGD), including industrial sound sources such as the H17 radar proposed, the Greater Cambridge Shared Planning – Sustainable Design and Construction: Supplementary Planning Document (GCSP-SPD, 2020) ‘**Table 3.11: New Noise Generating Development - External Noise Standards for “non-anonymous noise”**’ (recreated below as **Table 2**), sets local ‘Noise Significance Risk’ and ‘Noise Significance of Effect’ categories, having regard to the principles of BS 4142 outcome criteria and adopting

the terminology advocated in the NPSE (2010) and PPG-Noise i.e. for No Observed Effect Level (NOEL), Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL).

Table 2: New Noise Generating Development - External Noise Standards for “non-anonymous noise” (GCSP - SPD, 2020)

Noise Significance Risk	Noise Significance of Effect	BS4142 Outcome rating level ($L_{Ar,Tr}$ minus (-) background level (LA_{90}))	Planning Advice
None	NOEL	$L_{Ar,Tr} - LA_{90,T}$ is ≤ -10	Sound is likely to be inaudible and have no discernible impact on health or quality of life. No objection from a noise perspective and no specific noise measures required.
Minimal	NOEL to LOAEL	$L_{Ar,Tr} - LA_{90,T}$ is > -10 & ≤ -5	Where the rating level of noise is below the background noise level by at least 5dB, this indicates that the proposed NGD is likely to be acceptable from a noise perspective. The LPA will seek this level of compliance in most noise sensitive areas and/or where there is a requirement to mitigate creeping background effects.
Low	NOEL to LOAEL	$L_{Ar,Tr} - LA_{90,T}$ is > -5 & ≤ 0	Where the rating level of noise is equal to, or below the background noise level by up to 5dB, this indicates that the proposed NGD may be acceptable from a noise perspective but will be more context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is more applicable to less sensitive sites or where there is no requirement to mitigate creeping background effects.
Medium	LOAEL to SOEL	$L_{Ar,Tr} - LA_{90,T}$ is > 0 & $\leq +5$	Where the rating level of noise is equal to, or above the background noise level by up to 5dB, this indicates that the proposed NGD is less likely to be acceptable from a noise perspective and will be context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is typically only applicable to non-sensitive sites or where there are overriding other reasons why development should be considered. It will typically be necessary for the applicant to confirm how adverse impacts from the NGD will be mitigated and minimised. It is less likely that planning consent will be granted. Acceptable only if there are overriding economic or social reasons for development to proceed.
High	SOEL	$L_{Ar,Tr} - LA_{90,T}$ is $> +5$ & $+10$	Where the rating level of noise is above the background noise level by more than 5dB, this indicates that the proposed NGD is unlikely to be acceptable from a noise perspective and planning consent is likely to be refused on noise grounds.
Very High	SOEL and unacceptable	$L_{Ar,Tr} - LA_{90,T}$ is $> +10$	Where the rating level of noise is above the background noise level by more than 10dB, this indicates that the proposed NGD is unacceptable from a noise perspective and planning consent shall be refused on noise grounds.

Note:

- (i) Certain acoustic features eg Tonality, Impulsivity, Intermittency or sound features characteristics that are otherwise readily distinctive against the residual acoustic environment, can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level. For example sound with prominent impulses has been shown to be more annoying than continuous types of sound (without impulses or tones) with the same equivalent sound pressure level.

Where such features are present at the assessment location, a character correction may need to be added to the specific sound level to obtain the rating level. Full justification for selecting and not selecting character corrections will need to be provided.

- (ii) All terms as defined in BS4142

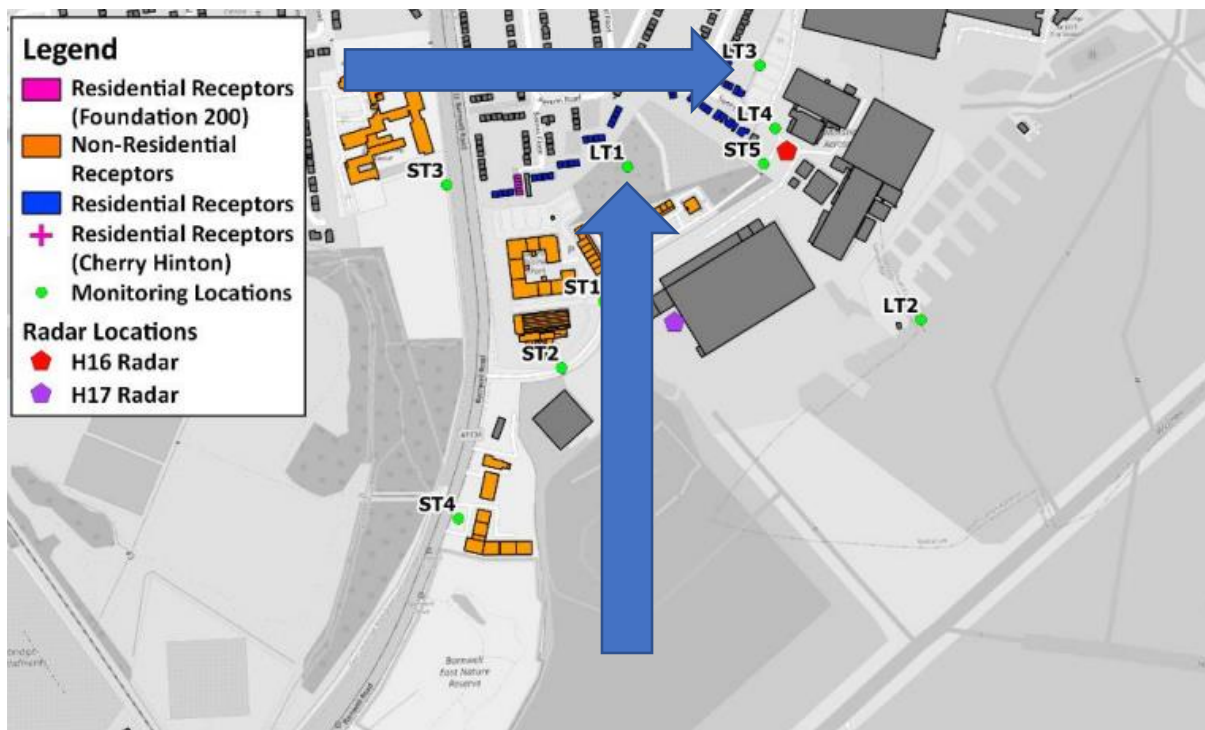
9.4 Background Noise Levels – Residential Receptors

Establishing representative background noise levels at receptors is an important step in any BS 4142 assessment as they are a key determinant in the significance of any impact outcome.

It is stated in the ES that the noise baseline has been characterised by direct measurement over two periods.

The first survey ('Survey 1') was undertaken on the 1 February 2021 at locations representative of the closest non-residential receptors at Barnwell Drive / Road. Survey 2 was undertaken between the 7 – 14 May 2021 at long term locations to inform the validation of the noise model, and to measure baseline noise levels at locations representative of the closest residential receptors at **LT1 – Barnes Close** and **LT3 – The Westering**. The monitoring locations LT1 and LT3 are shown in Figure 3 below.

Figure 3: ES – Background Noise Monitoring Locations LT1 and LT3



During Survey 2, the H16 Radar was switched on for the latter half of the survey (11/05/2021 1600hrs – 14/05/2021 1600hrs). Measurements during the initial part of Survey 2 (7/05/2021 – 11/05/2021), when the H16 Radar was not in operation, have been used to derive the noise baseline.

Meteorological conditions were monitored using a met station deployed at LT1 Barnes Close. Periods of adverse weather (wind speeds > 5m/s and/ or periods of rain) have been removed from the long-term data analysis.

In order to determine the representative background sound levels at residential receptors for use in the assessment, consideration has been given to the mean and

modal average LA90,15min captured at monitoring locations **LT1 – Barnes Close** and **LT3 – The Westering**, and the distribution of sound levels.

The distribution of background sound levels are shown in Appendix A14.4 of the ES, and include the periods when the H16 Radar was in operation, and not in operation.

The derived background sound levels are presented for the daytime (0700 – 1900), evening period (1900 – 2300) and night-time (2300 – 0700) periods in Table 3 below, along with a justification of the selected level to inform the assessment.

Table 3: ES -Derived Background Sound / Noise Levels (LT1 and LT3)

Location	Period	Derived dB LA90(T)	Justification
LT1-Barnes Close	Daytime 0700-1900)	43 (1hr)	Modal – most common
	Evening (1900-2300)	40 (1hr)	Modal – most common
	Night-time (2300-0700)	36 (15mins)	Modal – most common
LT3 – The Westering (on boundary with Airport)	Daytime 0700-1900)	43 (1hr)	Average, no clear mode
	Evening (1900-2300)	36 (1hr)	Modal – most common
	Night-time (2300-0700)	36 (15mins)	Modal – most common

The derived background sound levels are considered in the ES to be conservative as it is stated that the majority of the survey included a weekend period, and the measurements were during a period of national lockdown, when ambient sound levels are likely to be lower than those considered ‘representative’.

For context, a comparison has been made with background sound measurements undertaken before the national lockdown period at a location in the vicinity of Sunnyside, and likely representative of the properties on The Westering, as reported in the submitted ‘*Hoare Lea – Cambridge Airport – Radar Replacement. Cambridge. Marshall Aerospace and Defence Group. Acoustics – Environmental Sound Survey (20 May 2021)*’.

This Hoare Lea survey was undertaken between 4 – 11 December 2018, and derived a 39 dB LA90, 15min typical night-time background sound level, which is 3 dB greater than the levels assumed in the ES assessment. It is stated in the ES that this further supports the view that the lower background sound levels used in this assessment from more recent monitoring during the period of national lockdown are likely to be conservative.

9.5 **EQG Comment: Background Noise Levels – Residential Receptors**

ES - Background Noise Levels

During the pre-application advice stage, it was considered that the general approach proposed and as reported in the ES for deriving representative background noise levels was acceptable in terms of proxy receptors monitoring locations used and relatively conservative / cautious, as levels were measured / monitored during Covid lockdown. The approach in using proxy locations is not uncommon as it can be difficult to obtain readily available secured access to residential properties outside of the applicant's control.

There are contributions to background noise from general industrial noise and activity (apart from the H16 radar) from the Airport which can be considered a legitimate part of the background noise levels in the area, when not dominant.

However, it is agreed that when the acoustic environment has contributions from road traffic noise, as in this case, measurements during this period may not be totally representative of the pre-lockdown situation and the reported background levels are likely to be actually lower due to reduced local traffic movements during lockdown. However, this is more likely to be the case for day and evening time periods and possibly less relevant during night time periods.

It is stated that a comparison has been made with background sound measurements undertaken before the national lockdown period at a location in the vicinity of Sunnyside, and likely representative of the properties on The Westering, as reported in the submitted '*Hoare Lea – Cambridge Airport – Radar Replacement. Cambridge. Marshall Aerospace and Defence Group. Acoustics – Environmental Sound Survey (20 May 2021)*'. It is further stated that this further supports the view that the lower background sound levels used in this assessment from more recent monitoring during the period of national lockdown are likely to be conservative.

This is noted but the microphone location for the measurements is not fully in accordance with recommended measurement protocols e.g. for example the microphone was located in a very tight / constrained location between and close to building façade and a large / high established boundary tree line. The microphone location is very close to a reflective façade and this is not in accordance with recommended good practice. Therefore, levels reported in this report are likely to be at least +3dB if not higher, than if measured in a free field environment with no reflections.

Also, the report simply states that weather conditions were generally suitable for environmental sound measurements with clear sky, moderate wind speed and no recent rainfalls. No meteorological / weather data has been provided.

Therefore, the Hoare Lea report should be used with great caution in justifying background noise levels. However, if they are adjusted by a minus 3dB (-) correction they are considered consistent with the background noise levels reported in the ES. In addition, as the microphone for the Hoare Lea measurements is in a shielded location (behind a boundary airport building /structure) from other noise sources at Marshalls Airport, it could be argued that they are potentially lower as other legitimate

background noise sources at the airport are substantively shielded from the microphone.

The applicant in their response to our request for additional information has provided additional information in relation to the potential influence of meteorological conditions (wind speed and direction and temperature inversions) and on background noise levels reported. The additional information and consideration of weekend periods only are considered acceptable, and we agree that there is a negligible variance in the background derived sound levels during the 'weekend' periods, when comparing those presented in the ES Noise Chapter. We therefore agree that the ES Noise Chapter background sound levels are in the main considered representative, and robust for the nearest receptor locations.

9.6 Three Spires Report, Jan 2022 - EQG/CCC – Additional Background Noise Measurements

As concerns about the acceptability of the background noise levels used in the submitted ES have been raised by local objectors including their noise consultant MAS Environmental, with the view that the levels should be lower (as low as 30dB), the Council's noise consultant Three Spires Acoustics Ltd has undertaken two further additional long term background noise surveys (for approximately a week each) at locations MP1 (58 Westering -rear garden) and MP8 (Barnes Close -garden boundary with Barnes Close / Peverel Road) as detailed in Figure 4 below.

Figure 4: Three Spires - Background Monitoring Locations



The background noise survey at location MP1 was undertaken within the rear external amenity space of No 58 The Westering at a height of 1.5m and away from any reflecting surfaces, such as the garden shed, was carried out from approx. 12:53 on Wednesday 22nd to 07:00 on Wednesday 29th September 2021.

The background noise survey at location of MP8 which was on the perimeter of the open field (between the rear of industrial units on Barnwell Drive and residential to the North at Barnes Close at the boundary to the gardens of properties on Barnes Close/Peverel Rd), was undertaken from mid-night on the 11/11/2021 to 11:45am on the 17/11/2021.

Table 4 below details the Three Spires derived background sound levels at MP1- 58 Westering (rear garden) and MP8 – Barnes Close (garden boundary with Barnes Close / Peverel Road) for the daytime (0700 – 1900), evening period (1900 – 2300) and night-time (2300 – 0700) periods, along with a justification of the selected level.

Table 4: Three Spires -Derived Background Sound/ Noise Levels (MP1 and MP8)

Location	Period	Derived dB LA90(T)	Justification
MP1- 58 Westering (rear garden)	Daytime 0700-1900)	38 (1hr)	Modal – most common
	Evening (1900-2300)	34 (1hr)	Although modal was 37dB (most common) professional judgement was used to select 34dB from distribution curve
	Night-time (2300-0700)	32 (15mins)	Modal – most common
MP8 – Barnes Close (garden boundary with Barnes Close / Peverel Road)	Daytime (0700-1900)	43 (1hr)	Modal – most common
	Evening (1900-2300)	38 (1hr)	Although modal was 43dB Modal (– most common) professional judgement was used to select 38dB from distribution curve
	Night-time (2300-0700)	36 (15mins)	Modal – most common

Table 4 shows that the derived background noise levels reported in the ES for LT1- Barnes Close and LT3 – The Westering (on boundary with Airport) are in the main consistent with the Three Spires derived background noise levels at MP8 for the following receptors: Barnes Close (garden boundary with Barnes Close / Peverel Road), and are therefore considered representative and acceptable for those receptor locations closest to the airport as follows: 163 to 169 (odd numbered) Barnwell Road (R1); 1 to 6 Caroline Hart Walk (R6); 9, 10, 11, 12 Barnes Close (R2); 5, 6, 7 and 8 Barnes Close (R3); 50, 52, 54, 56; Peverel Road (R4); 58, 60, 62, 64 Peverel Road (R5), 1, 2, 3, 4, 5 and 6 Mansfield Way (R7); 53 (R30) / 55 (R29) The Westering and

all of the Sunnyside properties (R8 to R22). Effectively all the closest receptors on the west of Sunnyside, at Mansfield Way and Barnes Close / Peverel Road etc.

However, the Three Spires monitoring at MP1- 58 Westering (rear garden) has revealed that at the rear of properties e.g. 54 to 64 The Westering (even nos only – receptors R 23 to 28) further away from the airport and where they are afforded greater shielding to their rear gardens / facades from other airport noise sources, background noise levels are likely to be lower in this location to the rear.

The Three Spires report indicates that the background noise levels at MP1 - 58 Westering (rear garden) general area are likely to be lower at these more distant properties, by up to approximately 5dB - daytime (38dB - Three Spires v. 43dB - ES), 2dB evening (34dB - Three Spires v. 36dB - ES) and 4dB night-time (32dB - Three Spires v. 36dB - ES).

However, it is important to emphasise that we consider that these lower background levels are only for properties that are more distant from the immediate vicinity of the airport when compared with those closest to the airport and only at facades and gardens directed and orientated away from the airport in the opposite direction, that is generally not in a direct line of sight to airport structures / buildings or the airport boundaries e.g. 54 to 64 The Westering (even nos only – receptors R 23 to 28) etc.

These lower background noise levels at receptors further way from the airport are acknowledged and should be considered. However due the low absolute levels of H17 radar operational noise as modelled and predicted at these receptors, the overall significance of impact outcome remains a very low impact. These predicted noise levels are still below representative background noise levels namely -3 to -14 dB below daytime/ evening backgrounds in rear gardens and -2 to -5 dB below backgrounds at night-time on the most exposed facades fronting and closest to the airport radar.

It is concluded that these potential lower backgrounds do not change the overall view that the impact at these more distant receptors remains low under BS 4142 significance criteria and unacceptable adverse impacts are unlikely to arise.

9.7 Embedded Measures – Operational Noise

It is stated in the ES that following the construction of the H16 Radar and ongoing complaints from local residents about operational noise, noise mitigation measures were installed to the upper radar cabin (main source of operational noise) in January 2021, with additional sound insulation measures installed in April 2021 as detailed in section 14.57 of the ES.

Noise surveys following the implementation of the mitigation measures have been used to quantify the H16 Radar sound emissions, informing the validation of the noise model for the proposed H17 Radar.

The sound survey measurements showed that emissions from the H16 Radar differ in magnitude and characteristics (tonal ‘peak’ at a 400 Hz one-third octave band frequency) in orientations / direction around it, and in particular those measured on the south-west side which are more prominent to those on the north-west side.

Section 14.59 states that as an additional mitigation measure, as far as reasonably practicable, the H17 Radar will be orientated so that the direction of sound emission with the greatest magnitude will be in a direction towards the airfield, and away from the closest NSR. However, for the purpose of the ES assessment, the worst-case orientation has been assumed with respect to all receptors in the noise model, adding a further element of conservatism to the assessment.

9.8 EQG Comment: Embedded Measures – Operational Noise

The radar motor cabin embedded mitigation measures as detailed in the ES and the commitment for additional mitigation to ‘*as far as reasonably practicable*’ to orientate the H17 Radar so that the direction of sound emission with the greatest magnitude will be in a direction towards the airfield, and away from the closest NSR are noted.

However, the commitment to orientate the H17 Radar so that the direction of sound emission with the greatest magnitude will be in a direction towards the airfield is difficult to accept, assess and secure as a quantifiable mitigation measure with a reasonable degree of certainty.

Whilst it may assist, in downwind conditions and due to the complexity of sound propagation, there is uncertainty over the actual effectiveness of this mitigation proposal. However, the use of the highest noise levels with assumed directionality and downwind to all receptors in the noise modelling as a worst-case orientation for the noise impact assessment that has been undertaken and reported is considered acceptable.

Further to our request for further information on the effectiveness of the proposed embedded noise mitigation and our view that additional noise mitigation measures could be considered to improve and reduce radar cabin noise breakout / generation and make the proposals more acceptable in terms of operational noise impacts, the applicant has provided additional information in the submitted ‘*Response: Planning Consultation Response. Planning Ref. 21/03224/FUL - November 2021*’, report No J20-12041B/1/F1: *Noise Consultants Ltd*

This includes a ‘Hoare Lea Report (November 2021, Appendix A5)’ which reports on the acoustic improvements / reductions achieved pre-works and post-works H17 radar cabin noise mitigation scenarios including the overall performance and workmanship. In considering the mitigation measures implemented at the H16 Radar to date and which will be inherent in the design of the H17 Radar, Hoare Lea LLP conclude that “...*these measures represent the limit of what can be done within the current height restrictions and without significant redesign of the radar tower.*”

The applicant also states that further mitigation, through redesign of the radar, would also risk undermining the manufacturer’s warranty. No further mitigation actions are proposed. However, the relocation of the radar presents the opportunity, when the cabin is at ground level, to refit the acoustic insulating material and other seals that were installed with the cabin in situ in January and April / May 2021, which could offer some further slight improvements in acoustic performance.

In conclusion having regard the low absolute level of radar noise predictions at all receptors and the fact that the noise rating levels at all assessed NSR are below the Lowest Observed Adverse Effect Level (LOAEL), we do envisage any

unacceptable adverse noise impacts and the inherent embedded noise mitigation as detailed is acceptable In terms of nation noise policy the NPSE or national or local planning policy. It is also our view that and there is no justification for requiring any additional noise mitigation to that proposed and it would not be necessary or reasonable to do so.

However, a bespoke condition is recommended to ensure the said mitigation is fully implement and retained at all times.

9.9 Prediction of Effects - Operational Noise

It is agreed that the main potential operational noise sources that make up the proposed development include the following:

- i. Radar Motor enclosure cabin (above ground at a height of approximately - including two electrical motors and a vertical bearing, and upper support bearing below the rotating antennae);
- ii. A back-up diesel generator (ground height);
- iii. Four heat exchangers outside the H17 Radar electronic cabin (ground height);
- iv. Four air conditioning units inside the H17 Radar electronic cabin (ground height);
- v. Electronic cooling fans inside the electronic cabin (ground height).

It is also agreed that the dominant source of noise at distances commensurate with those of the closest NSRs is in relation to the motor enclosure cabin (i), and therefore this noise source should be the main focus of the impact assessment.

With regard to noise sources ii, iii, iv and v. above due to a combination of physical shielding, adequate distance separation and hours of use we do not envisage any unacceptable adverse noise impacts.

9.10 Noise Model Inputs and Assumptions

The ES states that the assessment of noise effects from the H17 Radar has been informed by the development of a noise model. The robustness of the model is benefited by the fact that the motor enclosure cabin for the H16 Radar will be retained for use as the H17 Radar, and therefore the sound emission characteristics will be very similar and informed by measurements undertaken whilst in the H16 Radar location.

The development of the noise model, in particular sound emissions from the motor enclosure cabin, has been informed by measurements of sound emissions from the operation of the actual H16 Radar, both in close proximity to the radra and at locations within the community. The measurements have been used to inform the sound source quantification.

The propagation of sound levels arising from the operation of the H17 Radar has been determined through noise modelling using Stapelfeldt's LimA® computational noise modelling software (v2020), which accounts for variances in propagation due to barrier and ground effects, such as those due to existing buildings. LimA® allows the calculation of sound levels at specific single points, or over a calculation grid of specified size.

It is noted that the noise model uses the calculation method advocated in ISO 9613 '*Acoustics — Attenuation of sound during propagation outdoors*' Parts 1 and 2 (ISO 9613, 1996), which is an acceptable industry standard.

The calculation results are considered in the ES to be worst-case as they assume downwind propagation, which in reality would not occur at all times due to changes in wind direction.

9.11 EQG Comment: Prediction of Effects / Noise Modelling - Operational Noise

The noise model used incorporates a recognised industry standard ISO 9613 which is widely used for noise impact assessments and allows for precise acoustic modelling of particular noise sources to predict noise immissions levels at receptors from proposed sources of noise such as the H17Radar.

The model was produced using on-site measured source data for the radar cabin, detailed / accurate ground topography data including the locations and heights of the radar cabin as a noise source and other buildings / structures and houses. Building height information has been extracted from OS Mastermap. Building heights have been determined from analysis of LiDAR data, namely a digital terrain model (DTM), which describes terrain elevations, and a digital surface model (DSM), which describes surface elevations including buildings.

The H17 radar cabin as a noise source has been modelled in its expected final context, i.e. with all other buildings in place and how the noise interacts with adjacent buildings. This means that the impact of shielding, reflection and/or diffraction effects of the surrounding on site buildings has also been modelled. Measurements, upon which the assessment and model are based, have been undertaken with embedded mitigation measures in place, and therefore can be considered inherent in the design of the development, rather than mitigation measures to be implemented.

Using a computer model allows for the potential to quickly undertake many hundreds of calculations for a given noise source taking into account factors that influence sound propagation including multiple reflections, diffractions, air and ground absorption over distance and variation of ground type, façade reflections and normative weather conditions. This capability can lead to a greater degree of confidence in the predicted results for any given assessment provided that the data inputs used to programme the model are accurate and has been processed correctly.

Relevant inputs to simulate the radar as a relevant noise source have been used and verified where possible using the noise measurements taken to ensure that the model was giving the representative predictive noise levels at the positions where real-time monitoring had taken place.

The model of the radar sound source has been calibrated using two measurements at the base of the H16 Radar, with the louvre mitigation in place. The location of the calibration positions allowed for consideration of the entirety of the radar sound source. and shows the broadband modelled and measured levels differ by +/-0.4 dB. Therefore, the Noise Model Validation Methodology detailed / undertaken reports a

good correlation between modelled output specific sound levels and onsite measured levels at certain locations.

We agree that for the NIA reasonable worst-case assumptions have been adopted for the noise modelling inputs, such as hard ground surface attenuation ($G=0$: totally reflecting surfaces and effectively little sound energy absorbed by the surface such as asphalt, concrete), downwind propagation to all receptors at all times, and 'worst-case' noise source directional orientation of the radar cabin. All of these factors combined have allowed for a 'worst case scenario' predictive approach.

The model was ultimately used to calculate the 'Specific Noise levels' required in the BS4142 impact assessment both for day /evening time and night time and includes a +2db correction for tonal noise character at receptors. The main difficulty faced in a BS4142 assessment is being able to accurately determine the impact of the noise sources in question in the absence of any other noise source note not pertaining to the radar, (roads, birdsong, and other general background noise). The use of computer modelling in this way allows direct prediction of the 'Specific Noise Level' and removes the complication of calculating this from out of the 'Ambient Noise Level'.

The model is designed to reflect reality as far as is possible, has been validated and is considered representative of future predicted H17 radar noise levels at receptors.

In conclusion, the predictive radar noise modelling that has been undertaken is considered robust and we have a high degree of confidence in the predicted noise rating levels at receptors. This position is also supported by Three Spires Acoustics Ltd.

9.12 BS 4142:2014 - Character Correction Considerations (Tonality etc.)

As required by BS 4142, where there are certain acoustic features of the specific sound level, that would likely increase the significance of impact, then an appropriate character correction is added to the specific sound level, L_s , to derive a sound rating level - $L_{A,r,Tr}$.

This matter is important as industrial noise can be dynamic and have numerous acoustic features which can illicit complex emotional reactions to the sound, resulting in greater significance of impact / effect.

This matter was discussed in considerable detail at the pre-application stage.

We agree that the radar sound is neither impulsive or intermittent, as there are no rapid changes in the noise and no identifiable on / off conditions as the proposed H17 Radar will be typically operating continuously across a 24-hour period, 7 days a week.

Various assessment methodologies to establish if any character correction at the receptor location should be applied for tonality or other sound characteristics (such as modulating sound levels), are detailed in BS 4142. This includes both subjective (visiting and listening in actual real time to the sound) and objective (analysis of audio recording of the specific sound) methods.

In this case the ES assessment concludes that following consultation with LPA, a +2 dB correction for tonality has been agreed, and applied to the daytime, evening, and

night-time assessments. It is stated that this is considered conservative, given during the daytime and early evening periods, tonal characteristics of the H17 Radar would be significantly less distinct against the residual sound environment.

In terms of any potential modulating noise (e.g. a variation in the level of the broadband noise and the perceived loudness varies BS 4142 - Other Sound Characteristics) the ES concludes that based on objective quantitative analysis supported by subjective experience onsite and from listening to audio recording a correction is not justified in this case.

This matter has been extensively discussed with officers within the Environmental Health service who have previously visited the area on numerous occasions to listen to the noise from H16 (which has a degree of identifiable modulation at the closet receptors), and it is agreed that an acoustic correction is not required in this case for other modulating sound / noise at residential receptors locations at a distance of approximately 200m plus.

We therefore agree that as part of the BS 4142 impact assessment the only character correction that needs to be applied is +2 dB for a tone that is likely to be just perceptible at times as a worst case, at the residential receptor locations considered.

This conclusion is supported by the Three Spires report, whose objective assessment indicates that noise emissions from the proposed H17 radar location is unlikely to cause any unacceptable adverse or significant adverse noise impact and measurements showed no noise level change with the radar off/on situations. The aural assessment undertaken indicates that noise from the radar during the assessment was inaudible at approx. 200m when in operation, in the general location from the residential boundaries of properties on the west side of Sunnyside and towards the Peverel Rd and Barnes Close property boundaries. This suggests that a tonal correction may not be required but it has been included in the ES specific noise predictions as a matter of caution as it may just be audible at times.

9.13 Significance of Effects Assessment - Demolition / Construction Noise

There is the potential for adverse noise and vibration effects during both the demolition / dismantling of the H16 Radar and AR15 Radar, and the construction of the proposed H17 Radar.

The methodology used to assess construction impacts is acceptable e.g. the use of British Standard 5228-1:2009+A1:2014.

It is stated that, the appointed construction contractor will be required to comply with the provisions of a Construction Environment Management Plan (CEMP) which has been prepared which includes details of construction traffic access and management, working hours, temporary hoarding, and waste management. This can be found in Appendix 3.2.

The CEMP includes recommendations that represent best practicable means (BPM) which will be applied during construction works at all times to minimise noise (including vibration) at neighbouring residential properties and other sensitive receptors.

In conclusion, due to the relatively low impact nature of demolition / construction and short duration of the works involved, if the submitted CEMP is fully implemented and adhered to, we agree that unacceptable adverse noise impacts should not arise.

This matter can be conditioned accordingly, and no further information is required.

9.14 Significance of Radar Noise Effects Assessment / Analysis – Non-Residential Receptors

The approach for ascertaining baseline noise levels and assessing the significance of impacts / effects at the nearest non-residential premises at the Mercedes-Benz garage (Commercial, Retail, Shops and Showrooms), Quorum Offices, Barnwell Business Park, Abacus Care Home Commercial offices, other offices and Work Studios all of Barnwell Road / Drive, Peverel Road Allotment Gardens (Whitehill Allotment Society) and other recreational areas or areas of open space and the Abbey Meadows School are considered acceptable.

Most of these premises are combination of commercial, industrial, workshops, light industrial, retail and showrooms do not have any specific external amenity areas and are considered less sensitive and more tolerant to noise. In the main they operate during normal daytime business hours. For these reasons unacceptable noise impacts should not arise.

The Fields Childrens Centre and Galfrid School both Galfrid Road, the Barnwell West and East Local Nature reserves and Coldhams Common are considered to be an acceptable distance (approximately 250m plus at the nearest point) from the proposed radar so as not to give rise to unacceptable adverse impact.

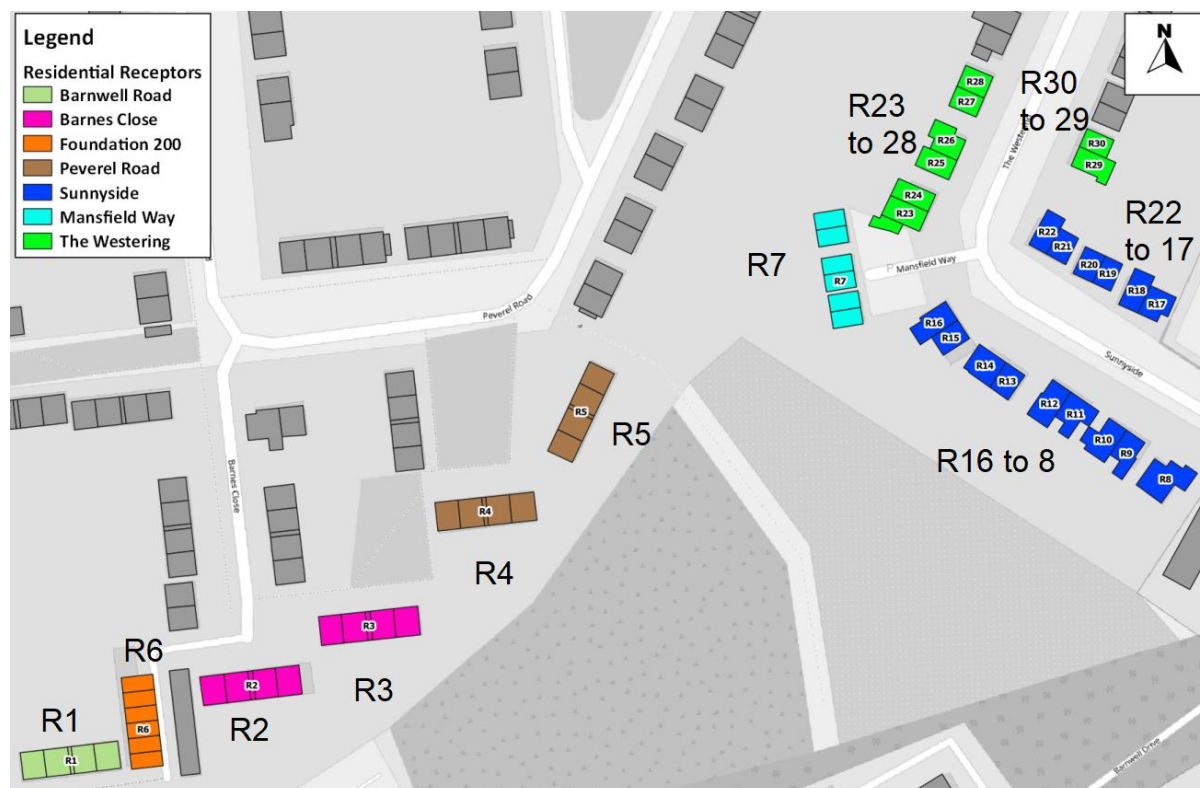
In conclusion, we do not envisage unacceptable adverse impacts on non-residential premises or other noise sensitive recreational areas or areas of open space. No further action is required.

9.15 Significance of Operational Noise Effects Assessment / Analysis - Residential

ES - BS 4142 Rating Levels and Significant of Effect

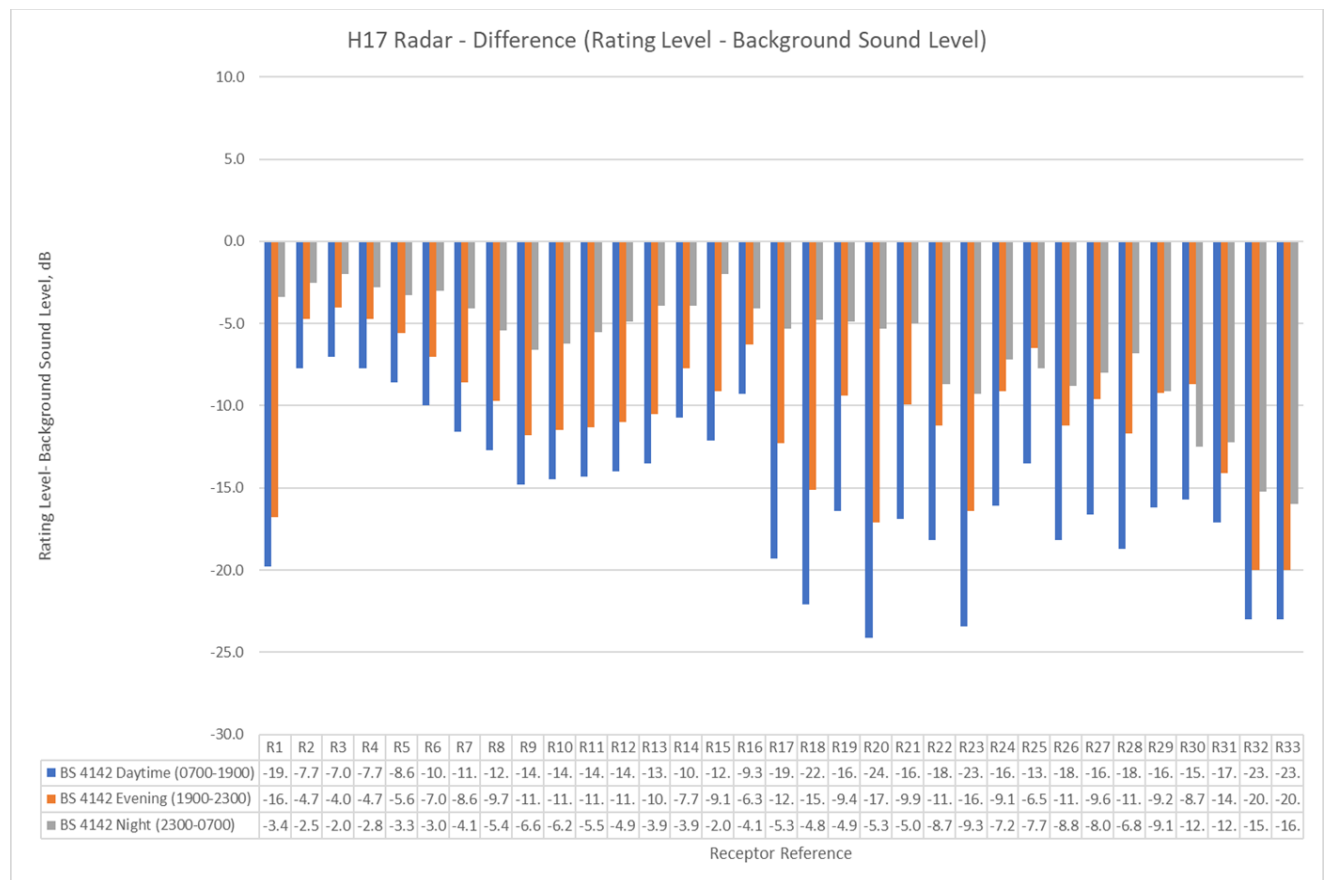
It is reported in the ES that at all the closet receptors R1 to R30 (55 separate receptors locations as highlighted on Figure 5 below) the BS 4142 rating levels are less than the assumed representative background sound levels.

Figure 5: Residential Receptors (Assessment References R1 to 30)



A graphical representation of the differences between the calculated H17 radar noise rating levels and the background sound levels reported in the ES for daytime, evening and night-time periods is shown in Figure 6 below. A negative value is where the calculated noise rating level is below the derived background sound level. The greater the negative value, the less likely it is that the specific sound source will have an adverse impact or significant adverse impact. There is a decrease in the significance as the – (negative) value difference increases. For context, a 3dB change in noise level is commonly considered to be the smallest change perceptible to humans unless under controlled conditions, whilst a 10dB change corresponds to a subjective doubling of level.

Figure 6: ES - BS 4142 (2019) Rating Level v. Background Sound Level margins



With reference to Figure 6, in summary the significance of impact is as follows:

- **Day Assessment Period (0700-1900) – external in amenity areas / gardens:**

- Calculated noise levels are more than 5 dB below the background sound level (considered LOAEL) at all 55 receptors, and more than 10 dB below the background sound level (considered NOAEL) at all but six receptors (R2, R3, R4, R5, R6 and R16).
- BS4142 margins / differences range from -7.0 to -16.8 dB in the Barnes Close, Barnwell Road / Peverel Road area and -9.3 to -24.1dB in the Sunnyside/ The Westering / Mansfield Way area. In terms of BS4142 these are considered indicative of very low impacts. There is a decrease in the significance of impact as the – (negative) value difference increases (is higher numerically).
- Further consideration of operational noise effects has been informed by the ‘New Noise Generating Development (NGD) - External Noise Standards for “non- anonymous noise” (GCSP-SPD, 2020):

In terms of the GCSP-SPD (2020) the outcome is a Noise Significance Risk: ‘None’ to ‘Minimal’ with a Noise Significance of Effect: from ‘NOEL (≤ -10 dB) to LOAEL (> -10 & ≤ -5)’ for all receptors. For these outcomes, the SPD (2020) planning advice is that the proposed development ‘is likely acceptable from a noise perspective. The LPA will seek this level of compliance in most noise

sensitive areas and / or where there is a requirement to mitigate creeping background effects.'

- In terms of Planning Practice Guidance (PPG) 'Noise Exposure Hierarchy Table' (Table 1 above), the likely response is that the noise may be 'present and not intrusive' with the example outcome that 'Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life'.

- **Evening Assessment Period (1900-2300) – external in amenity areas / gardens:**

- Calculated noise levels are more than 5 dB below the background sound level (considered LOAEL) at all 55 receptors but three (R2, R3 and R4).
- BS4142 margins / differences range from -4.0 to -16.8 dB in the Barnes Close, Barnwell Road / Peverel Road area and -6.3 to -17.1 dB in the Sunnyside/ The Westering / Mansfield Way area.
- In terms of the GCSP-SPD (2020), all but three receptors are in the 'None' or 'Minimal' Noise Significance Risk, with the remaining in the 'Low' category.

For 'Low', the SPD (2020) planning advice is: *'this indicates that the proposed NGD may be acceptable from a noise perspective but will be more context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is more applicable to less sensitive sites or where there is no requirement to mitigate creeping background effects.'*

- **Night Assessment Period (2300-0700) – external at residential façades:**

- Calculated noise levels are below the background sound level (considered LOAEL and below) at all 55 receptors.
- BS4142 margins / differences range from -2.0 to -3.4 dB in the Barnes Close, Barnwell Road / Peverel Road area and -2 to -12.5 dB in the Sunnyside/ The Westering / Mansfield Way area.
- In terms of the GCSP-SPD (2020), all but three receptors are in the 'None' or 'Minimal' Noise Significance Risk, with the remaining in the 'Low' category' with a Noise Significance of Effect: NOEL to LOAEL is > -5 & ≤ 0) for all receptors.

For 'Low', the SPD (2020) states *'this indicates that the proposed NGD may be acceptable from a noise perspective but will be more context dependent, i.e. extent and effect on noise sensitive receivers (externally and internally). Compliance within this range is more applicable to less sensitive sites or where there is no requirement to mitigate creeping background effects.'*

- Have regard to the national Planning Practice Guidance (PPG)-Noise 'Noise Exposure Hierarchy Table' (Table 1 above), the impact of the radar noise is considered to be below the 'Lowest Observed Adverse Effect Level (LOAEL)' at all the nearest receptors at all times.

Based on the likely average response of those affected, the likely response to the noise is that it may be *'present and not intrusive'* with the example outcome that *'noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.'*, with the planning advice / action of *'No specific measures required'*.

We agree with the 'ES - BS 4142 Rating Levels and Significant of Effects' for residential receptors as detailed above.

9.16 Three Spire Acoustics - H17 BS4142 Assessment

In their report Three Spire Acoustics provide an opinion on the proposed relocation of the radar to the H17 location and likely impact. Their report details the results of a background noise survey undertaken at location MP8 and the outcome of the BS4142 assessment applying the results from the background noise survey and measurements made at the base of the radar and predicted back to location MP7 (at 200m) and MP8 as shown on Figure 7 below.

Figure 7: Three Spires BS4142 assessment locations.



A BS4142 assessment of the daytime, evening and night-time situations, replicating the distance from the proposed H17 radar tower relocation at a distance of 200m from receptors, has been undertaken and the results presented in Table 5 below.

Table 5: Three Spires MP8 - H17 BS4142 Assessment Outcome

Situation	BS4142 Outcome $L_{A,T,r} - L_{A90,T}$	Significance of Outcome
Day	-14	Indication of low adverse impact depending on context
Evening	-9	
Night	-7	

The Three Spires report states the following:

'The results indicate a rating level minus background level of between -14 to -7 for day, evening and night respectively. BS4142 states where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.'

With regard to the above the absolute level of radar noise it is predicted to be approx. 29dB(A) at the receptor location (MP8) which is significantly below the prevailing background and ambient acoustic conditions for daytime, evening and night time periods and shows no level change with or without the radar in operation. Aural assessment during the noise survey at MP7 approx. 200m from radar H16, indicated that the radar noise was completely inaudible in terms of absolute level and also regarding tonal components specifically at 400 Hertz. The time profile for 400 Hertz LZeq and LZ90 1minute measurements indicates no level change between the radar on and radar off situations. There may be some uncertainty in BS4142 measurement outcome due to the use of the proxy location, however the negative level difference is large enough to indicate that there is confidence in the outcome of low adverse impact.'

It is considered that the background and ambient prevailing conditions at location MP8 and for residents at Peverel Rd and Barnes Close are different and typically higher than those experienced by residents in The Westering and Sunnyside which are further away NE from the Airport boundary. This is due to the increased noise from local traffic on the A1134 Barnwell Rd and noise emissions from the paint abatement plant at Marshalls Airport, which both legitimately form part of the background noise level.'

Comparison against the Greater Cambridge Shared Planning – Sustainable Design and Construction: Supplementary Planning Document (SPD, 2020) Table 3.11: New Noise Generating Development- External Noise Standards for “nonanonymous noise” SPD (2020) Noise Generating Development – External Noise Standards for “non anonymous noise” is presentedand indicates that the daytime and evening BS4142 outcomes results in a “no significance risk” and a “no observable effect” level. The night-time BS4142 outcome results in “minimal significance of risk” and within the range of “no observable effect” to the “lowest observable adverse effect level”

It is therefore considered that the relocation of the radar to H17 is unlikely to result in any unacceptable noise impact to the closest residential receptors in Peverel Rd and Barnes Close. For properties further away such as those on the southern side of Sunnyside and The Westerings the operational noise impact will be even lower due to the greater separation distance involved, and unacceptable adverse noise impact is not envisaged.'

9.15 BS 4142 & Context (in which the sound occurs)

In terms of BS4142 significance of impact advice, all the assessment outcomes above equate to an indication of the specific sound source having a '*low impact, depending on the context.*'

As advocated in BS4142, NPPG- Noise and Para. 3.6.105 of the GCSP-SPD (2020), when considering the overall impacts / effects of noise due regard should be given context in which the noise occurs which depends on how various factors combine in any particular situation. **The difference between the rating level and the background sound level only provides an indication of the impact and that the context must be considered before any conclusions can be drawn about the magnitude of any impacts.**

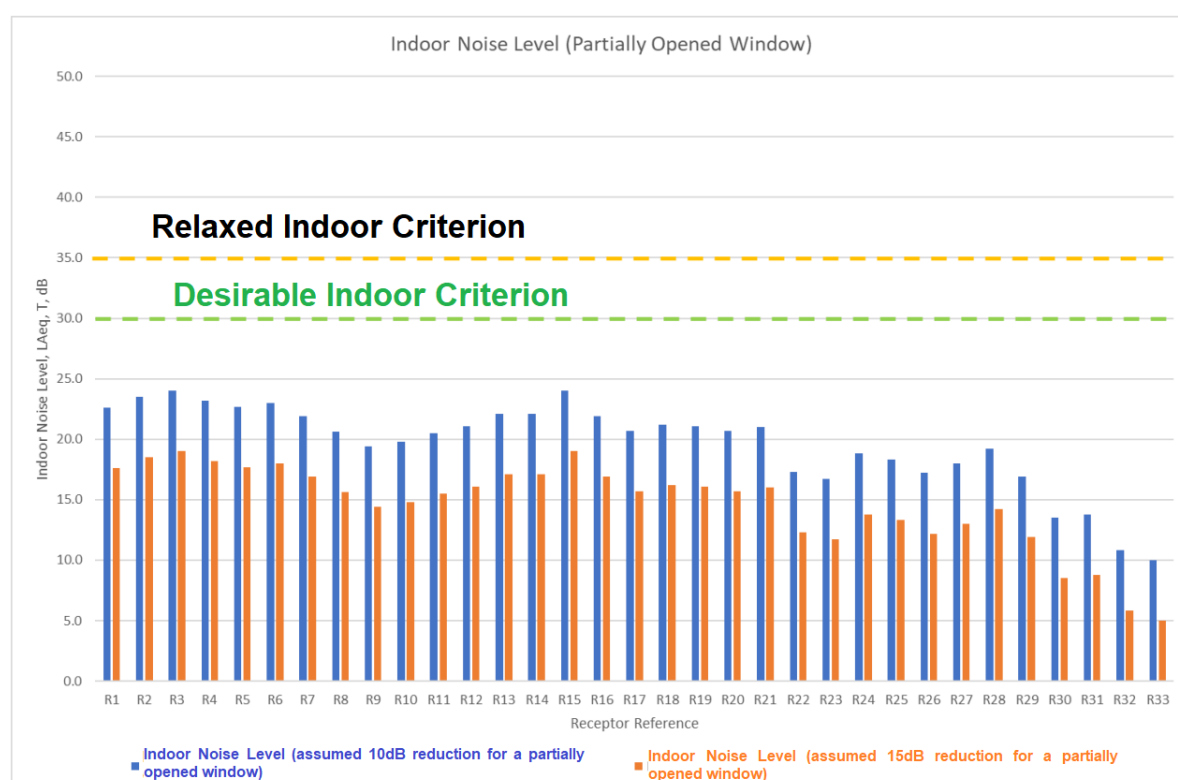
All pertinent contextual considerations should be taken into account including the following:

- the absolute level of the sound / noise;
- the character and level of the residual sound compared to the character and level of the specific sound;
- for a new noise making source, how the noise from it relates to the existing sound environment;

For the night-time period (2300 to 0700hrs) which is considered the most sensitive time of day context is paramount in reaching an overall conclusion on effects. In this case the relatively low absolute levels of the sound / noise at receptor façades is a key factor in this mixed commercial / industrial urban area adjacent to an operational airport.

In terms of assessing potential internal noise impacts, the acoustic performance of receptor façades can be considered. Assuming a partially opened window providing either a 10 dB (conservative) or 15 dB (relaxed for urban type areas) attenuation from outside to inside, having regard to predicted external façade noise rating levels (inclusive of a tonal correction of +2dB), the calculated internal noise levels adopting this approach are shown in Figure 8 below. In all instances are significantly below the BS8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings' desirable internal noise criterion of 30 dB LAeq,T and the relaxed criterion of 35 dB LAeq, T for a bedroom at night. The internal noise levels would be even further below the BS 8233 (2014) criterion if consideration was given to closed windows, or the average time that windows are open / closed.

Figure 8: ES - Night-time Assessment– Additional Context (Indoor Noise Levels)



Therefore, in terms of context and the absolute internal noise levels, the predicted night-time internal noise levels at the nearest receptors range from 10 to 24dB under a worst case prediction scenario just assuming a 10 dB reduction across a partially open window. These levels are considered extremely low and are unlikely to result in any unacceptable adverse impact when having regard to industry standards and best practice technical guidance recommended acceptable internal noise standards. The noise levels are shown in the main to be significantly below BS 8233 (2014) desirable internal noise levels of 30 for bedrooms at night, as recommended in World Health Organisation community guidelines.

Although it could be argued that standards such as BS 8233 (2014) are not directly applicable to this application and industrial noise sources such as the radar noise, the levels as stated are significantly below recommended internal levels and give sufficient comfort that unacceptable adverse impacts are unlikely to arise.

9.16. Noise Impact Comparison of H17 with existing H16 Radar

The submitted ES does undertake any BS 4142 comparative analysis between the existing H16 and H17 radar impact scenarios. However, it is our view that it would be beneficial and helpful to do so.

Table 6 below from the ES presents the assessment at the five residential receptors where the difference between the predicted rating level (the specific sound levels inclusive of a rating penalty) and the background sound levels, is smallest (i.e. where the rating level is closest to exceeding background sound level indicating the greatest potential noise impact). This is for the night-time period and in all instances, the predicted rating level in the ES is lower than the derived background sound level and

is considered below the Lowest Observed Adverse Effect Level (LOAEL), and the ES concludes that this is not significant in EIA terms.

Table 6: ES - BS 4142 Assessment: Night-time (2300-0700hrs) – smallest difference

Receptor	Ref.	Predicted Rating Level dB $L_{A,r,Tr}$ dB	Background Sound Level dB $L_{A90,T}$	Difference ($L_{A,r,Tr}$ – L_{A90}), dB	Assessment Outcome
Barnes Close	R3	34.0	36	-2.0	<LOAEL
Sunnyside	R15	34.0	36	-2.0	<LOAEL
Barnes Close	R2	33.5	36	-2.5	<LOAEL
Peverel Road	R4	33.2	36	-2.8	<LOAEL
Foundation 200	R6	33.0	36	-3.0	<LOAEL

These predication are at the facades of properties at 200m and greater from the proposed H17 radar with no other properties closer.

Three Spires have also undertaken a predictive impact assessment of the current H16 radar at the closest property 22 Sunnyside which is approximately 42 m to the nearest façade.

It has only been possible to predict the H16 radar noise at this location using measurement data gathered during their assessment and the background noise measurements provided / assumed by the applicant's noise consultant for the planning consultation for relocation of the radar to H17. Table 7 below details the outcome of the BS4142 assessment at this location.

A 4dB character correction has been applied to this situation as the tonal noise from the H16 Radar was clearly audible at the perimeter of the site with 22 Sunnyside.

Table 7: Three Spires - H16 BS4142 Assessment (22 Sunnyside)

Situation	BS4142 Outcome $L_{A,r,Tr} - L_{A90,T}$	Significance of Outcome
Day	+5	Indication of adverse impact dependent upon context
Night	+8	Indication of adverse impact dependent upon context

Whilst this assessment is strictly not directly comparable to the ES - H17 prediction assessment, as the same detailed noise modelling has not been undertaken, it indicates that the existing H16 - BS4142 rating level margins when compared to backgrounds at the existing closest receptor at 42m - 22 Sunnyside from the existing H16 radar are 12 to 17dB greater / higher during the daytime when compared with the H17 radar and closest receptors at 200m (a +5dB BS4142 rating for the existing H16 situation compared to a -7/-12 rating for the proposed H17 radar). For night-time the rating level margins at 42m at 22 Sunnyside are 10 to 11dB greater when

compared with the H17 radar and closest receptors at 200m (a +8dB for the existing H16 situation compared to a -2/-3 rating for the proposed H17 radar).

The absolute rating levels are also approximately 8 to 10dB higher at night-time (34 dB for H17 compared to 44dB H16). The planning criteria significance of BS4142 impact for H16 to the closest receptor at 22 Sunnyside is considered an indication of an adverse impact and having regard to the GCSP - SPD (2020) this is likely to be considered a high significance of noise risk and a '*significant observed adverse effect level (SOAEL)*' with the planning advice '*Where the rating level of noise is above the background noise level by more than 5dB, this indicates that the proposed NGD is unlikely to be acceptable from a noise perspective and planning consent is likely to be refused on noise grounds.*'

This H16 v. H17 comparison, clearly shows that in terms of operational noise impacts, the H17 radar (predicted to be below a '*Lowest Observed Adverse Effect Level (LOAEL)*') at all times is by far a preferable location to the existing H16 (predicted to give rise to a '*Significant Observed Adverse Effect Level (SOAEL)*') scenario.

9.17 EQG Overall Conclusion: Significance of Operational Noise Effects Assessment / Analysis - Residential

Having reviewed the noise impact assessments that have been undertaken by the applicant as detailed in the submitted Environmental Statement and by the Councils' own noise consultant Three Spires Acoustics Ltd, it is the EQG service conclusion that the long term operational noise associated with the H17 radar in the location proposed has been thoroughly assessed within in the submitted ES and complies with Environmental Impact Assessment regulations.

The ES noise impact assessment has been undertaken substantively in accordance with industry noise impact assessment methodologies / standards with acceptable professional judgement being applied as necessary and allows an informed decision / judgment to be made about the acceptability of the proposals. It is also our view that any uncertainty in the data and associated calculations in the ES assessment has been adequately accounted for.

The challenge with any noise impact assessment and exposure is that it is not possible to have a single objective noise-based measure that defines absolute acceptable noise levels or a range of noise levels that are mandatory and applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors / locations and at different times.

The ES Noise Chapter derived background sound levels are in the main considered representative and typical both for the particular circumstances and periods of interest for the nearest residential receptor locations at a distance of 200m from the proposed H17, to allow a robust noise impact assessment to be undertaken. 200m is the approximate separation distance to the closest residential receptors to the North / North East as follows: 163 to 169 (odd numbered) Barnwell Road (R1); 1 to 6 Caroline Hart Walk (R6); 9, 10, 11, 12 Barnes Close (R2); 5, 6, 7 and 8 Barnes Close (R3); 50, 52, 54, 56; Peverel Road (R4); 58, 60, 62, 64 Peverel Road (R5); 1, 2, 3, 4, 5 and 6 Mansfield Way (R7) and all of the western side of Sunnyside properties nos. even - 6

to 22 (R8 to R16). Effectively all the closest receptors on the west of Sunnyside, at Mansfield Way and Barnes Close / Peverel Road etc.

We agree that reasonable worst-case assumptions have been adopted for the noise modelling inputs, such as hard ground surface attenuation ($G=0$: totally reflecting surfaces and effectively little sound energy absorbed by the surface such as asphalt, concrete), downwind propagation to all receptors at all times, and 'worst-case' noise source directional orientation of the radar cabin. All of these factors combined have allowed for a 'worst case scenario' predictive approach for radar noise rating levels at the residential receptors considered.

In conclusion, it is our view that operational noise levels associated with the H17 radar will not give rise to any significant adverse noise impacts / effects on the health and quality of life /amenity both externally and internally at residential receptors.

During the daytime period, when the derived background sound levels are higher, the H17 radar noise is likely to be inaudible at distances of approximately 200m or greater. During quieter evening periods, and night-time periods, when background noise levels are lower, noise from the H17 radar may be just perceptible externally at times at approximately 200 m, but at what are considered to be low absolute noise levels and it is likely to be very difficult to distinguish the specific radar noise from other ambient noise in the area. The aural assessment undertaken by Three Spires and as witnessed by this service, indicates that noise from the radar (under very still wind conditions) was inaudible at approx. 200m when in operation, in the general location from the residential boundaries of properties on the west side of Sunnyside and towards the Peverel Rd and Barnes Close property boundaries. This suggests that a tonal correction may not even be required but it has been included in the ES specific noise predictions as a matter of caution as it may just be audible at times. Such an approach is considered precautionary.

However, overall impact will depend on how various factors combine in any particular situation. In terms of the most relevant impact assessment standard for industrial / commercial noise - BS 4142, the overall noise impact is predicted to be '*low to very low*', with the radar noise below the existing representative background sound levels at all relevant closest residential receptors. Having regard to context, the predicted radar noise rating levels (inclusive of a correction of +2dB for tonal character) at receptors are considered low in absolute noise level terms during the day / evening (ranges from 19 to 36 dB externally in gardens / amenity areas) and night- time (ranges for 20 to 34 dB externally at facades) periods.

In terms of national planning guidance on noise it is concluded that no unacceptable adverse effect is likely to arise, as the noise exposure / levels as predicted at receptors and as assessed are considered to be below the '*Lowest Observed Adverse Effect Level (LOAEL)*' at all times. Although the word 'level' is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure.

There is nothing in the mainstream scientific evidence to suggest with any degree of certainty that a low external noise rating level of 35 / 36 dB or lower could result in any changes in behaviour such as those described in PPG-N for a '*Lowest Observed Adverse Effect Level (LOAEL)*', even if the noise rating level was significantly above the background sound level. In this case the predicted noise rating levels at all receptors are all below the representative derived background noise levels and below

a noise rating level of 35/36dB and is considered as being between a 'LOAEL' to a 'No Observed Effects Level' (NOEL).' BS4142 is quite specific in this regard and advises that absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background and this *"is especially true at night"*.

Predicted internal noise levels at the nearest receptors at night-time range from 10 to 24dB under a worst case prediction scenario just assuming a 10 dB reduction across a partially open window (external to internal). Also based on the Three Spires noise assessment we are also confident that any, radar noise including any tonal character is unlikely to be audible internally or result in any unacceptable adverse impact having regard to recommended internal noise levels and Noise Rating (NR) curves. The character of the area around the airport is mixed urban residential / industrial and these noise levels are not considered unacceptable in the existing prevailing acoustic environment.

Based on national planning guidance it is concluded that the H17 radar noise may be just audible externally at times but should not cause any change in the behaviour, attitude or other physiological responses. The radar noise may slightly affect the acoustic character of an area but not to the extent that there is a change in quality of life / amenity. If the noise exposure is at this level the national planning guidance action / advice is that no additional specific measures are required to manage the proposed radar noise in the prevailing acoustic environment.

This conclusion is all advocated by the Councils' own noise consultant Three Spires Acoustics Ltd.

Therefore, it is considered that the proposed development is in accordance with NPPF paragraphs 174 e) and 185 a) and Cambridge Local Plan 2018 policies 35: Protection of human health and quality of life from noise and vibration and 83: Aviation development.

However, to ensure that the radar noise complies with the predicted noise rating levels as detailed in the submitted ES and to protect the quality of life / amenity a number of bespoke operational noise conditions are recommended as detailed above.

These operational noise conditions have been formulated and agreed in consultation with both the Councils' and the applicants' acoustic consultant and are considered highly precautionary. We understand that they are acceptable in principle to the applicant.

Regards,

Greg Kearney
Principal Environmental Health Officer
Environmental Quality & Growth Team
Environmental Services
Cambridge City Council

Enclosed:

- Three Spires Acoustics Ltd report '*Cambridge City Airport Radar Noise - Statutory Nuisance & Planning Assessment, Rev3 - 31/01/2022: Ref. No. TSA/ENA/2021/37*'