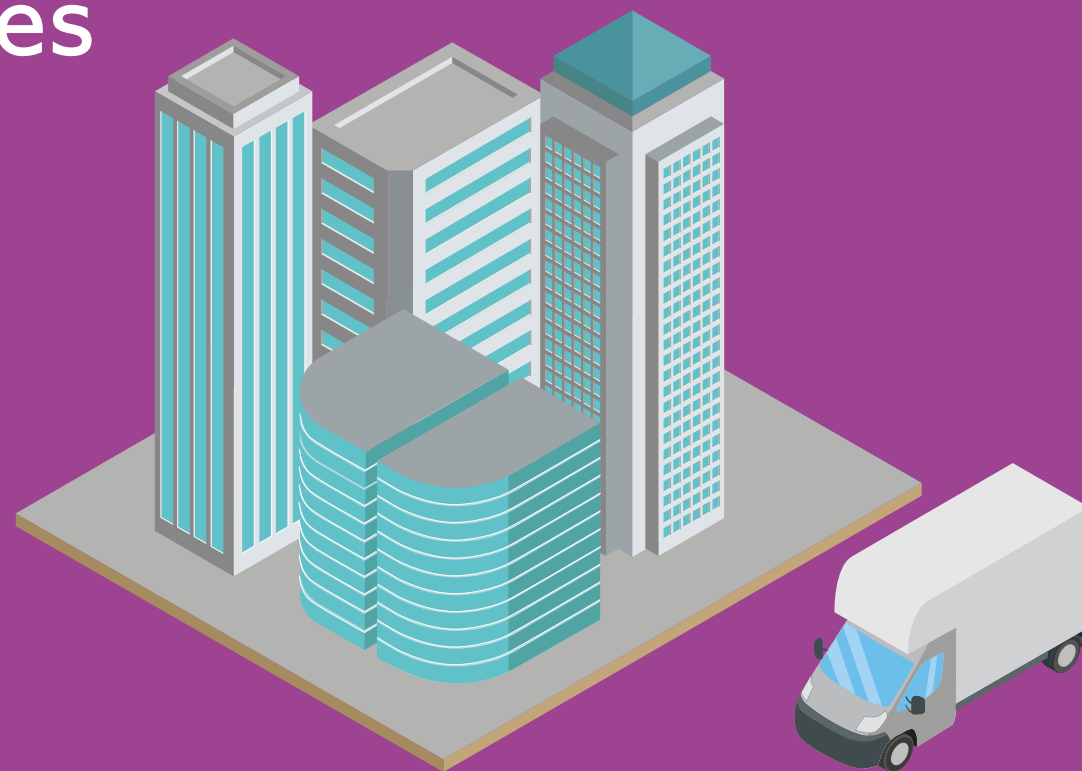


Building design guidance for quieter deliveries



Many urban road networks suffer from congestion and the movement of goods and servicing vehicles adds significantly to this congestion, particularly as a large proportion of these trips are made during the day.

Changing delivery and servicing times, and avoiding peak times, can improve traffic flow. It may also result in reduced costs for businesses and better air quality.

Noise has been identified as a key barrier to changing delivery times as servicing activity tends to occur in areas close to local residents.

This guidance provides a list of potential measures that can be implemented to help mitigate against noise, through better building design, planning and infrastructure.

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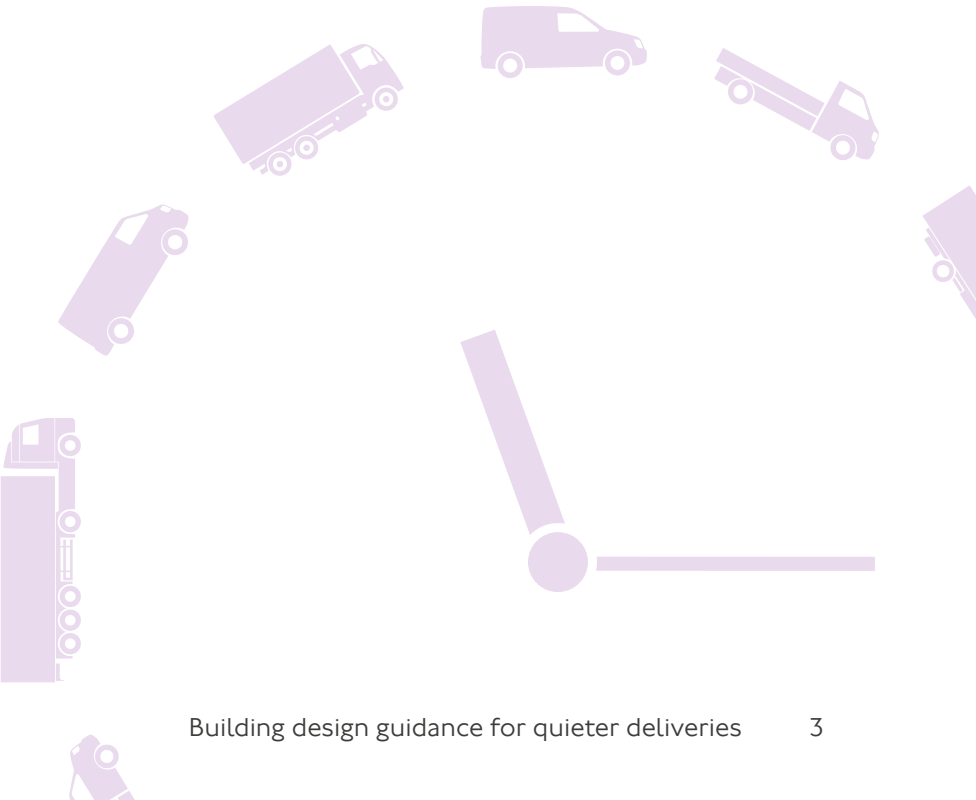
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Noise impact, nuisance and planning

Noise from off-peak delivery activity can have an adverse impact on nearby dwellings, both in terms of health and quality of life for residents. It is annoying and disturbs sleep.

Under the Environmental Protection Act 1990, local authorities have a duty to serve an abatement notice on companies if they find delivery noise to be a statutory nuisance.

When new developments proposing off-peak deliveries go through planning, guidance from the Noise Policy Statement for England should be followed. This aims to:

- Avoid significant adverse impacts on health and quality of life
- Mitigate and minimise adverse impacts on health and quality of life
- Contribute to the improvement of health and quality of life, where possible

British Standard 4142:2014 describes the methods used for rating and assessing sound of an industrial and/or commercial nature. This standard is typically used for assessing noise from deliveries, and compares the level generated by the delivery activity – whether these sounds are tonal, impulsive, intermittent or in some other way distinctive – against the sound level without any delivery noise.

This measured approach allows the likely noise level to be estimated.

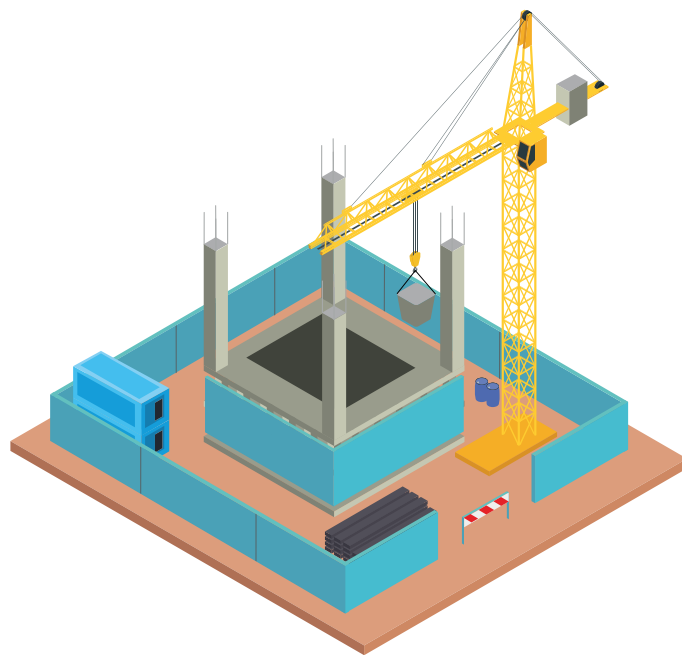
Noise mitigation measures are effective at reducing delivery noise so they do not have an adverse impact on health and quality of life.

The list of potential noise mitigation measures presented in this guidance can be used to help manage noise from deliveries within a local environment. Although they should be considered for new developments, they can also be applied retrospectively. However, this may be more costly.

Although planning permission may be granted to a development which proposes off-peak deliveries, it does not prevent delivery noise from becoming a statutory nuisance through vehicle, equipment or driver/staff behaviour.



Considering mitigation at different stages of a development



The RIBA* Plan of Work 2013 is the UK model for the building, design and construction process. It is a reference document for those involved in the briefing, design, construction and post-occupancy process of buildings. It has eight stages, each with clear boundaries, and details the tasks and outputs required at every stage.

As a guide only, the table opposite illustrates at what stage different mitigation measures may be considered. Those indicated for later stages are generally appropriate for a retrofit or in dealing with unforeseen issues in new builds.

*Royal Institute of British Architects

RIBA plan of work stages

	Step 0 Strategic Definition
Barriers	
Enclosures	
Balconies	
Site or Building Layout Design	
Green Facades	
Ground Treatments	
Landscaping	
Sound Absorption in the Vicinity of Noise Source	
Sound Insulation Treatment on Facades	

Step 1 Preparation & Brief	Step 2 Concept Design	Step 3 Concept Design	Step 4 Technical Design	Step 5 Construction	Step 6 Hand over & Close out	Step 7 In Use	
	✓	✓	✓	✓	✓	✓	Useful to design in early, but can also be incorporated to design at later stages or retrofitted in response to unforeseen issues.
	✓	✓	✓				Useful to design in early, limited ability to add this to design at later stages.
		✓	✓				The detailed aspects which reduce noise impact would be incorporated as design develops, but may not be able to be incorporated if only considered at later stages.
✓	✓	✓					If this is to be designed in properly, then may be considered in initial brief so that it can be incorporated in concept design. Limited opportunity to incorporate at later stages.
		✓	✓	✓	✓	✓	Start considering this while design develops, but can also be incorporated to design at later stages or retrofitted in response to unforeseen issues.
		✓	✓	✓			Start considering this while design develops, limited ability to incorporate after construction complete.
	✓	✓	✓				Useful to design in early given implications to development, limited ability to add this to design at later stages.
		✓	✓	✓	✓	✓	Start considering this while design develops, but can also be incorporated to design at later stages or retrofitted in response to unforeseen issues.
		✓	✓	✓	✓	✓	Start considering this while design develops but can -be incorporated to design at later states or retrofitted in response to unforeseen issues.

Mitigation measures



Barriers

In order to be effective, barriers should be positioned between the sources of noise (delivery vehicles and unloading areas) and residential properties.

Acoustic effectiveness*: Medium

(Depends on: material, height and length, gaps, shape)

Advantages

Straightforward concept, provides privacy, assists with security, easy to install and maintain, choice of wide range of material

Disadvantages

Negative visual impact, may obstruct movement of people and vehicles, blank facades encourage antisocial behaviour, expensive to relocate, wind loadings need to be considered

*Acoustic effectiveness is based on the potential maximum noise level (dB) reduction which may be achieved by the mitigation type.

Enclosures

Enclosures may be used for loading bays external to the building.

Acoustic effectiveness: High

(Depends on material, orientation and use of openings)

Advantages

Straightforward concept, enhanced security, increases weather protection in the enclosed area

Disadvantages

Negative visual impact, reduced visibility to loading bay, impact on manoeuvrability of vehicles, expensive solution, increased fire risk issues, reduced flexibility for future changes

Balconies

Balconies which break the line of sight from a window to a noise source can provide attenuation in cases where multi-storey buildings are in close proximity to the delivery area.

Acoustic effectiveness: Medium

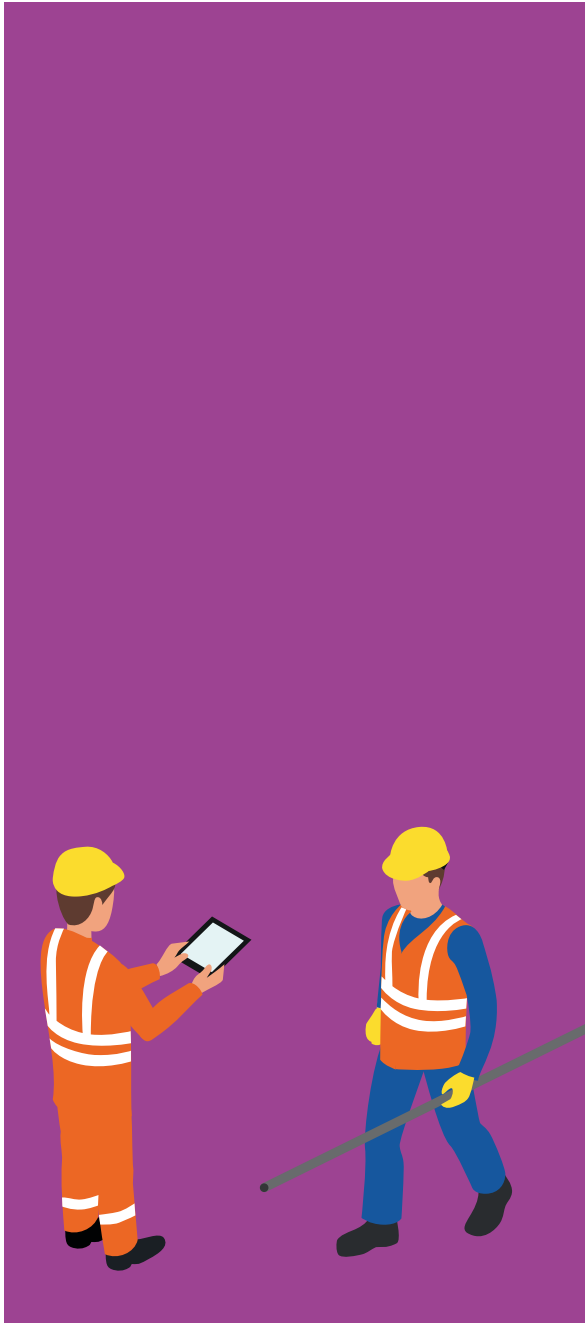
(Depends on: having an open area, absorptive surfaces, reflective surfaces, adding a micro barrier)

Advantages

Contributes to meeting residential standards for housing schemes, provides a multi-purpose outdoor amenity space for occupier

Disadvantages

Negative visual impact, expensive, may not be appropriate for all rooms facing the delivery area, on a building facade



Site or building layout design

Buildings within a scheme – and on the boundary – can be used as acoustic barriers to protect the rest of the development. Orientate the entrances of delivery bays away from residential properties and use the building or site layout to improve the perception of noise.

Acoustic effectiveness: High

(Depends on building orientation, shape, internal arrangement and location)

Advantages
Reduction in the need for additional measures to be incorporated eg for appearance and security, low cost if considered early
Disadvantages
Expensive if considered late in design, competing design interests may undermine effectiveness

Green facades

Vegetation can be used in some situations to reduce noise levels such as in street canyons where hard and dense materials can create multiple reflections on facades, leading to increased sound levels on the street.

Acoustic effectiveness: Low

(Examples: green walls, climbing plants, green roofs)

Advantages
Positive visual impact, welcomed by public, ecological advantages, calming effect, water retention, pollution reduction
Disadvantages
Costly maintenance

Sound absorption

Introducing ways of absorbing sound close to the noise source can reduce the level of sound coming from a delivery yard and reduce how much noise is heard by nearby residents.

Acoustic effectiveness: Low

(Depends on: material, amount of surface area covered, placement)

Advantages
Visually discreet, easy to install, unobtrusive, can also add thermal insulation benefits
Disadvantages
Could have high maintenance costs as exposed to wear and tear, dust accumulation

Sound Insulation

Improving sound insulation on the facade of a building can reduce noise experienced by people living close to a noise source and will also reduce noise levels internally.

Acoustic effectiveness: High

(Examples are: double glazing, secondary glazing, acoustic ventilation, secondary facades)

Advantages
Integrated into building, can improve heat retention
Disadvantages
Retrofitting is not always possible and can be difficult to obtain appropriate consent. Requires windows to be closed so alternative ventilation requirements will be needed

All types of buildings, residential or commercial, should protect from noise disturbance.

Ground treatments

A quieter road surface may be used on the streets leading up to and at the delivery area, rather than a traditional hard road surface which is noisier.

Acoustic effectiveness: Low

(Examples: low noise road surfaces, roughness element configurations, soft strips and patches (eg rubber tiles), resonators in hard ground)

Advantages
Less visual intrusion than some other options
Disadvantages
Maintenance and drainage considerations could be costly, expensive to change in the future

Landscaping

Planting trees can be effective if there is sufficient space between the source of the noise and residential properties.

Acoustic effectiveness: Negligible to low

(Depends on: density, thickness of foliage)

Advantages
Desirable, can create shade, calming, reduces air pollution, good visual impact. The positive environment which results can lead to a perception of less noise
Disadvantages
Space requirements are high, could be considered an inefficient use of land in some urban situations

Soundscaping

Introducing pleasant artificial or natural sounds can mask delivery noise or shift perceptions about how much noise deliveries are making.

Acoustic effectiveness: No sound attenuation but can reduce the perceived annoyance of delivery noise

(Depends on: sound masking or having alternative sounds which are more pleasant)

Advantages
Calming, positive perception of the space. Little physical equipment is required so it is a flexible form of mitigation and can be visually unobtrusive
Disadvantages
Ambient sounds can still be interpreted as noise, opinions can be subjective, difficult to predict result



Typical scenarios

Measures for building types



Supermarket

Supermarket requires fresh produce delivered in the early hours with residential dwellings in close proximity (new build)

Delivery noise sources:
Manoeuvring of Heavy Goods Vehicles (HGV) to delivery bay, unloading/loading

Sensitive receptors: People sleeping in nearby homes



Mitigation measures which may be considered in this scenario:

Site and building layout design

- Move delivery bay away from sensitive properties, or to an area which has more ambient noise
- Locate delivery bay so the amount of manoeuvring by an HGV is reduced
- Constraints may limit use of this measure if it is not considered at an early stage in the design process

Enclosures

- Enclose the delivery bay
- The enclosure could have a visual impact and is unlikely to be able to screen manoeuvring vehicles

Barriers

- Install a barrier between the car park/delivery bay and the sensitive properties
- Vegetation cover could reduce its visual impact and may help sound absorption
- Visual impact, costs and restricted access could be a constraint

Sound insulation

- Install sound insulation at dwellings close by
- Costs could be a constraint and separate agreements with multiple landowners may be needed. Effectiveness depends on people keeping their windows closed so an alternative means of ventilation would be needed

Industrial estate

Industrial estate with nearby residential dwellings seeks to vary its operating hours and requires retrofitted noise solutions

Delivery noise sources: Manoeuvring from HGVs, forklift loading, pallet trucks, delivery vehicles entering site

Sensitive receptors: People sleeping in homes close to the loading area and distribution route



Mitigation measures which may be considered in this scenario:

Enclosures

- Enclose the loading area
- Could be costly if it is a large loading area and would need ventilation and lighting, plus there could be potential security and fire risk issues

Barriers

- Install a barrier between the loading area and dwellings, and along the distribution route between it and dwellings. Can act as a visual screen to the industrial park
- Costs and visual impact could be a constraint

Sound absorption

- Apply sound absorption materials to building(s), facades and around loading area to reduce sound reflections. Could be more visually discreet than other measures
- Maintenance and durability may be a constraint, and may impact on light reflectance and fire properties

Ground treatments

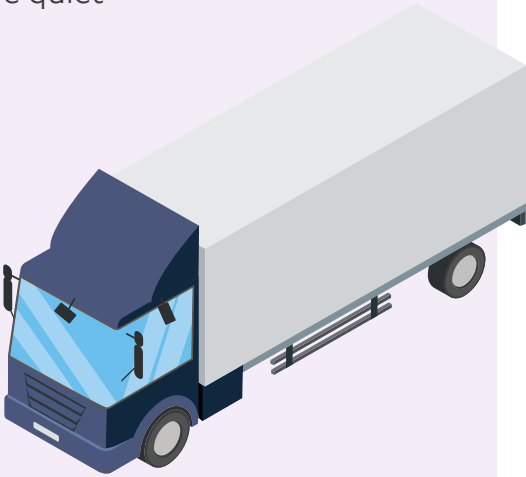
- Apply a quieter road surface along the distribution route and in the loading area. Could be combined with porous materials for a sustainable urban drainage solution and reduction of heat island effect
- Maintenance, durability and possible conflicts with other performance requirements (e.g. drainage, slipperiness) could be a constraint

New build distribution depot

Depot for distribution or hub services in a relatively open area with nearby residential dwellings seeks to avoid noise issues

Delivery noise sources: Activities around the delivery bay

Sensitive receptors: Homes closest to the site in an area which is likely to be quiet



Mitigation measures which may be considered in this scenario:

Site or building layout design

- Locate the delivery bay on the side of the building which faces the industrial area, rather than dwellings
- Operational requirements could be a constraint if it results in inefficient layouts, or other design requirements

Enclosures

- If vehicles reverse into an enclosed delivery bay, an enclosed manoeuvring area would reduce noise further
- Cost could be a constraint as the enclosure would need to be large and include ventilation and lighting, plus there could be potential security and fire risk issues

Barriers

- Install a barrier between the depot and the dwellings, possibly in the form of a landscaped bund or embankment, to reduce visual impact
- Cost and space could be a constraint

Landscaping

- Planting trees and dense foliage between the depot and the residential area could be an option. It could also add to the visual amenity of a site and have sustainability and ecology benefits
- Not particularly effective, acoustically, and maintenance costs and space may be a constraint

New build mixed use

A new development is being built which includes ground floor retail space, flats and a delivery yard

Delivery noise sources: Manoeuvring from HGVs, unloading/loading in the yard

Sensitive receptors: Existing and new flats overlooking the delivery yard



Mitigation measures which may be considered in this scenario:

Site or building layout design

- Locate the delivery yard away from existing and new flats and where proposed flats do not overlook or move the delivery bay to an underground basement area
- Adjust the layout of the flats within the new development so the less sensitive rooms (eg kitchens, bathrooms, WCs etc.) overlook the delivery yard, rather than bedrooms and living areas
- May clash with other design requirements and will need to be considered at early stage

Enclosures

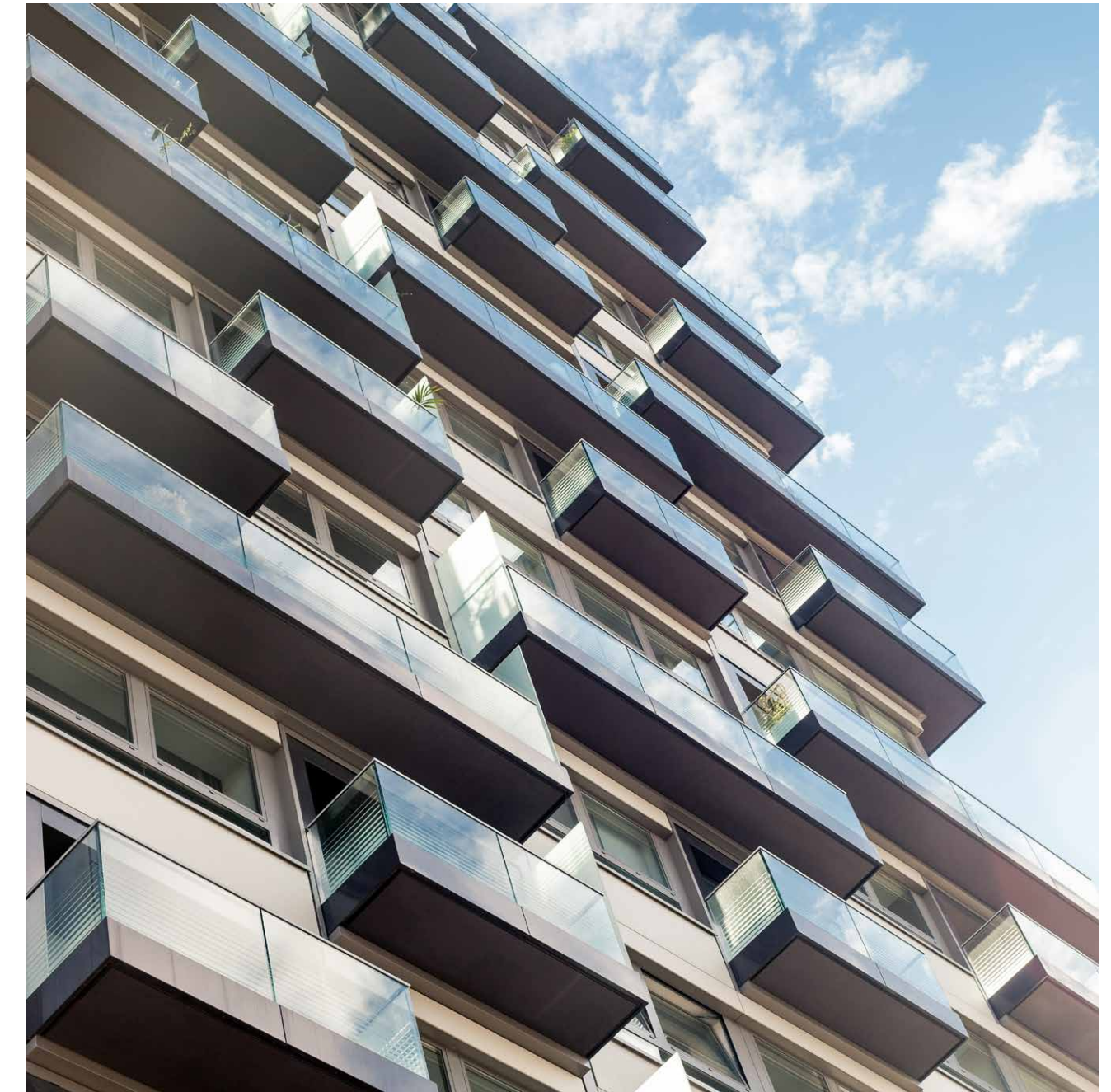
- Enclose delivery yard
- Cost could be a constraint as the enclosure would need to be large and include ventilation and lighting, plus there could be potential security and fire risk issues

Sound Insulation

- Improve sound insulation on the new flats which could be affected by noise
- Thermal performance and cost could be a constraint and effectiveness depends on people keeping their windows closed so an alternative means of ventilation would be needed

Balconies

- Introduce ways to absorb sound or barriers to balconies of flats overlooking the delivery area
- Cost could be a constraint and it may not be possible to apply it to all sensitive windows such as bedrooms on the elevation overlooking the delivery yard
- Drainage, screens, sunlight all need to be considered when designing balconies for noise reduction



High Street

High street deliveries are needed where a large number of small retailers are on the ground floor and residents live in flats above

Delivery noise sources: vehicles unloading, and the movement of loads from the loading bays to the high street store

Sensitive receptors: Dwellings overlooking the high street



Mitigation measures which may be considered in this scenario:

Ground treatments

- Apply a quieter road surface from the loading bay to the high street
- Maintenance, durability and a possible conflict with performance requirements (eg drainage, tyre grip) may be constraints

Landscaping

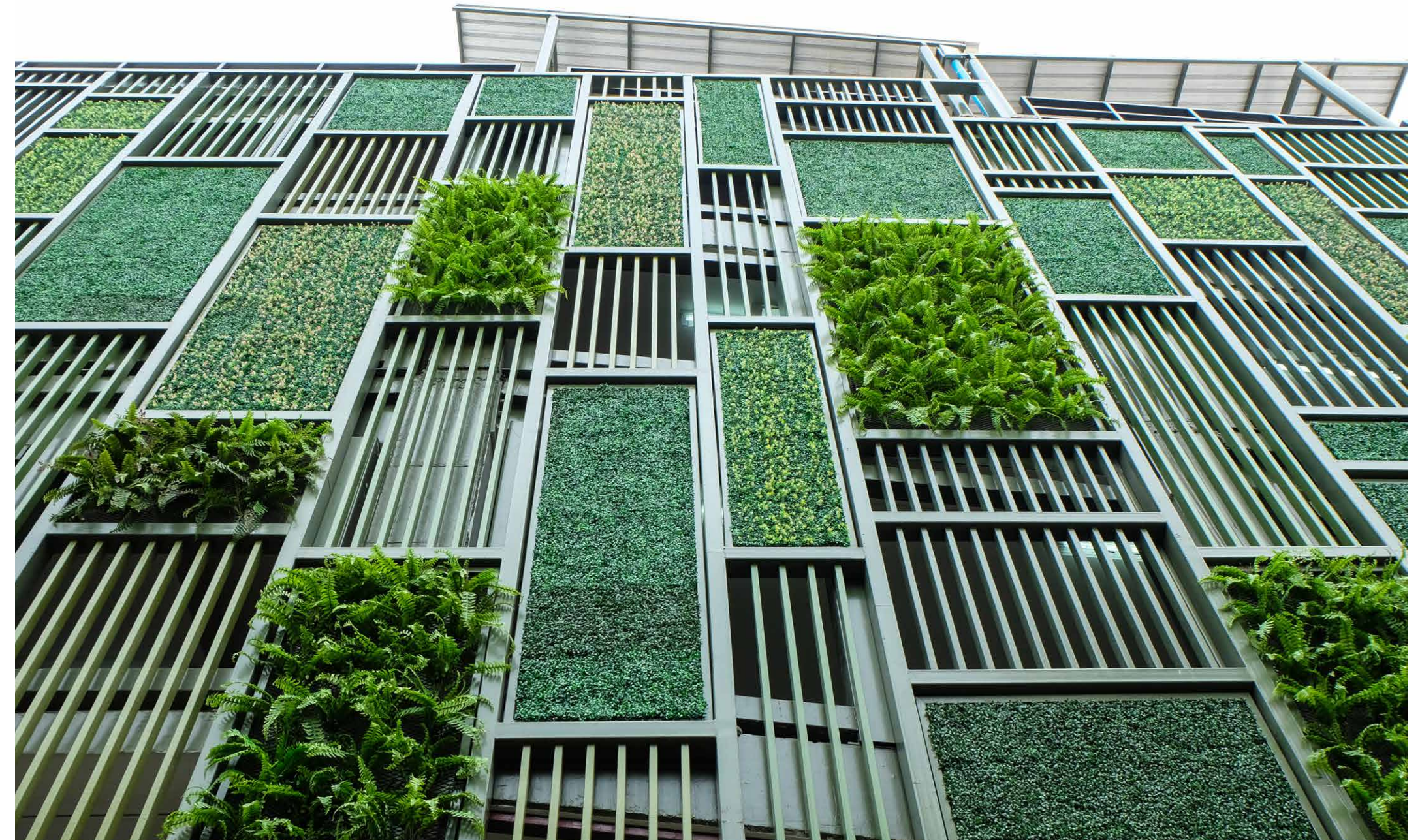
- Planting trees would to improve the perception of noise
- Maintenance costs could be a constraint and possible leaf fall may make it ineffective at some times during the year

Green facades

- Plant vegetation on high street facades to reduce noise reflections from hard surfaces
- Costs and maintenance could be a constraint, along with building ownership
- It is location-dependant (wind, light, water, frost), so may not always be suitable. Retrofitting on existing buildings and getting consent could be difficult

Sound insulation

- Install sound insulation to sensitive rooms or the building facade
- Cost and agreements with multiple landowners could be a constraint. Performance depends on keeping windows closed so alternative means of ventilation would be required



Recommendations

Noise mitigation measures are usually most effective if they are considered at the early stages of design. This is particularly important to enable off-peak deliveries.

They should take into account both the level of noise generated by deliveries, and the perceived level of noise, experienced by people living or working nearby.

Some measures are better at reducing noise than others, such as barriers or enclosures. Some measures have little or no effect on noise levels but, combined with other measures, can help improve people's perception of how much noise they hear such as landscaping (tree planting) or soundscaping.

While examples are given here for specific scenarios, the choice of measures will vary depending on the demands of the development and the local area. Specialist advice is therefore recommended in order to choose the best options which can be incorporated into the design of a building in order to optimise noise reduction.

The mitigation measures listed in the text should be adopted and used alongside delivery good practice, such as having quiet equipment in delivery bays and quiet driver and staff behaviour. It will maximise effectiveness in minimising noise impact.

While these measures can help reduce noise generated from deliveries, they do not guarantee that planning permission will be granted for off-peak deliveries or prevent noise from becoming a nuisance.

For further information, see the following:

Retiming Deliveries, TfL
www.tfl.gov.uk/retime

Kerbside Loading Guidance
www.tfl.gov.uk/corporate/publications-and-reports/streets-toolkit

ProPG: Planning & Noise – New Residential Development
www.ioa.org.uk/publications/propg

BS 4142
2014 Methods for rating and assessing industrial and commercial sound

BS 8233
2014 Guidance on sound insulation and noise reduction for buildings

