Chartered Institute of Environmental Health

# Pest minimisation

## Best practice for the construction industry

# 1.0 Introduction

**Aim of document**
This document provides guidelines designed to minimise pest problems that may be created inadvertently by the work of architects, developers and builders in the construction industry. It covers those aspects of pest management that are relevant to planning, design, demolition and construction.

The document has been produced by the Chartered Institute of Environmental Health Olympic Working Group. It is not intended to be fully inclusive but aims to provide the key principles of best practice. The annexes provide more detailed information on specific pests.

Although, the 2012 Olympic/Paralympic Games have been the main driver for the formation of this guidance, the principles can be applied to other construction projects at local, regional and national levels.

Further documents are planned to form a suite of advice and best practice to help consistency in the management and control of pest infestations.

## Public health risk and pest minimisation

The Chartered Institute of Environmental Health (CIEH) recognises the importance of protecting workers and the public from the wide range of threats to health and wellbeing from pests, such as rodents, birds and mosquitoes that may be associated with construction work. Such disease risks include salmonellosis, toxoplasmosis, ornithosis and leptospirosis. It is also important to ensure that the planning and design of new projects do not create avoidable additional problems.

In addition, rats, mice, grey squirrels and other pests can have a serious structural and financial impact on the buildings themselves, damaging thermal insulation, electrical wiring, drainage systems and other structural components.
The aesthetic appearance of new buildings can also be rapidly spoiled by bird fouling.

Apart from problems arising during demolition and construction of buildings, the Olympic/Paralympic development also involves the creation of new habitats such as artificial water bodies. Design and maintenance of such areas should be carried out to avoid increasing risks to workers, local residents and the public from pests such as mosquitoes.

There is a real need for planners, architects and builders to recognise and minimise the risks of pest infestation and disease transmission within new developments and to ensure that they do not create conditions that encourage and support pest infestation.

Planners, in particular, need to recognise that developments in areas of significant pest pressure require potential problems to be addressed as part of the planning process.

This is vitally important for the 2012 Olympic sites. The impact of negative press coverage, with or without public health incidents, must not be underestimated.

## General expectations on developers and construction workers

Architects and building designers are expected to recognise and take into account pest minimisation and management issues in the design of their projects and to obtain professional advice on these issues as necessary.

Developers and construction contractors are expected to employ qualified pest control professionals where necessary, and to work with them to develop and follow safe, effective and environmentally responsible pest management strategies. Such strategies should be capable of being audited as part of the project management programme.

Such expectations are part of the general responsibility of site management to provide a safe working environment for employees, contractors, and others who may affected by their work, under the Health and Safety at Work, Etc. Act 1974.

The local environmental health service, within the local council, will be able to give more information and advice.

# 2.0 Design of new build / refurbishment / redesign

To minimise opportunities for pests, it is essential that the design of new build property and refurbishments does not create points of pest ingress and harbourage, and should optimise accessibility for cleaning, sanitation and pest inspection.

### Drainage

Suitable pest proofed drainage systems should be used. For example earthenware below ground drainage in preference to plastic systems which can be more vulnerable to rat damage from gnawing if not properly installed.

Rodent proof drainage systems should be adopted on all new build / refurbishment projects to prevent rat egress from the sewers to the building structure, for example incorporating earthenware rat barrier drainage fitments as appropriate.

### Entry points

To avoid the risk of pests entering and dispersing through buildings, cracks and crevices in floors, walls, and ceilings must be avoided or, where unavoidable, they must be effectively sealed.

Supply pipes and cables, such as gas, electricity, water, computer and telephone, must be tightly sealed where they pass through floors and walls.

### External

External structures should be designed to avoid creating unnecessary pest harbourage. For example windows, ledges, flat roofs, roof edges, air vents and other features should be designed to prevent roosting of birds such as feral pigeons Etc.

Suitable areas should be designed into all property and environmental layouts to facilitate effective waste management practices including recycling.

External ground surfaces should be graded to drain into suitable drainage systems to prevent ponding.

When landscaping sites, the use of ground-hugging or thorny plants and shrubs should be avoided, in order to deny harbourage for rodents and to allow access for inspection and treatment.

Annex 1 has more detailed information on rodent proofing; Annex 2 covers mosquitoes, midges and flies; and Annex 3 bird proofing.

# 3.0 Demolition / refurbishment and construction of properties

## Demolition

Demolition of buildings containing a pest infestation can result in a dispersion of these pests into the surrounding area and may also result in the same pests infesting the new buildings.

Six weeks prior to the commencement of any demolition, individual blocks, properties and the surrounding area should be surveyed by professional pest control staff in order to identify the presence and extent of any infestations. Where infestations are identified, appropriate treatments must be implemented to eliminate infestation before demolition.

Unprotected exposure to the debris arising from bird infestation in disused buildings can result in disease such as ornithosis. Such debris should always be dealt with by fully trained persons wearing appropriate personal protective equipment.

## Sewers and rodents

Rats live in sewers and move through drainage systems. They come to the surface and enter buildings through breaks and faults in the drainage system.

Capping of drainage systems should be carried out where appropriate to isolate old redundant sewers /drains, including those servicing properties that have been vacated and are awaiting clearance and demolition.

Redundant drains and sewers should be grubbed out and the connection with the sewer effectively sealed.

Live sewer connections should be appropriately sealed and capped while construction works are in progress to prevent rat egress from the sewers.

To prevent rat egress from live drains and sewers to new systems, the live systems should be temporarily sealed off with expanding drainage stoppers until connection to new drainage is completed.

Pest monitoring and baiting programmes should be instigated on construction and refurbishment sites, including a proactive surface monitoring baiting programme during the demolition / construction process. Exposure of construction staff to risks associated with a rodent infestation may contravene the Health and Safety at Work, Etc. Act 1974.

An all-encompassing sewer rat monitoring programme should be implemented in the sewer systems within the project area for the duration of the project.

Sewers and drains should be cleared of any remaining building debris.

## Site hygiene

Contractors should ensure that construction sites are kept as clear and tidy as possible. Accumulations of surplus or damaged building materials can act as harbourage for pests, and should be removed and disposed of promptly and safely.

Construction staff should not leave food debris within buildings under construction, as this will encourage pests to become established.

Staff site facilities including canteens, accommodation and sanitary provision should be constructed and maintained in a clean and hygienic manner and in accordance with relevant regulations and codes of practice. Waste must be stored safely in suitably located, pest-resistant, closable containers and removed frequently.

Further information on the Workplace (Health, Safety and Welfare) Regulations 1992, which apply to construction sites, is available from the London Hazards Centre (see www.lhc.org.uk/members/pubs/factsht/48fact.htm).

# 4.0 Working with pest control contractors

**Working practices**
Most pest control work on site will be carried out by a professional pest control organisation, typically either from the local authority environmental health department, or from a pest control company which is a member of a recognised trade body.

**Maintaining and recording**

- Pest monitoring should be planned and documented. This will include the use of site plans/drawings. The placing of monitoring devices needs experience and knowledge of pest behaviour. If this expertise is not available in your organisation it will be necessary to consult with a professional pest controller. Local authority environmental health departments, pest control firms, or specialist consultants can provide this assistance
- All pest monitoring devices should be labelled with a date and placed in a recorded location. This should be mapped or recorded in document form
- Insect and rodent survey points should be placed in potential harbourage or activity areas and checked monthly for infestation. Results from inspections should be recorded
- A building perimeter inspection should be conducted to verify that there are no access routes for rodents. This includes doorway thresholds, pipe penetrations and any other location for pest entry
- An interior inspection should be undertaken to check that the plumbing fixtures, especially WC traps, food preparation areas, and waste storage are free from pest problems
- Full records of inspections, notifications of pest problems, visits by pest control professionals, use of pest control methods/pesticides including safety data sheets should be maintained. These records should be kept safely since they may be required in the event of an investigation

It is particularly important that any recommendations made by the contractor should be discussed and implemented as appropriate. The developer and builder must share in the responsibility to address pest problems.

The pest controller should be given advance notice of any changes to the site, such as demolition or completion, so that any pesticide bait points can be removed if necessary. This also relates to any damage caused by construction workers to any bait points, etc.

## Use of pesticides

Good pest control is based on creating conditions which prevent pests from infesting premises. However, often this will not be possible and many control measures will involve the use of pesticides.

Under the Control of Pesticides Regulations 1986 and 1987 (as amended) it is illegal to advertise, sell, supply, store or use a pesticide in the UK unless it has been approved by ministers for that use.

All approved pesticides carry an HSE reference number on the label confirming that they have been approved under the Control of Pesticides Regulations 1986 or 1987 (as amended). Checks should be undertaken to ensure that only approved pesticides are being used, since the use of illegal pesticides may have insurance consequences.

Many of the pesticides used in the construction industry will be approved for "professional use only". In this context, professional use is defined as use by someone who has received appropriate information, instruction and training; is competent to carry out the duties they are called upon to perform; and is required to use the pesticide as part of their work.

This means that only a properly qualified pest control operator should be employed to carry out any work required.

The usual minimum general qualification in the pest management industry is the RSPH/BPCA level 2 in pest management.

Details are available from the Royal Society for the Promotion of Health.

Additional specialist courses are also available, such as for the control of birds, mosquitoes and drainage. Builders should ensure that pest control contractor's staff have attended these courses, where appropriate.

## Storage of pesticides and personal protection equipment

There are health and safety guidelines for the storage of chemicals and other equipment (particularly PPE) used in pest management and these should always be followed.

Pesticides should not usually be left on site. However, where this is unavoidable, they should always be stored in well-ventilated, secure areas where there is no risk of spillage contaminating water courses. Guidance is available from the local Health and Safety Executive office or from www.HSE.gov.uk/pubns/ais16.pdf.

## Post treatment

Research has shown that where rodents are controlled with second generation anticoagulant rodenticides, there is a danger that non-target species, such as Red Kites, may take the carcass as a food source and so risk secondary poisoning. Pest control contracts must allow for seeking and collecting rodent carcasses as part of the treatment. It is also important that unused bait is also collected at the end of the treatment and disposed of safely.

# Annex 1 - Rodent proofing

Pests can only infest a building if they can gain entry and then survive and breed in it. Good proofing is based on denying the pest either entry or the right conditions in which to survive, ie food, water or safe harbourages.

## BUILDINGS

### Holes and openings

Rats can squeeze through any opening greater than 6mm wide. Smaller openings are often enlarged by gnawing. Mice can enter a building through openings greater than 5mm wide.

To prevent rodent entry, such holes should be plugged with durable materials. Coarse steel wool is a good temporary plug when packed tightly into openings. Copper and stainless steel wool are also effective and last longer. Close openings around augers, pipes, and electrical conduits or cables with concrete, mortar, or metal collars. Fill holes with crushed wire mesh before using cement. Any unprotected opening is an invitation to rodents.

### Foundations and floors

Normal foundations will normally prevent rodents from burrowing beneath them.

They will normally exclude rodents if they extend vertically to a depth of about 900mm or have an L shaped curtain wall which is about 600mm deep and a 300mm projection away from the building.

There should be no breach in the foundations larger than 9mm.

Cracks in foundations should be repaired with concrete or masonry grout. If rats have access to a building crawl space, modify the floor to prevent them from getting into the walls.

### Oversite concrete floors

These should be laid so as to cover completely the area within the containing walls. To prevent rodent entry the oversite concrete should also completely fill between the walls. Gaps left to allow for movement should be filled with non hardening sealant.

### External and cavity walls

These should be built so that there are no holes externally or internally greater than 5mm.

Ventilator bricks should have no holes larger than 5mm unless they are protected with a wire mesh of 4mm nominal size of opening and should be cased through the cavities.

Use of cavity closers at the tops of walls have the added advantage that they can deny rodents and birds access to the cavity wall at roof level.

### Doors

Doors should be designed to close onto a level threshold which will deny rodents a gnawing edge, with the gap beneath the doors of no more than 5mm. To exclude rodents, letter plates must not be lower than 460mm or they must open outwards.

In cases where external doors provide access to high risk areas such as kitchens and food stores they should be either of metal construction or fitted with metal kicking plates on the outside. These kicking plates should be no less than 300mm high. Hinged or sliding doors should be fitted with self closing devices.

### Roofs

Spaces between joists and rafters should be filled at the eaves so that if rats or mice (or birds and squirrels) can gain access under the eaves, they cannot enter the

roof space. Ridge and hip tiles in pitched roofs, and those at gable ends, should also be bedded in mortar.

### Internal walls and ceilings

Internal portioning and ceiling cavities should be sealed efficiently to deny access. Floor joists should be built in or hung on joist hangers so that any cavity between floor and ceiling is effectively sealed from that in the adjacent wall or partition.

Hollow spaces behind skirting boards, architraves and other moulding should be avoided as far as possible. All holes cut for pipes, jacketing or other fittings should be sealed.

### Fittings

Pipes, ducts and trunking should be tightly built in wherever they pass through walls, floors, ceilings or foundations. Spaces of more than 5mm must be avoided.

It is particularly important that pipes, cables, drains, ducts and ventilators that pass between buildings through outer walls and foundations are also carefully built in.

## SERVICES

### Refuse disposal

Refuse disposal areas present a high risk of infestation. Design should enable effective cleaning, inspection and avoid opportunities for the accumulation of residues.

Access between the storage and collection areas for refuse should avoid entry to dwellings. Doors to bin storage areas should ideally be metal, tightly closing and self closing unless they open directly to the outside in which case they should be kept locked.

Hoppers, chutes and containers for rubbish need careful design to ensure that their walls do not provide traps for the rubbish or footholds for rodents.

### Lift shafts

Rodents must be prevented from accessing lift shafts, not only to prevent access to the building but also to avoid damage to electrical systems.

The base areas of lift shafts must be accessible for cleaning and the removal of accumulations of rubbish.

### Interior rodent control

When rats or mice are present in a building, attention must be given to interior as well as exterior rodent-proofing to remove all sources of shelter.

Eliminate hiding places for rodents. Pay attention to storage rooms, feed rooms, closets and other areas where construction may be poorly finished, allowing rodents access to walls, floor spaces, or attics.

Miscellaneous debris provide shelter to rodents and make rodent control more difficult. Such debris needs to be removed and disposed of regularly. Store refuse pending removal in properly covered containers.

### Protect perimeter insulation

Perimeter insulation is a necessary part of energy-efficient construction. Insulation that is installed on the exterior of foundation walls, however, is subject to both mechanical damage and destruction by rodents.

To prevent damage to perimeter insulation, use sandwich wall construction that has insulation placed within the concrete.

### Grounds

Maintain a clean, weed and accumulation free area around buildings.  Maintain by mowing vegetation regularly.

# Annex 2 - Mosquito and fly breeding prevention

## Mosquito prevention

Some types of mosquito bite people and therefore have the potential to cause nuisance, and to transmit disease. Currently in the UK mosquitoes are primarily a nuisance pest. The immature stages of mosquitoes are found in water, and the adults then emerge to seek blood meals.

For construction sites, the most common mosquito breeding sites are temporary accumulations of water such as:

- Canvas and plastic sheets
- Puddles on the ground/concrete floors
- Discarded receptacles and building waste
- Water storage drums, tanks and containers
- Discarded used tyres
- Bulk waste containers
- Trenches
- Uncompleted lift wells
- Drains or channels temporarily constructed to drain off water
- Water in ruts, uneven or waterlogged ground

The above will pose a greater risk of breeding mosquitoes than properly designed and maintained water-features, ponds and lakes.

Water conveyance and storage systems should not allow leakage and seepage that may create water-logged areas.

Unsewered water from construction and industrial uses should be adequately contained and disposed off to prevent ponding.

Ponds and lagoons should be kept free of debris and algal blooms.

If mosquitoes or other biting, flying insects are causing a nuisance, a professional pest control organisation should survey the area and make recommendations as necessary to remedy the problem.

Qualified pest control operators will hold the RSPH level 3 certificate in mosquito control.

## Midge prevention

Some dockland and canal-side regeneration schemes have experienced problems with chironomid midges breeding in large numbers in disused docks. The midges have caused significant nuisance and allergy problems for nearby residents and food contamination problems for catering premises.

Midge breeding can be reduced by retaining a flow of water through such docks. Where this is not possible, then artificial aeration may be required to reduce breeding, and in some cases pesticide use may be required although this will require the use of pesticides with special approvals.

## Housefly prevention

Significant problems with houseflies are primarily associated with inappropriate storage or disposal of putrescible or animal waste.

Putrescible waste from construction staff accommodation and from catering premises should be sited, stored and disposed of in accordance with best practice. The risk of fly problems is greatly increased in warm weather.

In the event of problems, the waste storage area may be need re-locating, the waste removed more frequently and waste containers cleaned after emptying. Inspection and treatment by a professional pest control organisation may be required.

# Annex 3 - Problems with pest birds

### Damage potential

Feral pigeons and certain species of gull, for example the Herring Gull and Lesser Black-Back Gull are potentially a source of risk to health and safety in the urban environment. A range of diseases have been shown to be carried by birds living in urban environments.

Buildings are defaced by the droppings deposited by pigeons and in some cases building structure can be undermined by the large accumulation of droppings.

The feral pigeon uses urban buildings as convenient roosting sites while waiting to feed on debris from fast food outlets and by well meaning members of the public.

Both Herring Gulls and Lesser Black-Back Gulls are becoming an increasing problem in towns and cities, nesting on rooftops. They will aggressively protect their territory, especially when they have young.

These species of bird are attracted mainly by the abundant food source available and the available roosting sites provided in towns and cities.

### Legal status

Unlike most other pest species, birds have legislative protection unless it can be proved that their presence is detrimental to man in some way.

Under the European Wild Birds Directive 1979, applied through the Wildlife and Countryside Act 1981, all wild birds, their eggs, nests and habitat are protected. However, member states may derogate from the provisions in the directive, where there is no other satisfactory solution, for the following reasons:

- In the interests of public health and safety
- In the interests of air safety
- To prevent serious damage to crops, livestock, forests, fisheries and water
- For the protection of flora and fauna

In the UK, General Licences, issued and revised annually by Natural England, list the birds that can be taken. The licences also state the reasons for such action, methods of control and that the work must be carried out by an authorised person (authorised person means the owner, occupier or someone authorised by the owner or occupier in writing).

These licences do not have to be applied for. They are a legislative means of removing the protection of certain birds, regarded as pests, from the general protection afforded them through the Wildlife and Countryside Act 1981.

### Population control

Reduction in numbers by one of the approved methods, shooting, trapping etc will provide only short term relief. This method should only be used to provide temporary relief until proofing work is complete, or to clear derelict buildings of pest birds prior to demolition.

Management of pest birds can be divided into three distinct categories:

i **Reduction/removal of food sources**
The number of birds in an area will be directly influenced by the food source available. Therefore, good waste management and discouraging members of the public from feeding the birds (mainly feral pigeons) will naturally reduce the bird numbers over a period of time.

ii **Removal of roosting sites**
Design of new buildings should take into consideration ledges, window sills and any other feature that might provide roosting sites for birds. An

angle of 45˚ or more will prevent birds from roosting. Maintenance of existing buildings should be carried out to remove potential ingress points for feral pigeons. These would include missing roof tiles, broken windows and areas where maintenance work has been carried out and holes left in the fabric of the building.

Roofs should be designed and detailed specifically to exclude birds by keeping all gaps and openings below 20mm

iii **Proofing against bird nesting and roosting**

Proofing measures such as netting and stainless steel spikes can be used to deter birds from roosting on buildings.

Netting mesh sizes for bird proofing will vary according to the species of bird. As a guide, the following mesh sizes are recommended:

- Sparrows and similar size birds - 19mm mesh size
- Starlings - 28-30mm mesh size
- Pigeons - 50mm mesh size
- Gulls - 75mm mesh size

Spike systems will deter birds from roosting on ledges that cannot be made inaccessible by netting. They should be fixed in a manner that will ensure that the ledge is adequately covered by the spikes.

Bird proofing is specialist work. An experienced installer should be consulted for advice and proofing strategies.

It should be noted that birds other than those listed on the general licences cannot be prevented from accessing their nest site during the breeding season. To do so would be a breach of the Wildlife and Countryside Act 1981 and prosecution could follow. Natural England should be consulted in all cases where non-listed birds need to be displaced.

Urban pest bird control is a complex subject and requires an integrated approach which will include waste management regimes to minimise attractive food sources; maintenance and design of buildings that will reduce potential roosting and nesting sites and proofing strategies that will exclude pest birds from prioritised areas.

# References and further reading


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