Technical Appendix B-

Roost recreational disturbance early warning monitoring scheme

1. Background

1.1. There are the following Lesser Horseshoe Bat (LHB) roost buildings:

Hawkwell (majority of the LHB colony are known to roost here)
Nelson (purpose built roost completed in March 2015)
Birch Wood (purpose built roost completed in April 2015)
The Northern United Bath House
The Northern United Office building
New night roosts ((x2) yet to be installed/constructed)

1.2. During 2014 the highest roost counts for LHB at each roost building were as follows:

Bath House	32
Office Building	51
Hawkwell	371
Nelson	N/A
Birch Wood	N/A

2. Purpose

2.1. Recreational pressure associated with residential, tourism or employment uses has the potential to cause disturbance to Key Ecological Components (KEC) associated with the Northern Quarter. Whilst recreational activities involving quiet enjoyment of the woodland, such a walking and cycling, are unlikely to disturb lesser horseshoe roosts, anti-social behaviour and vandalism of roosts in particular has the potential to be significantly disturbing.

2.2. Both the Cinderford Northern Quarter Biodiversity Strategy and the Appropriate Assessment (AA) for planning permission P0663/14/OUT identified this. The AA recognised that embedded measures including the proposed pavement and swale layout of the spine road and open space provision within plots went a considerable way to reducing the likelihood of recreational impacts. It also recognised that the design of the artificial roosts (with their anti-vandal doors) and discreet siting further reduced the likelihood of such impacts. However, it imposed additional measures to provide certainty that recreational disturbance to LHBs would be avoided. These imposed measures were as follows:

a. Submission of a Biodiversity Management Plan (BMP) for each plot (Conditions 18 &19), to, among other things, prevent disturbance of LHBs, during operational phases. Measures could include those designed to deter access to sensitive locations through pedestrian layout, landscaping and interpretation for example. And;

b. Submission of a detailed early warning monitoring scheme (Condition 23) for recreational disturbance at the existing artificial roost (now known as Hawkwell) and replacement roost (previously referred to as RR1, now known as Nelson)

3. Monitoring aims

3.1. The objective of this monitoring is to:

Assess levels of human disturbance to known LHB roosts at the Cinderford Northern Quarter in order to provide early warning of disturbance and identify any necessary adaptive management requirements to avoid the likelihood of adverse significant effects with the potential to effect the integrity of the Wye Valley and Forest of Dean Bat Sites SAC.

3.2. Roost disturbance monitoring will be part of an overall package of monitoring (including populations size, reproductive success and forage and flightline maintenance to provide 'early warning' of impacts on the LHB colony.

4. Monitoring approach

4.1. Monitoring of roost population levels and reproductive rates (as describe elsewhere within this document) can be used to detect likely significant effects on the site where these are occurring as a result of impacts such as recreational disturbance. However, an approach to monitoring is needed to detect failure in embedded and/or imposed mitigation measures **before** any likely significant effect on the SAC occurs.

4.2. The monitoring scheme for recreational disturbance under Condition 23 does not seek to duplicate the monitoring requirements of Conditions 18 & 19. Instead it focuses on:

- vulnerable LHB roosts (i.e. the Hawkwell and Nelson roosts);
- signs that these roosts may become the target of anti-social behaviour and;
- signs that access in the vicinity of theses roosts may be increasing.

4.3. The Appropriate Assessment ruled out the need to monitor the Birch Wood (RR2) replacement roost and new night roosts for recreational disturbance due to distance. As such the scope of this early warning monitoring scheme does not cover these roosts.

4.4. A further distinction can be drawn between Northern United (NU) roosts and the purpose built roosts in that the NU roosts are to be closed and demolished as part of the overall mitigation scheme, which was subject to AA. The NU roosts are located within fenced compound and currently support a small percentage of the overall colony size. The Northern Quarter development is phased and requires the entire spine road to be developed prior to the majority of the development (Employment, residential/ tourism) taking place. The construction of the spine road necessitates the closure and demolition of the NU roosts. Therefore recreational disturbance as a result of development is unlikely to take place before the roosts are closed and demolished, the likelihood of recreational disturbance of the NU roosts is therefore considered low. Although not a requirement of the AA, in terms of condition 23, it is proposed to monitor for recreational disturbance of the Northern United roost until such time as the roosts are closed,

4.5. The purpose built roosts (Hawkwell & Nelson) are to be retained in the long term and in the case of Hawkwell currently support the majority of the colony. This part of the strategy will measure the effectiveness of imbedded measures and imposed measures (i.e. BMPs) for the Hawkwell and Nelson Roosts and to implement comprehensive and reliable follow up actions to avoid likely significant effects, if required.

5. Disturbance monitoring methodology - Purpose Built roosts

5.1. Whilst only the Hawkwell roost is an established roost, Nelson is constructed as a mitigation feature for LHB's. It is therefore considered appropriate to monitor Nelson for any disturbance which may be deterring its use by LHB's and disturbance as and when it is used by LHB.

5.2. Three methods will be used to ensure that these LHB roosts are not subject to levels of anti-social behaviour, including vandalism, that may cause disturbance and so have a likely significant effect on the Wye Valley and Forest of Dean Bat Sites SAC. These are:

- Monthly external inspections of the Hawkwell and Nelson Roosts to assess whether tampering has occurred. For(e.g. damage to roost entrances, doors or locks that may suggest attempted forced entry)
- Biannual vegetation cover assessment (using fixed point photography) ,
- Biannual recreational path assessment and inspection of area within 20m for other signs of increased human presence (such as presence of fires, litter etc).

5.3. **Baseline conditions**

5.3.1. The baseline condition of each roost is recorded in Annex's 1 & 2. One vandalism event is recorded to have occurred to the Hawkwell roost during 2015, the entrance chute, which was repaired.

Purpose built roost disturbance schedule			
	External inspections	Vegetation cover assessment	Recreational path assessment
Frequency	Monthly	Biannual February (without leaf cover) August (full leaf cover, high recreational activity roost vulnerability for juveniles	Biannual February (without leaf cover) August (full leaf cover, high recreational activity roost vulnerability for juveniles
Activity	External inspection looking for evidence of disturbance / damage / Vandalism and requirements for maintenance	Fixed point photograph of vegetation cover at roosts sites for direct comparison (Annex 2 for details).	Assessment of recreational paths at roost sites for direct comparison. See (Annex 2 for details).
Recording	Carried out when monthly roost counts are undertaken and form part of monthly recording scheme	Records provided to overseeing management group.	Records provided to overseeing management group.
Threshold / Trigger	Any vandalism event that affects or had the potential to affect the outer envelope of the building or entrances.	10% reduction in vegetation cover over previous two years	Additional paths within survey area or intensification of use of an existing pathway by a level as described in the assessment key (Annex 2).
Analysis / Reporting	Evidence of disturbance will be reported immediately to site owners (FoDDC) for assessment as to requirements for action. Instances will be summarised and reported to the overseeing management group which meets twice yearly (April & September)		
Duration	Every year, review monitoring approach every three years.		

6. Disturbance monitoring methodology - Northern United roosts.

6.1. These buildings are within a fenced compound of the former Northern United Colliery site and support lower numbers of LHB's than Hawkwell, the main colony roost site. The NU roosts are therefore at a lower risk of disturbance, due to being within a secured area, and there significance as a roost site is also lower than that of Hawkwell because of the number of LHB's they support. The likelihood of recreational disturbance is also low as the majority of the Northern Quarter development will not take place until the roosts are closed and demolished.

6.2. **Baseline conditions**

6.2.1. Both the Bath House and Office building are redundant and dilapidated. Year on year the condition of the buildings continues to decline as a result of weathering processes. Annex 1 records the current external conditions. Monitoring aims to identify human based disturbance rather than record the natural deterioration of the building as a result of weathering and successional vegetation growth.

Northern United monitoring schedule	
Frequency	Monthly
Activity	External and internal inspections looking for evidence of human disturbance / damage / Vandalism
Recording	Carried out when monthly roost counts are undertaken and form part of monthly recording scheme
Threshold /Trigger	No evidence of vandalism or forced entry to the building(s)
Analysis / Reporting	Evidence of disturbance will be reported immediately to site owners and FoDDC for assessment as to requirements for action. Instances will be summarised and reported to the overseeing management group which meets twice yearly.
Duration	Until roosts are demolished or summer roosts counts (May –September) show a roost is be used by less than 5 LHB at any time during two summers. Review monitoring approach every three years.

6.3. An occasional roost for one or two (2014) LHB's has been previously identified in former Canteen building at Northern United. It is not proposed to monitor disturbance to this roost site due to the very small number of bats, infrequently, using it.

Annex 1 – Northern United roosts external baseline conditions October 2015.

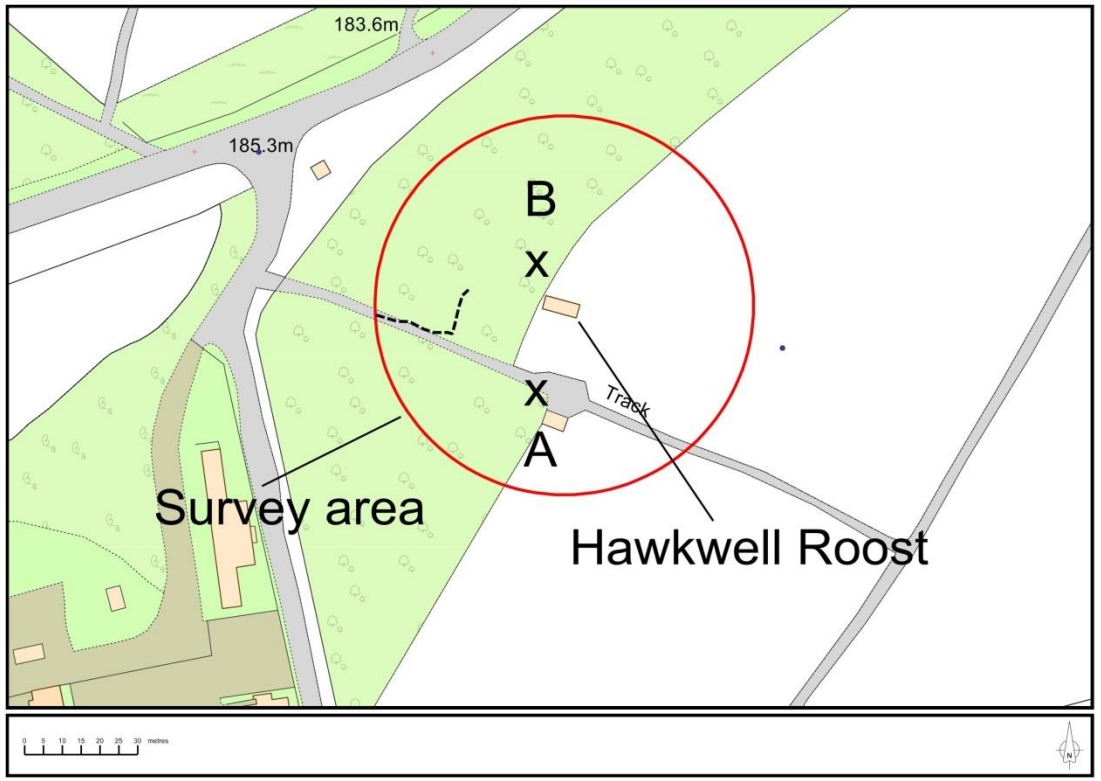
Northern United Office building photographic baseline October 2015	
North elevation	
Norther and Western Elevation (from North)	

South and Western Elevation (From South)	
Eastern Elevation (From North)	

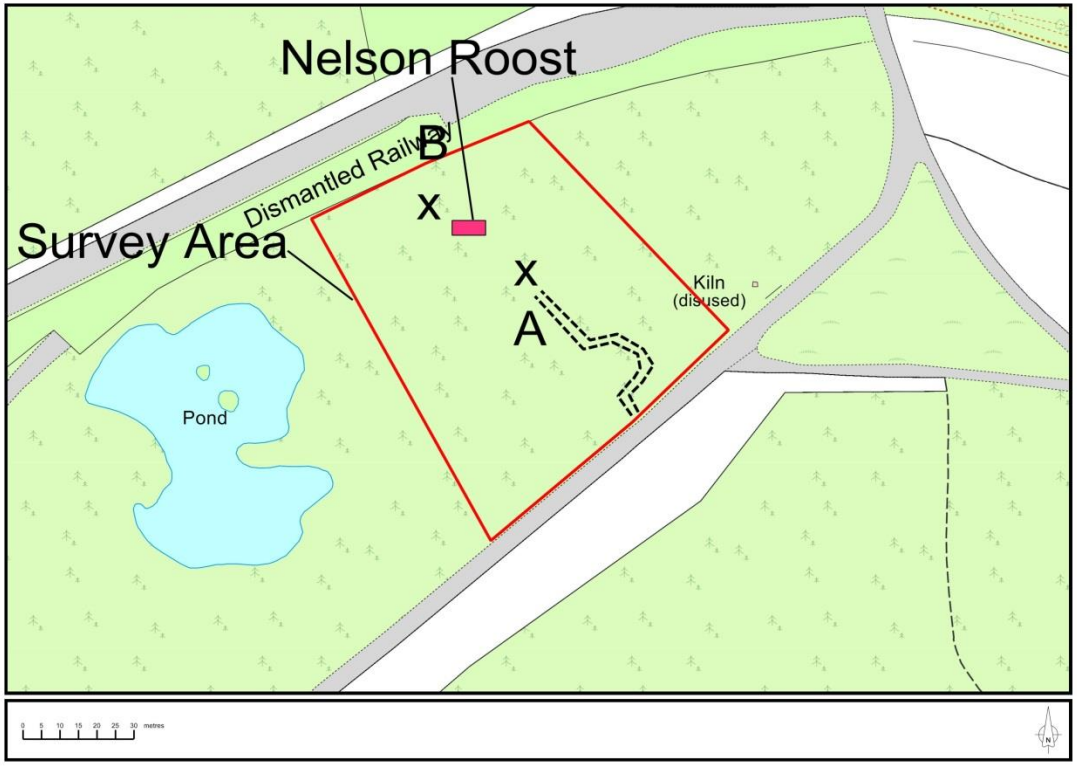
Eastern Elevation (from South)	

Northern United Bath House photographic baseline October 2015	
Eastern Elevation	
Northern Elevation	

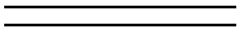
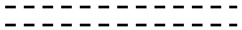
Annex 2 Disturbance monitoring and baseline

Site: Hawkwell	
Frequency: - Biannual February & August	
Activity: - 1. Fixed point photograph of vegetation cover at roosts sites for direct comparison 2. Assessment of recreational paths at roost sites for direct comparison	
Recording: - Photographic, annotated map and written report	
Reporting: - Evidence of disturbance to be reported immediately to site owners (FoDDC) for assessment as to requirements for action. Instances will be summarised and reported to the overseeing management group which meets twice yearly (April & September)	
Fix point camera location A Description: 20m to the south of the long southern elevation of the roost Photo Direction: 00 degrees (North) Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25.	
Fix point camera location B Description: 10m from NW roost corner Photo Direction: 190 degrees Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25	

Hawkwell Roost	
Fix point camera location A Description: 20m to the south of the long southern elevation of the roost Photo Direction: 00 degrees (North) Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25.	
Fix point camera location B Description: 10m from NW roost corner Photo Direction: 190 degrees Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25.	

Site: Nelson	
Frequency: - Biannual February & August	
Activity: - 1. Fixed point photograph of vegetation cover at roosts sites for direct comparison 2. Assessment of recreational paths at roost sites for direct comparison	
Recording: - Photographic, annotated map and written report	
Reporting: - Evidence of disturbance to be reported immediately to site owners (FoDDC) for assessment as to requirements for action. Instances will be summarised and reported to the overseeing management group which meets twice yearly (April & September)	
Fix point camera location A Description: 15m from the SE corner of the roost Photo Direction: 320 degrees Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25.	
Fix point camera location B Description: 8m from NW roost corner Photo Direction: 130 degrees Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25.	

Nelson Roost	
Fix point camera location A Description: 15m from the SE corner of the roost Photo Direction: 320 degrees Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25.	
Fix point camera location B Description: 8m from NW roost corner Photo Direction: 130 degrees Height above ground: 1.5m Camera details: f/3.4, Focal Length 4mm, Max aperture 3.3, 35mm focal length 25.	

Recreational path assessment key				
Open Limited scrub or woody vegetation. Short grassland allowing open dispersed access	**Forest road** Forestry service road of loose bound surfacing. On average in excess of 3m wide.	**Well used route way** Well used route way of on average 1-3m wide at ground	**Open path** Narrower walkway of around 1m in width (average) at ground. Possible to walk route without longer stretches (3m+) of overhanging vegetation	**Vegetated path** Small route way of less than 1m in width (average) at ground. Substantial sections of overhanging vegetation. Wet vegetation would make the user very wet.
				
Examples				
				
Animal routes Deer, Feral Boar and free roaming sheep are widespread throughout the area. Care must be taken to distinguish between paths created by animals and those by humans. Typically animal paths have high levels of animal footprints and a ‘tunnel’ effect may be created by vegetation crossing the path above animal head height.				