

The Importance of **Controlling Noise in the Built Environment**



creating better environments

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1. INTRODUCTION ACOUSTICS

Whether at work, or at home, excess noise can become a real nuisance if left unchecked. Incessant noise is not only distracting, affecting productivity and concentration, but it can manifest in physical ailments. In fact, year on year, the link between excess noise pollution and poor physical health is further established.

Across a number of studies, researchers have demonstrated that people who live and work in noisy environments tend to be more likely to develop harmful health conditions, such as heart disease and high blood pressure. "When it comes to Healthcare environments, acoustics can have a direct affect on the patients recovery: Good acoustic conditions improve patient privacy and dignity, and promote essential sleep patterns. Such conditions are key to healing." Health Technical Memorandum 08-01.

In light of this growing concern, noise-reducing solutions are becoming increasingly commonplace in domestic and commercial properties. To this end, there is now an expectation that buildings should incorporate solutions that can effectively deal with excess noise.

For many, this endeavour will require an enhanced understanding of acoustics. As such, in this whitepaper, we will highlight the different types of sound that can occur in a building, the relevant regulations applicable to acoustic design and the benefits of installing acoustic flooring solutions.



WHAT IS SOUND?

To begin with, it is important to clarify what we mean by 'sound.' Simply put, sound is a form of energy, just like light and electricity, which occurs when air molecules vibrate and move in a pattern called waves, or sound waves.

When a wave is made, the distance between one compression and the next compression is called the wavelength. Wavelengths travel at different speeds, which affects their length and frequency. For example, slower sound waves have longer wavelengths and lower frequencies, whilst quicker sound waves produce shorter wavelengths and higher frequencies. In turn, the frequency of a sound affects its pitch, which can range from high to low.



HOW DO WE HEAR SOUND?

Hearing a sound relies on thousands of tiny hair cells located inside the inner ear. When sound waves enter your ear, they cause a reaction amongst these cells, causing them to rock back and forth. Once this happens, the body converts the vibrations into electrical signals and sends it on to your brain via the hearing nerve. At this point, the brain is able to tell you that you are hearing a sound, as well as what it is.

To help understand the basic science of acoustics, this is a useful glossary of the most important sound-related terms:

Acoustic Treatment	Refers to a collection which look to abso controlled manner with more accepta sound character.
Audio Frequency	Signals in the rang range between 20
Decibel (dB)	The unit most com The higher the dec
Frequency	Refers to the speed measured in Hertz the total number of in a second.
Reverberation	The tendency of a by its "reverberatio smooth, slowly dee
Reflection	Reflection of sound a surface. Echoes a
Sound Absorption	Sound absorption come into contact

on of products or construction practices, orb, diffuse or reflect sound waves in a . Such products are used to create rooms ble reverberation time and improved

e of human audio audibility, which tend to Hz to 20 kHz.

monly used to measure sound level. tibel level, the louder the noise.

d of vibration in a sound wave and is (Hz). Frequency is measured by counting of cycles a repetitive waveform completes

space to maintain sound energy is quantified n". Reverberation can be described as a caying echo.

d occurs when sound waves bounce back off re produced as a result of reflected sound.

is the loss of noise, when sound waves with an absorbent material such as walls.

2. THE DIFFERENT TYPES OF SOUND

Sound can take one of two forms: airborne noise, or impact noise. It is important to know the difference, as each comes with its own specific set of challenges. Products designed to reduce airborne noise will not necessarily reduce impact noise. Therefore, when designing new build homes, student accommodation or even healthcare and care home facilities, it is important to understand the difference. In doing so, those in charge of the process will be able to make well informed decisions about how to manage acoustics.

Impact noise

Impact noise occurs following a physical impact on a building, or solid material. For example, footfall and banging doors are both examples of impact sound. When impact sound occurs both sides of the building element vibrate, generating sound waves. As such, impact noises are often hardest to isolate. What's more, in rooms with dense materials, impact vibrations tend to be stronger and travel further.

Airborne noise

Airborne noise applies to things like TV noise, people talking and dogs barking. This form of noise travels through the air and will either reflect off building elements when it hits them, be absorbed into acoustic dense materials or travel through building structures and be radiated out to the other side. When reflected, the noise level can increase, and when absorbed or allowed to travel through structures, the volume can be reduced.

How is sound measured?

As mentioned, sound is measured in decibels (dB). Decibels denote the intensity of the sound, which relates to how much energy a sound wave contains. The human ear is capable of hearing sounds as quiet as 10 dB, but can begin to become damaged when listening to sounds of around 80 dB [2].



What is a normal level of sound?

The human ear is capable of hearing a great deal of sounds, but overexposure to certain levels can cause damage. Nowadays, many of us are subjected to louder environments, such as underground rail on a day-to-day basis. The following guide of relative decibel levels helps to provide some perspective:



When comparing sound levels it is important to consider that the scale of measurement is not linear. For example, 60 dB is half as loud as 70 dB and is fairly quiet, whilst 80 dB is twice as loud as 70 dB.

At around 80 dB, sound can start to become dangerous and affect hearing if experienced for a prolonged time. As such, there are increasingly stringent regulations regarding exposure to noise pollution.

Table information source: https://www.iacacoustics.com/blog-full/comparative-examples-of-noise-levels.html

3. THE IMPORTANCE OF CONTROLLING SOUND

"Flooring plays an important part in the transmission and reduction of noise within student accommodation. It is possible to specify softer floor coverings with good acoustic properties but typically these do not last as long or wear as well as harder floor coverings. Therefore, the specification of hard-wearing floor coverings with good acoustic performance is the ideal solution for the PBSA landlord or manager."

Nick Woolcott,

Head of Project Management at Curlew Capital

If left uncontrolled, excess sound can become a real problem, particularly in housing, education and healthcare facilities. As aforementioned, the effects of excess noise extend far beyond just hearing damage and can even manifest in mental and physical ailments. As such, it is essential that those designing and specifying buildings do all they can to pre-empt such issues and create harmonious, sound-controlled environments. Here are some of the main problems, which can be linked to exposure of excess noise pollution:

Hearing Loss

When overexposure to noise occurs for a prolonged period, sound energy causes the hair cells in the ear to become damaged.

The primary consequence of such excess noise pollution is hearing loss. Long-term exposure to noise continuously between 85-90 dB can lead to progressive hearing loss [3 – British Medical Bulletin December 2003].

At this point, the only remedies on offer to those affected are permanent hearing aids.

Mental Health

Excess noise pollution can be a key driver of stress, which in turn, can have negative effects on an individual's mental wellbeing. Studies link excess noise to increased levels of irritability, nervousness, irrationality, as well as contributing to occupational stress [4].

What's more, as excess noise can adversely affect workplace concentration and productivity, it can begin to affect in-work competency, which can undermine an individual's professional self-confidence.

Excess levels of noise can also increase the likelihood of incidents as performance in tasks demanding continuous attention (safety critical tasks) may be affected by noise distraction.



Cardiovascular Risk

According to the HTM 08-01 "Good acoustic conditions improve patient privacy and dignity, and promote essential sleep patterns" [1].

This is because high noise levels are known to increase an individual's pulse rate, causing the constriction of blood vessels. In turn, this makes a person far more vulnerable to heart problems, or ailments related to high blood pressure.

https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6541745/ https://www.healtheuropa.eu/noise-pollution-effects/92504/.

Speech Intelligibility

It might go without saying, but it's far harder to communicate effectively in loud environments than it is in guieter ones. According to the WHO, 'speech in relaxed conversation is 100% intelligible in background noise levels of about 35 dBA, and can be understood fairly well in background levels of 45 dBA [5].' Unfortunately, persistent airborne and impact noise means that even office environments often now exceed these levels. As such, excess noise is affecting the speech intelligibility of many people, whether they know it or not. In future years, the issue will only worsen as people become older and their hearing begins to deteriorate.

https://www.who.int/docstore/peh/noise/Comnoise-4.pdf

Poor Sleep

Potentially the biggest concern is excess noise's impact on our ability to sleep. Anyone who has ever lived in a noisy neighbourhood will be able to testify how hard it is to sleep when there's unwanted noise. Unfortunately, lack of sleep, especially if it becomes chronic can negatively affect the body in many ways. Not only does it increase the likelihood of developing serious illnesses, such as diabetes, heart disease or stroke, but it can also increase hunger and make an individual more likely to shun exercise. [6].





How can we control sound?

Fortunately, advances in sound insulation solutions mean that noises coming from inside, or outside of a building can now be significantly reduced. There are a number of solutions available, which can be used individually, or together, as part of a broader acoustic treatment scheme.

Here are three of the most popular forms of sound insulation:

Acoustic flooring	The most well-suited insulation solution when dealing with impact sound, but also effective when looking to minimise airborne sound too. Acoustic flooring is specifically manufactured with high performance foam backing to enhance impact sound reduction. At Forbo, we have over 30 years of acoustic experience and industry knowledge of this specialist area, including our own accredited testing facility. We offer a range of acoustic floor covering solutions (standard EN ISO 717-2) with an impact sound reduction ranging between 14 dB and 30 dB to suit a variety of project requirements. Forbo's acoustic performance flooring coverings are also all classified as Class A for in-room impact sound (standard NF-S31- 074), which is the highest rating possible. Acoustic flooring can not only be installed as part of a new build but also offers a good retrofit solution when it comes to improving the acoustic performance of older buildings. Further information on the Forbo acoustic product offer can be found in section 5 of this whitepaper.	Multi-Occupancy Housing	Acoustic performulti-occupar requirements withis a wide rawithin rooms in this helps to erron other's abili Conversely, in racoustic envirce end, many aco and enhance s In Scotland, for complaints are around 50% of Source: Neighbour http://www.scotla Noise-Nuisance/1
Sound insulation for walls	Can be used to reduce noise from both the inside and outside. One example, which is commonly found within new builds, is sound insulation, which is applied to the frame and finished with plasterboard. In turn, any sound that makes it through the exterior wall is absorbed by the insulation. At this point, any remaining sound which does make it past the finished wall only does so at a greatly reduced level. Installing sound absorbing insulation into a retrofit project can be difficult. As such, there are also acoustic panels that can be applied to internal walls, as well as deflection panels.		acoustic perfo care homes for intelligibility, w Elevated noise they do young such as demer altering how th Excess noise ca other, and staf Too much nois and confusion priority when w
Soundproof ceiling	Soundproof ceilings are either installed as new or retrofitted solutions by creating a new finishing layer onto an existing ceiling. Soundproof ceilings consist of two layers, with the gap between filled with an insulation, such as mineral wool.		which reflect s is an issue that that extra care https://www.scie. friendly-environm

Is it possible to control sound differently throughout a building?

Unlike other forms of insulation, sound insulation is often needed to meet varying performance levels throughout a building. Particularly in larger facilities such as hospitals, student accommodation and care homes, different areas will require different acoustic performance.

As such, it is possible to specify different sound insulation solutions throughout, in order to create defined sound zones. In this next section we discuss some you might look to specify through different parts of a building and how you could best go about it.

> prmance is an important consideration when designing ncy housing. However, in these buildings, acoustic vill vary between different areas, so it's important to ange of sound controlling techniques. For example, t's important to ensure that sound is insulated. Doing nsure that noisy neighbours don't become a hindrance ity to sleep.

reception areas, or lobbies, it's important to create an nment, which helps to amplify communication. To this ustic engineers will install surfaces that reflect sound peech intelligibility.

example, Local authorities report that a rising number of about neighbour noise and mediation services report that neighbour mediaiton cases are about noise disturbance.

6871

occupants are usually older, it's important to tailor mance accordingly. As such, the acoustic design of most cuses on implementing solutions that improve speech hilst reducing unwanted vibrations.

levels tend to affect older people more significantly than er people, particularly for those who have conditions itia, which can worsen the effects of sensory changes by ne person perceives external stimuli, such as noise or light. an make it difficult for the residents to understand each ⁶ members, especially if the resident is hard of hearing.

e can be overwhelming, and echoes can also cause stress Therefore, limiting background sound is always a big vorking on a care home. Similarly, in areas where staff/ nunication takes place, it's important to create spaces, ound and make speech clearer. Once again, hearing loss occurs more commonly in older people, so it's important is taken.

org.uk/dementia/supporting-people-with-dementia/dementiaents/noise.asp

rhood noise nuisance: Scottish Government – Environment; nd.gov.uk/Topics/Environment/waste-and-pollution/Pollution-1/

Classrooms	In learning and teaching environments such as classrooms, it is essential to ensure good levels of speech intelligibility and listening comfort. Using sound insulation solutions to mask interfering noises is ideal. With this said, specifiers should also create a sense of reverb, which will help ensure that listening comfort sustains. In such situations, specifiers must ensure that enough sound is absorbed to not impede listener comfort, whilst also making sure that too much sound is not absorbed, making it difficult to hear and be heard. Specifiers should look to use acoustic materials with sound absorbing and diffusing properties, as well as a small amount of reflection. When designing sports halls, specifiers should look for acoustic solutions that help to improve reverberation. The role of verbal communication in sports halls is less prominent than in other areas, so it is less important to guarantee a level of listening comfort. Instead, planners should focus on creating an environment that feels full of activity and life. Often, sports halls have high ceilings, so it is normally wiser to install sound-insulation solutions on the combined of the second solutions on the combined solutions on the combined solutions on the combined of the second solutions on the combined so	4. WHAT ARE THE LEG AROUND SO The first sound-related regulations were introduced in The Factories Acts in 1959 [7]. Since then, there has be number of rules and regulations specifically designed to living and learning environments and limit excess noise relevant modern-day policies, which specifiers must be The Building Regulations 2010 Approved Document E Resistance to the passage o
Sports Halls		This document provides guidance on the resistance to residential use buildings, schools (see below) and flats. resistance to sound, including preventing transmission and floors. In general, the regulation has been designed in from attached dwellings, or from within the dwelling to be built in order to provide specific levels of protecti Department for Education Building bulletin 93 (2015)/England – Acoustic desi
	walls instead.	"This document supersedes section 1 of Building Bullet minimum performance standards for the acoustics of s

Standards (2013)."

throughout this document.

performance-standards

GAL REGULATIONS Sound?

d in Britain following the passing of been a significant proliferation in the d to promote healthy acoustic workplace, bise pollution. Here are some of the most be aware of:

e of sound.

e to the passage of sound in rooms for its. As such, it primarily provides guidance on on of sound between walls, ceilings, windows ned to protect residents from sound coming ing itself. It requires separating walls and floors ection.

esign of schools: performance standards

"This document supersedes section 1 of 'Building Bulletin 93' (BB93) published in 2003. It sets out minimum performance standards for the acoustics of school buildings and describes the normal means of demonstrating compliance with the Building Regulations (E4). It also provides guidance in support of the School Premises Regulations (2012) and the Independent School

"This document should be read in conjunction with 'Acoustics of schools: a design guide' published by the Association of Noise Consultants and the Institute of Acoustics, which contains supporting information and additional design considerations. References to the guide are made

Acoustic design of schools: performance standards – GOV UK (publishing.service.gov.uk) https://www.gov.uk/government/publications/bb93-acoustic-design-of-schools-

School Premises Regulations and Independent School Standards

The School Premises Regulations (SPRs) and Independent School Standards (ISSs) apply to both new and existing school buildings, including the refurbishment of existing teaching and learning spaces.

Akin to Part E of the Building Regulations, the standards state that acoustic conditions and sound insulation within education facilities must be "suitable" to "the nature of the activities which normally take place therein".

Advice on standards for school premises

For local authorities, proprietors, school leaders, school staff and governing bodies March 2015

Acoustics – Page 9

ISS Regulation 23D – The standard in this paragraph is met if the proprietor ensures that the acoustic conditions and sound insulation of each room or other space are suitable, having regard to the nature of the activities which normally take place therein.

SPRs Regulation 7 – The acoustic conditions and sound insulation of each room or other space must be suitable, having regard to the nature of the activities which normally take place therein.

Reference is made on page 9 to Acoustics of schools: a design guide (see below)

https://www.gov.uk/government/publications/standards-for-school-premises

'Acoustics of schools: a design guide' 2015

"This document has been produced by the Institute of Acoustics and the Association of Noise Consultants to provide supporting guidance and recommendations on the acoustic design of new and refurbished schools. It replaces the guidance previously published in the 2003 edition of Building Bulletin 93: Acoustic Design of Schools.

"The performance standards in Building Bulletin 93 provide the normal means of compliance with the following:

- Requirement E4 of Part E of the Building Regulations.
- The School Premises Regulations 2012.
- Independent Schools Standards 2013."

Acoustics of Schools – Institute of Acoustics (ioa.org.uk)

https://www.ioa.org.uk/news/design-guide-schools-acoustics-published

Department of Health and Social Care (England)

Health Technical Memorandum 08:01 Acoustics

This guidance (HTM 08-01) sets out acoustic criteria for the design and management of new healthcare facilities.

"Acoustic design is fundamental to the quality of healthcare buildings as sound affects us both physiologically and psychologically. Unwanted noise can increase heart rate, blood pressure, respiration rate and even blood cholesterol levels, whereas pleasant sounds help create a sense of well-being."

Health Technical Memorandum 08-01: Acoustics (publishing.service.gov.uk) https://www.gov.uk/government/publications/guidance-on-acoustic-requirementsin-the-design-of-healthcare-facilities

The Equality Act 2010

This places a duty on all buildings to implement accessibility strategies and plans to increase the accessibility of facilities for people with special educational needs and disabilities (SEND) including schools. Through the act, schools and local authorities have been required to improve education facilities in ways that benefit SEND students.

As such, many schools have had to make improvements to their physical environments, which have enabled SEND students to better participate in school activities and more greatly benefit from educational services. For children with special hearing or communication needs, this has meant the provision of physical aids and acoustic improvements.

https://www.gov.uk/guidance/equality-act-2010-guidance

WELL Standard

The WELL Building Standard[™] (WELL) can help project teams to create distraction-free, productive, and comfortable indoor environments. Across its wide range of sections, the WELL standard provides guidance on how to shape spaces in a way that mitigates unwanted indoor noise levels, reduces exterior noise intrusion and enhances social interaction, learning, satisfaction and productivity.

https://www.wellcertified.com/

Working to further promote the importance of neurodiverse inclusive design within the built environment, Forbo has teamed up with the British Standards Institution (BSI) to develop a Publicly Available Specification (PAS).

For more information or to download Forbo's Design for the Mind whitepaper, please visit www.forbo-flooring.co.uk/neurodiversity

5. EXAMPLES OF ACOUSTIC FLOORING

At Forbo, we recognise that achieving lower noise pollution is essential to reducing stress and promoting the well-being and comfort of individuals. From our extensive experience, we believe that acoustic flooring solutions represent one of the most effective options, when looking to reduce impact building noise - especially in multi-occupancy buildings, such as housing, healthcare facilities and schools. As such, we have developed a wide selection of both sheet and tile products, in a range of acoustically-engineered forms.

Acoustic Vinyl

We offer a range of vinyl products that combine high acoustic performance with optimal resistance to indentation. These products form our industry-leading Sarlon collection. The floor coverings in this range have been developed and tested to maximise impact sound reduction, whilst meeting the needs of heavy traffic commercial areas and also retaining a minimum residual indentation.

How we manufacture Sarlon:

XtremPUR[™] •

The high performance surface protection with double (laser + UV) curing ensuring optimum durability and stain resistance combined with an enhanced aesthetic.

> Usage layer Design protection

Intermediate reinforced laver Excellent residual indentation

There are also two levels of sound reduction available: 15 dB and 19 dB. On projects where sound-insulation is key, the Sarlon 19 dB floors offer the highest levels of acoustic performance.

Alternatively, the Sarlon 15 dB products offer the ideal solution on projects where wheeled traffic and rolling loads are a daily part of the working building. The tough, durable and sound reducing solution offers an effective acoustic floor covering with excellent residual indentation resistance, making it ideal for use in heavy traffic commercial applications. Finally, we produce a design vinyl sheet called Eternal de Luxe Decibel, which combines excellent performance with premium design. As well as providing 17 dB impact sound reduction performance, the floor covering comprises luxurious state of the art wood and stone designs, which stand out because of their realistic embossing structures.

For safety underfoot our Surestep Decibel range combines R10 Health & Safety Executive compliant slip resistance with 17 dB impact sound reduction.



High-performance foam base for underfoot comfort

Adhesive Free Acoustic Vinyl

It is always important to reduce downtime especially within healthcare or education facilities. In fact, it is crucial to avoid impacting on the daily activities of staff, students or patients, so finding quick fit solutions is important. For this reason, leading manufacturers are developing guick, easy and economical product collections that do not require the need for adhesive. At Forbo we have Modul'up. Requiring no adhesive, tackifier

How we manufacture Modul'up:



Double structural stabilisation system

- Excellent dimensional stability
- Suitable for heavy traffic

Adhesive free installation

Impact sound reduction of 19 dB • High-performance base foam

or double-sided tape, Modul'up can not only be installed quickly, but it can also be walked on immediately after installation, reducing downtime and minimising impact on day-today business.

Featured within the collection is an enhanced Decibel version, which provides 19 dB impact sound reduction.

XtremPUR™ surface treatment

- Ensures that the product remains easy to clean throughout its service life
- Stain-resistant

Luxury Vinyl Tile Solutions

Setting new standards in acoustic luxury vinyl tile (LVT) solutions, Forbo's Allura Decibel range has been developed to offer 19 dB impact sound reduction, without compromising on aesthetics or ease of installation. The new acoustic collection consists of 30 tile and plank formats in a balanced colour palette of wood, stone and concrete designs, combining beautiful floor design with high acoustic

properties and outstanding residual indentation performance. The range is particularly suitable for multi-occupancy buildings, such as high-rise office buildings, where noise pollution and the well-being of occupants is of vital consideration. Additionally, our LVT solutions can be fitted with a tackifier, which enables them to be used alongside standard carpet tiles.

Acoustic Linoleum

We are also proud to offer a range of acoustic linoleum products, which form part of our Marmoleum collection. Unlike standard linoleum products, acoustic linoleum achieves higher impact sound reduction values thanks to a special insulating layer, which is laminated to the linoleum sheet. In turn, this sheet can offer impact sound reduction of up to 18 dB.



We offer two acoustic linoleum solutions. Marmoleum Acoustic features a cork backing and can achieve a 14 dB sound impact reduction. Marmoleum Decibel features a polyolefin backing and can achieve a sound reduction of up to 18 dB.



Textile Floor Coverings

Carpet tiles can offer an excellent acoustic solution when it comes to heavily trafficked areas which require a higher level of warmth and comfort underfoot. Forbo's Tessera collection of carpet tiles offer sound impact reduction ratings of between 22 - 28 dB.

Additionally our Tessera carpet tiles can be manufactured with our innovative SOFTbac® secondary backing. Providing greater backing adhesive strength, the solution ensures higher sound absorption in tiles, and delivers impact sound reduction ratings of up to 30 dB.

Last but not least, we also have our popular flocked flooring option, Flotex. The unique textile floor covering, which combines the hard-wearing characteristics of a resilient floor with the quality, warmth and comfort of a carpet is perfect for a variety of commercial and domestic applications. In addition Flotex provides excellent acoustic properties of between 19 and 22 dB.

A TUDOR TWIST FOR NEW **CHESTER STUDENT ACCOMMODATION**

Capturing the traditional charm of the Tudor period, London-based design studio, Upcircle, designed Chester's newest student accommodation by taking inspiration from the city's history and architecture. With the help of Forbo Flooring Systems' comprehensive portfolio, including its recently refreshed Allura Luxury Vinyl Tile (LVT) collection, a warm, striking and sophisticated interior was created.

How we manufacture Flotex[®]:





Ophélia Gisquet, Head of Interior Design at Upcircle, commented:

"Students will be spending a lot of time in their bedrooms, studios and kitchens, whether they are sleeping, relaxing, studying or socialising. Therefore, reducing noise pollution and sound being transmitted through the floors in these areas was vital for us, to ensure the comfort and wellbeing of the tenants. We opted for Forbo's Sarlon Acoustic Vinyl in Hazelnut as the acoustic floor covering delivers excellent sound reduction of up to 19 dB, whilst the natural and timeless look of the floor still ties in with the Tudor theme."

What's more, in the corridors where acoustic comfort was also key, Fresh Student Living requested the use of a carpet tile as their modular format allows for easy maintenance. Renowned for their aesthetic styling and outstanding performance, even in the most demanding of heavy traffic environments, Tesssera Diffusion offers 22 dB impact sound reduction. The Space Quest colourway was installed for its softer, more organic geometric design. Inspired by crystalline structures, the fractal shapes fade in and out creating appealing contemporary floor spaces for the student accommodation complex.

From the branding and signage through to the interior design, Upcircle's multi-disciplinary expertise has helped to shape Fresh Student Living's latest development, Tudor Place. Located only a stone's throw away from Chester City Centre, the four-block student accommodation complex comprises 323 bedrooms and studios, as well as an array of modern facilities such as an on-site gym, a multi-media room and a communal lounge.



6. CONCLUSION

At Forbo, we understand that acoustic performance is an important component of designing buildings and we aim to make the concept easier to understand for those designing for a variety of sectors. We want architects, specifiers and installers to feel more confident having conversations around acoustic performance with their supply chain partners. As with any issue regarding building specification, parts of the concept can be technical, but by sticking to the standards identified in this paper, as well as knowing that we manufacture products that help you achieve the requirements of these standards, we are confident that those in the sector will achieve effective results.

Hopefully, by reading this whitepaper you'll now have a more solid understanding on the basics of sound. From developing greater knowledge of how it works, to better appreciating how it can affect human health, we hope that readers are more aware of the important role it plays in our everyday lives. Similarly, with the help of our whitepaper, those in the building and construction sector should be able to more effectively plan and execute projects, which meet the relevant acoustic requirements and regulations. In doing so, those in the trade can help to engender a new era of acoustic understanding and performance, which benefits all parties involved.

In this effort, we believe that acoustic flooring solutions hold the key. More than ever before, the market for such solutions is full of powerful, effective and affordable systems, which improve acoustic performance and limit the consequences of excess noise. More-so than with other technologies, these products can enable dramatic improvements in acoustic performance and are easy to fit quickly. Likewise, the extensive number of systems on the market are suited to a wide range of different building environments. At Forbo, we're proud to lead in this area with our wide selection of both sheet and tile products.

So, whether you're looking for an adhesive-free vinyl sheet, which can be laid quickly without causing disruption, or an acoustic LVT solution that is setting new standards in acoustic performance, or a comfortable yet hard wearing textile option, look no further than us. With our extensive experience and effective solutions, we're able to offer powerful products that limit impact building noise and allow architects and specifiers to create more serene, peaceful environments. In doing so, we can help to ensure that building occupants in all types of developments are less exposed to dangerous levels of excess noise and contribute to greater levels of health and wellbeing.

For more information, please visit **www.forbo-flooring.co.uk/acousticsolutions**

[1] Health Technical Memorandum - 08.01: Acoustics: Executive Summary

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dBA is the abbreviation of A-weighted decibels, which are an expression of the relative loudness of sounds in air as perceived by the human ear.

[6] NHS Choices (2019). Sleep and tiredness. [online] Available at: https://www.nhs.uk/live-well/sleep-and-tiredness/why-lack-of-sleep-is-bad-for-your-health/

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Forbo Flooring Systems is part of the Forbo Group, a global leader in flooring and movement systems, and offers a full range of flooring products for commercial and affordable housing and new build markets. High quality linoleum, vinyl, textile, flocked and entrance flooring products combine functionality, colour and design, offering total flooring solutions for any environment.

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