

Bishopsgate Goodsyard, London

Bat Mitigation Strategy

Report for Bishopsgate Goodsyard

Regeneration Ltd

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1 Introduction

BACKGROUND

- 1.1 The Ecology Consultancy was commissioned by Temple Group Ltd on behalf of Bishopsgate Goodsyards Regeneration Limited in March 2020 to produce a Bat Mitigation Strategy for the proposed redevelopment at the Bishopsgate Goodsyards site in Shoreditch, London.
- 1.2 The mitigation strategy is to be used to inform the outline planning application and ensure the protected species, namely roosting bats, associated with the site are protected and the functionality of the site for bats is retained during the construction and operational period of the development.

SUMMARY OF PREVIOUS ECOLOGICAL SURVEYS

- 1.3 Previous ecological surveys and assessments undertaken at the site in relation to roosting bats comprise:
- Preliminary Roost Assessment (The Ecology Consultancy, 2019a);
 - Bat Hibernation survey (The Ecology Consultancy, 2020);
 - Preliminary Ecological Appraisal (The Ecology Consultancy, 2019b); and
 - Ecological Impact Assessment (The Ecology Consultancy, 2019c).
 - Bat Activity surveys (AECOM, 2017);
 - Bat Activity surveys (URS, 2013)

SCOPE OF THE REPORT

- 1.4 The purpose of this strategy is to ensure that adverse environmental effects of development activities (specifically relating to roosting bats) are mitigated.¹

¹ This bat mitigation strategy is specific to roosting bats. Other protected species are not covered in the assessment (See Environmental Statement Addendum for other protected species (The Ecology Consultancy, 2019b))

- 1.5 The strategy has been prepared with reference to the British Standard 42020:2013 Biodiversity - Code of Practice for Biodiversity and Development (BSI, 2013) and Bat Mitigation Guidelines (Mitchell-Jones, 2004).
- 1.6 This strategy covers the works area associated with the outline development scheme proposed at Bishopsgate Goodsyards only (referred to in this document as 'the site').

IMPACT ASSESSMENT

- 1.7 An assessment is provided on the likely impacts of the development proposals on any bat roosts located within or immediately adjacent to the site boundary. This assessment is made with reference to Section 62 of the Bat Mitigation Guidelines (Mitchell-Jones, 2004) and Natural England's standing advice¹ and includes a summary of the scale of impact according to roost type and development effect². This section considers types of construction impact to bats and their roosts including; disturbance, loss, modification and fragmentation in relation to duration and timing. For the site as a whole, a statement is made on the geographic scale at which impact is deemed to be significant, following CIEEM guidance (CIEEM, 2018).

SITE CONTEXT AND STATUS

- 1.8 The site is approximately 4.16 hectares (ha) in size and is centred on Ordnance Survey National Grid reference TQ 33659 82207. The northern boundary of the site is formed by Bethnal Green Road and Sclater Street, the eastern boundary is formed by Brick Lane, the southern boundary by the Bethnal Green to Liverpool Street Railway and the western boundary by Shoreditch High Street and Commercial Street. The site largely comprised hardstanding and buildings in the northern section and continuous scrub, tunnels and archways in the southern and eastern sections, with smaller areas of ephemeral/short perennial vegetation, scattered scrub, semi-improved grassland and trees. The wider surrounding area is predominantly urban and largely made up of residential and commercial areas. The nearest significant areas of green space comprise Spitalfields City Farm and Allen Gardens 100 metres (m) to the south-east of the site, which is a Site of Borough Importance for Nature Conservation (SBINC).

DEVELOPMENT PROPOSALS

- 1.9 The proposed scheme is only in outline at present. As such full construction and operational details are not available. At this stage, it is understood that the outline

² *Bats: surveys and mitigation for development projects*, first published 28 March 2015

development proposal is for a multiphase development with a mix of office, retail and residential space. The station and listed railway arches will be retained and refurbished. All other tunnels and archways will not be retained. A new park is proposed in the south-east of the site above the railway arches. Biodiverse roofs are proposed throughout the development.

RELEVANT LEGISLATION AND PLANNING POLICY

1.10 The following key pieces of nature conservation legislation are relevant to this strategy. A more detailed description of legislation is provided in Appendix 2:

- The Conservation of Habitats and Species Regulations 2017 (as amended) (commonly referred to as the Habitats Regulations);
- Wildlife and Countryside Act 1981 (as amended);
- Natural Environment and Rural Communities Act 2006; and
- Wild Mammals (Protection) Act 1996.

1.11 The National Planning Policy Framework (Ministry of Housing, Communities and Local Government, 2019) requires local authorities to avoid and minimise impacts on biodiversity and, where possible, to provide net gains in biodiversity when taking planning decisions.

2 Review of Existing information

Bat Activity Surveys 2013

- 2.1 During the surveys undertaken by URS in 2013 (URS, 2013) it is understood that no bats were recorded emerging or returning to the structures during the summer months; however, the upper levels of the site were found to support at least three species of bat, which used the site for foraging purposes. These were common pipistrelle, soprano pipistrelle, and Nathusius' pipistrelle.

Bat Activity Surveys 2017

- 2.2 Update surveys in 2017 undertaken by AECOM had similar results to those obtained by URS in 2013, with no bats recorded emerging or re-entering the structures during the summer months (AECOM, 2017 & URS, 2013). As well as the three pipistrelle species previously recorded, three myotis calls were also identified during the static detector activity surveys. The most frequently recorded species on the majority of survey visits were common pipistrelles (The Ecology Consultancy, 2019).

Ecological Impact Assessment and Preliminary Ecological Appraisal 2019

- 2.3 The site is not subject to any statutory nature conservation designations and no statutory sites are present within 1 kilometre (km) of the site and no sites with international statutory designations are located within 5km of the site.
- 2.4 Six non-statutory sites designated as Sites of Importance for Nature Conservation (SINCs) are present within 1km of the site. The closest of which is Spitalfields City Farm and Allen Gardens SBINC 100m south east of the site.
- 2.5 The site largely comprised hardstanding and buildings in the northern section and, continuous scrub, tunnels and archways in the southern and eastern sections, with smaller areas of ephemeral/short perennial vegetation, scattered scrub, semi-improved grassland and trees. In places, these habitats qualified as Open Mosaic Habitats on Previously Developed Land (OMHPDL), a Habitat of Principal Importance. The area of OMHPDL had decreased from 1.62ha, as recorded in the original Preliminary Ecological Appraisal (PEA) in 2013, to 0.53ha, owing to the succession of continuous scrub (The Ecology Consultancy, 2019b).

Preliminary Roost Assessment and Hibernation Survey 2019-2020

- 2.6 No bats or evidence of hibernating bats were recorded during the inspection of the on site railway arches / tunnels. However, features with potential to support hibernating bats were present on the structures.
- 2.7 The data search returned seven records for three species of bats from 1985 to 2018 and four historic or extant European Protected Species Mitigation (EPSM) licences for two species within a 2km radius of the site.
- 2.8 Bat activity was recorded during the survey by the static detectors in the east of the site, with common pipistrelle bats recorded on four nights in January 2019.
- 2.9 The microclimatic conditions of the structures were reviewed to assess the suitability of the features to support roosting bats during hibernation. The temperature and relative humidity readings indicated that the railway arches / tunnels and their features were suitable to support hibernating bats.
- 2.10 The land immediately adjacent to all four railway tunnel / archway areas was varied with both disused brownfield land, areas in use as sports grounds and railway lines. Whilst, within each area there were features that were not subject to artificial lighting, the areas surrounding the site were highly likely to be subject to levels of artificial lighting given the proximity of the offsite high rise commercial buildings and adjacent sport pitches with floodlights.
- 2.11 A precautionary approach to the works was recommended, and the mitigation hierarchy must be implemented and any potentially disturbing works to be avoided in the first instance.

Importance of the site for bats

Roosting

- 2.12 A number of limitations were associated with the hibernation survey. As such, the presence of hibernating bats could not be discounted (The Ecology Consultancy, 2020). Different species and individuals select the location which best suits their needs and, as such, the different and varied potential roost features within the tunnels may be suitable at various times during the hibernation season. Current best practice guidance states the absence of a hibernation roost is difficult to demonstrate and in

some cases it may be prudent to assume a suitable site underground in good habitat and close to other known roost sites is used by bats (Collins, 2016).

2.13 Given the urban context of the site with levels of artificial lighting, limited connectivity and patches of suitable habitats, the likelihood of bats finding and utilising the potential roost features identified on site for hibernating is significantly reduced. However, a small number of bats were recorded on the static detectors and it must be noted that whilst the majority of tunnels / railway arches were inspected during the hibernation survey not all areas could be inspected.

2.14 A small number of records of bats were received from the local bat group. In total, three species of bat, common pipistrelle, Nathusius' pipistrelle and noctule bat, were recorded within a 2km radius and the closest record was 220m south-east of the site. During the summer activity survey undertaken by URS and AECOM in 2013 and 2017 respectively, four species (soprano pipistrelle, Nathusius' pipistrelle, common pipistrelle and Myotis species) were recorded foraging intermittently in low numbers on the site (AECOM, 2017). These species are considered of local importance due to their relatively common and widespread status within London. However, given the limitations of the survey that cannot be overcome through further survey due to the nature of the site and its inherent limitations, the importance of the site for roosting bats during the hibernation period has been assessed on a precautionary basis. Accordingly, whilst no roosting bats were found during the hibernation survey or during the summer activity survey, it is assumed that the tunnels / archways on site provide a supporting function for small numbers of common species during the bat hibernation season. Therefore, the site is of moderate conservation significance (Mitchell-Jones, McLeish, 2004). Sites with this function for the species and number of bats mentioned above within London are not considered common. Therefore, the site is assumed to have up to Metropolitan level importance for roosting bats.

Bat foraging and commuting habitats

2.15 The land immediately adjacent to four railway tunnel / archway areas on site was varied with both disused brownfield land, areas in use as sports grounds and railway lines. The largest area of disused brownfield land was present above tunnels in the south of the site. Habitats comprised continuous scrub and scattered scrub with trees. In the centre of this area was a tree line which led to two holes in the ground that led to tunnels beneath. No artificial lighting units were present in this area. However, it

was likely to be subject to levels of artificial lighting given the surrounding offsite high rise commercial buildings and adjacent sport pitches with floodlights.

2.16 The railway lines immediately south of the site lacked vegetation with only a small section of scrub. However, they were well linked to suitable bat foraging and commuting habitats within the surrounding area including parks, church grounds, gardens and tree lines. It is considered likely that the railway line provides a suitable foraging and commuting route for bats to find and utilise the features present. Given the variable levels of connectivity across the site, urban context with human disturbance and lighting levels, the habitat is unlikely to support large numbers of bats or rare species as suggested by the bat activity surveys carried out to date.

3 Risk Assessment of Potentially Damaging Development Activities

- 3.1 All British species of bat are listed on Schedule 5 of the Wildlife and Countryside Act 1981 (as amended) and Schedule 2 of the Conservation of Habitats and Species Regulations 2017 (as amended). Under this legislation it is an offence to deliberately capture, kill, disturb a bat and to damage, obstruct or destroy a bat roost.
- 3.2 A risk assessment of all the proposed construction and operation-related activities likely to impact upon roosting bats and their habitats associated with the site is detailed below and presented in Table 1. This risk assessment should be cross-referenced with the Ecological Constraints and Opportunities Plan (ECOP) provided in Appendix 3. The ECOP presents habitats on the site and gives spatial context to the ecological constraints and biodiversity protection areas associated with roosting bats and the development risks are outlined below.

Table 1 - Potential impacts on habitats and roosting bats on site

Activity	Protected Sites/local area	Roosting bats
Removal and pruning/cutting of trees, shrubs, and ground vegetation	None anticipated	Destruction of bat foraging and commuting habitats.
Working near railway line	None anticipated	Disturbance of bat foraging and commuting and/or fragmentation of flight lines via lighting and noise
Temporary storage areas and stockpiles for soils, materials, spoils and waste	None anticipated	Obstruction of potential roost features and disturbance of foraging and commuting bats via lighting.
Installation of physical protection measures e.g. fencing, scaffolding	None anticipated	Obstruction of potential roost features
Ground investigations, foundations, excavations and temporary earthworks	None anticipated	Damage or destruction to potential roost features. Disturbance of a roost and/or flight lines due to lighting, vibration and noise.
Dust, noise and vibration	None anticipated	Disturbance of roosting bats. Abandonment of roost.
Repointing retained archways/tunnels	None anticipated	Bat roost damage, destruction and disturbance. Killing and injury of roosting bats
Creation of new openings in the archways/tunnel brick walls for access and shop fronts	None anticipated	Bat roost damage and destruction. Killing and injury of roosting bats

Activity	Protected Sites/local area	Roosting bats
Demolition of archways	Hibernation roost loss	Bat roost damage and destruction. Killing and injury of roosting bats
Infilling of subterranean archways and tunnels	Hibernation roost loss	Killing and injury of roosting bats. Bat roost damage and destruction.
Increased lighting	Fragmentation of bat flight lines across the landscape and thereby affect the local bat population	Disturbance to a roost site and important bat foraging and commuting routes.
Increase in traffic movements (deliveries, materials, etc.)	None anticipated	Disturbance to a roost site and important bat foraging and commuting routes. Obstruction of roost
Pollution (air, water and ground)	Damage to adjacent ecologically valuable habitats	None anticipated
Installation of underground services (e.g. pipes, electricity, gas, foul and surface water drains).	Hibernation roost loss	Killing and injury of roosting bats. Bat roost damage and destruction.

Activity	Protected Sites/local area	Roosting bats
Lighting	Disturbance of roosting bats/fragmentation of flight lines within local landscape	Disturbance of roosting bats/fragmentation of flight lines. Abandonment of roost.
Increase noise and vibration	Disturbance of roosting bats/fragmentation of flight lines within local landscape	Disturbance of roosting bats/fragmentation of flight lines. Abandonment of roost.
Habitat management	Disturbance of roosting bats/fragmentation of flight lines within local landscape	Disturbance of roosting bats/ fragmentation of flight lines.

Hibernation roost loss

- 3.3 Given the results of the hibernation survey it can be assumed that in the absence of mitigation the development would result in the destruction and permanent loss of roosts for small numbers of common species.
- 3.4 It is understood all areas will be subject to demolition and refurbishment works with the exception of the subterranean archways and archways / tunnel east of Wheeler Street which will be retained (Appendix 3, Figure 1, BPZ3). However, the retention of the subterranean section is also dependent on detailed construction designs that are not available at present due to the outline stage of the proposed development. For example, infilling, and therefore potential roost feature modification/removal, may be required for stability and structural purposes in light of works required on the upper levels directly above them.
- 3.5 In the absence of mitigation, potential roost features within archways / tunnels which shall be retained are also considered likely to be affected by the proposals due to the proposed function of the site for recreation and commercial use. Indirect impacts from the proposed development such as disturbance via vibration, noise and lighting could deter roosting bats from using the site and/or cause abandonment of a roost site. Furthermore, during the construction and operation phases of the development there is also a risk of obstructing a roost site. For example, due to the placement of construction materials or through refurbishment works. During construction works to the potential bat hibernation features such as repointing, breaking out and resurfacing there is also a risk of death or injury of bats.

Foraging and Habitat loss

- 3.6 The removal of foraging and commuting habitats such as scrub and OMHPDL on site to facilitate the development has the potential to affect roosting bats. As stated under paragraph 2.16 bat foraging and commuting habitats play a key role in a bat finding and utilising a roost and therefore provide a supporting function to a roost site on site and those within the local landscape. The habitats may provide a stepping stone across the area for the local bat population to navigate. Indirect impacts such as lighting can also prevent habitats providing a supporting function for bats and cause important flight lines throughout the landscape to be fragmented.

Scale of impact

- 3.7 No hibernating bats were found during the survey. However, given that the limitations of the survey cannot be overcome by further survey due to access restrictions and the nature of the potential roost features, it is assumed that the site provides a hibernation site for small numbers of common species, of moderate conservation significance (Mitchell-Jones, 2004). The development proposal comprises the removal of bat habitat and potential roost sites. In the absence of mitigation and by applying a precautionary approach, the proposals are considered to have a high impact on the favourable conservation status of the bat species likely to be present.

4 Identification and protection of biodiversity protection zones

4.1 The Biodiversity Protection Zones (BPZs) detailed on the ECOP map in Appendix 3 and outlined below have been used to identify the following:

- important bat habitats that are to be retained and protected during construction;
- areas that are to be restricted for some or all construction-related activities;
- areas where protective measures are to be installed; and
- areas for construction-related activities necessary to implement the proposed development.

BPZ 1 – Eastern Braithewaite Tunnel / Archways

4.2 The BPZ1 comprises the following features of value to hibernating bats that require protection and mitigation measures implemented:

- Ground floor level archways / tunnels east of Wheler Street (Appendix 1, Photographs 1 - 4);
- Subterranean sections that extend underneath the ground level archways / tunnels. Their extent is unknown; and
- Suitable foraging and commuting habitats adjacent and above tunnels / archways in the form of OMHPDL, scattered trees and scrub.

BPZ 2 – Western Braithewaite Tunnel / Archways

4.3 The BPZ2 comprises the following features of value to hibernating bats that require protection and mitigation measures implemented:

- Ground floor level archways / tunnels with potential roost features west of Wheler Street (Appendix 1, Photographs 6 & 7); and
- Suitable foraging and commuting habitats adjacent and above tunnels / archways in the form of OMHPDL, scattered trees and scrub.

BPZ 3 – Southern subterranean tunnels

4.4 The BPZ3 comprises the following features of value to hibernating bats that require protection:

- Subterranean tunnels that extend underneath the ground level archways / tunnels and have connectivity further underground via the London Underground tube network (Appendix 1, Photographs 10 & 11); and
- Suitable foraging and commuting habitats adjacent and above tunnels / archways in the form of OMHPDL, scattered trees and scrub.

BPZ 4 – A10 Tunnels / Archways

4.5 The BPZ4 comprises the following features of value to hibernating bats that require protection and mitigation measures implemented:

- Ground level archways that are fully/partially enclosed by brick walls and metal fencing with bat hibernation features and likely to provide suitable humidity levels and temperatures (Appendix 1, Photograph 12).

BPZ 5 – Railway lines

4.6 The BPZ5 comprises the following features of value to hibernating bats that require protection:

- Suitable linear routes with potential to provide important bat foraging and commuting routes from the site to the wider landscape (Appendix 1, Photograph 13).

5 Practical measures to avoid or reduce impacts during the construction and operational phases

Summary

- 5.1 The conservation status of the bat assemblages at the proposed site is dependent on the presence of structures (tunnels / archways) with suitable roosting features on site and adjacent commuting and foraging habitat and low levels of artificial lighting. In accordance with the Bat Conservation Trust Guidance, if a roosting site cannot be retained in situ or will be modified by development or maintenance works, then the works must ensure the roost must be restored to its former roosting opportunities or created to mimic the roost lost (Collins, 2016).
- 5.2 In accordance with Section 2, a precautionary approach to the development proposal has been taken. Whereby, works to the tunnels / archways with potential to support roosting bats on site (BPZs 1-5) are considered to have an effect on the conservation status of hibernating bats. Mitigation will accord with the mitigation hierarchy to minimize impacts, and maximize benefits for biodiversity (CIEEM, 2018).
- 5.3 An appropriate mitigation strategy will be implemented to ensure no net loss of roost sites and their associated habitats as follows:
- Works that will alter or modify the potential roost features will only take place following the provision of suitable alternative hibernation roosting sites to ensure the site continues to provide potential hibernation roost features and importantly retain its functionality for roosting bats during and post development. To ensure the alternative roost is suitable to support hibernating bats, at least 1 years monitoring is to be undertaken comprising hibernation checks and temperature and humidity monitoring;
 - Precautionary method of works such as timing, season and method restrictions will be in place to reduce the likelihood of hibernating bats being disturbed, killed or injured during the works;
 - All works to the tunnels / archways with potential to support hibernating bats will be supervised by a suitably qualified ecologist; and

- In the event that a hibernating bat(s) is found, all works will stop immediately and Natural England consulted.

5.4 Overall, with the adoption of the measures listed above and detailed below, it is anticipated that the construction and operation phase of the proposed development will not significantly impact the conservation status of the bat assemblage on site.

Retention and modification of roosts

5.5 Due to the nature of the development and required construction activities it is understood that the majority of the potential hibernation roost features shall be impacted indirectly and/or directly and cannot be avoided. There is potential for the subterranean tunnels in BPZ3 to be retained however, at present this is not known with certainty. Given construction plans are in outline at present and the scope of construction is not detailed at this stage it is not possible to state the chosen location of the replacement roost. For example, the orientation, location and height of buildings, artificial lighting and surrounding environment proposed on site may vary considerably given the iterative nature of development planning and it is envisaged that its implementation will be secured by an appropriately worded planning condition.

New roost creation and enhancement of existing tunnels / archways

5.6 The retention and enhancement of the subterranean section of the site in the south (BPZ3) with potential to support roosting bats shall be sought in the first instance to ensure suitable roosting provision is provided and there is not a loss of potential roosts. Should it not be possible to retain and enhance the subterranean section with hibernation potential the next step will be to create an alternative hibernation roost site within the subterranean level of the site. The creation of new roosts on site in this scenario is considered the most suitable option to compensate for the loss of the potential roost sites. Should it not be possible to provide the new roosts on site, a suitable and proportionate offsite location to compensate for the potential roost lost shall be sought. The replacement roost site will be determined and in place prior to the commencement of works to the tunnels / archways.

5.7 Measures to be undertaken to ensure the functionality of the proposed hibernation roost site and the hibernation roost specification is provided below:

Existing potential roost site protection and enhancement

- 5.8 Should it be possible to retain subterranean section (BPZ3), it will be protected from construction works, the integrity of the underground tunnels / archways within shall not be subject to works, except by approval from a suitably qualified ecologist.
- 5.9 Suitable signage will be provided to inform all contractors that the area is inaccessible except for ecological monitoring purposes.
- 5.10 The underground tunnels / archways shall be enhanced through the provision of additional hibernation features as provided below under 'New Roost Provision'. Additional access features shall also be required to increase the likelihood of bats finding and utilising the roost site with consideration to the thermal properties of the roost site.

New roost provision

- 5.11 A new bat hibernation site shall be constructed as direct replacement for the loss of the features within BPZ1-3 if the subterranean area cannot be retained and enhanced. Its specification is detailed below:

Location – on site

- 5.12 The onsite hibernation roost provision must be situated in a location with connectivity to the local landscape. The species of bat recorded on static detectors (Common pipistrelle) on site during the hibernation period has an average Core Sustenance Zone (CSZ)³ is 2.5km as such, connectivity to surrounding habitats of value to bats must be retained and commuting and foraging routes maintained. In certain circumstances, important foraging areas and/or commuting routes can be regarded as being afforded de facto protection, for example, where the continued usage of such areas is crucial to maintaining the integrity and long-term viability of a bat roost.
- 5.13 The replacement roost is proposed to be built within the subterranean section that at present is due to be retained. Two rooms in this location will ensure that roost sites are maintained on site in line with existing features (see location plan in Appendix 3, Figures 2 & 3). This location is optimal as the likelihood of bats finding and utilising it is increased. It lies immediately adjacent to the main railway lines which is considered likely to provide a key foraging and commuting route that links bats within the local area to the site. Furthermore, this location provides the best opportunity to maintain the existing climatic

³ A core sustenance zone (CSZ) refers to the area surrounding a communal bat roost within which habitat availability and quality will have a significant influence on the resilience and conservation status of the colony using the roost (BCT, 2016)

conditions such as stable temperature and humidity conditions necessary for hibernation.

Lighting

5.14 The alternative roost will be located where artificial lighting units are not proposed and therefore lux levels are at the lowest possible. At present, the site is subject to a degree of artificial lighting given its urban context with high rise office towers and MUGA sports pitches nearby. However, features below ground and those that extend into the crevices of the archway / tunnel are subject to low levels and they provide stable temperature and humidity levels, which are key hibernation roost requirements. During hibernation, bats need roosts that are cool and remain at a constant temperature (BCT, 2019). As such, the alternative hibernation roost provision will be enclosed with only access features for bats and a single entrance for monitoring purposes only.

Access points

5.15 An update survey of the current potential access points shall be undertaken for the subterranean tunnels. At least two potential access points shall be present, letterbox size in shape with a textured surface beneath measuring approximately 25 millimeters (mm) high x 16mm long (English Heritage, Natural England, National Trust, 2009).

Roosting site size and materials

5.16 Guidance states that a replacement roost with a footprint of less than approximately 5m x 4m and a total height of less than 5m is unlikely to be successful (Mitchell-Jones, McLeish, 2004). The alternative site will mimic the hibernation features being lost and aim to replace like with like as much as practically possible. As stated above, it is proposed that two rooms with the subterranean area in BPZ3 are used. Whilst one room would meet the dimensions above, more than one is suggested to increase the microclimates available.

5.17 The building should be designed so as to provide a suitable thermal regime. In accordance with guidance, hibernation sites should be sufficiently large to achieve stable winter temperatures of 0-6°C for Vespertilionid bats (Mitchell-Jones, McLeish, 2004). They should also be draught free and provide stable humidity and temperature levels (English Heritage, Natural England, & National Trust, 2009).

- 5.18 A variety of roosting opportunities and thermal regimes should be provided to maximise the value of the subterranean area to bats. Research suggests that any artificial roosting sites should contain a variety of crevice widths (13–70 mm) and depths (350–>1000 mm) for summer roosts, and deeper for winter hibernation sites.
- 5.19 It is proposed that at least eight bat bricks of various type are installed within the tunnels (See Appendix 1, Photographs 14-16 for examples). In addition, at least three woodcrete bat boxes should be provided. The bat bricks will mimic natural gaps between stonework and brickwork. Partially blocked arches are also known to be suitable as hibernacula. Where feasible areas could be partially enclosed to provide a different microclimate. A grille would be fitted in the unenclosed section with a hinged door for monitoring purposes by a bat licenced ecologist.

Monitoring

- 5.20 As stated in the bat mitigation guidelines, mitigation should aim to ensure that the bat population will be free from further disturbance, and is subject to adequate management, maintenance and monitoring. The roost site shall be monitored for at least two years (Mitchell-Jones, McLeish, 2004).

PRECAUTIONARY METHODS OF WORK

Seasonal restrictions

- 5.21 Works to the potential roost features will be undertaken under ecological supervision, outside the bat hibernation period (mid October – end April, weather permitting). In line with the bat hibernation report (The Ecology Consultancy, 2020) and described below, bat boxes proposed within the landscape scheme should also be installed prior to the works.

Timing

- 5.22 Work to or within proximity to the tunnels / archways must not be undertaken during the night.

Equipment

- 5.23 Works to the tunnels / archways with potential to support hibernating bats will be undertaken with low vibration methods and vibration works will be kept to a minimum.

Ecological supervision

- 5.24 All works to the potential roost features and any works that have the potential to impact the features will be supervised by a bat licenced ecologist or accredited agent. Contractors will be instructed by the bat licenced ecologist or accredited agent in a toolbox talk before the works. They will be informed of this mitigation strategy, the role of the licenced ecologist and accredited agents and will be advised on how to minimise impacts to hibernating bats. Contact details for the licenced ecologist will also be provided.
- 5.25 Where new previously inaccessible areas are to be subject to works (i.e. enclosed areas or crevices that have become exposed) they will first be subject to a preconstruction check by a suitably qualified ecologist. The preconstruction check shall only take place if it is safe to do so. Depending on the proposed works and nature and shape of the potential roost feature it may be necessary to remove parts of the feature under soft strip methods whereby, the features are dismantled gradually by hand to allow detailed inspection by the ecologist using torches and endoscope, where required. Where it is confirmed by the ecologist that bats are absent works may commence.
- 5.26 If bats are discovered, works to the area must stop immediately. Contractors must not touch or handle bats if found. The ecologist will capture and care for the bat appropriately in accordance with the Bat Workers Manual (Mitchell-Jones, McLeish, 2004). If injured the bat shall be kept in a cotton bag or ventilated box in a temperature stable and dark location. The local bat group will be contacted and advice from a bat carer requested. Should a bat be suitable for release it shall be placed into a bat box provided on the site prior to the commencement of works.
- 5.27 Works on site must not recommence until a licence from Natural England is obtained.

Lighting

- 5.28 A sensitive lighting strategy to avoid illumination of existing and newly created foraging and commuting habitats and the hibernation roosts for bats will be followed in accordance with the Environmental Statement Addendum and Bat Survey report (The Ecology Consultancy, 2019b & AECOM, 2017, The Ecology Consultancy, 2020) and BCT, ILP Guidance (BCT, ILP, 2018).
- 5.29 Lighting during the construction phase will largely be limited to the winter months when conditions will be dark during working hours and night time lighting may be required in certain phases of the construction works but will be kept to a minimum. Bats hibernate in the winter and are therefore not sensitive to lighting unless it is directed at hibernation

roosts. Lighting will only be directed towards working areas, away from commuting and foraging features, such as areas of scrub and tree lines.

- 5.30 Lighting during the operation phase must be carefully managed. Based on expert guidance, lighting impacts on bats are considered more likely above one lux at 2.5m vertical distance above ground level. This light threshold is predominantly pertinent to bats of the *Myotis* and *Plecotus* genera, which are considered more light sensitive. Other species are likely to be impacted by higher light levels (Stone, E.L, 2013 & Fure, 2006). Given the urban context of the site and current artificial lighting on site, it would not be proportionate or feasible to ensure all habitats on site are limited to 1 lux. To inform appropriate lighting levels current lux levels on the habitats with potential to support bats and off site railway lines to the south shall be obtained and used as a baseline. The lighting strategy will be produced with an ecologist. The ecologist will review proposed lux plans. Lux plans are to be provided using a maintenance factor of 1 and measuring level of light at 2.5m on the vertical and horizontal plane in accordance with best practice guidance (BCT, ILP, 2018). See Preliminary Roost Assessment (The Ecology Consultancy, 2019a) for lighting recommendations.

Habitat provision – boxes for shelter

- 5.31 At least two bat boxes are to be installed on suitable retained trees onsite to provide additional bat roosting opportunities. They should be positioned between 3-5m above ground level facing southeast – southwest and protected from artificial lighting.
- 5.32 Schwegler bat boxes are made from woodcrete, and as such, are long lasting compared to wooden boxes and insulates occupants from extremes of temperature and condensation. Equivalent woodcrete boxes are provided by other suppliers, but should be checked with a suitably qualified ecologist before buying. This will enhance the site for bats through the increased roosting opportunities for these species.

Habitat provision – food sources

- 5.33 In accordance with the PEA (The Ecology Consultancy, 2019a) wildlife planting shall be integral to the soft landscape plans and shall be included within a Landscape and Ecological Management Plan (LEMP) to include native species and/or species of recognised wildlife value. The post-development landscape design shall utilise native and non-native plant species of recognised wildlife value. Shrubs and herbaceous perennials proposed within the residential development will comprise night scented plants and those that flower such as honeysuckle, night scented stock, evening primrose

and Nottingham catchfly to attract moths and other night flying insects which in turn provide a valuable food source for bats on site. A lists of plants of value to bats can be found here: <https://www.rhs.org.uk/advice/pdfs/plants-for-bats.pdf> and at: <http://www.suffolkwildlifetrust.org/attracting-bats>

5.34 Native tree planting will also follow guidance given in the Forestry Commission Practice Note 8a (Herbert et al, 1999). A list of reputable suppliers is available from the Flora Locale website: www.floralocale.org.

5.35 All plants shall be fed using organic based fertilisers and the soil structure will be improved by incorporating organic material, preferably composted waste. The use of pesticide (herbicides, insecticides, fungicides and slug pellets, etc.) shall also be discouraged to prevent cumulative fatal effects to animals via the food chain.

Roost site safe guarding

5.36 All contractors will be made aware that the following applies to areas of retained bat habitats onsite or adjacent to the works boundary (to safeguard roosting bats):

- no storing of vehicles, soils, materials, spoils or waste;
- no storing of oils, fuels or chemicals;
- no excavations, piling or tunnelling;
- no ground investigations or installation of underground services unless works agreed with and overseen by an Ecological Clerk of Works (ECoW); and
- any cutting of construction materials such as concrete or ground breaking works will be carried out on the hardstanding away the hibernation roost site to limit noise pollution and vibration to the roost site and immediately adjacent railway lines.

5.37 Appropriate signage will be used as described below (See example Appendix 1, Photograph 17). Maintenance of the bat boxes and hibernation roost provision will be the responsibility of the developer during the construction period and for at least five years post development.

The Timing of Sensitive Works and Presence of ECoW

5.38 A timetable of works which outlines, where applicable, the months in which the practical measures described above should be implemented is presented in Table 3 below. This also indicates for which activities an ECoW will be required to be present.

Responsible Persons and Lines of Communication

- 5.39 All contractors working on site will have access to this mitigation strategy and be given a toolbox talk by the ECoW prior to undertaking works on site. Information will be provided to explain the importance of sensitive bat roosting features at the site and the associated protection measures to be employed.
- 5.40 It will be made clear to all contractors that should any unexpected discoveries of any protected species be made during construction, works will cease in the area and the ECoW contacted immediately.
- 5.41 Details of personnel and lines of communication necessary for full implementation of the mitigation strategy are presented in Table 3 below. This is provided to ensure that the project team know who to liaise with and which personnel are responsible for undertaking the required tasks.

Table 3: Responsible persons and lines of communication

Information required	Responsible person	Line of communication
a) Advice and monitoring in relation to regulations, legal consents, planning conditions, environmental procedures and contractual arrangements.	ECoW, The Ecology Consultancy	Request for advice or monitoring received from the client Project Manager.
b) Correct installation and maintenance of physical protection measures.	Lead Contractor (TBC)	Advice on the correct installation and maintenance of any fencing received from the client Project Manager.
c) Training and toolbox talks for staff.	ECoW, The Ecology Consultancy	Request for training and toolbox talks received from the Lead Contractor (TBC) or the client Project Manager.
d) Contingency measures in the event of an accident or occurrence of other potentially damaging incidents.	Lead Contractor (TBC)	Advice on contingency measures in the event of an accident received from the ECoW, The Ecology Consultancy and the client Project Manager.
e) Periodic reporting on the success of a) to d) as required, for example, by planning conditions.	Lead Contractor (TBC), ECoW, The Ecology Consultancy and the client Project Manager.	All reporting fed back to the client Project Manager.

The Role of the ECoW

5.42 The responsibilities of the ECoW are as follows:

- review and update the ECOP and risk assessment (where necessary);
- review and update the BPZs (where necessary);

- review and update the practical measures to avoid and reduce impacts on hibernating bats, achieve ecological mitigation, compensation and enhancement (where necessary);
- review and update the timing of sensitive works during construction and implementation (where necessary);
- monitor site works and practical undertaking of ecological works;
- provide toolbox talks;
- monitor and report on compliance with legal and planning requirements in relation to hibernating bats;
- investigate and report unplanned incidents (e.g. pollution, damage to habitats, unexpected occurrence of protected species, implications of delays due to bad weather); and
- provide further advice to the client / site manager on any of the above as necessary.

5.43 The ECoW role will be fulfilled by the involvement of a number of competent persons with differing skill sets. Where less experienced ecologists are placed in this role they will be adequately supported by more senior staff, who will be accessible to give advice and guidance at all times.

Protective fencing, wildlife exclusion barriers and warning signs

5.44 The types of fencing to be installed on the site include the use of on ground hoarding and heras fencing around the works areas and suitable areas for storing equipment away from roost features. Signage will also be provided for the bat hibernation roost location to ensure no unauthorised access and works within its proximity (See example Appendix 1, Photograph 17).

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- URS (2013) Bishopsgate Goodsyards. Bat Survey Report

Appendix 1: Photographs

Photograph 1
BPZ1 main tunnel / viaduct with nine tunnels on the right.



Photograph 2:
BPZ1 raised section (circled in red)
with hole leading to underground
archways / cellar



Photograph 3:
BPZ1 underground cellar / archway
seen through a hole beneath raised
section within a tunnel.



Photograph 4:
BPZ1 gaps between pipework and brickwork.



Photograph 5:
BPZ1 southern elevation of the tunnels in the south of the site adjacent to railway lines.



Photograph 6:
Western section of BPZ2



Photograph 7:
Eastern section of BPZ2.



Photograph 8:
Small dark voids in the piers of the tunnels of BPZ2 which had a metal grill.



Photograph 9:
Large gaps between tunnel section joins in BPZ2.



Photograph 10:
Subterranean rooms located in
BPZ3.



Photograph 11:
Dark subterranean room with
potential bat access points at ceiling
level located in BPZ3.



Photograph 12:
Tunnels located in BPZ4 (not accessed)



Photograph 13:
Railway lines immediately south of the site adjacent to the subterranean sections (BPZ3)



Photograph 14:
Norfolk Bat brick



Photograph 15:
Schwegler bat brick 1GS



Photograph 16:
2FE Schwegler wall mounted shelter



Photograph 17:
Example bat roost warning sign
(Historic England, Natural England &
The National Trust (2009))



Appendix 2: Legislation and Policy

Important Notice: This section contains details of legislation and planning policy applicable in Britain only (i.e. not including the Isle of Man, Northern Ireland, the Republic of Ireland or the Channel Islands) and is provided for general guidance only. While every effort has been made to ensure accuracy, this section should not be relied upon as a definitive statement of the law.

A NATIONAL LEGISLATION AFFORDED TO SPECIES

The objective of the EC Habitats Directive⁴ is to conserve the various species of plant and animal which are considered rare across Europe. The Directive is transposed into UK law by The Conservation of Habitats and Species Regulations 2017 (as amended) (formerly The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)) and The Offshore Marine Conservation (Natural Habitats, &c.) Regulations 2007 (as amended).

The Wildlife and Countryside Act 1981 (as amended) is a key piece of national legislation which implements the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) and implements the species protection obligations of Council Directive 2009/147/EC (formerly 79/409/EEC) on the Conservation of Wild Birds (EC Birds Directive) in Great Britain.

Since the passing of the Wildlife & Countryside Act 1981, various amendments have been made, details of which can be found on www.opsi.gov.uk. Key amendments have been made through the Countryside and Rights of Way (CRoW) Act (2000) and Nature Conservation (Scotland) Act 2004.

Other legislative Acts affording protection to wildlife and their habitats include:

- Deer Act 1991
- Countryside and Rights of Way (CRoW) Act 2000
- Natural Environment & Rural Communities (NERC) Act 2006
- Protection of Badgers Act 1992
- Wild Mammals (Protection) Act 1996

Species and species groups that are protected or otherwise regulated under the aforementioned domestic and European legislation, and that are most likely to be affected by development activities, include herpetofauna (amphibians and reptiles), badger, bats, birds,

⁴ Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora

dormouse, invasive plant species, otter, plants, red squirrel, water vole and white clawed crayfish.

Explanatory notes relating to species protected under The Conservation of Habitats and Species Regulations 2017 (as amended) (which includes smooth snake, sand lizard, great crested newt and natterjack toad), all bat species, otter, dormouse and some plant species) are given below. **These should be read in conjunction with the relevant species sections that follow.**

- In the Directive, the term ‘deliberate’ is interpreted as being somewhat wider than intentional and may be thought of as including an element of recklessness.
- The Conservation of Habitats and Species Regulations 2010 (as amended) does not define the act of ‘migration’ and therefore, as a precaution, it is recommended that short distance movement of animals for e.g. foraging, breeding or dispersal purposes are also considered.
- In order to obtain a European Protected Species Mitigation (EPSM) licence, the application must demonstrate that it meets all of the following three ‘tests’: i) the action(s) are necessary for the purpose of preserving public health or safety or other imperative reasons of overriding public interest including those of a social or economic nature and beneficial consequence of primary importance for the environment; ii) that there is no satisfactory alternative and iii) that the action authorised will not be detrimental to the maintenance of the species concerned at a favourable conservation status in their natural range.

Bats

All species of bat are fully protected under The Conservation of Habitats and Species Regulations 2017 (as amended) through their inclusion on Schedule 2. Regulation 41 prohibits:

- Deliberate killing, injuring or capturing of Schedule 2 species (e.g. all bats)
- Deliberate disturbance of bat species as:
 - a) to impair their ability:
 - (i) to survive, breed, or reproduce, or to rear or nurture young;
 - (ii) to hibernate or migrate³
 - b) to affect significantly the local distribution or abundance of the species
- Damage or destruction of a breeding site or resting place
- Keeping, transporting, selling, exchanging or offering for sale whether live or dead or of any part thereof.

Bats are also currently protected under the Wildlife and Countryside Act 1981 (as amended) through their inclusion on Schedule 5. Under this Act, they are additionally protected from:

- Intentional or reckless disturbance (at any level)
- Intentional or reckless obstruction of access to any place of shelter or protection
- Selling, offering or exposing for sale, possession or transporting for purpose of sale.

How is the legislation pertaining to bats liable to affect development works?

A European Protected Species Mitigation (EPSM) Licence issued by the relevant countryside agency (e.g. Natural England) will be required for works liable to affect a bat roost or for operations likely to result in a level of disturbance which might impair their ability to undertake those activities mentioned above (e.g. survive, breed, rear young and hibernate). The licence is to allow derogation from the relevant legislation but also to enable appropriate mitigation measures to be put in place and their efficacy to be monitored.

Though there is no case law to date, the legislation may also be interpreted such that, in certain circumstances, important foraging areas and/or commuting routes can be regarded as being afforded de facto protection, for example, where it can be proven that the continued usage of such areas is crucial to maintaining the integrity and long-term viability of a bat roost⁵.

⁵ Garland & Markham (2008) Is important bat foraging and commuting habitat legally protected? Mammal News, No. 150. The Mammal Society, Southampton.

Appendix 3: ECOP

Figure 1 – Ecological Constraints and Opportunities Plan

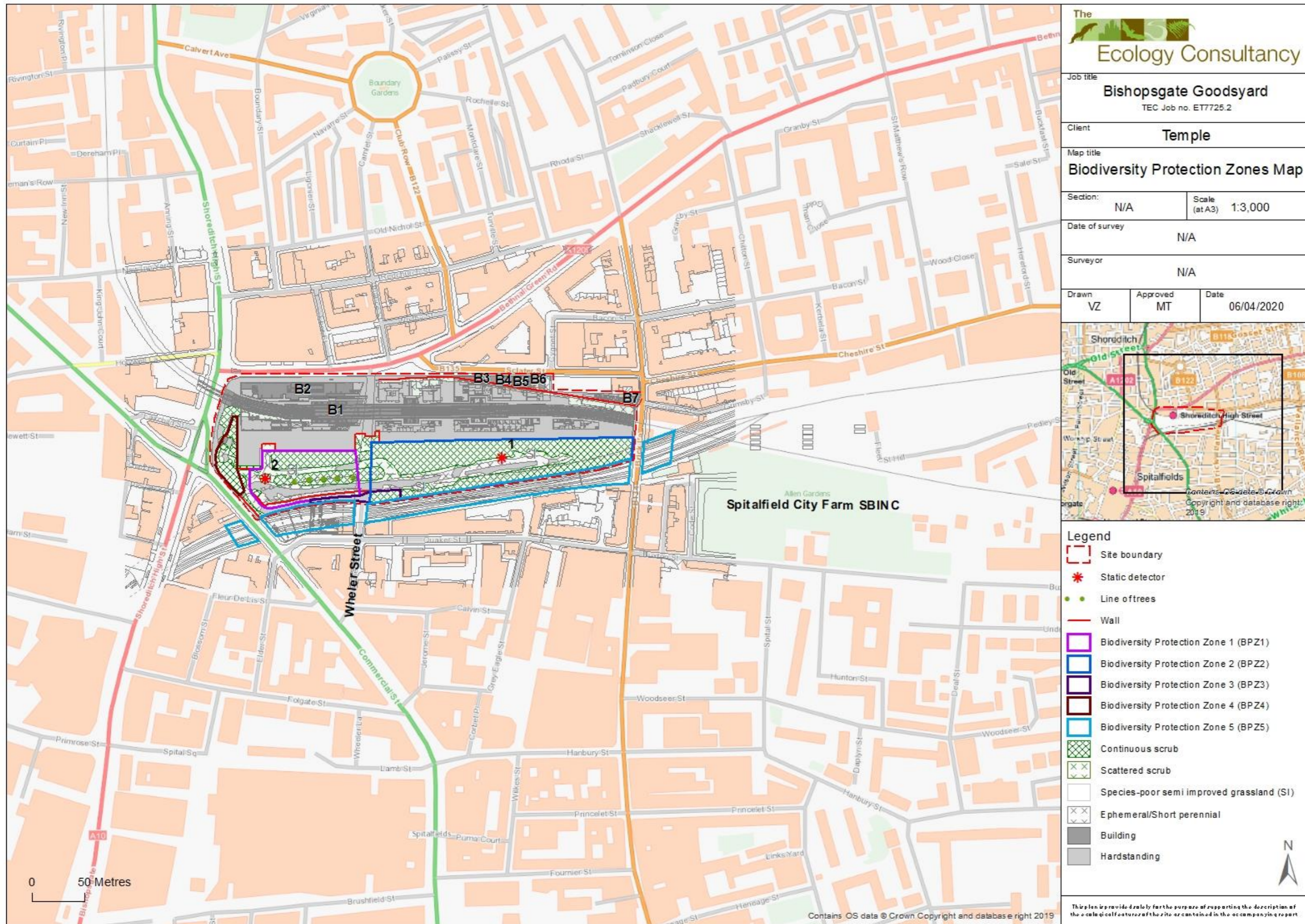


Figure 2– Proposed location of alternative hibernation roost (2) (Dark purple) (Image ref: Design and Access Statement (Ballymore, Hammerson, 2019))

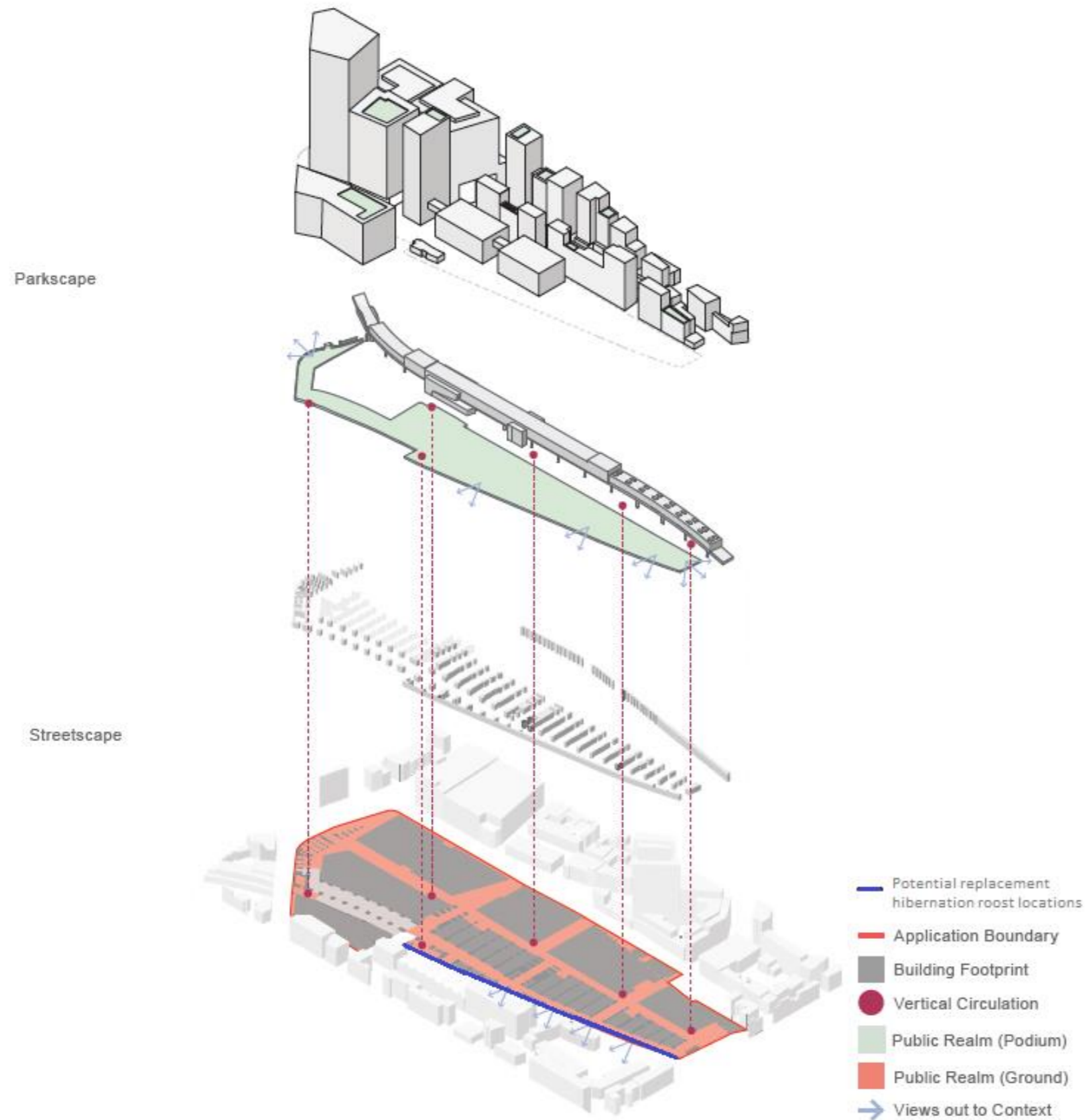
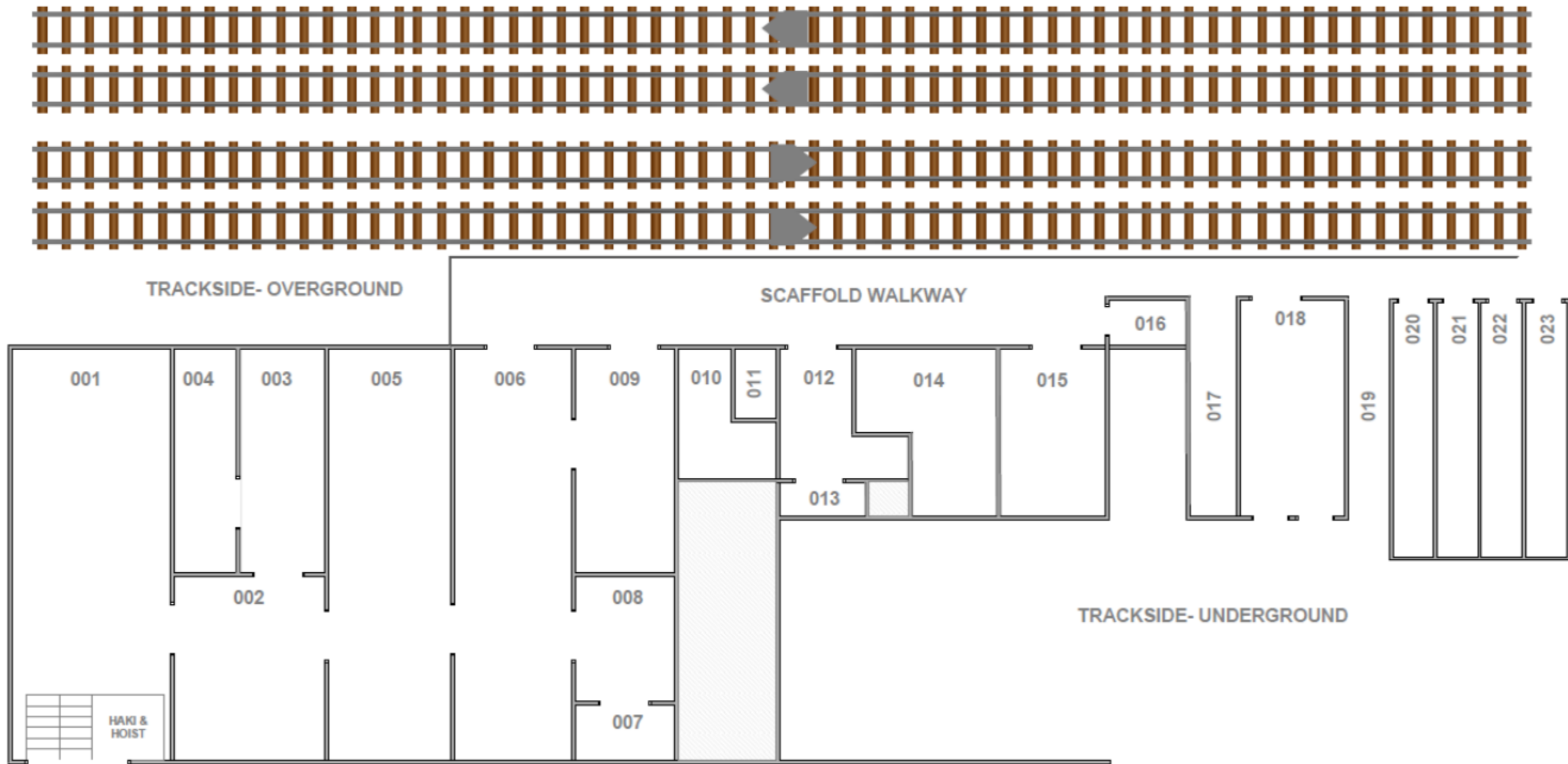


Fig 3.2.30: Response to Context Axo

Fig 3.2.31: Key

Figure 3– Proposed location of alternative hibernation roost – rooms at subterranean level

SUB LEVEL -1 ROOM LAYOUT





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