TRIPTYCH PD

LAND TO THE WEST OF HATFIELD

Environmental Statement – Chapter 16: Mitigation

Arlington Business Parks GP Ltd

Version No: FINAL
October 2018

CONTENTS

16 MITIGATION

16.1 INTRODUCTION

This Chapter of the ES draws together a summary of the mitigation measures proposed with regard to the development. Further detailed information pertaining to the proposed mitigation measures is provided within the relevant chapters of the ES.

16.2 AIR QUALITY

16.2.1 Construction Dust Phase

An assessment of the significance of impacts associated with construction phase dust has been undertaken in accordance with the IAQM methodology. A summary of the risk category associated with each identified source of construction phase dust is presented within **Error! Reference source not found.**, for the purposes of identifying mitigation requirements.

The risk of dust soiling effects is assessed as medium from earthworks, construction and trackout activities. The risk of human health effects from PM_{10} is assessed as low from earthworks, construction activities and trackout activities. No demolition is required prior to proceeding with site works and therefore this element of the assessment was screened out from further assessment in terms of identifying an associated risk and requirements for mitigation.

In order to control potential impacts, the mitigation measures presented within **Error! Reference source not found.**16.1 are proposed for the scheme. These mitigation measures should be secured by planning condition.

Table 16.1: Construction Dust Mitigation Measures

Output Parameter	Mitigation Measures
Communications	Develop and implement a stakeholder communications plan that includes community engagement
	Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary
	Display the head or regional office contact information
	Develop and implement a Dust Management Plan (DMP) which may include measures to control other emissions, approved by the Local Authority
Site Management	Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken
	Make the complaints log available to the local authority when asked
	Record any exceptional incidents that cause dust and / or air quality emissions, either on- or off-site, and the action taken to resolve the situation in the log book
Monitoring	Carry out regular site inspections to monitor compliance with the Dust Management Plan, record inspection results, and make the log book available to the local authority when asked

Output Parameter	Mitigation Measures
	Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out
Preparing and Maintaining the Site	Plan site layout so machinery is located away from receptors as far as possible
	Erect solid barriers around dusty activities or the site boundary
	Fully enclose site or specific operations where there is a high potential for dust production
	Avoid site runoff of water or mud
	Keep fencing, barriers and scaffolding clean using wet methods
	Remove materials that have the potential to produce dust from site as soon as possible
	Cover, seed or fence stockpiles to prevent wind whipping
Operating Vehicle / machinery and sustainable travel	Ensure all on-road vehicles comply with the requirements of NRMM standards
	Ensure all vehicles switch off engines when stationary – no idling vehicles
	Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable
	Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials
Operations	Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction
	Ensure an adequate water supply on the site for effective dust / particulate matter suppression / mitigation
	Use enclosed chutes and conveyors and covered skips
	Minimise drop heights
	Ensure equipment is readily available on site to clean any dry spillages
Waste Management	Avoid bonfires and burning of waste materials
Earthworks & Construction	Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out

Potential dust effects during the construction phase considered to be temporary in nature. The impacts are determined to be temporary as they will only potentially occur throughout the construction phase and short-term because these will only arise at particular times when certain activities and meteorological conditions for creating the level of magnitude predicted combine.

However, the application of the above dust control and mitigation measures, it is considered that impacts at all receptors will be 'not significant' in accordance with the IAQM guidance.

16.2.2 Construction Phase Road Traffic Emissions

Potential air quality impacts associated with construction phase road traffic emissions (principally HDV movements) have been screened out for further assessment with associated impacts on air quality predicted to result in an 'insignificant' effect. Therefore, mitigation measures are not considered to be required.

16.2.3 Construction Phase NRMM Emissions

LAQM.TG(16) guidance states that with the application of suitable control measures and site management, exhaust emissions from on-site NRMM are *"unlikely to make a significant impact on local air quality. In the vast majority of cases they will not need to be quantitatively assessed"*.

However, NRMM and plant should be well maintained. If any emissions of dark smoke occur then the relevant machinery should stop immediately and any problem rectified. In addition, the following controls should apply to NRMM:

- all NRMM should use fuel equivalent to ultralow sulphur diesel;
- all NRMM should comply with either the current or previous EU Directive Staged Emission Standards;
- all NRMM should be fitted with Diesel Particulate Filters (DPF) conforming to defined and demonstrated filtration efficiency (load/duty cycle permitting);
- the on-going conformity of plant retrofitted with DPF, to a defined performance standard; and
- implementation of fuel conservation measures including instructions to throttle down or switch off idle construction equipment; switch off the engines of trucks while they are waiting to access the site and while they are being loaded or unloaded, ensure equipment is properly maintained to ensure efficient fuel consumption.

Successful implementation of the above mitigation measures, which should be secured by planning condition, would ensure that emissions from the construction phase and NRMM used during construction are 'not significant'.

16.2.4 Operational Phase Emissions

An assessment of vehicle emissions associated with the operation of the scheme predicted the unmitigated impact to be negligible at all considered receptors resulting in an overall 'not significant' effect on air quality.

Notwithstanding, a Travel Plan is being prepared for the residential and school uses proposed. The Travel Plans for the development states the following mitigation measures which would help to improve air quality in the development locale, to be secured by planning condition. These include:

- Residential travel plan:
    - Appointment of a travel plan coordinator to oversee successful implementation of the Travel Plan;
    - Provision of residential travel packs which include information on public transport, including bus discount vouchers;
    - Provision of a new pedestrian access point to encourage walking;
    - Encouragement of car sharing; and
    - Cycling parking to be provided for each household, with cycle routes displayed to encourage cycling.
- School travel plan:

- Appointment of a travel plan coordinator to oversee successful implementation of the Travel Plan;
- Parental engagement to encourage parents to travel to the school by sustainable transport modes;
- Encouragement of car sharing; and
- Cycling parking to be provided on-site for staff and pupils;
- Cycling training to be provided to increase the uptake and use of cycling; and
- Information provided to staff and pupils / parents on public transport options.

16.3 Ground Conditions and Contamination

It is likely that a full site investigation will be required for the development to comply with planning requirements. This would include (if necessary) a remediation method statement and a verification report for approval by the local authority.

16.3.1 Construction Phase

16.3.1.1 Construction Workers

Health and safety risks to construction workers will be mitigated by the implementation of appropriate health and safety measures. Developers of each plot or sub plot will be responsible for ensuring that members of the public and site workers are protected from the potential effects of any contamination encountered during the entire construction process. Measures utilised will be incorporated within the general construction site safety standards.

The engaged contractors will carry out a health and safety risk assessment with appropriate precautionary measures planned and recorded in advance by adequately trained and qualified persons. During all works, the principles outlined in the Protection of Workers and the General Public during Development of Contaminated Land (HSE, 1991), or prevailing best practice guidelines, will be adhered to.
Points that will be considered include:

- Advising all site personnel concerning the significance of land affected by contamination and the associated risks to human health on site prior to commencing work.
- Suitable personal protective equipment (PPE), including clothing, footwear, gloves and respiratory equipment (if necessary) should be provided for all site personnel, who should be advised on the use of PPE items on the site with the items remaining on site at all times.
- Workers should not eat, drink or smoke in the vicinity of the works. Comprehensive welfare facilities should be provided for all site staff to enable workers to wash prior to leaving the site.
- Health and Safety risks to adjacent site users relating to dust, noise, odour and vibration should be appropriately addressed prior to commencement of site works.

16.3.1.2 Construction related activities

Protection of the underlying groundwater and nearby surface water from construction activities will be achieved using the following mitigation methods:

- Prevention of water entering excavations, where possible;

- Use of measures such as cut off ditches, silt fences or impermeable membranes to prevent uncontrolled release of runoff from excavations or exposed ground;
- Use of adequate wheel wash facilities to contain and dispose of potentially polluted runoff;
- Regular washing of machinery and access roads and dampening to reduce dust emissions with appropriate collection and disposal runoff.

16.3.2 General

A construction environmental management plan will be prepared and implemented by the contractors of each zone prior to the commencement of the respective construction phases. Mitigation measure will be implemented during the construction phase to minimise potential effects associated with airborne dust.

Dust mitigation measures such as damping down, covering of stockpiles, use of wheel washes and covering of lorries during transportation should be implemented as part of a general good site management plan to ensure that the potential effects associated with airborne dust are minimised.

It is prudent in unexplored areas for a suitably qualified Geoenvironmental Engineer to be present during construction works tasked with a watching brief, in order to ensure that correct measures are taken if unexpected contamination is encountered.

16.3.3 Post-Construction/Operation Phase

It is considered that, following the implementation of the construction phase mitigation measures outlined above, there will be no significant residual effects associated with the post-construction phase of the proposed site. The site investigation works prior to the construction phase will either confirm the lack of – or define the extent of – a contaminant source. Should a contaminant source be identified, this will require further assessment prior to the commencement of the construction works.

16.4 NOISE

16.4.1 Construction Mitigation

Construction noise levels have been determined to be not significant; therefore, mitigation is not necessary to avoid significant effect. However, it is possible that during the construction phase noise may be audible at nearby sensitive receptors, as best practice and to regulate construction noise levels it is recommended that the levels of noise during the construction phase are monitored as part of an Environmental Management Plan (CEMP). Also, the below good practice measures should be incorporated into the CEMP to help control noise emissions from the site.

- Regular communication between the contractor and affected neighbours to clearly understand the anticipated level and duration of noise throughout the construction period. Where excessive noise cannot be avoided, adjacent neighbours should be notified as to when such noisy works will be undertaken and these times adhered to.
- Adequate planning should be undertaken within the project to prevent noise emissions from double handling of materials and overlapping of high noise activities.

- Loading and unloading of vehicles, dismantling of site equipment such as scaffolding or moving equipment or materials around the site are to be conducted in a manner as to minimise noise generation. Vehicles should be switched off when not in use. The use of reverse beepers shall be avoided as far as is practicable with safe operating practices.
- Compressors should be 'sound reduced' models, fitted with properly lined and sealed acoustic covers, to be kept closed whether the machines are in use. All percussive tools shall be fitted with mufflers or silencers of the type recommended by the manufacturer.
- All machines in intermittent use shall be shut down in the intervening periods between works if possible, or throttled down to a minimum.
- Where possible, equipment should ideally be powered by mains electricity in preference to locally powered sources such as diesel generators. Hand tools to be electrically powered.
- To minimise breakout and as far as is practically possible when taken against the scope of works, ensure that all external windows and doors to the existing building are kept closed.
- No radios or similar noise-producing entertainment devices.
- Contractors should belong to the Considerate Contractors Scheme.

16.4.2 Operational Mitigation

Operational noise levels have been determined to be not significant if the commercial noise limits set out in **Error! Reference source not found.** are adhered to. Therefore, no mitigation is necessary for the operation of the Proposed Development.

16.4.3 Mitigation for Site Suitability

The sound insulation properties of the building envelope depend upon the external noise levels present at the façade and the proposed design criteria for the internal noise levels of specific rooms, dependant on their use. A standard thermal double-glazed window when closed provides the required sound insulation performance to comply with the internal noise levels stated in **Error! Reference source not found.**.

Simple natural ventilation using opening windows will provide a level difference in the order of 15 dB. Measured noise levels are in the order of 50 dB $L_{Aeq,16\,h}$ daytime and 44 dB $L_{Aeq,8\,h}$ night-time. On this basis open window ventilation is suitable for achieving BS 8233 compliant noise levels of 35 dB $L_{Aeq,16\,h}$ daytime and 30 dB $L_{Aeq,8\,h}$ night-time internally for the majority of the development site.

For more exposed dwellings to the north of the Proposed Development Site overlooking Coopers Green Lane, predicted noise levels are elevated due to road traffic and activities associated with the minerals extraction facility (daytime only). Total noise levels incident on the façade are predicted up to 60 dB $L_{Aeq,16\,h}$ dB daytime and 54 dB $L_{Aeq,8\,h}$ night-time. Open window ventilation is not a suitable solution in these areas; an alternative solution should be considered. For example, mechanically assisted cross ventilation may be possible on plots with openings on the shielded elevations. When selecting the alternative system consideration should be given to thermal overheating. Purge ventilation could be by means of opening windows as the rooms would be deemed to be unoccupied under purge ventilation.

The noise level in the external amenity spaces comprising gardens and public spaces are 55 dB $L_{Aeq,\,16hour}$ or less, or have an area that is. Screening is provided by buildings and garden fencing as embedded mitigation. No further mitigation is considered practicable to provide an imperceptible reduction in noise. It is assumed there will be no main external amenity spaces facing onto Coopers Green Lane.

A 5-m high acoustic barrier is included on the eastern boundary that is shared with the existing commercial units. This is part of the Proposed Development and considered as embedded mitigation.

16.5 SOCIO-ECONOMICS

16.5.1 Construction Phase

No significant adverse effects are expected during the construction phase, and no additional mitigation is required.

16.5.2 Operational Phase

No significant adverse effects are expected during the operational phase, and no additional mitigation is required.

16.6 LANDSCAPE AND VISUAL IMPACT

A 'mitigation by design' approach has been taken for the proposals, meaning that during the course of the masterplanning process, landscape considerations were taken into account as an integral part of the design of the development, as described in Chapter 3: Proposals and Alternatives, and summarised at the start of the Section 11.4 of this Chapter. The assessment of effects therefore assumes that all primary mitigation measures are embodied in the design of the proposals.

Additional mitigation measures that should be adopted, beyond those inherent within the design include:

- Careful section of building materials, colours and architectural treatment to ensure the proposed development sites well within the landscape and is not visually intrusive.
- Adoption of a Construction and Environmental Management Plan to ensure existing landscape features to be retained are properly protected during the construction phase.
- Adoption of a Landscape and Ecological Management Plan to ensure the proposed planting and green infrastructure becomes well established and is properly managed in perpetuity.

16.7 TRANSPORT

16.7.1 During Construction

Although only negligible impacts have been identified, to ensure best practice a robust Construction Traffic Management Plan (CTMP) will be implemented, ensuring that the potential impact of the demolition and construction phase on the surrounding highway network is minimised.

The CTMP will include, amongst other aspects, details of the following:

- Proposed working hours;
- Vehicle size and schedule of use;
- Access arrangements;
- Access routing;
- Measures to reduce impact on the highway network, such as wheel washing.

16.7.2 During Operation

The development comprises a mix of uses which will allow people to undertake some of their day to day trips without leaving the site. In particular:

- Primary education trips should be retained on site since there will be provision of a primary school;
- Day to day shopping can be undertaken at either the retail units on the site or in the adjacent District Centre and Galleria;
- The site is adjacent to two major employment centres within the borough (i.e. Hatfield Business Park and the University) which provide a wide variety of employment opportunities; and
- A park is proposed to the west of the site to provide informal recreation for residents on the site and those that live in the neighbouring area.

16.7.2.1 Residential Travel Plan

The Residential Travel Plan will define, in an integrated way, how transport demand for the site will be managed and promote travel to and from the site by means other than the car.

The Travel Plan will be an over-arching plan to be implemented for the site as a whole and will be the main document for the residential element. In addition, travel plans will be implemented for the primary school.

The overall management and implementation of the Travel Plan would be the responsibility of the developer. A Travel Plan Co-ordinator would be appointed by the developer and would be responsible for the management, development and implementation of the Travel Plan. The school will appoint School Travel Plan Co-ordinators.

16.7.3 School Travel Plan

The proposed primary school will be required to develop and agree a School Travel Plan within 3 months of occupation. The School Travel Plans will accord with the aims and objectives of the Site Travel Plan.

The primary school will have limited parking for staff and it is expected that the vast majority of pupils will live within the site and travel to school by sustainable modes. Notwithstanding this, the school will be required to develop a Travel Plan that looks at ways of continuing the use of sustainable modes of travel such as the implementation of 'walking buses' (i.e. a group of children walk to school together with accompanying adults), cycling proficiency courses, road safety lessons etc. Children can positively influence their parents travel behaviour and therefore it will be important to educate the school pupils of the benefits of walking, cycling and public transport.

16.7.3.1 Parking Strategy

The availability of parking both at the origin (e.g. residential units) and destination (e.g. employment, retail, leisure facilities) is a key determinant in the proportion of trips that are undertaken using private car.

The parking strategy has two particular features:

- The parking provision will be within the Local Authority standards therefore restricting the availability of parking spaces. This approach recognises the need to provide sufficient parking spaces to avoid parking that would adversely affect the operation of surrounding streets, but

not providing parking to a level that would encourage car usage. This is a balanced approach that is consistent with the aspirations of the national Guidance.

- The layout of the parking spaces will create a good quality urban environment. Parking will be provided to ensure that it is well located to the houses that it serves to ensure that on-street parking does not occur to any significant degree. This means that access to all parts of the site will be maintained at all times for larger vehicles (refuse lorries and delivery vehicles) and for the emergency services.

Cycle parking will be provided at a minimum standard of 1 space per unit.

16.7.3.2 Bus Strategy

The provision of a quality bus system is one of the key elements of the Sustainable Transport Strategy for the development site.

Either new or extended bus services will be provided into the site. The location of bus stops will be coordinated with the network of pedestrian routes to ensure that access is provided within a 400 metre (5 minutes) walk of a bus stop.

It is necessary to ensure that adequate provision is made for frequent bus services destined for the town centre and Hatfield railway station, which is located 2.6km to the east. Bus services will be provided at a frequency of at least 15-20 minutes during peak periods wherever possible. Where new bus services are proposed within the site or surrounding area to serve the site, adequate bus infrastructure will be provided in the form of bus shelter, seating, information provision and the potential for real time information at busier stops. To-date, initial discussions have been held with bus operating companies who believe it will be possible to direct bus services through the development.

The introduction of the bus services will be phased in accordance with the occupation of the site. The bus service phasing will be agreed with the local authorities and will balance the need to provide a high-quality service from commencement with the efficient use of resources.

16.7.3.3 Pedestrian Facilities

The following measures are proposed in order to promote walking, particularly for trips within the development site:

- All residents will be within easy walking distance of a bus stop;
- All residents will be within a reasonable walking distance of the shops, primary school and provided on the site;
- The streetscape will be designed to provide a legible and convenient hierarchy of pedestrian routes;
- Pedestrians would be given priority over motor vehicles through 20 mph speed limits and through designing the internal layout in accordance with Manual for Streets and other relevant guidance;
- Accessibility and orientation will be assisted through consistent treatment of the public domain and way-finding signage;
- All residents and employees will be provided with an Information Pack which will include maps of local walking routes and information; and

- The Transport Co-ordinator will raise awareness of the benefits of walking.

16.7.3.4 Cycle Facilities

In order to promote cycling the following measures will be implemented:

- A high-quality network of cycle routes will be provided throughout the site;
- The design of the streetscape will encourage low vehicle speeds and provide priority for cyclists;
- High quality cycle parking will be provided in accordance with the minimum cycle standards;
- All residents and employees will be provided with an Information Pack containing maps of cycle routes in the local area;
- The Transport Co-ordinator will raise awareness of the benefits of cycling;
- Cycle repair facilities will be provided on site to enable cyclists to undertake maintenance;
- A Bicycle User Group (BUG) will be set up by the Transport Co-ordinator to provide suggestions for further improvements to encourage cycle use; and
- Showers, lockers and changing facilities will be provided in all employment space.

16.8 WATER RESOURCES, FLOOD RISK AND DRAINAGE

16.8.1 Flood Risk

Mitigation for these potential impacts will be provided by a surface water strategy plan incorporating SUDS, which is considered in more detail in the FRA. With mitigation the impacts on the identified receptor is negligible and therefore the impact significance has been assessed as negligible. It is considered that with mitigation measures the impact will remain negligible over the lifetime of the development.

16.8.2 Water Resources Construction

Mitigation for these potential impacts will be provided in the method statement will detail how these potential environmental risks will be managed. It is essential that this method statement covers all the potential impacts that could arise at this site and that no discharge of polluting material or release of sediment occurs during construction.

A method statement for the construction of the development is not yet available but should take into consideration the following key issues:

- Appropriate storage of potentially polluting materials and chemicals in accordance with the Control of Pollution (Oil Storage) Regulations.
- Creation and release of contaminated silts and sediment release into the surrounding watercourses and surface water ponds – use of measures such as cut off ditches, silt fences or impermeable membranes to prevent this
- Control of any refuelling facilities, chemical and waste storage and handling areas
- Adequate supervision of all deliveries and refuelling involving potentially polluting substances
- Delivery and refuelling areas to be located away from surface water bodies, with adequate measures in place to contain spillages at these locations
- Leaks or spillages of potentially polluting substances to be contained, collected then removed from site in an appropriate manner, e.g. use of absorbent material, bunding or booms. An

emergency action plan will be formulated, which all site personnel will have read and understood
- Storage of machinery and equipment away from surface water bodies. Drip trays to be placed underneath any parts where oil / fuel may be found
- Regular servicing and inspection of vehicles used on site
- Restriction of vehicle movements within close proximity of the surface waterbodies
- Management of any dewatering required for construction of foundations
- Secure access to the site for construction personnel only, to prevent vandalism

With mitigation the impacts on the identified receptor is negligible and therefore the degree of effect significance has been assessed as negligible over the long-term lifetime of the development.

16.8.3 Water Resources Post-Construction

Mitigation for the potential operational impacts will be provided by implementing a surface water drainage scheme which utilises SUDS principles. SUDS features will restrict discharge rates and runoff volumes, as well as improve water quality, providing biodiversity opportunities and amenity value.

It is also proposed that through the measures described in the drainage strategy betterment is achieved on the existing surface water runoff rates. Therefore, with mitigation the impact on the identified receptor is beneficial and therefore the degree of effect has been assessed as negligible over the long-term lifetime of the development.

16.9 ECOLOGY

Mitigation measures that will address some of the ecological effects identified above are outlined in Table 14.14. These measures are additional to the ecology mitigation that has been designed into the Proposed Development, as outlined under *Ecology Strategy* above.

It is recommended that the proposed mitigation, including both the Ecology Strategy and additional mitigation is detailed within and delivered via the following documents, to be submitted to the LPA for approval prior to the start of construction:

- Construction Ecological Management Plan (CEMP). Describing ecology mitigation works (excluding habitat creation) that will precede and accompany the construction phase of the Proposed Development.
- Landscape Environmental Management Plan (LEMP). Describing habitat creation works that will precede or accompany or the construction phase of the Proposed Development, and habitat management and monitoring works that will follow the completion of the construction phase.

It is recommended that the proposed mitigation is secured through an appropriately worded planning condition requiring the mitigation described in this chapter to be incorporated into CEMP and LEMP documents, and these documents to be submitted to the planning authority for approval prior to the start of construction.

Table 16.2: Mitigation recommendations.

Feature	Mitigation Recommendations	
	Construction phase (delivered through a CEMP)	**Occupation phase (delivered through a LEMP)**
1. Symond-hyde Great Wood LWS and Ancient Woodland	None	None
2. Home Covert and Round Wood LWS	Fencing protection to avoid accidental incursion within 15 m of the LWS by construction vehicles during construction (except for any necessary landscaping/vegetation management within the western green corridor).	Access management (including barbed wire fencing along eastern boundary of the woodland and the provision of a planted woodland walk along the eastern edge of the woodland, east of the fence, to include a 15 m strip of woodland planting (widely spaced oak and hornbeam trees) with native ground flora planting (e.g. native ferns and bluebell of local provenance), replacing the existing vehicle track. This will provide a woodland walk adjacent to the edge of the LWS, thus reducing the attraction of entering the mature woodland, but will maintain visual accessibility into the woodland. Managed access to the easternmost part of the Lake within the eastern edge of the woodland, could also be included, with appropriate fencing preventing access beyond the eastern edge. Ongoing-maintenance of the fencing and woodland walk as part of the permanent management regime for greenspaces within the development.
3. Semi-improved neutral grassland	Fencing protection of grassland that is to be retained to avoid accidental incursion by construction vehicles during construction (except for any necessary landscaping/vegetation management, such as around ponds). This includes fencing protection of the green corridors at the east and west of the Application Site.	<u>For the majority of the retained grassland:</u> Conservation-focused grassland management programme, to include grazing during the growing season (and necessary fencing and infrastructure) and ecological monitoring of grassland structure and species composition, with monitoring feeding back into the management regime for the first ten years post-construction. Ongoing-maintenance of this conservation-focused grassland management as part of the permanent management regime for greenspaces within the development. <u>For further areas of retained grassland (e.g. within the green corridors</u>

Feature	Mitigation Recommendations	
	Construction phase (delivered through a CEMP)	**Occupation phase (delivered through a LEMP)**
		at the east and west of the Application Site, and along the de-culverted Ellenbrook: Conservation-led management by mowing of 50 % of the grassland every year (i.e. individual areas will be mown once every two years) to allow the retention of some winter vegetation structure for invertebrate and mammal species, with monitoring feeding back into the management regime for the first ten years post construction. Arisings from mowing to be collected into wildlife-focused compost heaps and habitat piles (with scrub management trimmings) within the green corridors. Ongoing-maintenance of this conservation-focused grassland management as part of the permanent management regime for greenspaces within the development
4. Scrub	Fencing protection of areas of scrub that are to be retained to avoid accidental incursion into by construction vehicles during construction. This includes fencing protection of the green corridors at the east and west of the Application Site.	Conservation-focused scrub management programme, to include maintaining a total scrub/tree cover of 20 to 40 % of the green corridors. Ecological monitoring of grassland structure and species composition, with monitoring feeding back into the management regime for the first ten years post-construction. Scrub trimmings to be collected into wildlife friendly compost heaps / habitat piles within the green corridors. Ongoing-maintenance of the conservation-focused grassland management as part of the permanent management regime for greenspaces within the development.
5. Semi-natural broadleaved woodland	Fencing protection to avoid accidental incursion within the mature woodland within the west of the Application Site by construction vehicles during construction (except for any necessary landscaping/vegetation management within the western green corridor).	Access management (including barbed wire fencing along eastern boundary of the woodland and the provision of a planted woodland walk along the eastern edge of the woodland, east of the fence, to include a strip of woodland planting (widely spaced oak and hornbeam trees) with native ground flora planting (e.g. native ferns and bluebell of local provenance), replacing the existing vehicle track. This will provide a woodland walk adjacent to the edge of the mature woodland, thus reducing the attraction of entering the mature woodland, but will maintain visual accessibility into the woodland.

Feature	Mitigation Recommendations	
	Construction phase (delivered through a CEMP)	**Occupation phase (delivered through a LEMP)**
		Ongoing-maintenance of the fencing and woodland walk as part of the permanent management regime for greenspaces within the development.
6. Ellenbrook stream	Fencing protection to avoid accidental incursion within the retained green corridors along the Ellenbrook by construction vehicles during construction (exception for any necessary landscaping/vegetation management within these green corridors). All works at the Application Site to be in accordance with appropriate pollution prevention guidance, such as Pollution prevention for business (Defra and EA, 2016). Industry standard pollution control measures to be incorporated in to any surface water drainage feeding into the Ellenbrook, such as provision for silt settlement and control of hydrocarbons/oil. Wherever possible (taking into account considerations such as land contamination), surface water at the site should be infiltrated into the ground rather than discharged into the Ellenbrook. Discharges should be of treated water (e.g. via settlement), and discharges should be restricted to appropriate flow rates through the use of storage ponds and flow regulators or similar.	Ongoing wildlife-focused maintenance of the green corridors along the Ellenbrook as part of the permanent management regime for greenspaces within the development.
7. Hedgerows	Fencing protection of hedgerows sections to be retained to avoid accidental incursion by construction vehicles during construction.	Planting of 2 m of native species-rich hedgerow for every 1 m of hedgerow to be lost in the development. This will be in a suitable location, such as on the boundary between the retained grassland in the south and west and developed areas of the Application Site. Conservation-focused management of retained and new hedgerows, to include late winter trimming every two years (to allow the development of flowering and fruiting wood) and retention (and thinning) of hedgerow trees.

Feature	Mitigation Recommendations	
	Construction phase (delivered through a CEMP)	**Occupation phase (delivered through a LEMP)**
		Ongoing-maintenance of the fencing and woodland walk as part of the permanent management regime for greenspaces within the development.
8. Mature trees	Fencing protection to avoid accidental incursion within root protection zones of mature trees (as advised by a qualified arboriculturist) by construction vehicles during construction. In all or most cases these zones will be well within the green corridors.	None
9. Ponds	Fencing protection to avoid accidental incursion of ponds or adjacent vegetation by construction vehicles during construction. In all or most cases these areas will be well within the retained grassland and are likely to be sufficiently protected by the protective fencing around the retained grassland. .	Access management (i.e. installation of fencing) to protect bankside vegetation along at least 60% of pond margins from access by people or livestock. Ongoing-maintenance of this fencing as part of the permanent management regime for greenspaces within the development
10. Badger	Protective fencing during construction (to prevent accidental incursion within 20 m of badger setts). Any digging or construction works within 20 m of active badger setts to proceed under a Natural England badger licence, with appropriate mitigation. For works in close proximity to a sett, this may involve sett closure, and (where a main sett is to be closed) the construction of a compensatory artificial badger sett. Application for a Natural England badger license is likely to require an up-to-date badger survey of the relevant works area and adjacent areas. Update badger surveys are to be carried out by a suitably qualified ecologist not more than one month prior to the start of construction (including for separate phases of construction where a phased approach is to be employed). Measures to be put in place during construction to avoid killing or injury of badgers through entrapment in pits,	None

Feature	Mitigation Recommendations	
	Construction phase (delivered through a CEMP)	**Occupation phase (delivered through a LEMP)**
	trenches or pipes at the construction site.	
11. Bats	Measures to avoid effects of floodlighting during construction on foraging, roosting and commuting habitats for bats, e.g. through time of year, location and direction, and shielding.	Lighting scheme to minimise light spill on all retained or new habitats (especially the green corridors in the east and west and long the Ellenbrook, retained grassland in the south, woodland west of the Application Site and the hedgerows along Coopers Green Lane to the north. To be achieved through the use of directed lighting fixtures and shields, through minimising the power of all lighting fixtures, and through avoiding external lighting wherever possible. Street lighting to be avoided where roads cross green space. Low level bollard lighting to be employed in preference to high level lighting wherever possible. The lighting scheme for the site will include a lux level contour plan, and will be subject to review and input from a professional ecologist and will be submitted to the Welwyn Hatfield District Council for approval prior to the start of construction (or the start of construction of the relevant phase).
12. Brown hare	None	None
13. Harvest mouse	Management of new and retained grassland to be designed with consideration of the habitat requirements of harvest mouse.	None
14. Hedgehog	Construction of ten habitat piles from scrub and tree cuttings/brash during initial vegetation management on/near the green corridors.	Creation of /addition to habitat piles during scrub and grassland management within green corridors, to form part of the permanent management regime for greenspaces within the development.
15. Breeding birds	Wherever possible, vegetation clearance for construction will be carried out outside the bird breeding season (which is March to August inclusive). Where this is not possible, vegetation clearance will be preceded by a check for nesting birds by a professional ecologist. If nesting birds are found to be present, the nest will be retained (with a suitable buffer) until the nest is no longer in use (as confirmed by a	Management scrub, trees and hedgerows at the Application Site will be designed to avoid impacts on breeding birds, primarily through ensuring that these activities are carried out outside the breeding season.

Feature	Mitigation Recommendations	
	Construction phase (delivered through a CEMP)	**Occupation phase (delivered through a LEMP)**
	professional ecologist). Where open or cleared areas remain undeveloped, and there is a risk of ground-nesting birds breeding, these areas will also be subject to the checks and measures described above immediately prior to renewal of construction/preparation works. A minimum of three barn owl nest boxes will be installed in suitable locations in woodland at Round Wood and Home Covert LWS (beyond the west of the Application Site) or within mature woodland within the west of the Application Site. These will be maintained/replaced as necessary as part of the permanent management regime for greenspaces within the development.	
16. Great crested newt	Clearance of habitats suitable for this species within 250 m of known or assumed populations to take place under European Protected Species mitigation licence from Natural England, which will involve destructive searches for this species over small areas of suitable habitat and trapping over larger areas of suitable habitat. Habitat retention outlined in the Ecology Strategy will avoid effects on newts in or adjacent to (i.e. within at least 50 m of) ponds. Protective fencing of ponds during construction (to prevent accidental incursion), as described *Ponds* above. New ponds at the Site will be deigned with consideration of the habitat requirements of great crested newt, including provision of terrestrial and hibernation habitat. Construction of five permanent hibernation sites within the Application Site, in suitable proximity to existing and new ponds. The surface water drainage system will be designed to be amphibian friendly through input from a professional	None

Feature	Mitigation Recommendations	
	Construction phase (delivered through a CEMP)	**Occupation phase (delivered through a LEMP)**
	ecologist. It will be designed to minimise the likelihood of amphibians becoming trapped, such as through the installation of British Herpetological Society Amphibian Gully Pot Ladders (or equivalent) into all gully pots in the development, or through the use of alternative drainage systems which avoid the potential for entrapment. Kerbs on all road crossings or adjacent to greenspace will be bullnose or half battered kerbs (rather than straight kerbs) in order to reduce the likelihood of amphibians being trapped on roads. Install/maintain weir system to maintain a level of water within the section of the Ellenbrook from where it emerges from the culvert to the pedestrian footbridge.	
17. Common toad	Measures under *16. Great crested newt,* above, will provide mitigation against killing an injury of common toad during site clearance. New ponds at the Site will be deigned with consideration of the habitat requirements of common toad, including provision of terrestrial and hibernation habitat.	None