



Copthorne Recreation Ground
Copthorne Bank, Copthorne, RH10 3RE

Noise Impact Assessment

17th October 2023
First Issue



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Revision History

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Executive Summary and Conclusions

This document has been written to assess the impact of noise 'pollution' generated by the proposed development of a new multi-use games area (MUGA), reconfiguration of an existing children's play park and the provision of a 25 space car park, at Copthorne Recreation Ground, Copthorne Bank, Copthorne, RH10 3RE.

Noise emissions from the proposed development have been assessed following several guidelines, including fixed noise level criteria *and* criteria based on the pre-existing ambient noise levels, determined by a baseline noise survey. Subsequent predictions of the noise emissions have been achieved using a detailed 3D noise model. A set of noise mitigation/management proposals have also been given.

In summary:

- Noise from the MUGA should be manageable to an acceptable level, providing that:
 - a 2m (minimum) height close boarded fence is installed close to the east side of the MUGA (outside of the ball stop fencing), to provide an element of noise screening to the dwellings to the east (which are the closest and likely most affected dwellings);
 - the ball stop fencing employs anti-vibration/resilient connections to minimise the level of vibration and 'rattling' of the fence when struck by a ball (the design suggests such a fence is already included within the proposals);
 - the other noise management measures in **Section 6.0** are all followed, regarding operation, code of conduct, and complaints management system.
- Noise from the reconfigured playground could potentially increase noise levels by a small margin, but to a level that corresponds to a 'minor' long term impact;
- Noise from the car park should only constitute a 'negligible' long term impact and is unlikely to cause a significant increase in road traffic noise levels along Copthorne Bank.

Therefore, providing that the applicant follows the recommendations herein, noise should be manageable to an acceptable level which avoids a significant adverse impact.

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1.0 Introduction

ParkerJones Acoustics Limited (PJA) has been instructed to undertake a Noise Impact Assessment (NIA) to accompany the planning application for the proposed development of a new multi-use games area (MUGA), reconfiguration of an existing children's play park and the provision of a 25 space car park, at Copthorne Recreation Ground, Copthorne Bank, Copthorne, RH10 3RE.

This Report has been written to assess the impact of noise 'pollution' generated by the proposed development on residential properties in the surrounding area. The objective is to ensure that the risk of noise impact will be controlled sufficiently, from noise sources including:

- the MUGA, i.e. football matches (and other sports), noise from players talking/shouting, and the impact of the ball on the fencing);
- the reconfigured/new children's play area; and
- and traffic in and out of the new car park and onto the surrounding roads, i.e. cars driving slowly, idling in neutral, and slamming doors.

There are no clear specific guidelines which explicitly outline how noise emissions from this type of development should be assessed. Therefore, PJA has assessed against several guidelines including:

- The Sport England Design Guidance Note *Artificial Grass Pitch (AGP) Acoustics – Planning Implications* document.
- The World Health Organisation (WHO) document '*Guidelines for Community Noise*' (1999) which suggests suitable internal noise levels in residential properties for good living/sleeping conditions, and external noise levels which would constitute a "moderate" or "serious" annoyance in gardens/patio areas. It's scope references noise sources such as "sports events" (i.e. use of the MUGA), playgrounds, and car parks.
- The '*Guidelines for Environmental Noise Impact Assessment*' (2014) document produced by the Institute of Environment Management & Assessment (IEMA), which considers the impact of an increase/change in average ambient sound levels from the existing baseline.
- The Chartered Institute of Environmental Health (CIEH) guidance document '*Clay Target Shooting: Guidance on the Control of Noise*' (2003), which contains a method for assessing short high level impulsive sounds, which could apply to some of the noise characteristics experienced from ball impacts on fencing.

The assessment is aimed at limiting the impacts to no greater than the LOAEL – the Lowest Observed Adverse Effect Level (the level above which *adverse* effects on health and quality of life can be detected) – as referenced in national planning policies including the National Planning Policy Framework (NPPF), the Noise Policy Statement for England (NPSE) and the Planning Practice Guidance on Noise (PPG-N), summarised in **Appendix B**.

Whilst every attempt has been made to ensure that this report communicates effectively to a reader who might not have much knowledge of acoustics, some parts are necessarily technical. A glossary of acoustic terminology and concepts is provided in **Appendix A**.

2.0 Site and Development Description

The application site is known as the *Copthorne Recreation Ground*, located on Copthorne Bank, Copthorne, RH10 3RE. The rectangular site as shown in **Figure 2.1**, is **currently occupied** by a children's play area known as Copthorne Bank playground on the southern side, with the northern half of the site comprising open greenspace.

Copthorne Village Hall and a Social Club (and the associated car park) is located directly to the east of the site, with a row of residential dwellings behind. Dwellings are also located to the west on Roffey's Close and Charlwood Close, and to the south on the opposite of Copthorne Bank (a 30 mph limit road to the south). Open agricultural land lies to the north. The site is approximately 1 km east of the M23 and 3 km from Gatwick Airport.

Figures 2.2, 2.3 and 2.4 show plans of the proposed development, which (extracted from the Design and Access Statement) is described as follows:

"New Multi Use Games Area (MUGA): a new Multi Use Games Area is to be constructed in the Northeastern corner of the grounds, that will support various sports including recreational football, basketball and potentially other sports such as Tennis and Netball. The design will be considerate of the site in terms of distance from housing, existing trees, and provide good access for the public to use the facility. The plan is for the MUGA to be both 'free to use' and hired out to generate income for the Council, and in turn to re-invest into the site and potentially other projects. As a result, Sports Lighting has been included into the design for extended hours.

Playground: the immediate plan is to improve the current playground which is outdated and in need of expansion and modernisation. The objective is to effectively double the size, improve the design and layout of the equipment, and cater for a wider range of ages and abilities. The site will be moved slightly central to the recreation ground with improved access, making way for the longer-term goals, mainly the car park.

New Car Park: with approx. 23 car spaces and 2 disabled car spaces at the front of the Recreation Ground, currently near the existing playground. This is to also serve the local retail outlets and central location of Copthorne."

The MUGA will be a 38 x 18.5 metre playing area, with a green mesh steel 3m high 8/6/8 twin bar rebound fencing system around the perimeter. A lighting system is to be installed albeit PJA is not aware of the hours that this would operate until. Typically PJA would anticipate that the facilities could be in use seven days per week, mainly between the hours of 08:00 and 21:00.

Figure 2.1 – Site and surrounding area



TR

MUGA DIMENSIONS
Standard MUGA courts are 15m x 17m or 15m x 15m, depending on the site dimensions.
Dimensions shown are approximate and subject to change.

Play area
750m²
50%
increase

PAVED AREA 5m x 35m

Playgroup

Club

Hall

WYNGATES

COPTHORNE BANK

LB

The Old Hawthorne

SCALE 1:500 @A3
NOT BASED ON
DETAILED SURVEY

Figure 2.3 – Proposed MUGA layout



PLAYGROUND EQUIPMENT LIST

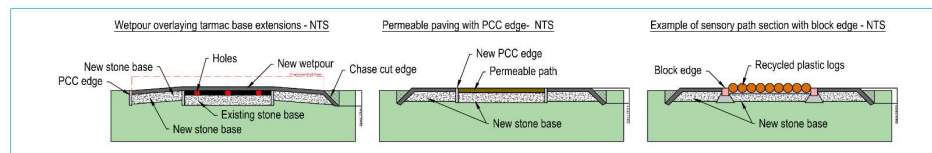
1. FANTASY TREE SPRINGER Ref: J281A
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 34. FANTASY TREE SPRINGER Ref: J281A
 35. FANTASY TREE SPRINGER Ref: J281A

LEGEND

- Blue: Rubber mulch
- Green: Grass
- Yellow: Sand
- Patterned: Wood chips
- White: Plastic
- Black: Metal

EQUIPMENT SPECIFICATIONS

1. Fantasy Tree Springer Ref: J281A
2. Fantasy Tree Springer Ref: J281A
3. Fantasy Tree Springer Ref: J281A
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34. Fantasy Tree Springer Ref: J281A
35. Fantasy Tree Springer Ref: J281A



3.0 Relevant Guidelines

There are no clear specific guidelines which explicitly outline how noise emissions from MUGAs, playgrounds and car parks should be assessed. Therefore, PJA has assessed against several guidelines, outlined in the following subsections.

3.1 Sport England Artificial Grass Pitch Acoustics – Planning Implications

The Sport England Design Guidance Note *Artificial Grass Pitch (AGP) Acoustics – Planning Implications* document published in 2015 was written to provide guidance on the planning implications of artificial pitches, particularly with regards to acoustics, the main stumbling block in the design of such pitches close to sensitive residential areas.

It indicates that there are no specific noise criteria for an AGP, but that the following documents are commonly applied:

- The WHO document *Guidelines for Community Noise 1999* – see **Section 3.2**;
- The IOA/IEMA Working Party Consultation Draft 2002 (subsequently developed to form the IEMA 'Guidelines for Environmental Noise Impact Assessment' 2014 – see **Section 3.3**);

With regards to the WHO fixed noise level guidelines, it states "*exceedance of the WHO guideline values does not necessarily imply significant noise impact and indeed, it may be that significant impacts do not occur until much higher levels of noise exposure are reached*".

This guideline could also be considered relevant to noise from MUGAs and playgrounds given the similar nature of noise emissions to an artificial grass pitch, hence it's reference in this report.

3.2 World Health Organisation (WHO) Environmental Noise Guidelines

The WHO document *Guidelines for Community Noise 1999* has recently been superseded by the *Environmental Noise Guidelines for the European Region*. However, the updated guidance states that '*all WHO guidelines for community noise (CNG) indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid*'.

The 1999 document gives the following description of community noise:

*"Community noise (also called environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood. Typical neighbourhood noise comes from premises and installations related to the catering trade (restaurant, cafeterias, discotheques, etc.); from live or recorded music; **sport events** including motor sports; **playgrounds**; **car parks**; and domestic animals such as barking dogs."*

The document sets out guidance as to noise levels at which there will be an unacceptable impact on the local community. WHO guidelines state:

- To protect the majority of people from being seriously annoyed during the daytime, the sound pressure level on balconies, terraces and outdoor living areas should not exceed 55 dB L_{Aeq} for a steady, continuous noise.
- To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound pressure level should not exceed 50 dB L_{Aeq} .

3.3 IEMA Guidelines for Environmental Noise Impact Assessment

The Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Environmental Noise Impact Assessment', Version 1.2 published in November 2014 addresses the key principles of a noise impact assessment. The document states that it is applicable to "all development proposals where noise effects are likely to occur" and "are relevant to all types of projects, regardless of size".

The guideline provides a method of assessing the significance of an increase in the average ambient sound level over a baseline level, as a result of a new (or modified) noise source. The table below (recreated from Table 7-14 of the IEMA guidelines) gives an example of how the impact can be evaluated.

This is assessed by determining the pre-existing ambient sound level L_{Aeq} , and then logarithmically adding the predicted L_{Aeq} noise emissions from the development.

Table 3.1 – IEMA guidelines for classifying the level of impact based upon the increase in ambient sound level

Long-term Impact Classification	Short-term Impact Classification	Increase in Ambient Sound Level L_{Aeq}
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

3.4 Chartered Institute of Environmental Health: Clay Target Shooting

The CIEH guidelines could be adopted and applied to the impulsive noise or maximum noise levels measured as L_{Amax} , i.e. from ball impacts on fencing.

The Chartered Institute of Environmental Health (CIEH) guidance document '*Clay Target Shooting: Guidance on the Control of Noise*' describes how noise from clay pigeon target shooting can occur and provides advice on methods to minimise or prevent annoyance and intrusion. The guidance includes details of a recommended method for the measurement and subsequent assessment of clay target shooting noise produced by the Building Research Establishment (BRE) and derived from research.

The BRE research suggests that there is no fixed shooting noise level at which annoyance starts to occur. Annoyance is less likely to occur at a mean shooting noise level (mean SNL) below 55 dB(A), but likely to "*evoke a strong community response*" if the SNL is above 65 dB(A). The likelihood of annoyance at levels within this range will depend upon local circumstances and other factors. The shooting noise level references to the average noise level of the 25 loudest shots over a 30-minute period. In this context, it *could* be used to mean levels from the 25 loudest ball impacts over a 30 minute period.

4.0 Baseline Noise Survey

PJA has attended the site and surrounding area to conduct a baseline noise survey between Thursday the 28th and Friday the 29th of September 2023. The results have been used to give context to the predicted noise emissions from the MUGA as the impact partially depends on how noisy or quiet the area is already.

4.1 Methodology

A fixed monitoring position was employed with a sound level meter installed on land just north of the site, and close to the boundary of the nearest dwelling to the MUGA to the east. The location of the monitoring position is shown in **Figure 2.1 (Section 2.0)**.

The sound level meter was set to log noise levels over continuous 15-minute averaging periods with a 1-second time history rate, measuring from 10:00 on the 28th until 12:15 on the 29th.

The following noise indices were recorded (amongst others):

- **L_{A90,T}** : The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level' and is therefore used in determining the 'representative background sound level' as defined by BS 4142:2014;
- **L_{Aeq,T}** : The A-weighted equivalent continuous noise level over the measurement period T. This parameter is typically considered as a good representation of the average ambient sound level; and
- **L_{AFmax,T}** : The maximum A-weighted noise level during the measurement period T.

The monitoring equipment used for the baseline noise survey is detailed in the table below. The sound level meter was calibrated before and after the survey, with no significant drifts of greater than 0.5 dB observed. The sound level meter has been calibrated to a traceable standard within the 24 months preceding the survey, and the calibrators have been calibrated to a traceable standard within the 12 months preceding the survey. The equipment complies with the standards of as BS EN 60942:2003 Class 1 device.

Table 4.1 – Equipment used for the noise survey

Name	Serial Number	Last Calibrated	Calibration Due
Casella CEL 633B Class 1 Sound Level Meter	0221364	Oct-2022	Oct-2024
Casella CEL 252 Class 1 Microphone	21198	Oct-2022	Oct-2024
Casella CEL 120-1 Acoustic Calibrator	113251	Feb-2023	Feb-2024

4.2 Results

The ambient noise climate is made up mostly of distant road traffic from the M23 and aircraft, as well as kids at times in the grassy playing area.

Figure 4.1 shows the time history of measured noise levels at the monitoring position.

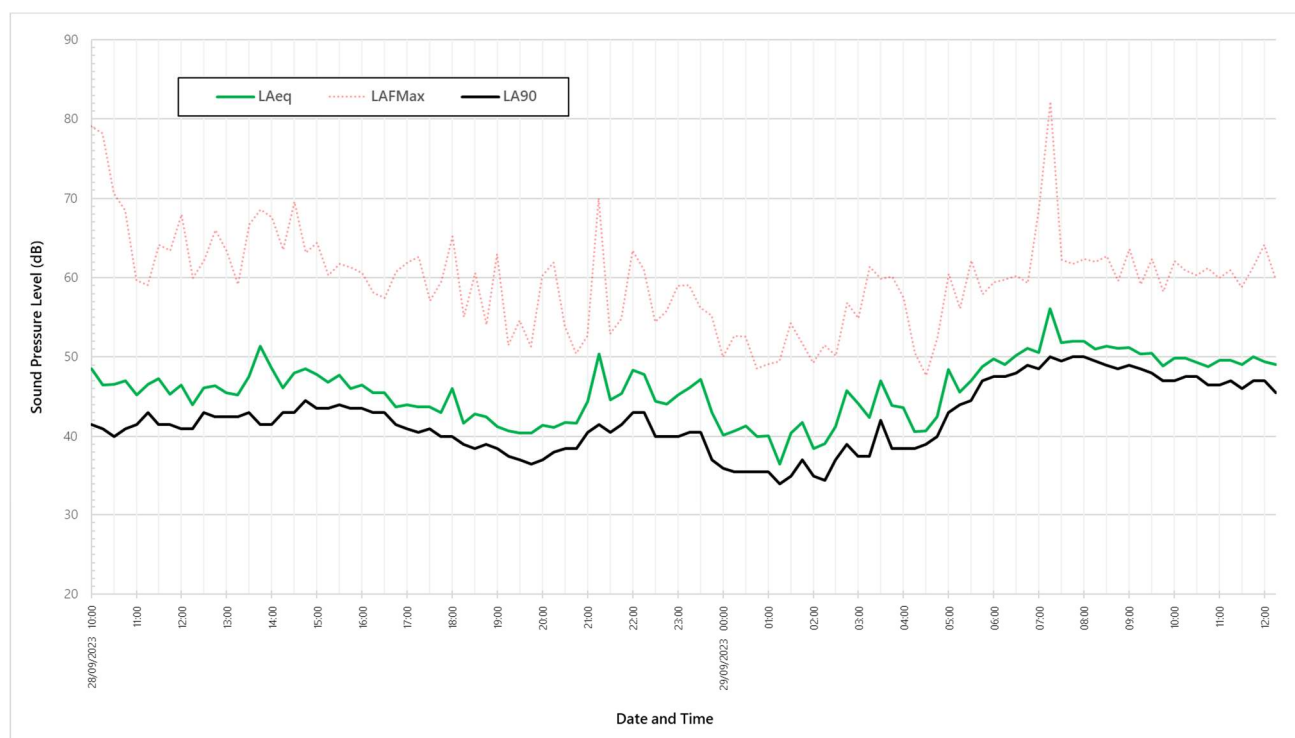
Table 4.1 below provides a summary of the results between 09:00 – 21:00 - the anticipated usage hours of the MUGA. The most relevant parameters in terms of the representative ambient sound levels are the $L_{Aeq,15min}$.

Average ambient noise levels were typically around 47 dB $L_{Aeq,15min}$.

Table 4.1 – Summary of measured noise levels – likely usage hours between 08:00 and 21:00

Parameter	Maximum	Minimum	Logarithmic Average	Mean Average	Modal Average	Median Average
$L_{Aeq,15min}$ (dB)	52	40	48	47	49	47
$L_{AFMax,15min}$ (dB)	79	50	N/A	62	60	61
$L_{A90,15min}$ (dB)	50	37	N/A	43	43	43

Figure 4.1 – Time history of measured noise levels



5.0 Noise Assessment

5.1 MUGA

5.1.1 Assessment Criteria

Interpreting Sport England's document '*Artificial Grass Pitch (AGP) Acoustics – Planning Implications, New guidance for 2015*' and the relevant guidance from WHO, CIEH guidelines, and National Planning Policy, the following criteria would appear to be a useful benchmark in the assessment:

- Noise emissions from the MUGA should be no greater than **50 – 55 dB $L_{Aeq,1hr}$** in nearby residential gardens or outside of residential windows to avoid 'moderate' and 'serious' annoyance;
- Impulsive noise levels from the MUGA, i.e., from the impact of balls on the fencing should not generally exceed **55 - 65 dB L_{AFmax}** outside of nearby residential windows.

These criteria would appear to correspond to the LOAEL (Lowest Observed Adverse Effect Level) at most. The aim of planning policy is usually to limit adverse impacts from factors such as noise to no greater than the LOAEL. This provides a good guideline to assess against but shouldn't be applied as a black and white limit. It is also important to consider the context of the existing use of the site (which in this case already involves the usage of the site for sports).

5.1.2 Source Noise Levels

General Use (Average Levels)

Sport England's document '*Artificial Grass Pitch (AGP) Acoustics – Planning Implications, New guidance for 2015*', provides advice on typical noise levels generated from a typical AGP sports session – relevant to the proposed MUGA.

The most significant noise source from a typical session is from the voices of the players, with the exception of hockey, where impact noises of balls hitting goal backboards and perimeter strike boards are particularly noticeable (though these can be mitigated with shock-absorbing material).

The Sport England study measured nine sports sessions on three separate AGPs, including football, hockey, and rugby, ranging from 12 to 50 players involved. Noise measurements were taken 10m behind the mid-way points along goal lines and side-lines – finding it to be the highest behind the side-line halfway line. It states:

"A typical free-field noise level from an AGP (at 10 m from the side-line halfway marking) = 58 dB $L_{Aeq}(1 \text{ hour})$ "

From surveys conducted for other noise impact assessments ^{1 2 3}, it appears the average levels from a 5-a-side to an 11-a-side football match are usually around the 51 dB – 58 dB $L_{Aeq,1hr}$ range when measured 10m from the side-line halfway marking – hence the 58 dB figure appears appropriate.

At 10m behind the goal line levels are usually lower during matches, but not always the case if shooting practice is being conducted at one end, so it is not assumed that behind the goals are quieter for the purpose of the assessment.

Fence Impacts (Frequent Maximum Levels)

In terms of maximum noise levels from short events, the main noise sources are from balls hitting the perimeter metal fence (mainly football).

The proposed fence is a 3m high twin bar rebound fencing system. Such a fence system is designed to be far more rigid in comparison to weldmesh fences often seen around playgrounds which have little support and are flexible in comparison. This rigidity means that the fence does not rattle as much (if at all) when struck by a football. Anti-vibration fixings can also be added in to dampen vibrations/resonance within the fence (which is recommended and discussed in **Section 6.1.2**).

PJA has sourced noise data from tests of football impacts on similar 'rigid' mesh fencing (assumed with anti-vibration fixings), finding quoted levels of **77 dB ⁴ to 78 dB ⁵ L_{AFmax} at 1m**. This is in comparison to lighter/flexible weldmesh fencing which can produce levels of up to 85 dB ⁶ - 94 dB L_{AFmax} ⁷ at 1m when struck by a football.

1 - Proposed Artificial Grass Pitch Emmbrook School, Wokingham, RG41 1JP – Noise Impact Assessment 7544/DO – Acoustic Consultants Limited – January 2019
2 - Uplands Community College Lower High Street, Wadhurst, East Sussex - Proposed 3g Synthetic Sports Pitch – Noise Impact Assessment MRL/100/698.1v1 – MRL Acoustics – July 2014
3 - Proposed AGP – Beeston – Noise Assessment 31674.2v1 – Hepworth Acoustics – September 2014
4 - Luckley House School, Luckley Rd, Wokingham RG40 3EU - Noise Impact Assessment TH2111182NR – Peak Acoustics – January 2019
5 - Proposed Sports Pitches, Horfield Leisure Centre – Noise Impact Assessment – MACH Testing – May 2016
6 - Sandfields School – Noise Impact Assessment – AECOM – November 2016
7 - Noise impact assessment for a proposed 2FE primary school on land adjacent to Henhurst Ridge, Burton, DE13 – Peninsular Acoustics – March 2016 – based upon converting quoted sound power level of 105 dB to a sound pressure level at 1m in free field conditions.

5.1.3 Residents Noise Levels

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package that implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996 – as detailed in **Appendix C**. Noise from the pitch is modelled as an area source at a height of 1.5m. Impacts are modelled as a point source at a height of 2.5m.

Figures C.1 and C.2 in **Appendix C.1** show the predicted noise contours and predicted levels in the gardens/outside of facades of the nearby residential receptors in terms of average and maximum levels.

Table 5.1 summarises the highest values seen in the noise maps, at 1m outside of the worst-affected dwelling window.

Table 5.1 – Predicted noise levels at nearby residents from the MUGA – no mitigation

Figure (Appendix C)	Description	1m outside of the worst affected dwelling window
Figure C.1	Predicted $L_{Aeq,1hr}$ levels at receptor from the general use of the MUGA.	57 dB $L_{Aeq,1hr}$
Figure C.2	Predicted L_{AFmax} levels from balls hitting the perimeter fence.	51 dB L_{AFmax}

The predicted maximum levels from ball impacts are below (and thus compliant with) the suggested upper limit/range of 55 – 65 dB from CIEH guidelines (assuming the fence is installed with anti-vibration fixings as discussed in **Section 6.1.2**).

However, average levels are above the recommended limit of 50 – 55 dB(A) referenced within WHO guidelines, which is referenced by the Sports England document. The addition of a level of 57 dB $L_{Aeq,1hr}$ to the average existing level of 47 dB $L_{Aeq,1hr}$ (measured during the survey close to the boundary of the worst-affected dwelling) would total an overall level of 57.4 dB $L_{Aeq,1hr}$, an over 10 dB increase, a 'major' long term impact when assessing against IEMA guidance (which again is referenced within the Sports England document).

Mitigation

Therefore, PJA recommends that some form of mitigation will be required to protect the dwellings to the east of the development. This should be achieved by the addition of a 2m (minimum) height close-boarded fence along the eastern boundary of the MUGA, as described further in **Section 6.1.1**.

Figures C.3 and C.4 in **Appendix C.1** show the predicted noise contours and predicted levels in the gardens/outside of facades of the nearby residential receptors in terms of average and maximum levels – with this barrier in place. **Table 5.2** summarises the highest values seen in the noise maps, at 1m outside of the worst-affected dwelling window.

Table 5.2 – Predicted noise levels at nearby residents from the MUGA – with a 2m high eastern MUGA boundary barrier

Figure (Appendix C)	Description	1m outside of the worst affected dwelling window
Figure C.3	Predicted $L_{Aeq,1hr}$ levels at receptor from the general use of the MUGA.	50 dB $L_{Aeq,1hr}$
Figure C.4	Predicted L_{AFmax} levels from balls hitting the perimeter fence.	50 dB L_{AFmax}

Average levels as a result, reduce from 57 dB to 50 dB $L_{Aeq,1hr}$ (a similar level to those experienced by the dwellings to the west).

This would be within the recommended limit of 50 – 55 dB(A) referenced within WHO guidelines.

The addition of a level of 50 dB $L_{Aeq,1hr}$ to the average existing level of 47 dB $L_{Aeq,1hr}$ (measured during the survey close to the boundary of the worst-affected dwelling) would total an overall level of 51.8 dB $L_{Aeq,1hr}$, an increase just short of 5 dB, a 'minor' long term impact when assessing against IEMA guidance.

5.1.4 Summary

In conclusion, PJA recommends that to bring noise emissions from the MUGA to an acceptable level, that a 2m (minimum) height close-boarded fence should be constructed along the eastern boundary of the MUGA, as described further in **Section 6.1.1**. The inner mesh fence should be installed with anti-vibration fixings to dampen vibrations/resonance from ball impacts, as discussed in **Section 6.1.2**.

5.2 Playground

5.2.1 Assessment Criteria

The assessment of the new playground is different contextually to the MUGA, as it is replacing an existing facility incorporating a playground, skate ramp, and small basketball court.

PJA believe the best course of assessment method is to compare predicted worst-case 1-hour levels from the existing playground vs the new playground, to determine the increase in L_{Aeq} and assessing against IEMA guidelines (Section 3.3).

5.2.2 Source Noise Levels

Each area of existing and new playground has been modelled as area source with a level of 60 – 65 dB $L_{Aeq,1hr}$ inside the playground boundaries at a height of 1.5m.

It is often expected that skate ramps can be significantly noisier, particularly in terms of impact noises. But this has been modelled as the same as the other play areas, for a worst-case assessment. The new playground does not have a skate park.

5.2.3 Residents Noise Levels

Figures C.5 and C.6 in Appendix C.2 show the predicted noise contours and predicted levels in the gardens/outside of facades of the nearby residential receptors from the existing and proposed playgrounds respectively.

The biggest difference between existing and proposed levels appears to occur at the dwelling which is closest to the west boundary of the new play area, a 3 dB increase from 46 dB to 49 dB.

This corresponds a 'minor' long term impact when assessing against IEMA guidance.

5.2.4 Summary

The impact of a possible increase in noise levels from the reconfiguration of the playground should be 'minor' at the worst-affected dwelling when assessing against IEMA guidance.

5.3 Car Park

5.3.1 Assessment Criteria

PJA believe the criteria used for MUGA is all relevant here (i.e. comparison with WHO guidelines, and IEMA).

5.3.2 Source Noise Levels

The car park has a total of 25 spaces; therefore, a worst-case scenario has been modelled based upon:

- 25 vehicles arriving, parking up, and then leaving again all within a 1-hour collection/drop-off period;
- all parents/children slamming their car doors;
- all cars idling for a minute in the parking space;
- all cars travelling along Copthorne Bank, an equal spread in both directions.

The source noise data below is based on assessments/measurements that PJA has previously conducted.

Table 5.3 – Source noise data for vehicles

Noise Source	Sound Power Level (dB)						
	Octave Band Centre Frequencies, Hz						dB(A)
	125	250	500	1 k	2 k	4 k	
Car pulling up/away slowly at 10 km/h – (large diesel car over-revving as a worst-case)	92	87	85	85	85	77	90
Car door slam	100	100	80	94	90	83	98
Car idling	82	77	75	75	75	67	80

5.3.3 Residents Noise Levels

Figure C.7 in Appendix C.3 shows the average levels from the worst-case 1-hour period, indicating external noise levels of up to 46 dB $L_{Aeq,1hr}$ outside the worst-affected dwelling opposite the site entrance.

PJA unfortunately have not conducted a baseline survey along the road to determine existing ambient noise levels. Existing levels at the north site boundary well back from the road average at around 47 dB $L_{Aeq,15min}$. It is reasonable to assume that levels directly next to Copthorne Bank would therefore be higher, likely around the 55 – 60 dB $L_{Aeq,1hr}$ range (from PJA's experience of assessing sites for new residential developments next to similarly sized roads).

Taking an existing level of 55 dB $L_{Aeq,1hr}$, and adding the predicted noise emissions from the car park to this (55 dB + 46 dB = 55.5 dB) would result in a 0.5 dB increase, a negligible long term impact assessing against IEMA guidance.

5.3.4 Summary

The assessment indicates the impact of noise from the car park should result in an acceptably low impact.

6.0 Noise Management/Mitigation

The assessment has provided an indication that the proposed development could operate with an acceptably low impact on residents in the local area, providing certain mitigation measures are installed.

It is recognised that meeting suggested noise level criteria does not automatically rule out an adverse impact or stem the possibility of complaints, as the perception of noise is somewhat subjective. As with any development, there is always the possibility that the applicants may receive complaints, though the suggested criteria provide a way of determining what is a 'valid' complaint.

It is recommended that the applicant is committed to further mitigating the noise impact within reasonable measures and maintaining engagement with the local community and local residents to keep good public relations that can benefit by partially offsetting any impact, keeping annoyance to a minimum.

Hence it is recommended that the applicant follows a Noise Management Plan. This section provides an example which can be directly adopted or adapted into a separate document.

The aim is that any noise impact that occurs from early use of the development can be investigated and responded to, ensuring that the impact from future events is mitigated well. This will be an ongoing improvement of review and control (to a reasonable degree, as the assessment herein has demonstrated that the development should not cause an unreasonable adverse impact). This should be considered to be a live document that may be revised to create an acceptable balance between the requirements for a successful recreation facility and the protection of local residents' amenity.

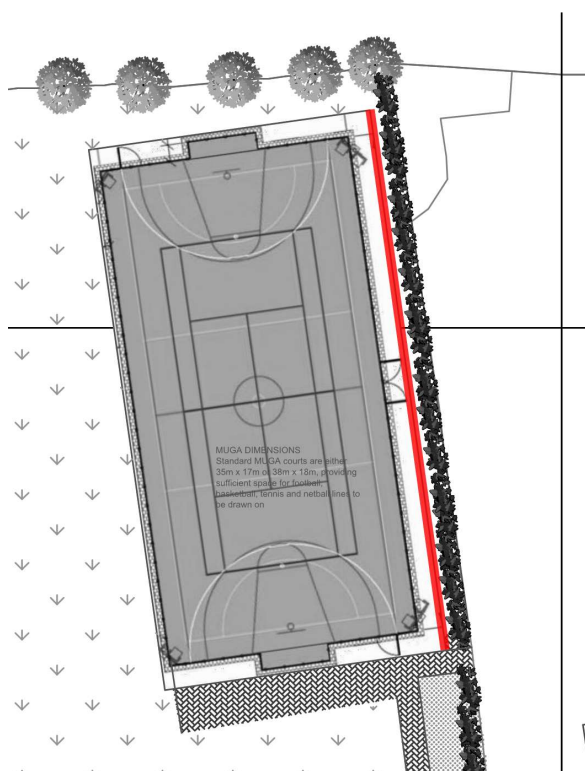
6.1 Mitigation Measures

6.1.1 Noise Barrier/Fence

An acoustic barrier should be built along the east perimeter of the MUGA, to the extent of that shown in **Figure 6.1**. The barrier should be:

- At least 2m in height;
- Be closed boarded (without gaps and crack) and have a mass of at least 10 kg/m². Solid timber fences are often used as acoustic barriers;
- Be constructed on the outside of the ball stop fence, so they are protected from being hit by balls and generating impact sound.

Figure 6.1 – Extent of the required noise barrier (red line)



6.1.2 Ball Impact Noise

- Noise generated by ball impacts on the metal ball stop fencing will be reduced by the use of fence mounting systems which employ resilient connections between the perimeter fencing and the supporting structural columns. The fence panels will be securely clamped together and to supporting posts with resilient fixings/neoprene isolators to minimise noises from ball impacts causing the fence to vibrate and rattle.
- The state of repair of the inner perimeter fence will be reviewed on an annual basis.
- Similar anti-vibration fixings will be applied to any other signs or structures in proximity to the playing surface. Any objects likely to rattle (such as sheet metal advertising signs) will be avoided or positioned where they cannot be hit by footballs – and if they cannot be repositioned, soft vinyl signs will instead be used.
- If low-level perimeter boards are used around any of the MUGA, including behind goals, then these will be covered with impact-absorbing material, i.e. soft padding, rubber, or artificial turf – to minimise noise from ball impacts.
- If complaints are received or if a ball stop mechanism is required above the 3m high fence then netting could be installed at high level or in front of the fence, as ball impacts on this would be virtually silent.

6.1.3 Whistles

- Whistles will only be for competitive matches and to indicate the end of each allocated time slot.

6.2 Code of Conduct

All *organised* users of the MUGA (i.e. the social club and sports clubs) will need to formally agree to a document that includes a Code of Conduct that is expected of them in respect of the local residents, which will include:

- Avoiding the use of excessive noise, foul language, and anti-social or intimidating behaviour.
- The latest vacation times of the premises after evening use.
- That the use of whistles will only be for competitive matches and to indicate the end of each allocated time slot.
- The maximum number of players allowed on the MUGA at any one time.
- Forbidding the use of the MUGA for hockey (as this can generate higher levels of impact noise when the ball hits a fence or backboard).
- The group leader must ensure proper use of the facility and is responsible for conduct of their group on and off the pitch.

This will be enforced by signage around the facility. The operator will be vigilant that this Code of Conduct is adhered to. Where it is discovered that this policy is being broken by the hirer they will be warned and reminded of their obligations under the policy. If the policy is broken again within an agreed period, the hirer will be suspended or banned from using the pitch.

If a user acts in an unreasonable manner resulting in higher noise levels, and/or if excessively raised voices and anti-social language is witnessed by the site manager then the use of the MUGA will be stopped until the site management resolves the matter, with the player removed from the site if the behaviour continues. Users will be informed that swearing and anti-social behaviour is unacceptable, and that the facility reserves the right to dismiss users from the pitch and ban future use if this is the case.

User groups will be asked to nominate a lead person to take responsibility for the booking. This person would receive an induction on safe usage and sign a usage policy specifying the condition of use. This policy would include the Code of Conduct and users would risk their booking if these conditions were not met.

6.3 Operator Responsibilities

The operator will:

- Employ a maintenance regime that will ensure that all equipment is maintained so that it does not generate excessive noise. This includes tightening fixings to the mesh fencing, so they do not excessively rattle.
- Maintain a log of all received complaints and actions.
- Respond to all complaints within three working days via email.
- Provide a clear and reliable mechanism whereby noise complaints can be made and logged.
- Provide the Local Authority with details of logged complaints and any actions taken.
- Liaise with the Local Authority to ensure the noise management plan remains effective and revise the noise management plan accordingly.
- Install relevant signage around the MUGA to encourage quiet and considerate behaviour.

6.4 Complaints Management

The Operator will implement a clear noise complaints management procedure. Neighbours will be given a clear route to report excessive noise or anti-social behaviour directly to the operator. This will allow the complaint to be investigated and addressed quickly.

The operator will provide a telephone number and email address to residents' associations and any other organisations including the Council and community groups – so that any issues can be reported. Complaints records will (as a minimum) include the following:

- date, time, and the name of the complainant (if given);
- nature of the complaint;
- the locality of complaint; and
- a summary of the investigation into the noise complaint, the actions that were taken and the outcome.

The response to the complaint will have the objective of investigating the incident and preventing any continuing issue by putting in place additional control or management measures to prevent the re-occurrence of the incident.

The investigation into the complaint will include but not be limited to:

- a visit by a representative of the MUGA operator or phone call/email correspondence with the complainant to verify the issue, including whether the complaint is made 'after' rather than 'during' a noise event;
- a review of activities at the time of the incident to investigate potential sources; and
- a review of noise control measures and management actions at the time of the incident;

The investigation will be accompanied by a written record detailing any failures, incidents and what mitigation was (at the time) employed or will be used in future. The operator shall keep records of all noise monitoring, investigations, and complaints and these shall be made available to the EHO to examine on request.

An example complaints management form is given in **Table 6.1** overleaf.

Table 6.1 – Complaints management form

Complaint made by:	
Date of complaint:	
Complaint received by:	
Time of occurrences:	
Number of occurrences:	
Details of complaint:	
Action(s) taken:	
Review of action (s):	
Details of adjustment(s) made to the noise management plan if required:	
Signed (Noise supervisor):	
Date:	

Appendix A – Acoustic Terminology and Concepts

A.1 – Glossary

Table A.1 – Glossary of acoustic terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio of the root-mean-square pressure of the sound and a reference pressure (2×10^{-5} Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4000Hz (4kHz). This is roughly equal to the range of frequencies on a piano.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period. This parameter is typically considered as a good representation of the 'average' overall noise level. It is referred to technically as the A-weighted equivalent continuous sound level and is a dB(A) as defined above.
$L_{A90,T}$	The A-weighted noise level that is exceeded for 90% of the measurement period T. This parameter is often considered as the 'average minimum level'.
$L_{A10,T}$	The A-weighted noise level that is exceeded for 10% of the measurement period T. This parameter is often considered as the 'average maximum level';
$L_{Amax,T}$	The maximum A-weighted noise level during the measurement period T.

A.2 – Subjective Changes in Noise Level

Table A.2 – Subjective loudness from an increase or decrease in sound pressure level

Change in sound pressure level	Relative change in sound power energy (multiplier)		Change in apparent subjective loudness (for mid-frequency range)
	Decrease	Increase	
3 dB	1/2	2	'Just perceptible'
5 dB	1/3	3	'Clearly noticeable'
10 dB	1/10	10	'Half or twice as loud'
20 dB	1/100	100	'Much quieter, or louder'

Appendix B – National Planning Policy

B.1 – National Planning Policy Framework (NPPF)

The National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. The NPPF provides a framework within which local people and their council can produce their own distinctive local and neighbourhood plans. With explicit reference to noise, the NPPF states that *"Planning policies and decisions should contribute to and enhance the natural and local environment by ... preventing new and existing development from contributing to, being put at unacceptable risk from ... noise pollution"*.

B.2 – Noise Policy Statement for England (NPSE)

The NPPF refers to the Noise Policy Statement for England (NPSE), which applies to most forms of noise including environmental noise. The NPSE sets out the long-term vision of Government policy which is to *"Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development."* It aims that *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse impacts on health and quality of life;*
- *mitigate and minimise adverse impacts on health and quality of life; and*
- *where possible, contribute to the improvement of health and quality of life."*

The use of the terms *"significant adverse"* and *"adverse"* are key phrases within the NPSE. The guidance establishes the concept of how the level of adverse effect on health and quality of life can be referenced including:

- **NOEL – No Observed Effect Level** - This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- **LOAEL – Lowest Observed Adverse Effect Level** - This is the level above which *adverse* effects on health and quality of life can be detected.
- **SOAEL – Significant Observed Adverse Effect Level** - This is the level above which *significant adverse* effects on health and quality of life occur.

Under the first aim of the NPSE (*"avoid significant adverse impacts on health and quality of life"*), an impact in line with SOAEL should be avoided. Under the second aim (*"mitigate and minimise adverse impacts on health and quality of life"*), where the impact lies somewhere between LOAEL and SOAEL, requiring that all reasonable steps are taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development, but does not mean that such adverse effects cannot occur.

B.3 - Planning Practice Guidance on Noise (PPG-N)

The Planning Practice Guidance on Noise (PPG-N) is part of a suite of web-based guidance which is intended to support the implementation of the policies in the NPPF and the NPSE.

It aids in expanding on the definitions from the NPSE of NOEL, LOAEL and SOAEL, by linking these terms to 'examples of outcomes', i.e. changes in behaviour and/or attitude to noise. The table below summarises the guidance from PPG-N in this regard.

Table B.1 – Noise exposure hierarchy based on the likely average response – adapted from PPG-N

Perception	Examples of outcomes	Increasing effect level	Action
NOEL - No Observed Effect Level ¹			
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
LOAEL - Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up the 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 perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
SOAEL - Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, 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 a change in the acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate the effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent
¹ This line is an assumption of the adverse effect level and is not explicitly referenced by PPG-N, though this appears to be a safe assumption.			

B.4 - BS 4142:2014

BS 4142:2014 '*Methods for rating and assessing industrial and commercial sound*' is intended to be used to assess the potential adverse impact of sound of an industrial and/or commercial nature, at nearby noise-sensitive receptor (NSR) locations within the context of the existing sound environment.

B.4.1 - Definitions

BS 4142:2014 provides the following definitions which are relevant at this pre-construction stage of assessment:

- **Background Sound Level, $L_{A90,T}$:** A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
- **Rating Level, L_{A,r,T_r} :** Specific sound level plus any adjustment for the characteristic features of the sound.
- **Reference Time Interval, T_r :** Specified interval over which the specific sound level is determined. This is 60-minutes during the day (07:00 – 23:00) and 15-minutes at night (23:00 – 07:00).
- **Specific Sound Level, $L_s = L_{Aeq,T_r}$:** Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r .
- **Specific Sound Source:** Sound source being assessed.

The BS 4142:2014 definition of sound of an industrial and/or commercial nature includes "*sound from fixed installations which comprise mechanical and electrical plant and equipment*". The scope of BS 4142:2014 is not intended for sound from the passage of vehicles on public roads; people; and 'other sources falling within the scopes of other standards or guidance'.

B.4.2 - Specific Sound Level

The specific sound level L_s is the equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r , of 60-minutes during the day (07:00 – 23:00) and 15-minutes at night (23:00 – 07:00).

B.4.3 - Rating Level

The rating level L_{A,r,T_r} is the specific sound level L_s plus any 'penalties' which account for the characteristic features of the sound.

BS 4142:2014 provides the following with respect to the application of penalties to account for "*the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention*".

- **Tonality** – For sound ranging from not tonal to predominantly tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible;

- **Impulsivity** – A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible;
- **Intermittency** – When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied; and
- **Other Sound Characteristics** – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied."

PJA consider the word 'perceptible' to be important, and variable depending on the context of a site. For example at a site with a relatively high background sound level of 50 dB(A), an 'impulsive' sound source with a specific sound level of 30 dB(A) at an NSR is unlikely to be perceptible and should probably not be penalised.

However, the same source at a site with a lower background level of 30 dB(A) would be perceptible, and therefore a penalty of 3 or 6 dB could be applied to the rating level, with possibly a 9 dB penalty being applied if the specific sound level were to rise from 30 to 40 dB(A). Therefore the context is important in applying rating level penalties.

B.4.4 - Background Sound Level

BS 4142:2014 states that "in using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."

BS 4142:2014 further states that "a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either minimum or modal value". Hence BS 4142:2014 does not provide a 'black and white' method of obtaining the assessment level for background sound $L_{A90,T}$. Note that it is standard practice that the $L_{A90,T}$ is determinable from the results of a baseline sound survey conducted at positions representative of sound levels at the nearest or worst affected NSRs.

B.4.5 - Assessment of Adverse Impact

The assessment of adverse impact contained in BS 4142:2014 is undertaken by comparing the rating level $L_{A,r,Tr}$ to the measured representative background sound level $L_{A90,T}$ outside the sensitive receptor location.

The significance of the impact of an industrial or commercial sound source depends on both the margin by which the rating level $L_{A,r,Tr}$ exceeds the background sound level $L_{A90,T}$ and the context in which the sound occurs. It is therefore essential to place the sound in context. But in general, "the lower the rating level is relative to the measured background sound level, 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, this is an indication of the specific sound source having a low impact, depending on the context."

Appendix C – Noise Calculations

The noise predictions within this report have been undertaken using the proprietary software CadnaA® by DataKustik, a 3-D noise mapping package which implements a wide range of national and international standards, guidelines and calculation algorithms, including those set out in ISO 9613-2:1996.

The noise model accounts for the topography of the land based on data available from the Ordnance Survey. All of the objects within the model (buildings, roads, barriers, foliage, etc) have been imported from OpenStreetMap. The scaled site plan, floor plans, and elevations for the proposed development have been accounted for in the model.

The noise model has assumed:

- downwind propagation, i.e. a wind direction that assists the propagation of sound from source to receptor, as a worst-case.
- a ground absorption factor of:
 - 0 on the car parking areas, playground, MUGA, buildings, and roads;
 - 1 in greenfield areas;
 - 0.5 in mixed ground areas (i.e. residential properties with a mix of gardens/grass and tarmac);
- a maximum reflection factor of two where buildings and barriers are assumed to have a 'smooth' reflective façade, as a worst-case;
- receptor heights at 1m from residential dwelling façades at heights of 1.5m, 4m, 6.5m, etc, with the noise map plotting the worst-affected floor level;
- atmospheric sound absorption based upon a temperature of 10°C and a humidity level of 70%, as per Table 2 of ISO 9613-2:1996.

The images on the following pages contain screenshots from the mapping. Note that:

- The noise contours are plotted at a height of 1.5m above ground, as are the receptor points away from buildings.
- The façade noise levels on the edge of buildings show the highest level from that façade, it is not a fixed height. Hence in some areas the façade level appears higher than the surrounding contour, this is because the façade level may be representing the top floor of the building which is less screened from the pitch the ground floor (the height of the contour).

C.1 – MUGA

Figure C.1 – Worst-case 1-hour period ambient noise levels (dB $L_{Aeq,1hr}$) from a football game on the MUGA – no mitigation

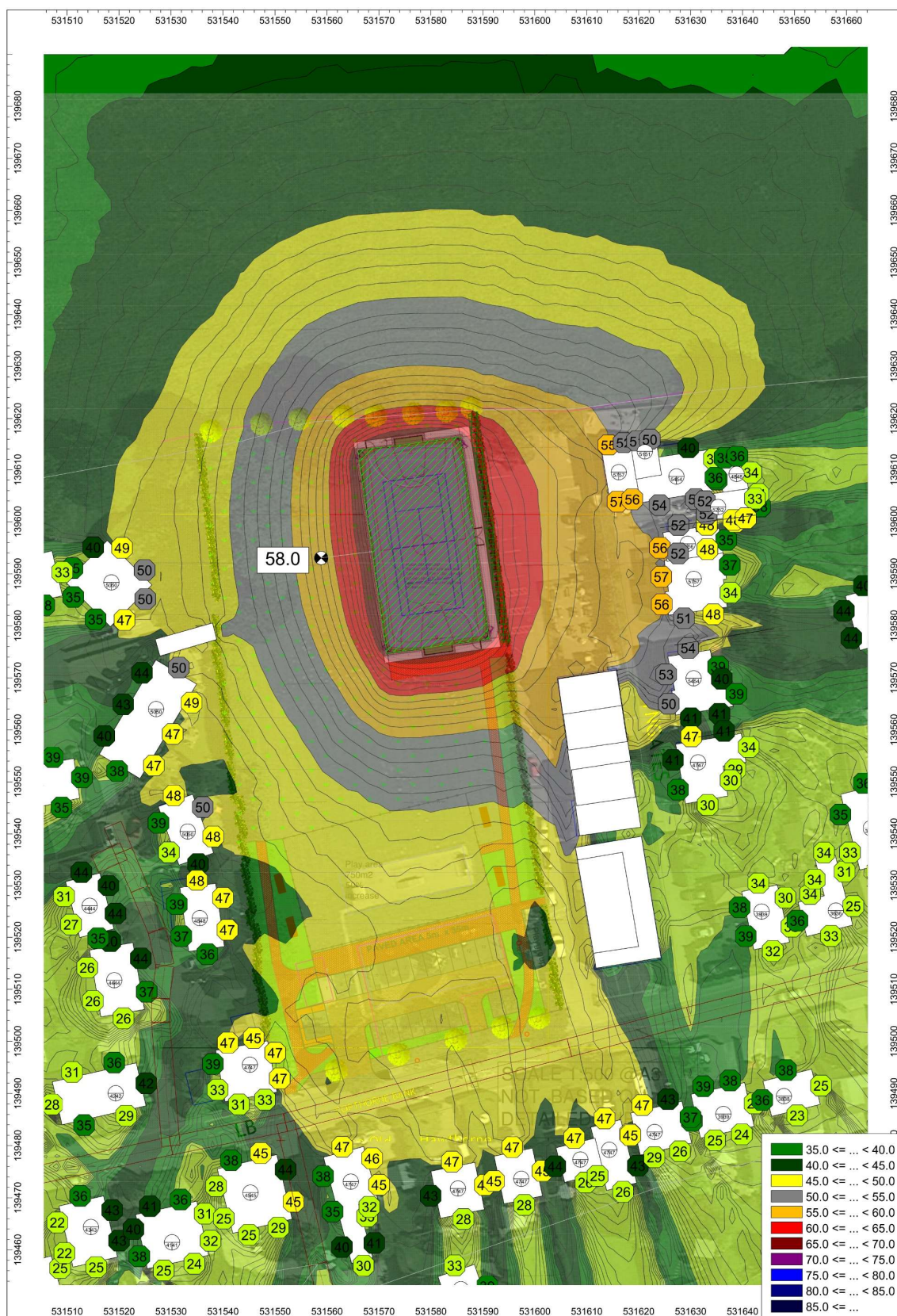


Figure C.2 – Maximum noise levels (dB L_AF_{max}) from a ball hitting the MUGA perimeter fence – no mitigation



Figure C.3 – Worst-case 1-hour period ambient noise levels (dB $L_{Aeq,1hr}$) from a football game on the MUGA – 2m high eastern boundary fence

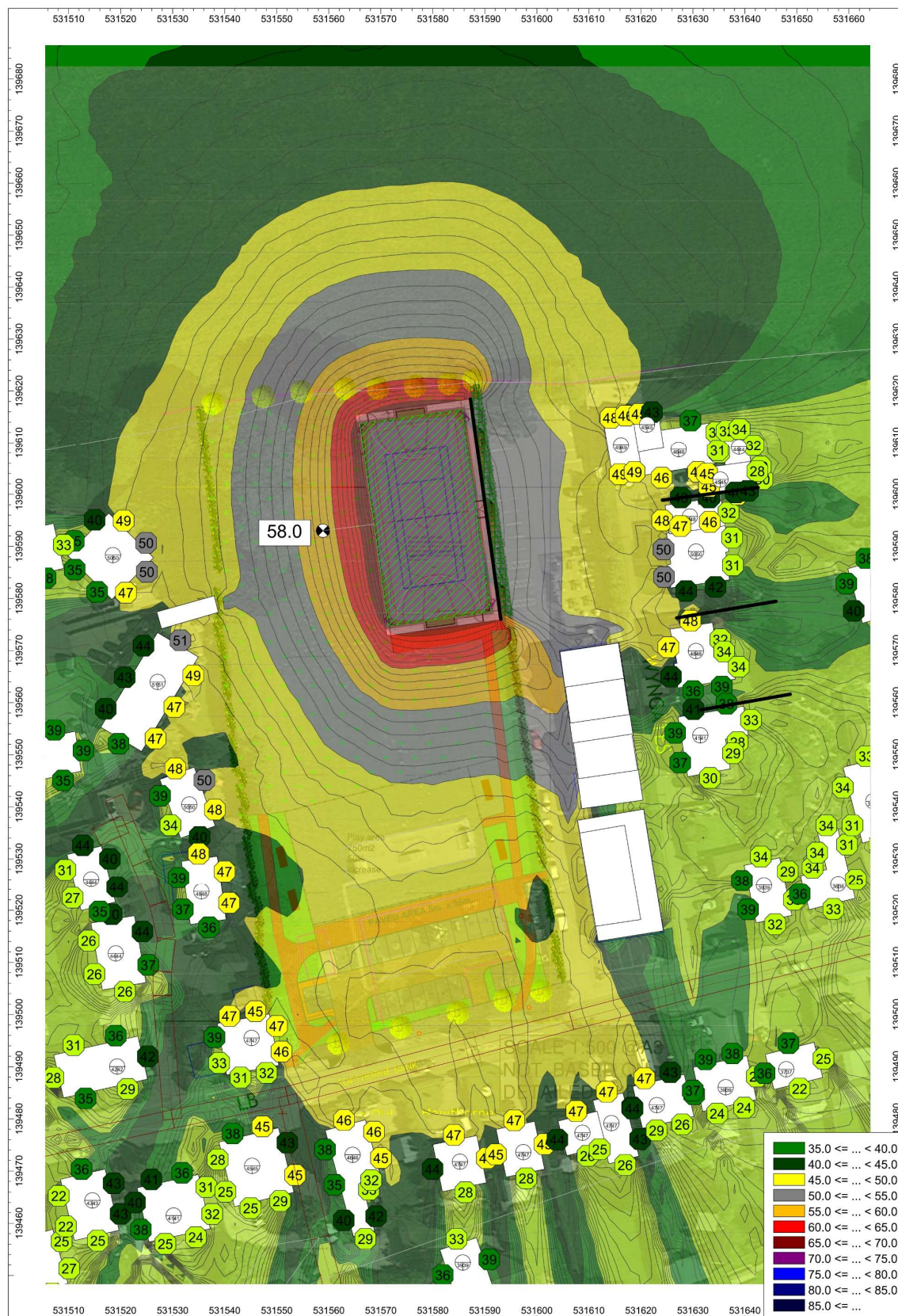
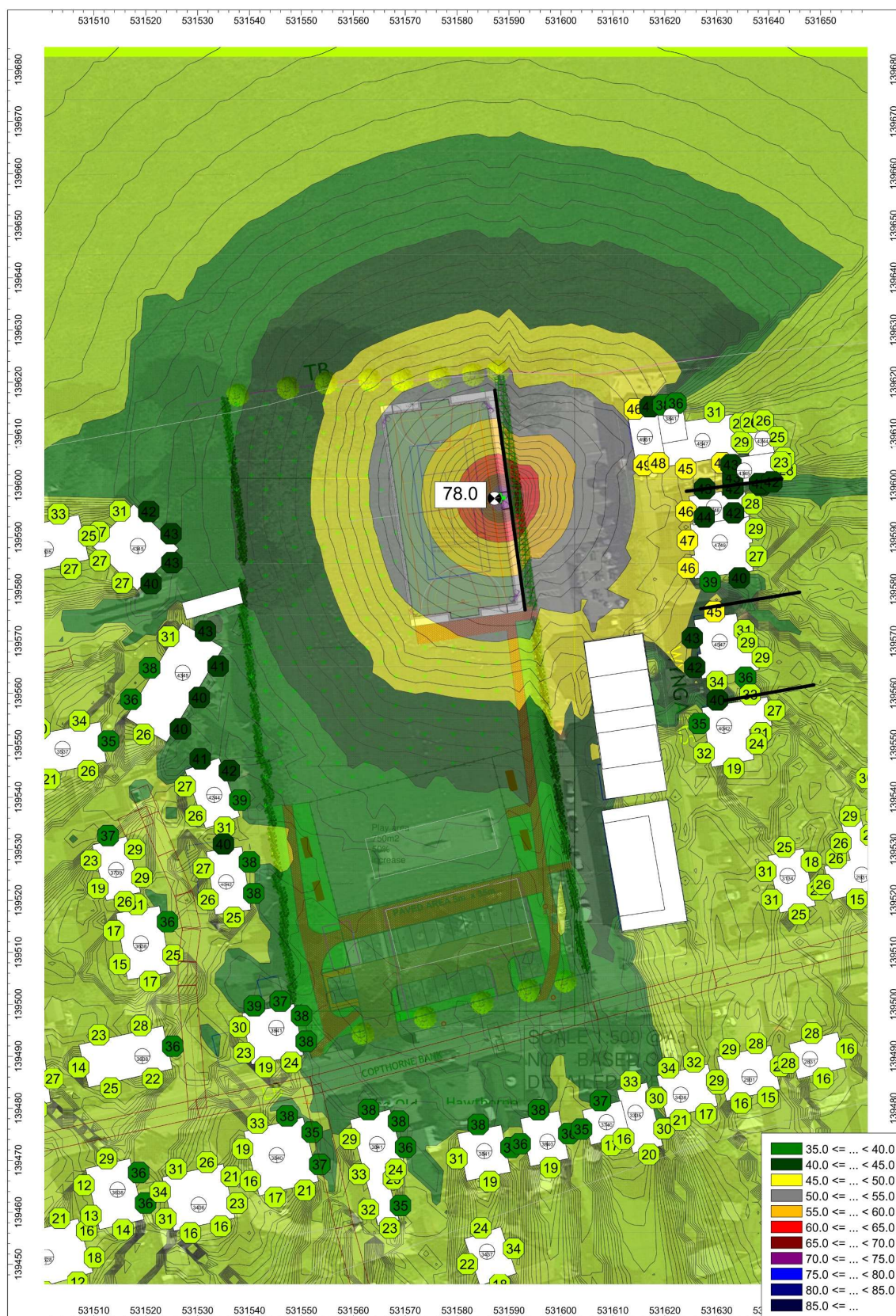


Figure C.4 – Maximum noise levels (dB LA_{Fmax}) from a ball hitting the MUGA perimeter fence - 2m high eastern boundary fence

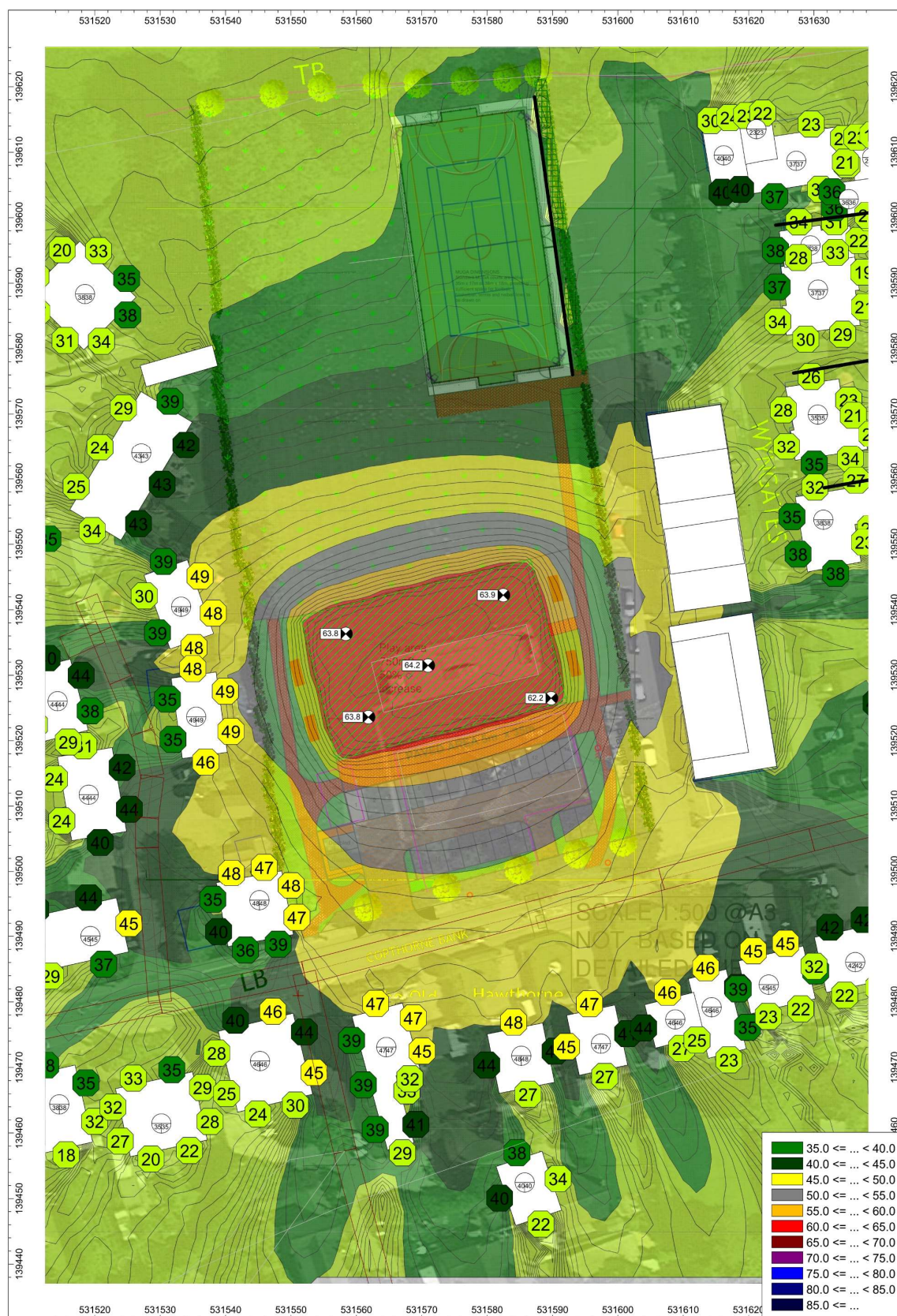


C.2 – Playground

Figure C.5 – Worst-case 1-hour period ambient noise levels (dB $L_{Aeq,1hr}$) from the existing playground

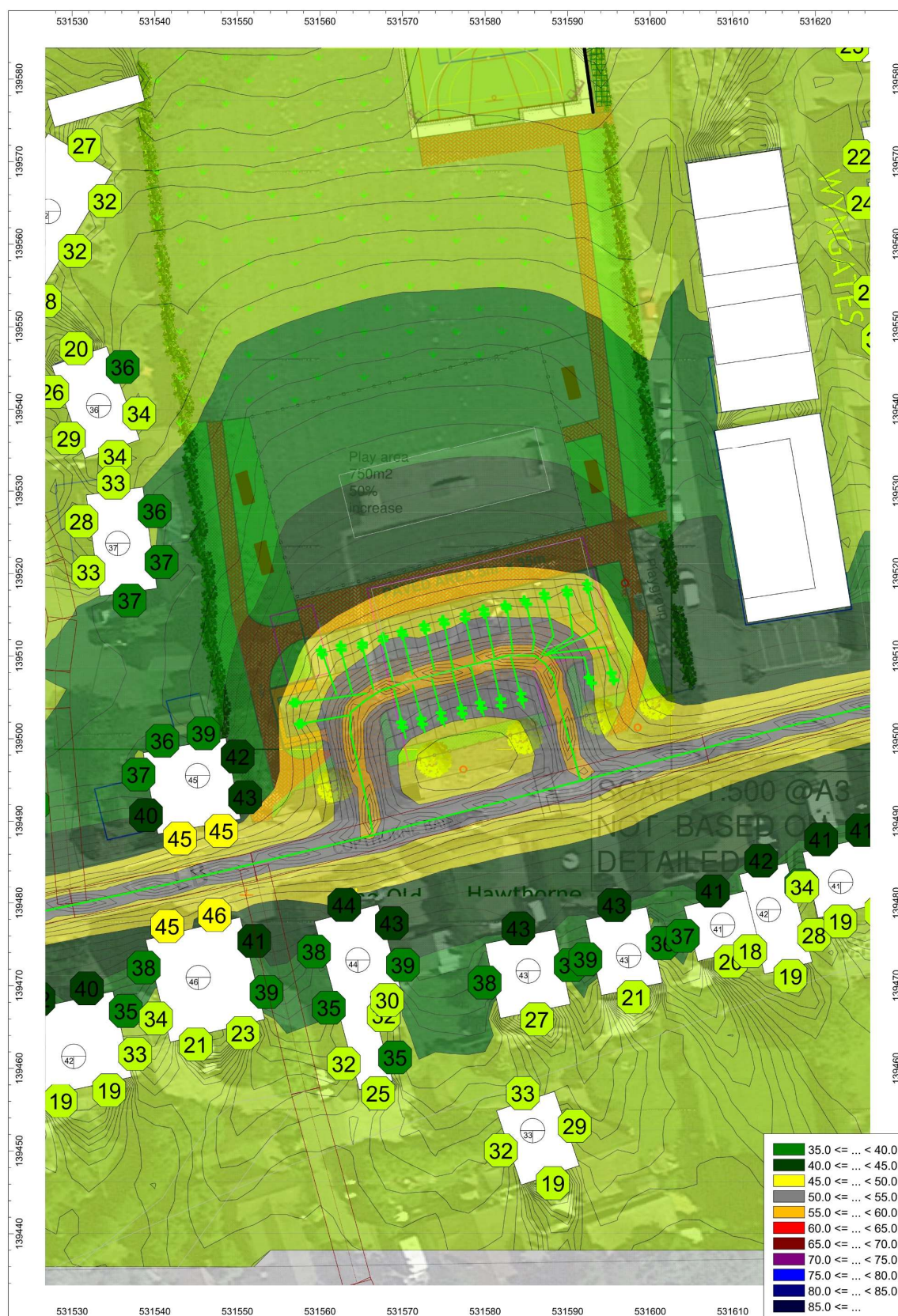


Figure C.6 – Worst-case 1-hour period ambient noise levels (dB LAeq,1hr) from the new playground



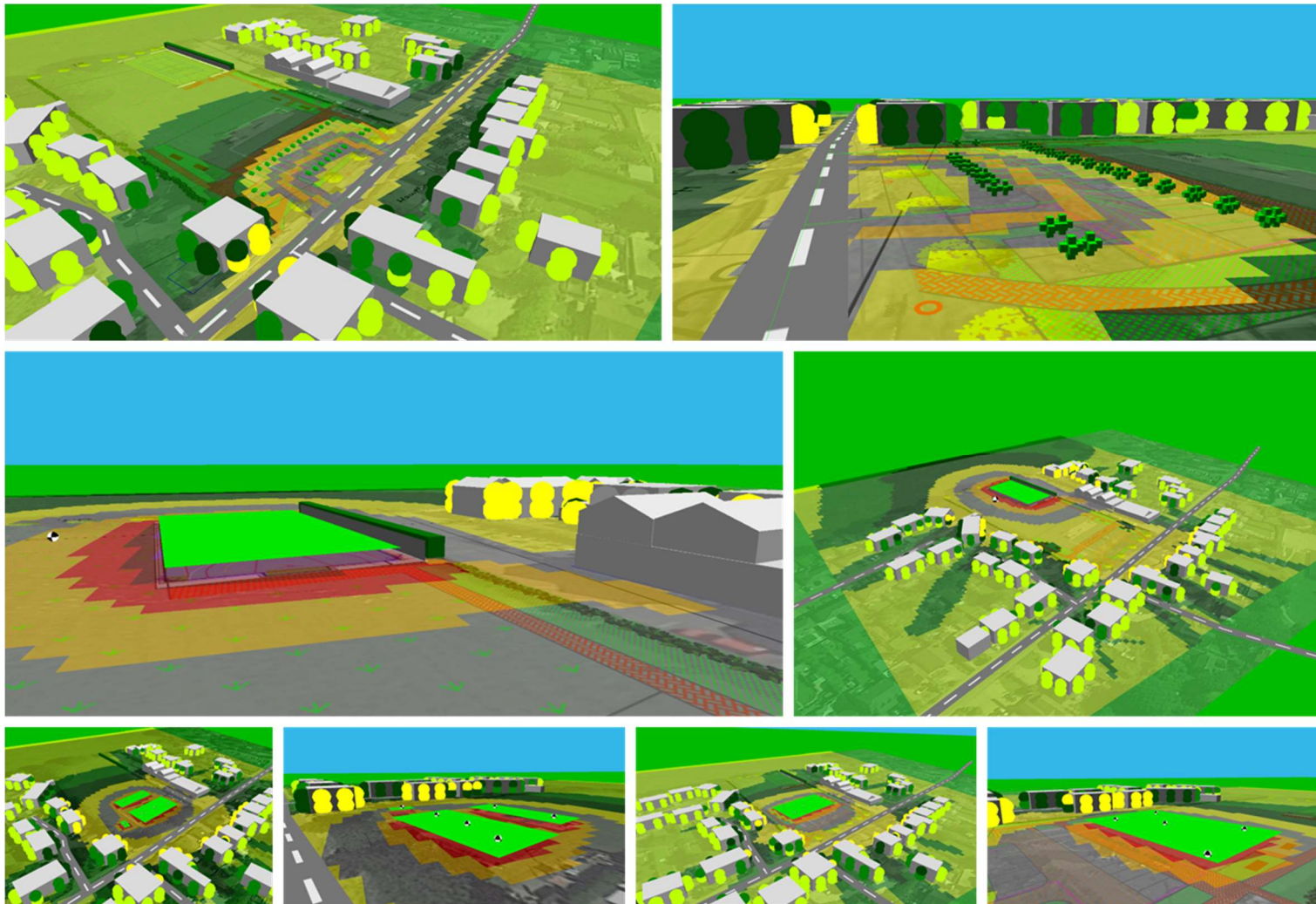
C.3 – Car Park

Figure C.7 – Typical average noise levels (dB $L_{Aeq,1hr}$) from 50 cars arriving, parking, and leaving in a 1-hour period



C.4 – 3D Views

Figure C.8 – 3D views of the noise modelling





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