WEST CAMBRIDGE

OUTLINE PLANNING APPLICATION

ENVIRONMENTAL STATEMENT ADDENDUM VOLUME 3

TECHNICAL APPENDICES

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Environmental Statement Update

Volume 3 Appendices

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Appendix 6.1 Ecology legislation

Table 6.1.1 Updated ecology legislation

Species	Legislation	Offences	Licensing procedures and guidance
Bats European protected species	Conservation of Habitats and Species Regulations 2017 Reg 43	Deliberately[1] capture, injure or kill a bat; deliberate disturbance[2] of bats; or damage or destroy a breeding site or resting place used by a bat. [The protection of bat roosts is considered to apply regardless of whether bats are present.]	A Natural England (NE) licence in respect of development is required. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013) • Bat Mitigation Guidelines (English Nature 2004) • Bat Workers Manual (JNCC 2004)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] a bat in such a place.	Licence from NE is required for surveys (scientific purposes) that would involve disturbance of bats or entering a known or suspected roost site.
Otter European protected species	Conservation of Habitats and Species Regulations 2017 Reg 43	Deliberately[1] capture, injure or kill an otter; deliberate disturbance[2] of otters; or damage or destroy a breeding site or resting place used by an otter.	Licences issued for development by Natural England. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] an otter in such a place.	No licence is required for survey in England. However, a licence would be required if the survey methodology involved disturbance.
Great crested newt European protected species	Conservation of Habitats and Species Regulations 2017 Reg 43	Deliberately[1] capture, injure or kill a great crested newt; deliberate disturbance[2] of a great crested newt; deliberately take or destroy its eggs; or damage or destroy a breeding site or resting place used by a great crested newt.	Licences issued for development by Natural England. Guidance documents: • NE Standing Advice for protected species 2013 • European Protected Species: Mitigation Licensing- How to get a licence (NE 2013) • Great Crested Newt Mitigation Guidelines (English Nature 2001)
	Wildlife and Countryside Act 1981 (as amended) S.9	Intentionally or recklessly obstruct access to any structure or place used for shelter or protection or disturb[3] a great crested newt in such a place.	Licences issued for science (survey), education and conservation by Natural England.

[1] Deliberate capture or killing is taken to include "accepting the possibility" of such capture or killing.
[2] Deliberate disturbance of animals includes in particular any disturbance which is likely a) to impair their ability (i) to survive, to breed or reproduce, or to rear or nurture their young, or (ii) in the case of animals of hibernating or migratory species, to hibernate or migrate; or b) to affect significantly the local distribution or abundance of the species to which they belong.
[3] Lower levels of disturbance not covered by the Conservation of Habitats and Species Regulations 2017 remain an offence under the Wildlife and Countryside Act 1981 although a defence is available where such actions are the incidental result of a lawful activity that could not reasonably be avoided.

Appendix 6.9 Ecology Survey Methods and Results, September 2020

Desk Study and Consultation Methodology

The geographical area for obtaining ecological data through desk studies has been determined using professional judgement. In September 2020 baseline data has been gathered from a range of sources through data requests, consultation, and using online resources as outlined below. This included data gathering in relation to statutory and non-statutory designated sites and protected and priority species.

Information on statutory and non-statutory designated sites for biodiversity and bat records within 2km and other legally protected and notable species records within 1km of the Site were requested from Cambridgeshire and Peterborough Environmental Records Centre (CPERC).

The Multi-Agency Geographic Information for the Countryside (MAGIC) website[4] was reviewed for information on European Protected Species records.

A review of ecological reports on the Cambourne to Cambridge Better Public Transport Scheme was undertaken including the Whittle Laboratory Preliminary Ecological Appraisal (PEA) and BREEAM Assessment (LE02-05) Report[5] and the Biodiversity Enhancement and Mitigation Plan associated with the Cavendish III development[6].

Surveys by Cambridge Ecology to inform the Cambourne to Cambridge Better Public Transport Scheme covered a much wider survey area than the West Cambridge Masterplan with two main sections (i) between Madingley Rise and Grange Road and (ii) Madingley Road and Bourn Airfield between Bourn Airfield and Grange Road, both located in Cambridge, Cambridgeshire. The red line boundary of the Cambourne to Cambridge Better Public Transport Scheme includes the whole of the West Cambridge Masterplan Site. It should be noted that these surveys have not been undertaken in relation to the proposed development at the West Cambridge site but are in the public domain and therefore the data is considered as desk study information.

The following Cambridge Ecology reports for the Cambourne to Cambridge Better Transport project were reviewed:

- Great crested newt eDNA report (July 2017);
- Protected species constraints survey 2017 (August 2017);
- Phase 1 habitat survey (September 2017);
- Stage 1 bat inspection survey 2017-18 (March 2018);
- Winter bird survey 2017-18 Survey (April 2018);
- Great crested newt eDNA survey 2018 update (August 2018);
- Great crested newt survey of sports ground pond 1 (August 2018);
- Badger survey (August 2018) – maps of badger sett locations removed.
- Water vole survey (August 2018);
- Breeding bird survey (August 2018);
- Reptile survey report (August 2018);
- Invertebrate survey (October 2018);
- Barn owl survey 2018-19 (March 2020);
- Brown hare survey 2018-19 (March 2020);
- Great crested newt eDNA survey (March 2020);
- Ecology Stage 1 bat inspection survey report 2018-19 (March 2020);
- Ecology Stage 2 bat activity survey report 2019 (March 2020); and
- Ecology wintering bird survey report 2018-19 (March 2020).

A search for any new water bodies within 500 m of the Site was undertaken by using Ordnance Survey plans and aerial photographs only.

Extended Phase 1 Habitat Survey Methodology

An ecological walkover survey of the Application Site and along the footpath immediately beyond the southern boundary of the Site and road verge of the A1303 along the northern boundary of the Site (the Survey Area), was undertaken on 15/09/2020 broadly following the extended Phase 1 habitat survey methodology and in accordance to CIEEM guidance[7]. The M11 road verge is located immediately to the east of the Site and could be viewed from the footpath along the eastern side of the Site. Beyond the footpath and cycleway immediately to the south of the Site was an arable field. Aerial photographs suggest residential properties and tennis courts are present to the east of the Site.

The walkover survey recorded information on the habitats within the Survey Area and also included a search for evidence of the presence of, and the potential of each habitat to support, priority and protected species as recommended by CIEEM. Plant names recorded in this survey follow Stace (2010).

This survey method comprised the following:

- Mapping habitats present according to the JNCC Phase 1 habitat survey methodology[8], with target notes (TN) used to record specific details on the plant species composition of the habitats, current management and condition. TNs were also used to record features of ecological importance e.g. veteran trees;
- Assessing the potential of terrestrial and aquatic habitats to support amphibians. Aquatic habitat was assessed for its suitability to support great crested newts;
- Assessing the suitability of habitats for nesting and wintering birds;
- Assessing the suitability of habitats for reptiles;
- Assessing the suitability of water courses for water vole, otter and white-clawed crayfish;

[4] Magic.gov.uk
[5] Applied Ecology Ltd (December 2019) Whittle Laboratory, University of Cambridge Preliminary Ecological Appraisal and BREEAM Assessment (LE02-05).
[6] Practical Ecology (January 2019). Biodiversity Compensation and Enhancement Plan for Cavendish III
[7] https://www.cieem.net/competency-framework
[8] Joint Nature Conservation Committee (2010) Handbook for Phase 1 habitat survey - a technique for environmental audit.

- Assessing the suitability of habitats for hazel dormouse;
- Assessing the suitability of habitats for foraging, commuting and roosting bats;
- Assessing the suitability of habitats for priority invertebrates; and
- Searching for evidence of badger activity including setts, tracks, snuffle holes and latrines.

Evidence of the presence of the following invasive species was recorded where seen:

- Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, Himalayan balsam, rhododendron, New Zealand pigmy weed, parrot's feather, Virginia creeper, variegated yellow archangel, and cotoneaster. These are listed on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) and subject to strict legal control.

Limitations

This section identifies any limitations to the surveys or assessment and provides an explanation as to the effect of these on the appraisal.

Access was not possible to the construction site to the east of the Department of Veterinary Medicine buildings, illustrated by TN 7 in Figure 2.1 in the Environmental Statement Update and Table A6.9.3 below. The 2015 Phase 1 habitat survey shows this area was species poor semi-improved grassland with tree lines around the edges. Retained trees and partially constructed new buildings are visible over the construction site hoarding. With the exception of the retained trees it is not considered likely that any habitats of ecological value are present within the construction site given the low ecological value of habitats identified in 2015 and the large proportion of the construction site where new buildings are visible.

Fencing around the Data Centre (building in southwest corner of the Site) and areas of grassland and ruderal habitat prevented close inspection of habitats within these fenced areas. However, the habitats could be viewed over or through the fences and therefore this is not considered a significant constraint.

The walkover survey was undertaken in mid-September 2020 when some species may have started to die back and therefore have been less obvious than in the summer months. A desk study included a review of information from the local biodiversity record centre and previous surveys that have been undertaken at the Site at different times of years and therefore this is not considered a significant constraint.

The Coton Path Hedgerow County Wildlife Site is over 1km in length and the exact locations of the previously recorded Nationally Scarce plants was unknown at the time of the Site visit. A more focussed search on the area where the species were previously recorded at an appropriate time of year would determine with greater confidence if these species were still present.

The CPERC records are not exhaustive, and the absence of records does not demonstrate the absence of species.

The search for water bodies within 500 m of the Site was undertaken by using Ordnance Survey plans and aerial photographs only. These sources may not show all ponds and / or water bodies within 500 m of the Site boundary and therefore some water bodies may not have been identified.

The list of invasive plant species included on Schedule 9 of the Wildlife and Countryside Act 1981 (as amended) is extensive and these plants are found in a range of different habitats, including aquatic habitats. The extended Phase 1 habitat survey checked for the presence of Japanese knotweed, giant knotweed, hybrid knotweed, giant hogweed, Himalayan balsam, rhododendron, New Zealand pigmyweed, Virginia creeper, variegated yellow archangel, and cotoneaster species. Other invasive species, in particular those associated with aquatic habitats, may not have been recorded.

Ecological surveys are limited by factors which affect the presence of plants and animals such as the time of year, migration patterns and behaviour. The ecological surveys undertaken to support this ecological assessment have not therefore produced a complete list of plants and animals and the absence of evidence of any particular species should not be taken as conclusive proof that the species is not present or that it will not be present in the future. The above limitations have been addressed through taking the precautionary approach within the appraisal.

Desk Study Results

The CPERC provided the following designated sites and species records.

There are four statutory designated sites within 2 km of the Site. Further detail is provided in Table A6.9.1 below.

Table A6.9.1 Statutory designated sites within 2km of the Site.

Name	Distance and Direction from Site	Size (ha)	Description
Traveller's Rest Pit Site of Special Scientific Interest (SSSI)	Located 550 m north of Site Ordnance Survey National Grid Reference (OSNGR): TL 42930 59883	2.3	Provides a unique exposure in fossiliferous cold stage gravels, sands and silts of a high level-terrace.
Sheep's Green and Coe Fen Local Nature Reserve (LNR)	Located 1600 m south-east of Site OSNGR: TL 44837 57598	16.9	Traditionally grazed by sheep and cows and is seasonally flooded. Provides habitat for herons, kingfishers, egrets and water voles.
Madingley Wood SSSI	Located 1610 m west of Site OSNGR: TL 40058 59613	15.4	Ash-maple woodland located on chalky Boulder Clay, with the western sector of ancient origin.
Paradise LNR	Located 2000 m south-east of Site OSNGR: TL44628 57215	2.2	Comprises a mixture of woodland, marshes and the River Cam.

There are 16 non-statutory designated sites within 2 km of the Site. These are described in Table A6.9.2 below.

Table A6.9.2 Non-statutory designated sites within 2km of the Site.

Name	Distance and Direction from Site	Size (ha)	Description
Coton Path Hedgerow County Wildlife Site (CWS)	Located within Site, along majority of southern boundary Ordnance Survey National Grid Reference (OSNGR): TL 42730 58711	0.9	Supports populations of two Nationally Scarce vascular plant species
Hedgerows East of M11 CWS	Located 140 m south of Site OSNGR: TL 42068 58469	2.1	Supports populations of Nationally Scarce vascular plant species and a vascular plant species which is rare in the county.
Adams Road Sanctuary CWS	Located 420 m east of Site OSNGR: TL 43705 58756	1.6	Contains an invertebrate index exceeding 500 (nationally rare = 100 and nationally scarce = 50).
Barton Road Pool CoWS	Located 1200 m south-east of Site OSNGR: TL 43523 57484	1.2	Grade C site in the JNCC Invertebrate Site Register.
River Cam CoWS	Located 1350 m east of Site OSNGR (at closest point): TL 44544 58511	N/A	Major river that has not been grossly modified, together with adjacent semi-natural habitat.
Sheep's Green and Coe Fen CoWS	Located 1600 m south-east of Site OSNGR: TL 44837 57598	16.9	Traditionally grazed by sheep and cows and is seasonally flooded. Provides habitat for herons, kingfishers, egrets and water voles.
Paradise CoWS	Located 2000 m south-east of Site OSNGR: TL44628 57215	2.2	Supports at least 0.5ha of NVC community W6 (Alder - Stinging Nettle woodland).
Scrub East of M11 Verge City Wildlife Site (CiWS)	Located within Site, along majority of western boundary OSNGR: TL 42082 59016	2.3	Scrub over 0.5 ha in area with four or more woody species. Plus, hedgerow over 100 m long at widest point with four or more woody species
Bird Sanctuary, Conduit CiWS	Located 90 m north of Site OSNGR: TL 42821 59443	0.8	Supports S6 Greater Pond Sedge swamp, S7 Lesser Pond Sedge swamp and 0.51-1 ha woodland with five or more woodland plants and 10% or more mature woodland. Also supports great crested newts.
Ascension Parish Burial Ground CiWS	Located 570 m north of Site OSNGR: TL 43544 59753	0.8	Supports two or more strong neutral grassland indicator species in frequent numbers.
Bin Brook CiWS	Located 570 m south-east of Site OSNGR (at closest point): TL 43621 58362	0.8	Supports breeding populations of water vole. Also supports at least five mature pollard willows.
Trinity Meadow CiWS	Located 1000 m east of Site OSNGR: TL 44278 58541	0.8	Wet grassland adjacent to River Cam.
Drain at Garret Hostel Lane CiWS	Located 1100 m east of Site OSNGR: TL4445258496	0.07	Unmodified drain joining River Cam. Supports mammal species protected by the Wildlife and Countryside Act 1981.
Meadow and Ditch Opposite King's College	Located 1250 m east of Site OSNGR: TL 44496 58332	2.1	Area of undeveloped floodplain directly associated with the River Cam.
Little St. Mary's Churchyard CiWS	Located 1750 m south-east of Site OSNGR: TL 44849 57991	0.2	Supports a nationally scarce species of species of non-vascular plant (*Rhynchostegiella curviseta*).
Skaters' Meadow group	Located 1950 m south-east of Site OSNGR: TL 44616 57209	4.6	Supports three or more strong neutral grassland indicator species in frequent numbers. Qualifies as part of the riparian habitat in the River Cam valley.

Amphibians (great crested newt)

The CPERC data search provided 37 recent[9] records of amphibians within 1 km of the Site, with the closest record a common frog recorded 90 m south-east of the Site. Of these records 31 were of great crested newt within 1 km of the Site, with the closest record located 100 m north of the Site (within Bird Sanctuary, Conduit Head CiWS).

Bats

The CPERC data search provided 139 recent records of bats within 2 km of the Site, consisting of barbastelle, brown long-eared, common pipistrelle, Daubenton's, noctule, serotine and soprano pipistrelle. The closest of these records is of a brown long-eared bat recorded 230 m to the north of the Site. Records of roosts provided by CPERC were degraded to a resolution of 1 km for confidentiality purposes.

Badger

The CPERC data search provided four recent records of badger within 1 km of the Site. The closest of these was recorded 25 m east of the Site, along Madingley Road. CPERC provided records of two badger setts within 1 km of the Site, which were degraded to a resolution of 10 km for confidentiality purposes.

Hazel Dormouse

The CPERC data search provided no recent records of hazel dormouse within 1km of the Site.

Nesting Birds

The CPERC data search provided 163 recent records of birds within 1 km of the Site. Of these, 34 were of Schedule 1 birds, consisting of barn owl, brambling, fieldfare, hobby, kingfisher, peregrine and redwing. The closest of these is of a kingfisher recorded within the Site, outside Cambridge Veterinary Centre.

[9] Within the last 10 years (2010 and later)

Reptiles

The CPERC data search provided five recent records of reptiles within 1 km of the Site, all of them of grass snake. The closest of these was recorded 25 m south of the Site. The remaining records are all in the vicinity of Adams Road Sanctuary CWS or to the south and east of the Site.

Water Vole

The CPERC data search provided nine recent records of water vole within 1 km of the Site, with the closest record located 540 m south-east of the Site. All records are located along Bin Brook.

Otter

The CPERC data search provided 10 recent records of otter within 1 km of the Site, with the closest of these 80 m west of the Site, along the M11. The remaining records were either in the vicinity of Adams Road Sanctuary CWS or Bin Brook to the east and southeast of the Site.

Priority Invertebrates

The CPERC data search provided three recent records of priority invertebrates within 1 km of the Site, consisting of the White-letter Hairstreak, Scarce Chaser dragonfly and Cinnabar moth. The closest of these is of the Scarce Chaser recorded 340 m north of the Site.

White-clawed crayfish

The CPERC data search provided no recent records of white-clawed crayfish within 1 km of the Site.

Priority plants

The CPERC data search provided recent records of a number of notable plants including slender tare treacle-mustard, tower mustard, strawberry clover, stinking hellebore, pyramidal orchid, fine leaved fumitory and early marsh orchid within the Site.

Invasive Non-Native Plant Species (INNPS)

The CPERC data search provided 68 recent records of INNPS within 1 km of the Site, consisting of Canadian waterweed, Virginia creeper, giant hogweed, Himalayan cotoneaster, Indian balsam, Japanese knotweed, montbretia, New Zealand pigmyweed, Nuttall's waterweed and wall cotoneaster. The closest of these is of New Zealand pigmyweed recorded in the south-eastern corner of the Site. The majority of records provided by CPERC are of a resolution of 1 km, so it is impossible to ascertain whether these species are located within the site boundary or not.

European Protected species records

The Magic website has records of great crested newt class licence returns approximately 100m to the north (separated by the A1303 road) from 2014 - 2016, 560m to the east (separated by the M11) from 2016 and 400m to the east from 2015. No otter, bat or dormice licences were found within 1km of the Site.

Habitats

The desk study identified a number of ponds and ditches within the Site and surrounding habitat and were found to be consistent with the original ES.

The CPERC data search recorded deciduous woodland priority habitat within and adjacent to the west edge of the Site and within the northern boundary of the Site. Other priority habitats recorded by CPERC within 1km of the Site included traditional orchard and coastal and floodplain grazing marsh.

Other ecology reports

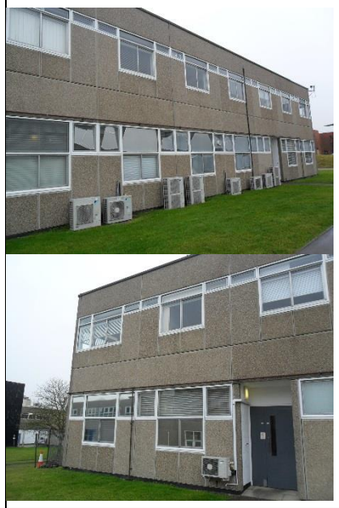
Relevant baseline information from the review of ecological reports on the Cambourne to Cambridge Better Public Transport Scheme, the Whittle Laboratory Preliminary Ecological Appraisal (PEA) and BREEAM Assessment (LE02-05) Report and the Biodiversity Enhancement and Mitigation Plan associated with the Cavendish III development are included in Table 2.2. and Table 2.3 of Chapter 2 of the ES update where relevant. Appendix 6.11 provides extracts from the Cambourne to Cambridge Better Public Transport Invertebrate Survey 2018.

Extended Phase 1 Results

Phase 1 mapping is shown on Figure 2.1 in the Ecology chapter (Chapter 2) of the Environmental Statement Update. Target notes and photographs related to the mapping are shown in Table A6.9.3 below.

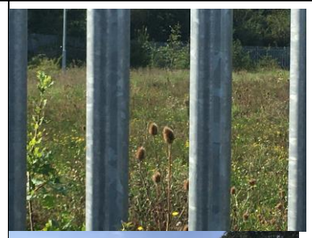
Table A6.9.3 Phase I habitat map target notes

Target Note Number	Description	Photograph
TN1	2015 - Laboratory building with low potential to support roosting bats 2020 – Building appears to have had a new roof since 2015. Detailed inspection for potential bat roost locations was not undertaken.	2015   2020 
TN2 (location of badger setts are confidential for animal welfare reasons and therefore TN2 is not shown on Figure 2.2. This information can be obtained on request by those with a genuine need to see the information)	2015 - Artificial badger sett which has been expanded. Signs of activity around the sett including dung pits, footprints and hair on fencing 2020 – No change. At least five active entrances.	2015   
TN3	2015 - Line of mature oak trees 2020 – Likely to still be present but not noted during 2020 site visit	
TN4	2015 - Wet ditch with low potential to support water vole 2020 – Collectively the waterbodies and watercourses along the southern boundary of the Site were considered to have good suitability for water voles. Ditch 5 (D5) was a steep sided ditch that was dry in September 2020. D4 was dry in September 2020. Pond 3 is an older ornamental pond overshadowed by trees. The waterbody layout in the vicinity of Pond 2 (P2) and Pond 5 may have changed. Pond 2 is now a dry reedbed and Pond 5 is slightly further north and larger than shown previously. The photograph from 2015 suggests Pond 5 has not changed significantly and therefore this difference may simply be a mapping error. Lake 1 (L1) – amenity grassland/saplings around lake in 2015 are now immature woodland	2015  2020  Photos P3, Pond 5b, D4, D3, P1, L1 respectively

Target Note Number	Description	Photograph
TN5	2015 - Cavendish laboratory buildings with potential to support bats and nesting birds 2020 - No change. Detailed inspection for potential bat roost locations was not undertaken.	2015 
TN6	2015 - Complex of modern buildings bisected by access roads, amenity grassland verges and public footpaths 2020 – Similar to in 2015 but at least one new building. Ecological value has not changed.	2015 - No photo

Target Note Number	Description	Photograph
TN7, TN9 and TN10	2015 - Paddocks associated with the veterinary school. Used to hold grazing animals including cows, horses and sheep. Species poor semi improved grassland comprising of perennial rye grass (*Lolium perenne*), cock's foot (*Dactylis glomerata),* white clover (*Trifolium repens*), daises (*Bellis perenis*), meadow grass (*Poa sp.*), knotgrass (*Polygonum aviculare*), thistles (*Cirsium spp.*), buttercups (*Ranunculus spp.),* ribwort plantain (*Plantago lanceolate*), Hawk's beard (*Crepis spp.*), cranesbill (*Geranium spp.*) and common sorrel (*Rumex acetosa*). 2020 – TN7 is now within a construction site. Partially built new buildings and retained trees visible within the site hoarding. From the roadside TN9 appeared to be species poor improved grassland and TN10 improved grassland.	2015  2020  Photos TN7 from east side, TN7 from west side, TN9 and TN10 respectively.
TN8	2020 - Department of Veterinary Medicine – older buildings with bat roosting potential	2020 

Target Note Number	Description	Photograph
TN11	2015 - Coton Path hedgerow CWS running parallel to cycleway. 2020 – Coton Path hedgerow CWS running parallel to cycleway	2015 - No photo 2020 
TN12 and TN13 (new target notes added in 2020)	2020 – Species rich grassland in areas recorded as amenity grassland in 2015. Possibly the result of wildflower seeding of these areas.	  Photo to rear of Whittle Laboratory (NE corner of Site) and surrounding Sports Centre (southern edge of Site)

Target Note Number	Description	Photograph
TN14, TN15 and TN16 (new target notes added in 2020)	2020 – Ephemeral / short perennial habitat in areas recorded as bare ground in 2015. Likely to be result of natural re-colonisation of these areas. Bristly ox-tongue is the dominant species in fields to east and north east of the Data Centre but there is a reasonable diversity of other species, including teasel and ribwort plantain, present.	   Photo through fence to south of Data Centre (SW corner of Site), other two photos of fields to east and north east of Data Centre.
TN17 (new target note added in 2020)	Area with benches, rows of trees and garden plants such as lavender. Recorded as amenity grassland and species-poor semi-improved grassland in 2015.	

Appendix 6.10 No net loss / net gain of priority habitats and species assessment

Introduction

Measures to demonstrate compliance with Policy 70 on protection of priority species and habitats of the Cambridge Local Plan, October 2018, are outlined in the biodiversity chapter of the June 2016 ES. However, the ES did not specifically address the need *to 'secure achievable mitigation and / or compensatory measures, resulting in either no net loss or a net gain of priority habitat and local populations of priority species'* as this policy element was not required at the time that the original ES was submitted in June 2016.

The Local Plan policy states:

> *'Where development is proposed within or adjoining a site hosting priority species and habitats, or which will otherwise affect a national priority species or a species listed in the national and Cambridgeshire-specific BAPs, an assessment of the following will be required:*
>
> *a. Current status of the species population*
>
> *b. The species' use of the site and other adjacent habitats*
>
> *c. The impact of the proposed development on legally protected species, national and Cambridgeshire-specific BAP species and their habitats*
>
> *d. Details of measures to fully protect the species and habitats identified'.*

The NERC Act, which came into force in 2006, requires the Secretary of State to publish a list of habitats and species which are of principal importance for the conservation of biodiversity in England. A list of priority habitats and species found within Cambridge is provided in the Local Plan and shown in Table 6.10.1. It is noted in the Local Plan that these lists are not exhaustive.

Table 6.10.1 Priority habitats and species identified in the Cambridge Local Plan

Priority habitats	**Priority species**
Lowland calcareous grassland	Great crested newt
Lowland meadows	Water vole
Wet woodland	Otter
Ancient / and species-rich hedgerows; and lowland mixed deciduous woodland	Common pipistrelle, Daubenton's, long-eared and noctule bats
Open mosaic habitats (often associated with brownfield sites)	Song thrush
	Skylark
	Brown hare

Assessment

Tables 6.10.2, 6.10.3 and 6.10.4 below provides an assessment of whether priority habitats and species within the West Cambridge Site are likely to achieve no net loss or a net gain. Calculations of areas of habitat loss have not been undertaken as this document is to support an outline planning application for parameter plans and at this stage exact areas of habitat loss and creation are unknown. That being said, the vast majority of priority habitats and habitats that support priority species are around the site boundary or in green corridors within the site that will be protected. The Landscape and Public Realm Parameter Plan (August 2017) illustrates that areas of ecological value will be protected.

Table 6.10.2 No net loss / net gain of priority habitats assessment

Priority habitats – NERC section 41 habitats	Habitats within the Site boundary	Current status[10]	Impact	Mitigation	Proposed compensation to achieve no net loss	No net loss or net gain achieved
Lowland calcareous grassland	No lowland calcareous grassland has been identified within the Site boundary					
Lowland meadows	No lowland meadows have been identified within the Site boundary					
Wet woodland	No wet woodland has been identified within the Site boundary					
Ancient / and species-rich hedgerows	Coton Path Hedgerow CWS is located along the Site's southern boundary. Surveys in 2015 found the hedgerow contained field maple, hazel, blackthorn, ash, dogwood, elder and oak, and has become overgrown. Parts of the verge under the hedgerow have been lost due to the growth of the hedge, whereas other parts are dominated by grasses and common herb species. Neither of the vascular plant species which Coton Path Hedgerow is designated for (yellow vetchling and slender tare) were identified during the survey. The species-rich hedgerow was still present in September 2020. Roads and footpaths within the Site are generally lined with regularly maintained beech hedgerows and lines of immature trees, with some mature oaks lining the newly constructed road south of Charles Babbage Road.	Cambridgeshire is dominated by intensive arable agriculture confining wildlife mainly to hedgerows, most of which are not ancient or species-rich. The stock of hedgerows in the county has been considerably reduced by post-war agricultural improvements and much of the remainder is not in a healthy condition.	The hedgerow comprising the CWS will be retained as part of the Proposed Development. Accidental damage to vegetation comprising the CWS could occur through construction activities adjacent to the CWS or close by.	The hedgerow comprising the CWS will be retained as part of the Proposed Development. If there were any works in the vicinity an exclusion buffer around the CWS would prevent accidental damage of the remaining vegetation and prevent further deterioration of the CWS.	The hedgerow comprising the CWS will be retained as part of the Proposed Development and therefore no compensation is required.	Minimum of no net loss (potential for net gain in terms of habitat quality through improving condition of the hedgerow with appropriate management)
Lowland mixed deciduous woodland	Small woodland blocks are present around the edges of the Site. A woodland strip within and adjacent to the western site boundary and a small woodland block within the northern boundary of the Site were identified as deciduous woodland in the desk study.	Lowland mixed deciduous woodland, the associated understorey and ground flora, contain some of the most important assemblages of animals and plants of any British habitat. However, Britain is one of the least wooded countries in Europe, with 2.743 million hectares of British woodland covering 11.38% of the country's land area. Cambridgeshire is one of the least wooded areas of the UK, with the total area of woodland across both Cambridgeshire and Peterborough excluding parcels less than 0.1ha, totalling 3.6% of the county land area. Of the total woodland present across the county, 10.8% consists of mixed woodland.	Existing woodland will be retained.	A Woodland Management Plan was included in the ES Addendum.	Existing woodlands will be supplemented with buffer planting as defined in the Parameter Plans and Parameter Statements (September 2017), which will increase these woodlands in size and quality. Woodland cover within the Site has already increased since the 2015 Phase 1 habitat survey with a woodland strip along the whole western edge of the Site and around Lake 1.	Net gain in terms of habitat quantity[11]

[10] Based on information from Cambridge and Peterborough Biodiversity Group http://www.cpbiodiversity.org.uk/biodiversity-action-plans [Accessed September 2019)
[11] West Cambridge Outline Planning Application Parameter Plans and Parameter Statements (September 2017)

Priority habitats – NERC section 41 habitats	Habitats within the Site boundary	Current status[10]	Impact	Mitigation	Proposed compensation to achieve no net loss	No net loss or net gain achieved
Open mosaic habitats (often associated with brownfield sites)	The construction activities on site may result in temporary areas of open mosaic habitats but none was identified within the site in September 2020.	Cambridgeshire is dominated by intensive arable agriculture, and brownfield sites are largely confined to urban areas such as Cambridge and Peterborough.	None required	None required	Potential for enhancements for invertebrates that utilise open mosaic habitats through consideration of notable species in landscape design.	Not applicable as not present at time of initial baseline report – short term habitat during construction phase of the plots within the Site being developed
Rivers and streams (within Cambridge this would include the River Cam and its tributaries)	No rivers or streams have been identified within the Site boundary – information on ditches is provided below.					

Table 6.10.3 No net loss / net gain of local priority habitats assessment

Local priority habitats	Habitats within the Site boundary (as described in Section 2.3 on updated baseline)	Current status	Impact	Mitigation	Proposed compensation to achieve no net loss	No net loss or net gain achieved
Floodplain grassland (this would include Cambridge's commons)	No floodplain grassland has been identified within the Site boundary.					
Veteran trees, including pollard willow (particularly along the River Cam)	Veteran trees were not mentioned specifically in the Biodiversity chapter of the original June 2016 ES, but an Arboricultural Impact Assessment accompanied the Addendum ES in 2017. This identified one veteran tree, a horse chestnut within one of the north east car parks (tree ref 014).	Veteran trees have significantly declined both country and countywide. Veteran trees do not have an even distribution throughout Britain, with some areas extremely sparse.	The veteran tree will be retained and protected from indirect impacts.	Tree protection measures will be implemented as outlined in the Arboricultural Impact Assessment (May 2017).	Supplementary tree planting is proposed to buffer the woodland habitat around the edges of the Site.	No net loss
Scrub	In the 2016 ES it was stated that 'The Scrub East of M11 CiWS qualifies under scrub, hedgerow and neutral grassland. The extent of the CiWS has been diminished through the construction of the university data centre which is located within the CiWS. The formal boundary of the CiWS has not been adjusted to account for these developments. The area currently comprises hawthorn, sycamore, blackthorn and elder trees with an understorey of nettles and ground ivy. The woodland edge that adjoins the public footpath contains species of agrimony, black medic, creeping cinquefoil, St Johns wart, square stemmed willow, common spotted orchid and southern marsh orchid. The area was considered to be under managed and in poor condition in terms of its designation.' In 2020 this area is now young woodland. There are no significant areas of scrub habitat within the Site.	N/A	N/A	If any scrub develops on Site it will be protected, where possible, by protective exclusion buffer for the duration of construction works in its vicinity.	Supplementary tree planting is proposed to buffer the woodland habitat around the edges of the Site.	No net loss

Local priority habitats	Habitats within the Site boundary (as described in Section 2.3 on updated baseline)	Current status	Impact	Mitigation	Proposed compensation to achieve no net loss	No net loss or net gain achieved
Drainage ditches and ponds	In the 2016 ES it was reported that there was one lake (West Cambridge Lake (L1)), five ponds (P1, P2, P3, P4 and P5), one ditch (D1), the source of Coton Brook (D2), the West Cambridge Canal (D3) and the Swales (D4) on Site. Ponds P2, P3 and P5 are connected to each other via the West Cambridge Canal (D3) which is within a concrete channel and the Swales (D4) which have shallow banks and little vegetation cover. Ponds P2 and P5 are relatively new and are not established in terms of vegetation and species diversity. Pond P3 is located in the south eastern corner of the Site and is fairly well established although it has not been managed and has become overgrown and rank in the shallower sections. The West Cambridge lake (L1) is of fairly new construction and is connected to ponds P2, P3 and P5 via the West Cambridge Canal (D3) and the Swales (D4). The pond in the north of the site (P4) is an isolated highway's balancing pond which appears to dry out regularly. The Coton Brook (D5), which was dry during the survey, runs along the north of the cycleway / footpath under the hedgerow that marks the southern boundary of the Site. The brook is culverted, heavily shaded and dominated by ruderal species and trees with the banks being largely supported by tree roots. Pond 3 was identified by Cambridge ecology as meeting the criteria to be a priority pond. In September 2020 the ponds were well established and form part of an interesting mosaic of habitats within the southern part of the West Cambridge Site. However, overshadowing by scrub and trees, particularly around Lake 1 and Pond 3, and large carp in Pond 1 mean they do not currently meet their maximum ecological potential.	There is limited information available about open water sites in Cambridgeshire in terms of their conservation status, water quality and importance of biodiversity.	The priority pond (P3) will be subject to re-profiling as part of the surface water drainage design to increase storage capacity.	Replacement aquatic and marginal planting will be of equivalent or better habitat value. The profile and plan of the revised source of Coton Brook (D2) Coton Brook (D5) and pond (P3) will maximise ecological value by providing a variety of physical habitats. Hard engineering structures along the banks of the revised West Cambridge Canal (D3) and ponds (P2 and P5) will be minimised with preference given to softer natural banks.	None	No net loss.

Table 6.10.4 No net loss / net gain of priority species assessment

Priority species (UK and local)	Species within the Site boundary (as described in Section 2.3 on updated baseline)	Current status	Impact (additional impacts to ES in bold)	Mitigation (additional mitigation to ES in bold)	Proposed compensation to achieve no net loss	No net loss or net gain achieved (source of information)
Great crested newt	No great crested newts were found in any of the ponds on Site during presence / likely absence surveys undertaken by Atkins in 2015 or eDNA surveys undertaken by Cambridge Ecology in 2017. Desk study records and surveys by Cambridge Ecology identified ponds that support great crested newts within 500m of the Site. The closest record was from a pond located in the sports ground, 35m south-east of the Site (grid reference TL 43209 58670) which was positive for the presence of great crested newt eDNA in 2017. eDNA and presence / likely absence surveys of this pond were negative in 2018 and this pond and Ponds 1, 3, 5 and Lake 1 within the West Cambridge Site were all negative in 2019. An ecological walkover survey in 2020 confirmed the waterbodies on site are suitable for great crested newts..	Great crested newts are widespread throughout much of England and Wales, but occur only sparsely in southwest England, mid-Wales and Scotland. Cambridgeshire and Peterborough support a significant proportion of the national population, with the largest UK (possibly largest European) population identified near Peterborough. Orton Pit Special Area of Conservation (SAC) in Cambridgeshire is partly designated for this large population of the species.	Potential for great crested newts to colonise the Site from possible population at the sports ground (35m to south-east) or other populations resulting in risk of harm to individuals.	Prior to works to reprofile any of the aquatic features, or construction activities within connected habitats, great crested newt surveys should be undertaken to determine if the species has colonised the waterbodies on site. Any development works within 500m of the Adams Road Sanctuary CiWS, Madingley Road Park and Ride and the Birds Sanctuary, Conduit Head CiWS, and the sports ground pond will be carried out under a PMW or European Protected Species licence for great crested newts. Mitigation measures to protect surface water quality from contaminated runoff are detailed in the water quality assessment (Chapter 13 of the ES).	None	No net loss (species not recorded within the Site boundary and proposed enhancements to southern section of the Site likely to improve suitability for the species)
Water vole	In 2015 it was assessed that there were no suitable habitats for water voles within the Site. A water vole survey conducted in 2018 by Cambridge Ecology found no evidence of water voles. Waterbodies on the West Cambridge site are now considered as suitable habitat for water vole but they were not recorded in 2018 and there is limited habitat connectivity to suitable habitat beyond the survey area where water vole has previously been recorded. Therefore, water voles are currently considered to be absent from the survey area.	Water voles have been lost from 94% of former sites across England, Scotland and Wales. Widespread in Cambridgeshire but declined in most rivers and increased in some other areas. Vulnerable to predation by American mink.	None	None	None	No net loss (species not currently present in the Site boundary)

Priority species (UK and local)	Species within the Site boundary (as described in Section 2.3 on updated baseline)	Current status	Impact (additional impacts to ES in bold)	Mitigation (additional mitigation to ES in bold)	Proposed compensation to achieve no net loss	No net loss or net gain achieved (source of information)
Otter	Otters were not considered in the 2016 ES or 2017 ES Addendum. Ten records of European otter have been returned from a desk study in 2020, including within Bin Brook and in the vicinity of Adams Road Sanctuary CWS. Otters are wide ranging species and although there are no direct aquatic linkages between the site and local watercourses it would be feasible for otters to cross terrestrial habitats from the Adams Road Sanctuary CWS and Bin Brook where they have been recorded. Habitats within the Southern Ecological Corridor are likely to have improved in suitability for otters since the 2016 ES, particularly now young woodland has established around Lake 1, providing improved sheltering opportunities for this species.	The otter underwent a significant decline in Britain between the 1950s and 1990s, particularly in central and southern England, however, otter has been increasing steadily within Cambridgeshire and Peterborough since the 1990s.	None	None	None	No net loss (species not currently present in the Site boundary and suitable habitats along the Southern Ecological Corridor will be retained)

Priority species (UK and local)	Species within the Site boundary (as described in Section 2.3 on updated baseline)	Current status	Impact (additional impacts to ES in bold)	Mitigation (additional mitigation to ES in bold)	Proposed compensation to achieve no net loss	No net loss or net gain achieved (source of information)
Common pipistrelle, Daubenton's, long-eared, noctule and barbastelle bats	Walking transect surveys undertaken for the 2016 ES identified low numbers of bats commuting and foraging around the Site with a peak count of 12 bats. Species identified included common and soprano pipistrelle and Daubenton's bats. In general, static detectors recorded common pipistrelle, soprano pipistrelle, noctules and Myotis species of bat. A single barbastelle bat was recorded to the west of the Site close to the M11 scrub area. It is likely that pipistrelle bat are occasionally using a transitional roost on or close to the Site which is consistent with the building survey results which showed a re-entry of a single bat in the Department of Veterinary Medicine (Building W27) during the whole survey period. Ground level tree inspections of all trees to be removed as part of the masterplan proposals identified three trees with features of moderate to high potential to support roosting bats. Two of these trees had bat boxes which were checked by a licenced ecologist. Tree climbing surveys found no evidence of roosting bats within these trees and the closer inspection of the features resulted in them being re-classified as low and negligible potential for roosting bats. Surveys undertaken since this assessment in the original ES as described in Table 2.2 of the Environmental Statement Chapter have not altered this assessment of use of the Site by bats.	Brown long-eared bat and common pipistrelle are widespread across Britain with the exception of some Scottish islands. Daubenton's are also widespread throughout Britain and noctules are widespread across England and Wales. Barbastelle bats are extremely rare in Britain, found in southern and central England and Wales. Wimpole and Eversden SAC in Cambridgeshire is designated for its breeding colony of Barbastelles.	Construction within development zones II and IV will result in an increase in light levels in the areas to the south and west of the Site due to the presence of compounds and work areas that will require lighting for safety and security purposes. Construction across the Site will result in the temporary loss of low quality foraging habitats in the form of amenity grassland and ornamental planting. The young woodland to the west of the Site, the Coton footpath hedgerow and the West Cambridge lake, will be retained. Impacts on ponds and ditches, as discussed above, will result in a temporary disturbance of foraging areas and commuting routes.	The 2016 ES identified that update surveys "may" need to be undertaken depending on the construction programme. Given the time since the surveys, update surveys will be required to inform detailed design and also (if there is a delay between detailed design and site works) prior to any building demolition or tree felling. Timing of these surveys should take into account the potential need to apply for a European Protected Species licence if roosting bats are confirmed to be present. An application will be made to Natural England for a Wildlife Licence before the building with a confirmed roost in the Department of Veterinary Medicine Complex building is demolished. Works will be undertaken under the watching brief of an appropriately qualified ecologist to ensure bats are not harmed, killed or disturbed during demolition. Lighting associated with construction activities will be installed in accordance with current artificial lighting and wildlife guidance[12]. Advice will be sought from ecologists regarding methods to be applied that will provide dark corridors/areas around the wooded site boundaries, Coton Footpath hedgerow and West Cambridge lake during construction.	A bat box will be installed within the vicinity of the known roost to compensate for the loss of the roost. The new Cambridge Local Plan outlines requirements for bat roosts that should be incorporated into new developments – see Appendix J of Local Plan.	No net loss

[12] **Institute of Lighting Professionals & Bat Conservation Trust (Sept 2018). Guidance Note 08/18 Bats and Artificial Lighting in the UK [https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/]**

Priority species (UK and local)	Species within the Site boundary (as described in Section 2.3 on updated baseline)	Current status	Impact (additional impacts to ES in bold)	Mitigation (additional mitigation to ES in bold)	Proposed compensation to achieve no net loss	No net loss or net gain achieved (source of information)
Priority bird species	Bird surveys in 2015 identified bullfinch probably breeding and house sparrow, linnet, skylark, starling and song thrush breeding. Grey partridge was possibly breeding adjacent to the Site.	Bullfinch – long-term decline House sparrow – declined significantly, benefits from installation of house sparrow boxes Linnet – long-term decline Skylark are widespread across Britain, benefitting from species specific plots created in farmland. Song thrush – widespread across Britain, however, the species is much declined. Grey partridge – low numbers throughout the area surrounding the Site on farmland.	Vegetation clearance and building demolition during construction will result in the loss of bird roosting and nesting opportunities. Noise disturbance will arise from demolition and construction works.	Vegetation clearance will be undertaken outside of the bird nesting season. If not possible all vegetation should be checked by a qualified ecologist for nesting birds prior to clearance. Mitigation measures to reduce noise emissions during the construction works are detailed in the noise assessment (Chapter 12 of the 2016 ES). Lighting associated with construction activities will be installed in accordance with current artificial lighting and wildlife guidance.	Supplementary tree planting is proposed to buffer the woodland habitat around the edges of the Site and would provide suitable nesting and foraging habitat for most of the priority species recorded utilising the Site. The new Cambridge Local Plan outlines requirements for nesting birds that should be incorporated into new developments – see Appendix J of Local Plan.	No net loss
Brown hare	Brown hare were recorded during surveys of Cambridge Ecology's wider survey area but were not noted during surveys of the West Cambridge Site.	Brown hares are widespread across the UK, however, the species has been in decline since the 1960s. Brown hares are most commonly found in eastern England, including Cambridgeshire.	None	None	None	No net loss

Appendix 6.11 Extracts from Cambourne to Cambridge Better Public Transport: Invertebrate Survey 2018 (October 2018) relevant to the West Cambridge Site

Survey Scope

Invertebrate surveys were undertaken on sections between Bourn Airfield and Grange Road between April and September 2018. The West Cambridge Site was described as follows:

The West Cambridge Site

This is in some ways the most interesting of the broad landscape categories from an invertebrate point of view, because it is the least predictable. It is an area of rapid change with much recently developed habitat, sometimes of unusual character, but it includes older buildings and well-established landscaping, and retains some features of the older countryside. The older areas of development tend to be the least interesting: grassland is generally improved, close-mown, or both, on largely level ground. There is a wide range of trees and shrubs, often in well-structured settings, which favours invertebrate diversity, but dead wood is generally scarce, which greatly limits the invertebrate potential. More recently established grasslands, some sown with wildflower mixes and some apparently generating their own floristic diversity, are more interesting, as are areas of recent disturbance with much bare ground.

Some of the recorded invertebrate interest may be transitory, even without the impacts of further building, as successional change closes vegetation cover on recently disturbed ground and in recently established grasslands. On the other hand, many features are so recently established that they have almost certainly as yet recruited only a fraction of the range of invertebrates they might be expected to support, and further species may well establish in the future.

There is, unsurprisingly, an “urban” element to the fauna in the more determinedly landscaped parts of the West Cambridge Site. The weevils O*tiorhynchus armadillo* and *O. crataegiare* recent colonists in England which are mainly found in urban and suburban gardens and shrubberies. Neither was found in the more rural parts of the survey area. The harlequin ladybird Harmonia axyridis, another recent arrival, was found throughout the survey area but it was by far the commonest species of ladybird on shrubs and trees in the landscaped areas, though a minor to scarce component of the ladybird assemblage elsewhere. The weevil *Polydrusus formosus,* formerly a very scarce species in Britain, has become more frequent in recent years and is seemingly established in the nursery trade. It was found widely in the landscaped areas of the West Cambridge Site on a number of trees and shrubs but was especially common on recently planted low hornbeam hedges.

An interesting feature of the recently developed area is the presence of scattered invertebrate interest through the very complex landscaped mix of buildings and open space. There is, for example, a very large colony of the mining bee *Andrena flavipes* on a south-facing bank of mown grassland sheltered by trees and buildings supporting a large population of its parasite *Nomada fucata*. Neither bee is scarce or surprising in Cambridgeshire at present, but the conditions which favour them should suit a wider range of ground-nesting aculeates. This group of insects, able to nest densely in suitable ground but to forage widely over surrounding land, should be particularly well-suited to benefit from the small-scale habitat complex in the more densely developed part of the site.

Distribution of interest between broad landscape categories

The samples taken were distributed amongst these areas of habitat character as follows: general countryside 147; land affected by recent road construction 115; West Cambridge Site 61. In this classification, old countryside features absorbed into or bordering the West Cambridge Site with little change are classed as “general countryside”. The sampling appears somewhat biased towards areas affected by road construction, especially when the proportion of the survey area they occupy is examined, but this reflects the facts that most of such land was considered to be of sufficient potential to be investigated, whereas most of the “general countryside” is arable; that the affected land varies considerably in character over short distances and is subdivided by roads, and that one of the aims of the survey was to have a reasonably good spread of samples across available habitats.

Table 6.10.1 shows the numbers of key species and numbers of records of key species for each of the broad landscape categories; “key species” being defined for current purposes as all those with formal statuses, plus any assigned “very local” status. Figures are potentially somewhat skewed by outdated statuses for some species, but this should not unduly affect such broad comparisons.

Table 6.10.1 Number and records of key species for each broad landscape category.

	General Countryside	Land affected by recent road construction	West Cambridge Site
Number of samples	147	115	61
%age of samples	45.5	35.6	18.9
Number of records of key spp.	317	250	102
%age of records of key spp.	47.4	37.4	15.2
Number of key spp.	200	166	45
%age of key spp.	48.7	40.4	10.9
Mean number of key spp. Per sample	2.1	2.1	1.6
Number ofsamples	147	115	61

Though the number of samples taken is considered a good indication of the recording effort applied to each character area, a small proportion of the records obtained were not in standard samples. The “mean number of key species per sample” is therefore, in each case, slightly lower than the figure that would be obtained by simply dividing the number of records of key species by the number of samples, as given in the table.

For the general countryside and for areas affected by road construction, the number of records of key species from each of the broad landscape categories is quite closely related to the number of samples taken. The mean number of key species per sample is identical in these two landscape categories, but is substantially lower for the West Cambridge Site, suggesting a lower quality fauna. This chiefly reflects low diversity and very limited interest in samples from some areas of improved grassland or planted trees in the West Cambridge Site.

Ponds

Most of the West Cambridge ponds are also recently made. The two older ponds are essentially ornamental, and the oldest dates only to the early 1970s.

The West Cambridge Lake also achieves a high conservation value based on CCI score, however, most of the lake is of relatively low quality with extensive open water and dense invading reed and alder becoming dominant over much of the lake margins. Current interest is mostly concentrated in small areas of more open margin which are likely to be lost to reed and alder without intervention. The CCI score is also heavily influenced by the occurrence of a single Nationally Scarce species, *Gyrinus paykulli*, on the lake. This species is relatively widespread in eastern England and often occurs on large, recently created, waterbodies amongst relatively low-quality reedy habitat. The interest associated with the West Cambridge Lake is therefore considered to be transitory and is likely to decrease as emergent marginal vegetation and shading trees become denser and water quality decreases due to increasing organic matter and fouling by waterbirds. Whilst not of exceptional intrinsic value the West Cambridge Lake is important in the context of the West Cambridge Site and the wider survey area as it is the only large, deep, waterbody present and therefore contributes unique features to the overall site value.

Of the five ponds present on the West Cambridge site, four achieved a fairly high conservation status based on their CCI score. Of these, the pond next to the Cavendish Laboratory, a large, ornamental, pond that is heavily shaded by trees and shrubs, has the highest conservation value. Although its interest is probably decreasing due to shading by surrounding trees and shrubs it currently has well-structured shallow areas that support a moderately large fauna, including the Nationally Scarce bug *Microvelia pygmaea*. This is the oldest of the ponds on the West Cambridge Site and also qualifies as a HAP priority pond. The remaining ponds on the West Cambridge site are all products of recent landscaping and, apart from one pond (south of the West Café) that appears to be seasonal, differ predominantly in the details of emergent vegetation species and area of open water. All are mature enough to be fairly heavily vegetated and are in large parts dominated by dense emergent vegetation. None are particularly well-structured and they generally lack shallow, complex margins, which are important for many water beetle species. Whilst none are individually exceptional, all but the seasonal pond support moderately diverse faunas, and, when considered collectively are of relatively high conservation value, especially in the context of the survey area, which has few ponds.

Of the 27 key species recorded from ponds, one is more usually associated, in Cambridgeshire, with open-structured dry habitats and grassland, and is probably best regarded as a stray; and one is generally characteristic of woodland and is probably associated with marginal scrub. Three are from marginal willows and can occur in the absence of open water. The remainder are quite taxonomically widespread but are unusual for the small number of beetles included, despite the use of suction sampling and pitfall traps.

Formal Landscaping

This habitat category is of relevance only in the West Cambridge Site. It is of slight value in the overall context of the survey area, but necessary because some uncommon species have been recorded from recently landscaped areas. Only eight key species are listed. The longhorn beetle *Anaglyptus mysticus*, though recorded from young planted shrubs, probably originated in older woody vegetation nearby; the fly *Chyliza extenuata* is associated with broomrapes O*robanche* spp., and its breeding site is presumably in grassland close to the shrubs from which it was recorded; a single black-headed mason wasp *Odynerus melanocephalus* was found on flowers in a planted bed, but a large nesting colony was in grassland nearby. Except for *Chyliza extenuata*, all the recorded key species were found elsewhere in the survey area.

Specific sites of high interest

Area 1. Payne’s Pond, south of the Cavendish Laboratories

A well-established pond, dating from landscaping in the early 1970’s, and now well-vegetated and sheltered by trees. Tree cover at the margins has increased in recent years and invertebrate interest is probably in decline through shading. The best margins and shallows are well-structured but occupy only a small fraction of the pond’s margin. The diversity of the aquatic fauna is the pond’s primary reason for designation as an area of high interest, but it is also of note for the discovery, during this survey, of a species of planthopper not previously recorded from Britain. *Flastena fumipennis* feeds on galingale, *Cyperus longus*, and the pond supports a large population. It is probably of little conservation significance, but its national status is as yet uncertain. For the moment, the precautionary principle would suggest that the only population of the species currently known in the country should confer a degree of significance to the pond.

Criteria for inclusion: Priority pond under HAP guidelines.

Area 2. The Coton Path Hedgerow

A long and almost continuous old mixed hedge, with varied and sometimes well-structured transitions to open vegetation, and variously associated with a shaded drainage channel and with areas of plantation. It is tall and reasonably dense throughout its length, includes varying densities of trees, contains a considerable amount of dead wood, and in places is elm-rich. It is bordered throughout by a footpath/cycleway. Much of its length is a County Wildlife Site. The boundary for current purposes extends further west that the CWS, to include the whole length of the hedge to its junction with scrub close to the M11; one of the better-structured stretches of habitat transition is beyond the CWS boundary. Recorded interest is from scattered points along the hedge, and the high value accorded this hedge in comparison to others on the site no doubt stems in part simply from its length rather than just from habitat quality.

Criteria for inclusion: Invertebrate Index: 700

Area 3. The West Cambridge drainage channel and associated habitats

The drainage channel along the south side of the pedestrian/cycle corridor which runs east-west from Ada Lovelace Way is the linking feature in this area, which is otherwise quite varied. It includes several ponds along the course of the channel, mature oaks, recent ornamental planting of both herbaceous and woody vegetation, and recently established flower-rich grassland. It provides a habitat corridor across the site and links other areas of high interest. Some parts of this area are of low to moderate interest at the moment, and the character of the route and its associated interest are likely to change quite quickly in view of recent development and landscaping, but it is not clear whether this will improve or reduce invertebrate interest. The flower-rich grassland incorporated in this area is also present in some other areas of the West Cambridge Site, but this example benefits from being quite extensive, on land with some variation in topography, and being associated with other features of interest. High interest is justified here only because of the combination of features and the fact they form a corridor. None of the component parts are individually of very high value, and though the West Cambridge Lake achieves an assessment of high conservation value using the Community Conservation Index it does so only because of a single capture of the scarce whirligig beetle *Gyrinus paykulli*. Both the aquatic and the marginal fauna of the lake seemed generally unexceptional and are likely to decline in interest through marginal shading; alder-dominated woody vegetation is already crowding much of the margin.

Criteria for inclusion: Invertebrate Index: 850 and Community Conservation Index for West Cambridge Lake: high conservation value

Area 4. Recently created grassland and open mosaic habitats in the West Cambridge Site

Four habitat areas of different character are included here: open-structured legume-rich grassland on a level field with varied substrate character immediately to the east of Ada Lovelace Way; taller grassland on a bank between the level grassland and Charles Babbage Road to its north; very open-structured vegetation on recently disturbed ground to the west of Ada Lovelace Way; and unmanaged tall herbs with abundant flowers along a bank and footpath/cycleway immediately to the north of the disturbed ground. Recorded interest is concentrated in the legume-rich grassland and its associated bank, and this area alone would qualify as an area of high interest. It is particularly noteworthy for a large population of the black-headed mason wasp *Odynerus melanocephalus*, which both nests and forages in the field in areas of open-structured vegetation with bare ground. The vegetation along the footpath/cycleway provides a sheltered flower-rich area where large numbers of solitary bees and wasps forage, and some at least of these are likely to nesting at least a little distance away; it is therefore complementary to more open habitats. The early successional area provides partial link between the other habitats, is a possible nesting site for some of the aculeates and is likely to increase in potential as an invertebrate habitat quite quickly.

Criteria for inclusion: Invertebrate Index: 650

Area 5. Hedge and grass verge on the east side of Ada Lovelace Road

This is a small and rather unexpected area of interest. What was presumably an overgrown hawthorn-dominated hedge has been greatly reduced, leaving an open-structured line of substantial lopped trunks, with large pieces of cut wood stacked in small piles. Coarse ruderal vegetation grows on disturbed ground beneath and near the hedge, but closer to the road it is replaced by managed grassland, of reasonably floristic diversity. A quite rich saproxylic fauna includes three species of the weevil genus *Magdalis*, which comprises all the species associated with hawthorn. The fauna of the grassland is surprisingly rich considering its limited area. The interest of the hedge probably results in part from its recent treatment and may be transitory. Recent plantings along the hedge-line suggest a plan to convert it to a more conventional hedge, which will diminish its potential.

Criteria for inclusion: Invertebrate Index: 600

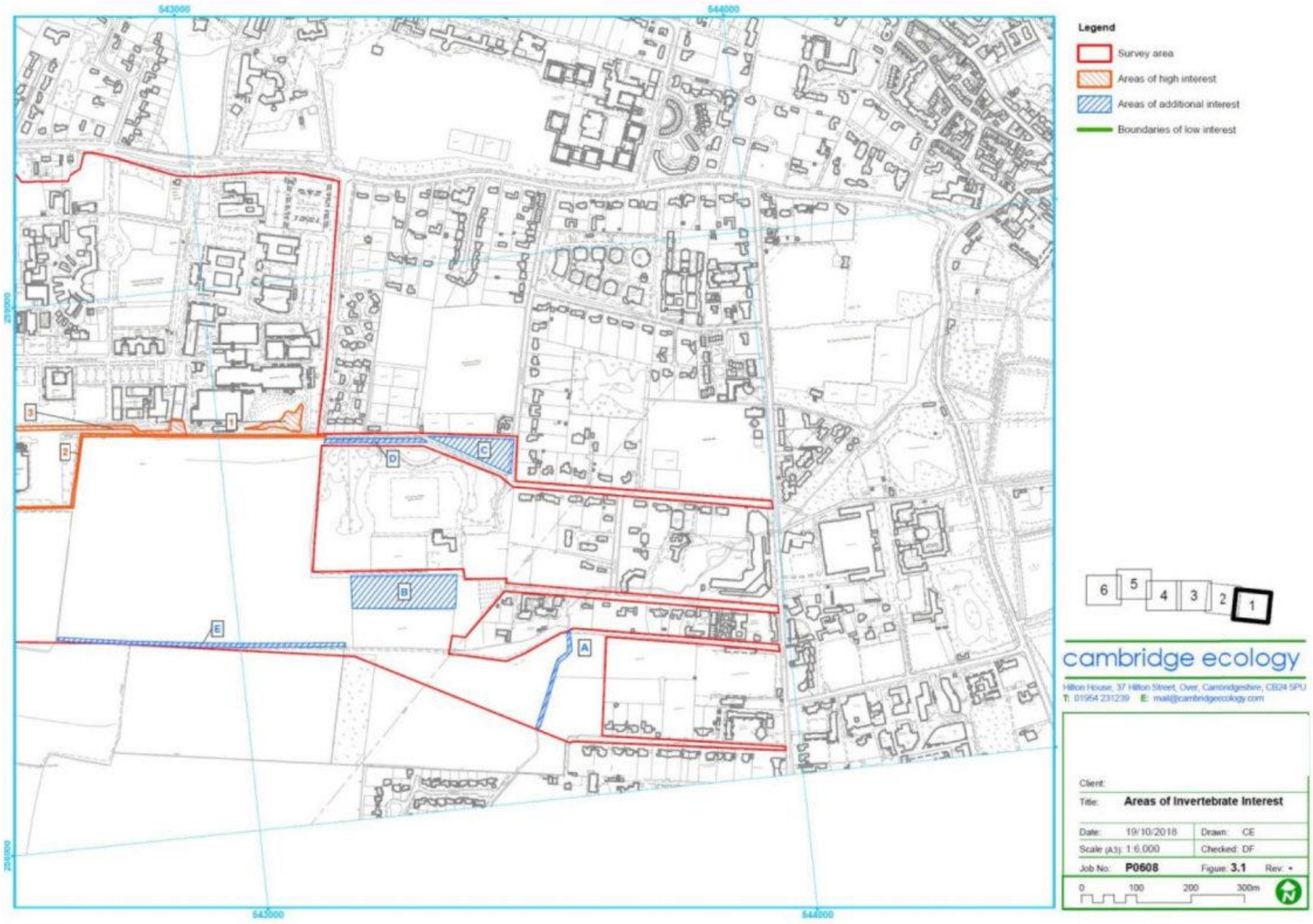


Figure 6.10.1 Invertebrate survey maps Sheet 1 of 2

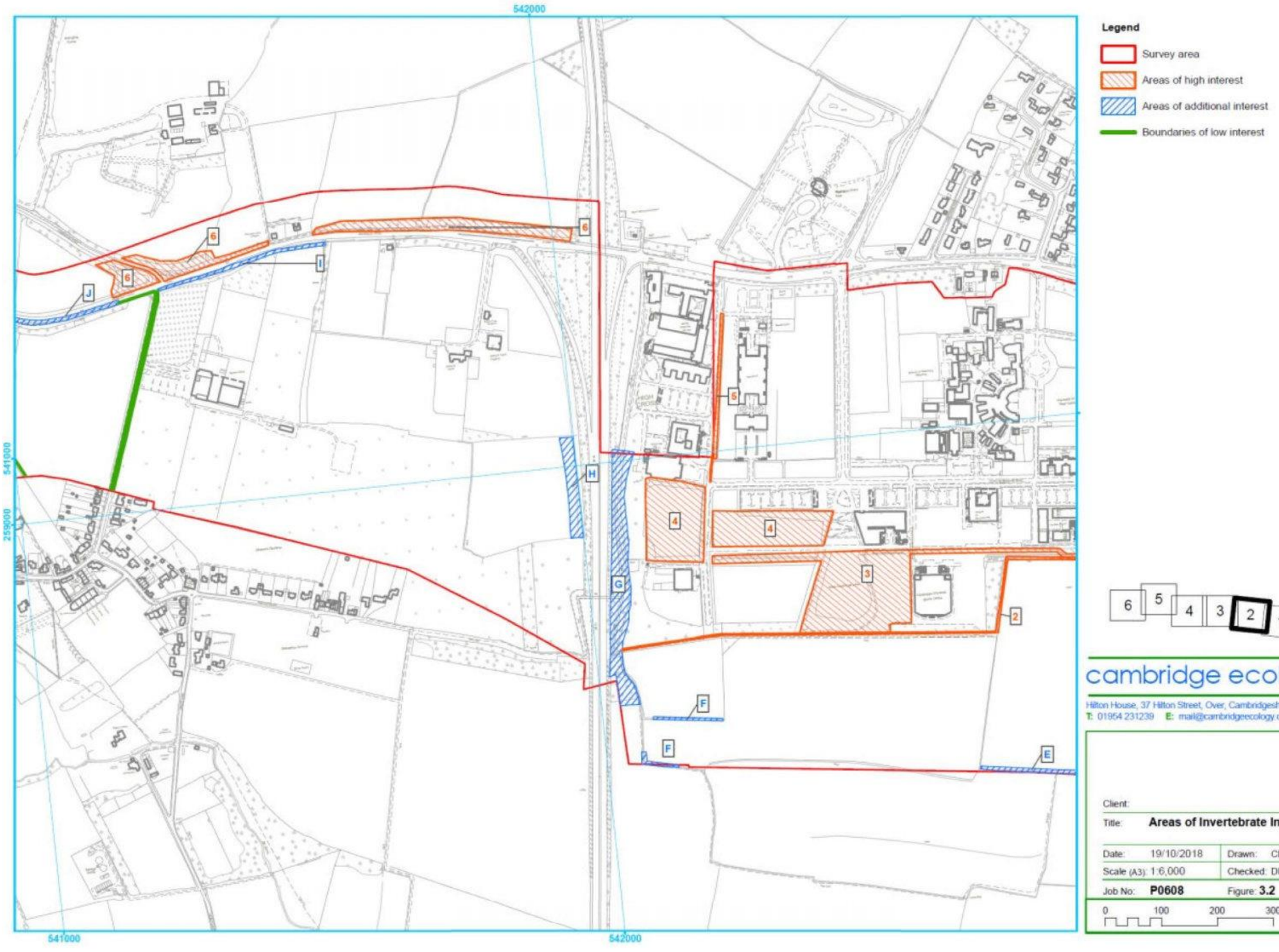


Figure 6.10.2 Invertebrate survey maps Sheet 2 of 2

Appendix 10.1 Traffic flows

45339 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2019 Base Flows

Prepared By: T Althorpe 05/08/2019

Checked by: E Moran 06/08/2019

123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)			6. Site Access		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2019 Base Flows								>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link	Tempro Factor Used	Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	3,582	3,702	7,284	1 - M11	46,246	46,169	70	2016 to 2019 S Cam 009 Motorway	7,261	15.70%	7,170	15.53%
1.0	M11 - J12 - J13 - Sbd	3,699	3,585	7,284	1 - M11	46,246	46,168	70	2016 to 2019 S Cam 009 Motorway	7,261	15.70%	7,170	15.53%
1.1	M11 J13 -J14 - Nbd	2,329	3,066	5,395	1 - M11	34,250	34,193	70	2014 to 2019 S Cam 009 Motorway	5,378	15.70%	5,310	15.53%
1.1	M11 J13 -J14 - Sbd	2,808	2,502	5,310	1 - M11	33,709	33,653	70	2014 to 2019 S Cam 009 Motorway	5,293	15.70%	5,226	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,507	2,222	3,729	1 - M11	23,674	23,635	70	2013 to 2019 S Cam 009 Motorway	3,717	15.70%	3,670	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,207	1,589	3,797	1 - M11	24,103	24,063	70	2013 to 2019 S Cam 009 Motorway	3,784	15.70%	3,737	15.53%
1.3	M11 J13 off-slip - Nbd	1,152	996	2,148	1 - M11	13,638	13,615	70	2018 to 2019 S Cam 009 Motorway	2,141	15.70%	2,114	15.53%
1.3	M11 J13 on-slip - Sbd	505	1,015	1,520	1 - M11	9,651	9,634	70	2018 to 2019 S Cam 009 Motorway	1,515	15.70%	1,496	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	3,913	3,540	7,453	2 - A14	42,498	39,106	70	2013 to 2019 S Cam 009 Rural Trunk Road	7,963	18.74%	7,166	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,271	4,474	7,745	2 - A14	44,167	40,642	70	2013 to 2019 S Cam 009 Rural Trunk Road	8,276	18.74%	7,448	18.33%
2.1	A14 North West of M11 J14 - Ebd	3,881	3,483	7,364	2 - A14	41,994	38,641	70	2015 to 2019 S Cam 009 Rural Trunk Road	7,868	18.74%	7,081	18.33%
2.1	A14 North West M11 J14 - Wbd	3,143	4,199	7,342	2 - A14	41,870	38,527	70	2015 to 2019 S Cam 009 Rural Trunk Road	7,845	18.74%	7,060	18.33%
2.2	A14 West of J32 Interchange - Ebd	3,928	3,834	7,763	2 - A14	44,266	40,733	70	2016 to 2019 S Cam 009 Rural Trunk Road	8,294	18.74%	7,465	18.33%
2.2	A14 West of J32 Interchange - Wbd	3,831	3,932	7,763	2 - A14	44,267	40,733	70	2016 to 2019 S Cam 009 Rural Trunk Road	8,294	18.74%	7,465	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,654	759	2,412	2 - A14	13,755	12,657	70	2014 to 2019 S Cam 009 Urban Trunk	2,577	18.74%	2,319	18.33%
2.3	A428 - West of M11 J14 - Wbd	798	1,267	2,064	2 - A14	11,771	10,832	70	2014 to 2019 S Cam 009 Urban Trunk	2,206	18.74%	1,985	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	498	540	1,038	3 - Madingley Rd	7,203	6,949	50	2016 to 2019 S Cam 009 Rural Principal	413	5.73%	380	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	542	1,252	1,794	3 - Madingley Rd	12,451	12,013	50	2016 to 2019 S Cam 009 Rural Principal	713	5.73%	658	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	669	1,678	2,347	3 - Madingley Rd	16,291	15,718	40	2018 to 2019 Cam 005 Urban Principal	933	5.73%	861	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	932	755	1,687	3 - Madingley Rd	11,707	11,295	40	2018 to 2019 Cam 005 Urban Principal	671	5.73%	618	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	1,705	993	2,698	3 - Madingley Rd	18,723	18,065	40	2018 to 2019 Cam 005 Urban Principal	1,073	5.73%	989	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	292	924	1,217	3 - Madingley Rd	8,445	8,148	40	2018 to 2019 Cam 005 Urban Principal	484	5.73%	446	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,474	581	2,056	4 - Barton Rd	13,047	12,534	40	2018 to 2019 Cam 005 Urban Principal	479	3.67%	426	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	565	1,524	2,090	4 - Barton Rd	13,263	12,742	40	2018 to 2019 Cam 005 Urban Principal	487	3.67%	433	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	580	1,545	2,124	4 - Barton Rd	13,482	12,952	40	2018 to 2019 Cam 005 Urban Principal	495	3.67%	440	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,485	600	2,085	4 - Barton Rd	13,233	12,713	40	2018 to 2019 Cam 005 Urban Principal	486	3.67%	432	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	602	1,392	1,994	4 - Barton Rd	12,658	12,161	40	2018 to 2019 Cam 005 Urban Principal	464	3.67%	413	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,358	629	1,988	4 - Barton Rd	12,615	12,119	40	2018 to 2019 Cam 005 Urban Principal	463	3.67%	412	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,089	502	1,592	4 - Barton Rd	10,102	9,705	40	2018 to 2019 Cam 005 Urban Principal	371	3.67%	330	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	542	1,109	1,651	4 - Barton Rd	10,481	10,069	40	2018 to 2019 Cam 005 Urban Principal	385	3.67%	342	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	812	559	1,371	4 - Barton Rd	8,702	8,360	30	N/A - 2019 Flows	319	3.67%	284	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	614	853	1,467	4 - Barton Rd	9,311	8,945	30	N/A - 2019 Flows	342	3.67%	304	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	746	589	1,335	4 - Barton Rd	8,473	8,140	30	N/A - 2019 Flows	311	3.67%	277	3.40%

3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	643	789	1,432	4 - Barton Rd	9,089	8,732	30	N/A - 2019 Flows	333	3.67%	297	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	716	591	1,306	4 - Barton Rd	8,291	7,965	30	2015 to 2019 Cam 005 Urban Principal	304	3.67%	271	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	656	626	1,282	4 - Barton Rd	8,137	7,817	30	2015 to 2019 Cam 005 Urban Principal	299	3.67%	266	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	716	591	1,306	4 - Barton Rd	8,291	7,965	30	2015 to 2019 Cam 005 Urban Principal	304	3.67%	271	3.40%
3.10	Madingley Rd - East of Grange Road Wbd	656	626	1,282	4 - Barton Rd	8,137	7,817	30	2015 to 2019 Cam 005 Urban Principal	299	3.67%	266	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	843	598	1,442	4 - Barton Rd	9,149	8,790	30	2015 to 2019 Cam 005 Urban Principal	336	3.67%	299	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	614	739	1,353	4 - Barton Rd	8,587	8,250	30	2015 to 2019 Cam 005 Urban Principal	315	3.67%	280	3.40%
3.12	Northampton St - West of Pound Hill Ebd	484	681	1,165	4 - Barton Rd	7,393	7,102	30	2015 to 2019 Cam 005 Urban Principal	271	3.67%	241	3.40%
3.12	Northampton St - West of Pound Hill Wbd	582	600	1,183	4 - Barton Rd	7,506	7,211	30	2015 to 2019 Cam 005 Urban Principal	275	3.67%	245	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	340	719	1,059	4 - Barton Rd	6,722	6,458	60	2015 to 2019 Cam 005 Urban Principal	247	3.67%	219	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	417	346	764	4 - Barton Rd	4,847	4,656	60	2015 to 2019 Cam 005 Urban Principal	178	3.67%	158	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	340	719	1,059	4 - Barton Rd	6,722	6,458	30	2015 to 2019 Cam 005 Urban Principal	247	3.67%	219	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	417	346	764	4 - Barton Rd	4,847	4,656	30	2015 to 2019 Cam 005 Urban Principal	178	3.67%	158	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	406	986	1,391	4 - Barton Rd	8,831	8,484	30	2015 to 2019 Cam 005 Urban Principal	324	3.67%	288	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access SEbd	698	472	1,170	4 - Barton Rd	7,424	7,132	30	2015 to 2019 Cam 005 Urban Principal	272	3.67%	242	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	463	1,038	1,501	4 - Barton Rd	9,529	9,155	30	2015 to 2019 Cam 005 Urban Principal	350	3.67%	311	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	984	541	1,525	4 - Barton Rd	9,679	9,298	30	2015 to 2019 Cam 005 Urban Principal	355	3.67%	316	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	483	928	1,411	4 - Barton Rd	8,958	8,606	30	2015 to 2019 Cam 005 Urban Principal	329	3.67%	292	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	828	572	1,399	4 - Barton Rd	8,881	8,532	30	2015 to 2019 Cam 005 Urban Principal	326	3.67%	290	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,160	508	1,669	4 - Barton Rd	10,591	10,175	30	2013 to 2019 Cam 007 Urban Principal	389	3.67%	346	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	315	1,007	1,322	4 - Barton Rd	8,392	8,063	30	2013 to 2019 Cam 007 Urban Principal	308	3.67%	274	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	649	458	1,107	4 - Barton Rd	7,028	6,751	30	2015 to 2019 Cam 007 Urban Principal	258	3.67%	229	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	296	971	1,267	4 - Barton Rd	8,042	7,726	30	2015 to 2019 Cam 007 Urban Principal	295	3.67%	263	3.40%
6.0	Queen's Rd - North of West Rd Nbd	484	683	1,167	4 - Barton Rd	7,406	7,115	30	2015 to 2019 Cam 005 Urban Principal	272	3.67%	242	3.40%
6.0	Queen's Rd - North of West Rd Sbd	816	574	1,390	4 - Barton Rd	8,820	8,474	30	2015 to 2019 Cam 005 Urban Principal	324	3.67%	288	3.40%
7.0	Histon Road - South of A14 Nbd	988	1,691	2,679	4 - Barton Rd	17,002	16,334	40	2015 to 2019 Cam 005 Urban Principal	624	3.67%	555	3.40%
7.0	Histon Road - South of A14 Sbd	1,907	1,270	3,177	4 - Barton Rd	20,164	19,372	40	2015 to 2019 Cam 005 Urban Principal	740	3.67%	658	3.40%
7.1	Histon Rd - South of Akeman St Nbd			0	4 - Barton Rd	0	0	30	No Base Flow Data	0	3.67%	0	3.40%
7.1	Histon Rd - South of Akeman St Sbd			0	4 - Barton Rd	0	0	30	No Base Flow Data	0	3.67%	0	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	204	210	414	5 - Grange Rd	2,155	2,046	30	2015 to 2019 Cam 005 Urban Minor	105	4.86%	91	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	335	158	493	5 - Grange Rd	2,568	2,437	30	2015 to 2019 Cam 005 Urban Minor	125	4.86%	108	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	272	86	358	5 - Grange Rd	1,862	1,768	20	2015 to 2019 Cam 005 Urban Minor	90	4.86%	78	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	95	227	322	5 - Grange Rd	1,676	1,591	20	2015 to 2019 Cam 005 Urban Minor	81	4.86%	70	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	143	350	492	5 - Grange Rd	2,564	2,434	30	2015 to 2019 Cam 005 Urban Minor	125	4.86%	108	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	357	211	568	5 - Grange Rd	2,959	2,809	30	2015 to 2019 Cam 005 Urban Minor	144	4.86%	124	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd								Future link - does not exist				
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd								Future link - does not exist				
11.1	Proposed Madingley Rd West Access to NWC Nbd								Future link - does not exist				
11.1	Proposed Madingley Rd West Access to NWC Sbd								Future link - does not exist				
11.2	Proposed Huntingdon Rd West Access to NWC Nbd								Future link - does not exist				
11.2	Proposed Huntingdon Rd West Access to NWC Sbd								Future link - does not exist				
11.3	Proposed Huntingdon Rd East Access to NWC Sbd								Future link - does not exist				
11.3	Proposed Huntingdon Rd East Access to NWC Nbd								Future link - does not exist				
12.0	Western Access to Madingley Rd Nbd								Future link - does not exist				
12.0	Western Access to Madingley Rd Sbd								Future link - does not exist				
12.1	High Cross Access to Madingley Rd Nbd	246	228	474	6 - Site Access	2,228	1,717	30		148	6.64%	107	6.26%
12.1	High Cross Access to Madingley Rd Sbd	144	285	429	6 - Site Access	2,018	1,555	30		134	6.64%	97	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	73	196	269	6 - Site Access	1,264	974	30	N/A - 2019 Flows	84	6.64%	61	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	220	65	285	6 - Site Access	1,339	1,032	30	N/A - 2019 Flows	89	6.64%	65	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access	10	32	42	6 - Site Access	197	152	30	Estimated Flows for Clerk Maxwell Road due to Park + Cycle and on street parking from 2016	13	6.64%	10	6.26%

12.3	Clerk Maxwell Rd Sbd - south of Car Park Access	38	9	47	6 - Site Access	221	170	30	Estimated Flows for Clerk Maxwell Road due to Park + Cycle and on street parking from 2016	15	6.64%	11	6.26%
12.4	Clerk Maxwell Rd Sbd - north of Car Park Access	18	103	121	6 - Site Access	569	438	30	N/A - 2019 Flows	38	6.64%	27	6.26%
12.4	Clerk Maxwell Rd Nbd - north of Car Park Access	114	11	125	6 - Site Access	587	453	30	N/A - 2019 Flows	39	6.64%	28	6.26%

45339 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2021 DM Flows

Prepared By: T Althorpe 06/08/2019

Checked by: J Hopkins 12/09/2019

123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)			6. Site Access		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2021 DM Flows										
		2021 DM Flows							>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link		Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	3,773	3,942	7,715	1 - M11	48,981	48,899	70		7,690	15.70%	7,594	15.53%
1.0	M11 - J12 - J13 - Sbd	3,899	3,881	7,780	1 - M11	49,395	49,312	70		7,755	15.70%	7,658	15.53%
1.1	M11 J13 -J14 - Nbd	2,471	3,149	5,620	1 - M11	35,682	35,622	70		5,602	15.70%	5,532	15.53%
1.1	M11 J13 -J14 - Sbd	2,893	2,654	5,546	1 - M11	35,213	35,155	70		5,529	15.70%	5,460	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,619	2,291	3,910	1 - M11	24,823	24,782	70		3,898	15.70%	3,849	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,276	1,700	3,977	1 - M11	25,246	25,204	70		3,964	15.70%	3,914	15.53%
1.3	M11 J13 off-slip - Nbd	1,201	1,153	2,354	1 - M11	14,947	14,922	70		2,347	15.70%	2,317	15.53%
1.3	M11 J13 on-slip - Sbd	618	1,160	1,778	1 - M11	11,290	11,271	70		1,773	15.70%	1,750	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	3,914	3,631	7,545	2 - A14	43,024	39,589	70		8,061	18.74%	7,255	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,340	4,528	7,867	2 - A14	44,863	41,282	70		8,406	18.74%	7,565	18.33%
2.1	A14 North West of M11 J14 - Ebd	3,868	3,633	7,501	2 - A14	42,775	39,361	70		8,015	18.74%	7,213	18.33%
2.1	A14 North West M11 J14 - Wbd	3,297	4,194	7,491	2 - A14	42,716	39,306	70		8,004	18.74%	7,203	18.33%
2.2	A14 West of J32 Interchange - Ebd	4,036	4,011	8,047	2 - A14	45,884	42,222	70		8,597	18.74%	7,737	18.33%
2.2	A14 West of J32 Interchange - Wbd	4,011	4,038	8,049	2 - A14	45,901	42,237	70		8,600	18.74%	7,740	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,690	794	2,484	2 - A14	14,167	13,036	70		2,654	18.74%	2,389	18.33%
2.3	A428 - West of M11 J14 - Wbd	833	1,297	2,130	2 - A14	12,145	11,176	70		2,276	18.74%	2,048	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	553	607	1,160	3 - Madingley Rd	8,049	7,765	50		461	5.73%	425	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	595	1,324	1,919	3 - Madingley Rd	13,317	12,849	50		763	5.73%	703	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	707	1,641	2,348	3 - Madingley Rd	16,296	15,723	40		934	5.73%	861	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	902	822	1,724	3 - Madingley Rd	11,962	11,541	40		685	5.73%	632	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	1,702	1,190	2,892	3 - Madingley Rd	20,073	19,367	40		1,150	5.73%	1,060	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	309	859	1,168	3 - Madingley Rd	8,107	7,822	40		464	5.73%	428	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,443	752	2,195	4 - Barton Rd	13,929	13,381	40		511	3.67%	455	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	668	1,578	2,246	4 - Barton Rd	14,253	13,693	40		523	3.67%	465	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	682	1,598	2,280	4 - Barton Rd	14,472	13,903	40		531	3.67%	473	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,454	770	2,224	4 - Barton Rd	14,115	13,561	40		518	3.67%	461	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	704	1,446	2,150	4 - Barton Rd	13,648	13,111	40		501	3.67%	446	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,327	800	2,126	4 - Barton Rd	13,497	12,966	40		495	3.67%	441	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,195	518	1,713	4 - Barton Rd	10,872	10,444	40		399	3.67%	355	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	531	1,267	1,798	4 - Barton Rd	11,412	10,964	40		419	3.67%	373	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	904	624	1,528	4 - Barton Rd	9,698	9,317	30		356	3.67%	317	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	575	990	1,565	4 - Barton Rd	9,934	9,544	30		364	3.67%	324	3.40%

3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	839	657	1,496	4 - Barton Rd	9,498	9,125	30		348	3.67%	310	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	607	928	1,535	4 - Barton Rd	9,741	9,358	30		357	3.67%	318	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	803	666	1,469	4 - Barton Rd	9,321	8,955	30		342	3.67%	304	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	660	769	1,429	4 - Barton Rd	9,070	8,714	30		333	3.67%	296	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	796	666	1,462	4 - Barton Rd	9,277	8,913	30		340	3.67%	303	3.40%
3.10	Madingley Rd - East of Grange Road Wbd	662	763	1,424	4 - Barton Rd	9,040	8,685	30		332	3.67%	295	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	935	703	1,638	4 - Barton Rd	10,396	9,987	30		381	3.67%	339	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	686	879	1,565	4 - Barton Rd	9,932	9,541	30		364	3.67%	324	3.40%
3.12	Northampton St - West of Pound Hill Ebd	524	790	1,314	4 - Barton Rd	8,337	8,009	30		306	3.67%	272	3.40%
3.12	Northampton St - West of Pound Hill Wbd	692	672	1,365	4 - Barton Rd	8,663	8,322	30		318	3.67%	283	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	472	883	1,355	4 - Barton Rd	8,599	8,261	60		315	3.67%	281	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	507	491	998	4 - Barton Rd	6,332	6,083	60		232	3.67%	207	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	426	749	1,175	4 - Barton Rd	7,457	7,164	30		274	3.67%	243	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	413	416	829	4 - Barton Rd	5,259	5,053	30		193	3.67%	172	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	585	1,215	1,800	4 - Barton Rd	11,427	10,978	30		419	3.67%	373	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access SEbd	929	707	1,636	4 - Barton Rd	10,385	9,977	30		381	3.67%	339	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	608	1,296	1,904	4 - Barton Rd	12,083	11,608	30		443	3.67%	395	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	1,263	744	2,007	4 - Barton Rd	12,737	12,236	30		467	3.67%	416	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	611	1,181	1,793	4 - Barton Rd	11,378	10,931	30		417	3.67%	372	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	1,131	769	1,900	4 - Barton Rd	12,059	11,585	30		442	3.67%	394	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,174	526	1,699	4 - Barton Rd	10,786	10,363	30		396	3.67%	352	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	326	1,016	1,342	4 - Barton Rd	8,519	8,184	30		313	3.67%	278	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	663	475	1,138	4 - Barton Rd	7,223	6,939	30		265	3.67%	236	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	307	980	1,287	4 - Barton Rd	8,168	7,847	30		300	3.67%	267	3.40%
6.0	Queen's Rd - North of West Rd Nbd	509	730	1,239	4 - Barton Rd	7,866	7,557	30		289	3.67%	257	3.40%
6.0	Queen's Rd - North of West Rd Sbd	862	596	1,458	4 - Barton Rd	9,256	8,892	30		340	3.67%	302	3.40%
7.0	Histon Road - South of A14 Nbd	1,128	1,758	2,886	4 - Barton Rd	18,320	17,600	40		672	3.67%	598	3.40%
7.0	Histon Road - South of A14 Sbd	1,888	1,432	3,320	4 - Barton Rd	21,073	20,245	40		773	3.67%	688	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	206	221	427	5 - Grange Rd	2,222	2,110	30		108	4.86%	93	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	345	163	508	5 - Grange Rd	2,646	2,512	30		129	4.86%	111	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	221	74	294	5 - Grange Rd	1,533	1,455	20		74	4.86%	64	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	90	211	301	5 - Grange Rd	1,568	1,488	20		76	4.86%	66	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	158	377	535	5 - Grange Rd	2,787	2,646	30		135	4.86%	117	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	379	233	612	5 - Grange Rd	3,185	3,023	30		155	4.86%	134	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd	8	86	95	6 - Site Access	445	343	20		30	6.64%	21	6.26%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd	91	27	117	6 - Site Access	552	425	20		37	6.64%	27	6.26%
11.1	Proposed Madingley Rd West Access to NWC Nbd	96	405	501	6 - Site Access	2,354	1,814	20		156	6.64%	114	6.26%
11.1	Proposed Madingley Rd West Access to NWC Sbd	299	208	507	6 - Site Access	2,382	1,836	20		158	6.64%	115	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Nbd	46	133	179	6 - Site Access	841	648	20		56	6.64%	41	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Sbd	94	75	169	6 - Site Access	794	612	20		53	6.64%	38	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Sbd	151	250	401	6 - Site Access	1,884	1,452	20		125	6.64%	91	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Nbd	286	222	508	6 - Site Access	2,387	1,840	20		158	6.64%	115	6.26%
12.0	Western Access to Madingley Rd Nbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
12.0	Western Access to Madingley Rd Sbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
12.1	High Cross Access to Madingley Rd Nbd	228	172	401	6 - Site Access	1,882	1,450	30		125	6.64%	91	6.26%
12.1	High Cross Access to Madingley Rd Sbd	81	292	372	6 - Site Access	1,750	1,348	30		116	6.64%	84	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	62	260	322	6 - Site Access	1,514	1,167	30		100	6.64%	73	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	195	58	253	6 - Site Access	1,188	916	30		79	6.64%	57	6.26%

12.3	Clerk Maxwell Rd Nbd - south of Car Park Access				6 - Site Access	295	235	30		20	6.64%	15	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access				6 - Site Access	290	231	30		19	6.64%	14	6.26%
12.4	Clerk Maxwell Rd Sbd - north of Car Park Access				6 - Site Access	590	470	30		39	6.64%	29	6.26%
12.4	Clerk Maxwell Rd Nbd - north of Car Park Access				6 - Site Access	601	479	30		40	6.64%	30	6.26%

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nvironmental Statement - Transport Air Quality and Noise Assessments

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Prepared By: M Balding 06/09/2019

Checked by: J Hopkins 12/09/2019

AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
18hr 5 day Flows (0600 - 0000)
24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)			6. Site Access		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

	2021 DS Flows											
	2021 DS Flows								>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link		Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
M11 - J12 - J13 - Nbd	3,855	3,929	7,783	1 - M11	49,414	49,332	70		7,758	15.70%	7,661	15.53%
M11 - J12 - J13 - Sbd	3,875	3,929	7,803	1 - M11	49,542	49,459	70		7,779	15.70%	7,681	15.53%
M11 J13 -J14 - Nbd	2,447	3,138	5,585	1 - M11	35,456	35,396	70		5,567	15.70%	5,497	15.53%
M11 J13 -J14 - Sbd	2,875	2,637	5,513	1 - M11	34,998	34,940	70		5,495	15.70%	5,426	15.53%
M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,599	2,281	3,880	1 - M11	24,636	24,594	70		3,868	15.70%	3,820	15.53%
M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,262	1,686	3,948	1 - M11	25,064	25,022	70		3,935	15.70%	3,886	15.53%
M11 J13 off-slip - Nbd	1,307	1,150	2,457	1 - M11	15,600	15,574	70		2,449	15.70%	2,419	15.53%
M11 J13 on-slip - Sbd	613	1,223	1,836	1 - M11	11,658	11,639	70		1,830	15.70%	1,808	15.53%
A14 West of J30 (Bar Hill) - Ebd	4,055	3,638	7,693	2 - A14	43,868	40,366	70		8,220	18.74%	7,397	18.33%
A14 West of J30 (Bar Hill) - Wbd	3,347	4,629	7,976	2 - A14	45,484	41,853	70		8,522	18.74%	7,670	18.33%
A14 North West of M11 J14 - Ebd	4,157	3,823	7,980	2 - A14	45,507	41,874	70		8,527	18.74%	7,674	18.33%
A14 North West M11 J14 - Wbd	3,461	4,473	7,934	2 - A14	45,242	41,630	70		8,477	18.74%	7,629	18.33%
A14 West of J32 Interchange - Ebd	4,025	3,982	8,008	2 - A14	45,662	42,017	70		8,556	18.74%	7,700	18.33%
A14 West of J32 Interchange - Wbd	3,974	4,036	8,009	2 - A14	45,673	42,027	70		8,558	18.74%	7,702	18.33%
A428 -West of M11 J14 - Ebd	1,686	790	2,476	2 - A14	14,117	12,991	70		2,645	18.74%	2,381	18.33%
A428 - West of M11 J14 - Wbd	826	1,296	2,122	2 - A14	12,101	11,135	70		2,267	18.74%	2,041	18.33%
A1303 East of Madingley Mulch R'bout Ebd	587	607	1,194	3 - Madingley Rd	8,283	7,991	50		475	5.73%	438	5.47%
A1303 East of Madingley Mulch R'bout Wbd	592	1,348	1,940	3 - Madingley Rd	13,463	12,990	50		771	5.73%	711	5.47%
Madingley Rd - East of Cambridge Rd Crossroads Wbd	705	1,666	2,371	3 - Madingley Rd	16,452	15,874	40		943	5.73%	869	5.47%
Madingley Rd - East of Cambridge Rd Crossroads Ebd	940	822	1,762	3 - Madingley Rd	12,226	11,796	40		701	5.73%	646	5.47%
Madingley Rd on Over Bridge M11 Ebd	1,849	1,190	3,039	3 - Madingley Rd	21,088	20,347	40		1,208	5.73%	1,114	5.47%
Madingley Rd on Over Bridge M11 Wbd	310	887	1,197	3 - Madingley Rd	8,308	8,015	40		476	5.73%	439	5.47%
Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,596	753	2,348	4 - Barton Rd	14,905	14,319	40		547	3.67%	487	3.40%
Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	668	1,670	2,338	4 - Barton Rd	14,840	14,257	40		544	3.67%	485	3.40%
Madingley Rd - West of P&R Access Wbd	705	1,688	2,392	4 - Barton Rd	15,185	14,588	40		557	3.67%	496	3.40%
Madingley Rd - West of P&R Access Ebd	1,607	779	2,387	4 - Barton Rd	15,149	14,553	40		556	3.67%	495	3.40%
Madingley Rd - East of P&R Access Wbd	736	1,544	2,279	4 - Barton Rd	14,468	13,899	40		531	3.67%	472	3.40%
Madingley Rd - East of P&R Access Ebd	1,490	816	2,307	4 - Barton Rd	14,641	14,066	40		537	3.67%	478	3.40%
Madingley Rd - East of Proposed High Cross Access Ebd	1,354	715	2,070	4 - Barton Rd	13,135	12,619	40		482	3.67%	429	3.40%
Madingley Rd - East of Proposed High Cross Access Wbd	711	1,358	2,069	4 - Barton Rd	13,131	12,615	40		482	3.67%	429	3.40%
Madingley Rd - East of JJ Thomson Ave Ebd	964	716	1,680	4 - Barton Rd	10,663	10,244	30		391	3.67%	348	3.40%
Madingley Rd - East of JJ Thomson Ave Wbd	709	1,012	1,721	4 - Barton Rd	10,923	10,494	30		401	3.67%	357	3.40%
Madingley Rd - East of Clerk Maxwell Rd Ebd	873	839	1,711	4 - Barton Rd	10,861	10,434	30		398	3.67%	355	3.40%
Madingley Rd - East of Clerk Maxwell Rd Wbd	868	948	1,816	4 - Barton Rd	11,524	11,071	30		423	3.67%	376	3.40%

Madingley Rd - East of Storey's Way Ebd	845	855	1,701	4 - Barton Rd	10,794	10,370	30		396	3.67%	352	3.40%
Madingley Rd - East of Storey's Way Wbd	932	795	1,727	4 - Barton Rd	10,960	10,529	30		402	3.67%	358	3.40%
Madingley Rd - East of Grange Road Ebd	836	849	1,685	4 - Barton Rd	10,694	10,274	30		392	3.67%	349	3.40%
Madingley Rd - East of Grange Road Wbd	927	785	1,711	4 - Barton Rd	10,862	10,435	30		399	3.67%	355	3.40%
Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	945	723	1,668	4 - Barton Rd	10,585	10,169	30		388	3.67%	346	3.40%
Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	724	880	1,603	4 - Barton Rd	10,176	9,776	30		373	3.67%	332	3.40%
Northampton St - West of Pound Hill Ebd	534	797	1,331	4 - Barton Rd	8,447	8,115	30		310	3.67%	276	3.40%
Northampton St - West of Pound Hill Wbd	684	675	1,359	4 - Barton Rd	8,623	8,284	30		316	3.67%	282	3.40%
Huntingdon Rd - West of Proposed NWC HRW Access NWbd	476	1,016	1,491	4 - Barton Rd	9,465	9,093	60		347	3.67%	309	3.40%
Huntingdon Rd - West of Proposed NWC HRW Access SEbd	689	495	1,184	4 - Barton Rd	7,512	7,217	60		276	3.67%	245	3.40%
Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	408	752	1,159	4 - Barton Rd	7,358	7,069	30		270	3.67%	240	3.40%
Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	412	410	822	4 - Barton Rd	5,219	5,014	30		191	3.67%	170	3.40%
Huntingdon Rd - East of NWC HRW Access NWbd	575	1,216	1,790	4 - Barton Rd	11,364	10,918	30		417	3.67%	371	3.40%
Huntingdon Rd - East of NWC HRW Access SEbd	836	715	1,551	4 - Barton Rd	9,847	9,460	30		361	3.67%	322	3.40%
Huntingdon Rd - East of NIAB Access NWbd	591	1,291	1,882	4 - Barton Rd	11,943	11,474	30		438	3.67%	390	3.40%
Huntingdon Rd - East of NIAB Access SEbd	1,162	745	1,906	4 - Barton Rd	12,099	11,624	30		444	3.67%	395	3.40%
Huntingdon Rd - East of Storey's Way NWbd	586	1,170	1,756	4 - Barton Rd	11,144	10,706	30		409	3.67%	364	3.40%
Huntingdon Rd - East of Storey's Way SEbd	1,034	756	1,789	4 - Barton Rd	11,357	10,911	30		417	3.67%	371	3.40%
Barton Rd - West of Grantchester Rd Ebd	1,173	524	1,697	4 - Barton Rd	10,774	10,350	30		395	3.67%	352	3.40%
Barton Rd - West of Grantchester Rd Wbd	325	1,016	1,341	4 - Barton Rd	8,511	8,176	30		312	3.67%	278	3.40%
Barton Rd - East of Grantchester Rd Ebd	662	474	1,136	4 - Barton Rd	7,210	6,927	30		265	3.67%	235	3.40%
Barton Rd - East of Grantchester Rd Wbd	306	980	1,286	4 - Barton Rd	8,160	7,840	30		299	3.67%	266	3.40%
Queen's Rd - North of West Rd Nbd	543	800	1,342	4 - Barton Rd	8,521	8,186	30		313	3.67%	278	3.40%
Queen's Rd - North of West Rd Sbd	918	633	1,551	4 - Barton Rd	9,844	9,458	30		361	3.67%	321	3.40%
Histon Road - South of A14 Nbd	1,127	1,908	3,035	4 - Barton Rd	19,261	18,504	40		707	3.67%	629	3.40%
Histon Road - South of A14 Sbd	2,100	1,434	3,534	4 - Barton Rd	22,433	21,551	40		823	3.67%	732	3.40%
Grange Rd - South of Madingley Rd Nbd	212	224	436	5 - Grange Rd	2,270	2,155	30		110	4.86%	95	4.43%
Grange Rd - South of Madingley Rd Sbd	348	168	516	5 - Grange Rd	2,685	2,549	30		130	4.86%	113	4.43%
Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	221	73	294	5 - Grange Rd	1,532	1,454	20		74	4.86%	64	4.43%
Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	90	211	301	5 - Grange Rd	1,568	1,488	20		76	4.86%	66	4.43%
Girton Rd - North of Huntingdon Rd Nbd	157	380	537	5 - Grange Rd	2,795	2,653	30		136	4.86%	117	4.43%
Girton Rd - North of Huntingdon Rd Sbd	383	233	616	5 - Grange Rd	3,209	3,046	30		156	4.86%	135	4.43%
Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd	12	93	105	6 - Site Access	493	380	20		33	6.64%	24	6.26%
Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd	92	32	124	6 - Site Access	580	447	20		39	6.64%	28	6.26%
Proposed Madingley Rd West Access to NWC Nbd	139	576	715	6 - Site Access	3,360	2,589	20		223	6.64%	162	6.26%
Proposed Madingley Rd West Access to NWC Sbd	514	230	744	6 - Site Access	3,495	2,693	20		232	6.64%	168	6.26%
Proposed Huntingdon Rd West Access to NWC Nbd	68	264	332	6 - Site Access	1,560	1,202	20		104	6.64%	75	6.26%
Proposed Huntingdon Rd West Access to NWC Sbd	276	85	361	6 - Site Access	1,698	1,308	20		113	6.64%	82	6.26%
Proposed Huntingdon Rd East Access to NWC Sbd	149	247	397	6 - Site Access	1,864	1,436	20		124	6.64%	90	6.26%
Proposed Huntingdon Rd East Access to NWC Nbd	181	237	417	6 - Site Access	1,961	1,511	20		130	6.64%	95	6.26%
Western Access to Madingley Rd Nbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
Western Access to Madingley Rd Sbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
High Cross Access to Madingley Rd Nbd	318	587	905	6 - Site Access	4,252	3,276	25		282	6.64%	205	6.26%
High Cross Access to Madingley Rd Sbd	516	350	865	6 - Site Access	4,065	3,132	25		270	6.64%	196	6.26%
JJ Thomson Ave Access to Madingley Rd Nbd	64	201	266	6 - Site Access	1,248	962	25		83	6.64%	60	6.26%
JJ Thomson Ave Access to Madingley Rd Sbd	272	43	315	6 - Site Access	1,481	1,141	25		98	6.64%	71	6.26%
Clerk Maxwell Rd Nbd - south of Car Park Access			0	6 - Site Access	161	128	30		11	6.64%	8	6.26%
Clerk Maxwell Rd Sbd - south of Car Park Access			0	6 - Site Access	158	126	30		10	6.64%	8	6.26%
Clerk Maxwell Rd Sbd - north of Car Park Access			0	6 - Site Access	1,229	980	30		82	6.64%	61	6.26%
Clerk Maxwell Rd Nbd - north of Car Park Access			0	6 - Site Access	1,252	998	30		83	6.64%	66	6.64%

31500 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2031 ES DM Flows

Prepared By: M Balding 06/09/2019

Checked by: J Hopkins 12/09/2019

123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			**5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)**			**6. Site Access**		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2031 ES DM Flows								>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link		Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	3,829	4,147	7,976	1 - M11	50,638	50,553	70		7,951	15.70%	7,851	15.53%
1.0	M11 - J12 - J13 - Sbd	4,126	3,990	8,116	1 - M11	51,528	51,442	70		8,090	15.70%	7,989	15.53%
1.1	M11 J13 -J14 - Nbd	2,498	3,278	5,776	1 - M11	36,672	36,611	70		5,758	15.70%	5,686	15.53%
1.1	M11 J13 -J14 - Sbd	3,037	2,707	5,743	1 - M11	36,464	36,403	70		5,725	15.70%	5,653	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,647	2,406	4,053	1 - M11	25,731	25,688	70		4,040	15.70%	3,989	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,396	1,749	4,146	1 - M11	26,319	26,275	70		4,132	15.70%	4,080	15.53%
1.3	M11 J13 off-slip - Nbd	1,230	1,227	2,457	1 - M11	15,601	15,575	70		2,450	15.70%	2,419	15.53%
1.3	M11 J13 on-slip - Sbd	701	1,216	1,917	1 - M11	12,172	12,152	70		1,911	15.70%	1,887	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	3,990	3,671	7,661	2 - A14	43,685	40,198	70		8,185	18.74%	7,367	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,375	4,609	7,983	2 - A14	45,525	41,891	70		8,530	18.74%	7,677	18.33%
2.1	A14 North West of M11 J14 - Ebd	3,969	3,780	7,749	2 - A14	44,190	40,662	70		8,280	18.74%	7,452	18.33%
2.1	A14 North West M11 J14 - Wbd	3,436	4,289	7,725	2 - A14	44,050	40,534	70		8,254	18.74%	7,428	18.33%
2.2	A14 West of J32 Interchange - Ebd	4,137	4,158	8,295	2 - A14	47,299	43,523	70		8,862	18.74%	7,976	18.33%
2.2	A14 West of J32 Interchange - Wbd	4,150	4,133	8,283	2 - A14	47,235	43,464	70		8,850	18.74%	7,965	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,729	864	2,593	2 - A14	14,788	13,608	70		2,771	18.74%	2,494	18.33%
2.3	A428 - West of M11 J14 - Wbd	905	1,330	2,235	2 - A14	12,744	11,727	70		2,388	18.74%	2,149	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	621	664	1,285	3 - Madingley Rd	8,916	8,602	50		511	5.73%	471	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	645	1,392	2,037	3 - Madingley Rd	14,136	13,639	50		810	5.73%	747	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	757	1,709	2,466	3 - Madingley Rd	17,115	16,513	40		981	5.73%	904	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	970	880	1,850	3 - Madingley Rd	12,836	12,385	40		735	5.73%	678	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	1,785	1,293	3,078	3 - Madingley Rd	21,363	20,612	40		1,224	5.73%	1,128	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	345	898	1,243	3 - Madingley Rd	8,627	8,324	40		494	5.73%	456	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,489	836	2,325	4 - Barton Rd	14,754	14,174	40		541	3.67%	482	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	750	1,653	2,403	4 - Barton Rd	15,250	14,650	40		559	3.67%	498	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	779	1,734	2,514	4 - Barton Rd	15,953	15,326	40		585	3.67%	521	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,638	859	2,497	4 - Barton Rd	15,846	15,224	40		581	3.67%	517	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	810	1,590	2,401	4 - Barton Rd	15,236	14,637	40		559	3.67%	497	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,521	896	2,417	4 - Barton Rd	15,339	14,736	40		563	3.67%	501	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,271	625	1,896	4 - Barton Rd	12,036	11,563	40		442	3.67%	393	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	678	1,319	1,997	4 - Barton Rd	12,678	12,179	40		465	3.67%	414	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	1,111	1,304	2,415	4 - Barton Rd	15,327	14,725	30		562	3.67%	500	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	1,454	1,164	2,618	4 - Barton Rd	16,615	15,962	30		610	3.67%	543	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	1,035	1,302	2,337	4 - Barton Rd	14,832	14,249	30		544	3.67%	484	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	1,448	1,096	2,544	4 - Barton Rd	16,145	15,511	30		592	3.67%	527	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	850	723	1,573	4 - Barton Rd	9,982	9,589	30		366	3.67%	326	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	702	822	1,524	4 - Barton Rd	9,673	9,293	30		355	3.67%	316	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	840	724	1,564	4 - Barton Rd	9,924	9,534	30		364	3.67%	324	3.40%

3.10	Madingley Rd - East of Grange Road Wbd	707	812	1,518	4 - Barton Rd	9,637	9,258	30		354	3.67%	315	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	976	734	1,710	4 - Barton Rd	10,853	10,426	30		398	3.67%	354	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	711	922	1,633	4 - Barton Rd	10,363	9,956	30		380	3.67%	338	3.40%
3.12	Northampton St - West of Pound Hill Ebd	533	855	1,388	4 - Barton Rd	8,807	8,460	30		323	3.67%	288	3.40%
3.12	Northampton St - West of Pound Hill Wbd	754	690	1,445	4 - Barton Rd	9,170	8,810	30		336	3.67%	299	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	528	953	1,481	4 - Barton Rd	9,399	9,029	60		345	3.67%	307	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	564	560	1,124	4 - Barton Rd	7,132	6,852	60		262	3.67%	233	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	480	799	1,279	4 - Barton Rd	8,117	7,798	30		298	3.67%	265	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	458	482	940	4 - Barton Rd	5,964	5,730	30		219	3.67%	195	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	637	1,318	1,955	4 - Barton Rd	12,411	11,923	30		455	3.67%	405	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access SEbd	1,035	786	1,821	4 - Barton Rd	11,560	11,105	30		424	3.67%	377	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	621	1,432	2,053	4 - Barton Rd	13,029	12,517	30		478	3.67%	425	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	1,420	791	2,211	4 - Barton Rd	14,032	13,480	30		515	3.67%	458	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	625	1,312	1,938	4 - Barton Rd	12,298	11,815	30		451	3.67%	402	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	1,284	814	2,098	4 - Barton Rd	13,316	12,793	30		489	3.67%	435	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,185	532	1,716	4 - Barton Rd	10,894	10,466	30		400	3.67%	356	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	330	1,027	1,357	4 - Barton Rd	8,614	8,276	30		316	3.67%	281	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	674	481	1,155	4 - Barton Rd	7,331	7,043	30		269	3.67%	239	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	311	991	1,302	4 - Barton Rd	8,264	7,939	30		303	3.67%	270	3.40%
6.0	Queen's Rd - North of West Rd Nbd	526	770	1,296	4 - Barton Rd	8,228	7,905	30		302	3.67%	269	3.40%
6.0	Queen's Rd - North of West Rd Sbd	905	614	1,519	4 - Barton Rd	9,643	9,264	30		354	3.67%	315	3.40%
7.0	Histon Road - South of A14 Nbd	1,208	1,824	3,032	4 - Barton Rd	19,246	18,490	40		706	3.67%	628	3.40%
7.0	Histon Road - South of A14 Sbd	1,940	1,510	3,450	4 - Barton Rd	21,898	21,038	40		803	3.67%	715	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	207	229	436	5 - Grange Rd	2,269	2,154	30		110	4.86%	95	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	353	165	518	5 - Grange Rd	2,699	2,562	30		131	4.86%	113	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	223	74	296	5 - Grange Rd	1,543	1,465	20		75	4.86%	65	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	91	213	304	5 - Grange Rd	1,583	1,503	20		77	4.86%	67	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	161	383	544	5 - Grange Rd	2,834	2,691	30		138	4.86%	119	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	385	236	621	5 - Grange Rd	3,232	3,068	30		157	4.86%	136	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd	20	181	202	6 - Site Access	947	730	20		63	6.64%	46	6.26%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd	191	57	247	6 - Site Access	1,163	896	20		77	6.64%	56	6.26%
11.1	Proposed Madingley Rd West Access to NWC Nbd	104	515	619	6 - Site Access	2,909	2,242	20		193	6.64%	140	6.26%
11.1	Proposed Madingley Rd West Access to NWC Sbd	398	234	632	6 - Site Access	2,970	2,289	20		197	6.64%	143	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Nbd	49	154	203	6 - Site Access	954	735	20		63	6.64%	46	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Sbd	107	79	186	6 - Site Access	874	674	20		58	6.64%	42	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Sbd	177	335	512	6 - Site Access	2,406	1,854	20		160	6.64%	116	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Nbd	374	271	645	6 - Site Access	3,031	2,336	20		201	6.64%	146	6.26%
12.0	Western Access to Madingley Rd Nbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
12.0	Western Access to Madingley Rd Sbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
12.1	High Cross Access to Madingley Rd Nbd	228	172	401	6 - Site Access	1,882	1,450	25		125	6.64%	91	6.26%
12.1	High Cross Access to Madingley Rd Sbd	81	292	372	6 - Site Access	1,750	1,348	25		116	6.64%	84	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	62	260	322	6 - Site Access	1,514	1,167	25		100	6.64%	73	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	195	58	253	6 - Site Access	1,188	916	25		79	6.64%	57	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access			0	6 - Site Access	295	235	30		20	6.64%	15	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access			0	6 - Site Access	290	231	30		19	6.64%	14	6.26%
12.4	Clerk Maxwell Rd Sbd - north of Car Park Access			0	6 - Site Access	590	470	30		39	6.64%	29	6.26%
12.4	Clerk Maxwell Rd Nbd - north of Car Park Access			0	6 - Site Access	601	479	30		40	6.64%	30	6.26%

31500 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2031 DS Flows

Prepared By: M Balding 06/09/2019

Checked by: J Hopkins 12/09/2019

123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			**5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)**			**6. Site Access**		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2031 DS Flows										
		2031 DS Flows							>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link		Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	4,081	4,125	8,206	1 - M11	52,101	52,014	70		8,180	15.70%	8,078	15.53%
1.0	M11 - J12 - J13 - Sbd	4,081	4,194	8,275	1 - M11	52,537	52,449	70		8,249	15.70%	8,145	15.53%
1.1	M11 J13 -J14 - Nbd	2,473	3,257	5,730	1 - M11	36,377	36,316	70		5,712	15.70%	5,640	15.53%
1.1	M11 J13 -J14 - Sbd	2,997	2,691	5,689	1 - M11	36,115	36,055	70		5,670	15.70%	5,599	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,626	2,387	4,013	1 - M11	25,480	25,437	70		4,001	15.70%	3,950	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,365	1,737	4,102	1 - M11	26,042	25,998	70		4,089	15.70%	4,038	15.53%
1.3	M11 J13 off-slip - Nbd	1,508	1,228	2,735	1 - M11	17,366	17,337	70		2,727	15.70%	2,692	15.53%
1.3	M11 J13 on-slip - Sbd	697	1,435	2,132	1 - M11	13,536	13,513	70		2,125	15.70%	2,099	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	4,322	3,689	8,011	2 - A14	45,683	42,036	70		8,560	18.74%	7,703	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,396	4,863	8,259	2 - A14	47,096	43,336	70		8,824	18.74%	7,942	18.33%
2.1	A14 North West of M11 J14 - Ebd	4,637	4,021	8,658	2 - A14	49,371	45,430	70		9,251	18.74%	8,325	18.33%
2.1	A14 North West M11 J14 - Wbd	3,602	4,927	8,529	2 - A14	48,633	44,751	70		9,113	18.74%	8,201	18.33%
2.2	A14 West of J32 Interchange - Ebd	4,124	4,116	8,241	2 - A14	46,993	43,242	70		8,805	18.74%	7,924	18.33%
2.2	A14 West of J32 Interchange - Wbd	4,092	4,135	8,227	2 - A14	46,916	43,171	70		8,791	18.74%	7,911	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,722	849	2,571	2 - A14	14,663	13,493	70		2,747	18.74%	2,473	18.33%
2.3	A428 - West of M11 J14 - Wbd	885	1,329	2,214	2 - A14	12,626	11,619	70		2,366	18.74%	2,129	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	720	665	1,384	3 - Madingley Rd	9,606	9,269	50		550	5.73%	507	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	641	1,471	2,112	3 - Madingley Rd	14,658	14,143	50		840	5.73%	774	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	754	1,797	2,551	3 - Madingley Rd	17,702	17,079	40		1,014	5.73%	935	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	1,081	880	1,961	3 - Madingley Rd	13,608	13,130	40		780	5.73%	719	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	2,178	1,301	3,479	3 - Madingley Rd	24,143	23,294	40		1,383	5.73%	1,275	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	347	993	1,340	3 - Madingley Rd	9,299	8,972	40		533	5.73%	491	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,895	847	2,742	4 - Barton Rd	17,400	16,717	40		638	3.67%	568	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	759	1,970	2,730	4 - Barton Rd	17,326	16,645	40		636	3.67%	566	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	755	1,732	2,487	4 - Barton Rd	15,783	15,162	40		579	3.67%	515	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,315	794	2,108	4 - Barton Rd	13,381	12,855	40		491	3.67%	437	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	786	1,588	2,374	4 - Barton Rd	15,065	14,473	40		553	3.67%	492	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,198	831	2,028	4 - Barton Rd	12,873	12,367	40		472	3.67%	420	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,266	801	2,066	4 - Barton Rd	13,116	12,601	40		481	3.67%	428	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	873	1,417	2,290	4 - Barton Rd	14,535	13,964	40		533	3.67%	475	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	1,211	1,635	2,846	4 - Barton Rd	18,064	17,354	30		663	3.67%	590	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	1,755	1,303	3,058	4 - Barton Rd	19,410	18,648	30		712	3.67%	634	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	1,135	1,633	2,768	4 - Barton Rd	17,569	16,879	30		645	3.67%	574	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	1,749	1,196	2,945	4 - Barton Rd	18,694	17,959	30		686	3.67%	610	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	941	1,153	2,094	4 - Barton Rd	13,289	12,766	30		488	3.67%	434	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	1,277	891	2,168	4 - Barton Rd	13,760	13,219	30		505	3.67%	449	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	928	1,142	2,071	4 - Barton Rd	13,142	12,626	30		482	3.67%	429	3.40%

3.10	Madingley Rd - East of Grange Road Wbd	1,269	876	2,145	4 - Barton Rd	13,614	13,079	30		499	3.67%	445	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	992	907	1,899	4 - Barton Rd	12,050	11,576	30		442	3.67%	393	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	925	927	1,852	4 - Barton Rd	11,757	11,295	30		431	3.67%	384	3.40%
3.12	Northampton St - West of Pound Hill Ebd	560	971	1,532	4 - Barton Rd	9,721	9,339	30		357	3.67%	317	3.40%
3.12	Northampton St - West of Pound Hill Wbd	825	703	1,528	4 - Barton Rd	9,701	9,320	30		356	3.67%	317	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	549	1,298	1,847	4 - Barton Rd	11,721	11,261	60		430	3.67%	383	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	1,002	580	1,582	4 - Barton Rd	10,039	9,644	60		368	3.67%	328	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	451	807	1,258	4 - Barton Rd	7,985	7,671	30		293	3.67%	261	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	461	469	930	4 - Barton Rd	5,902	5,670	30		217	3.67%	193	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	680	1,312	1,992	4 - Barton Rd	12,643	12,146	30		464	3.67%	413	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access SEbd	923	834	1,757	4 - Barton Rd	11,151	10,713	30		409	3.67%	364	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	634	1,402	2,037	4 - Barton Rd	12,927	12,419	30		474	3.67%	422	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	1,273	811	2,083	4 - Barton Rd	13,222	12,703	30		485	3.67%	432	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	612	1,276	1,888	4 - Barton Rd	11,983	11,512	30		440	3.67%	391	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	1,140	806	1,946	4 - Barton Rd	12,350	11,864	30		453	3.67%	403	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,186	539	1,725	4 - Barton Rd	10,946	10,516	30		402	3.67%	357	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	329	1,028	1,357	4 - Barton Rd	8,612	8,273	30		316	3.67%	281	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	674	489	1,163	4 - Barton Rd	7,383	7,093	30		271	3.67%	241	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	310	992	1,302	4 - Barton Rd	8,261	7,937	30		303	3.67%	270	3.40%
6.0	Queen's Rd - North of West Rd Nbd	651	884	1,535	4 - Barton Rd	9,743	9,360	30		357	3.67%	318	3.40%
6.0	Queen's Rd - North of West Rd Sbd	987	707	1,695	4 - Barton Rd	10,755	10,333	30		395	3.67%	351	3.40%
7.0	Histon Road - South of A14 Nbd	1,221	2,029	3,250	4 - Barton Rd	20,630	19,820	40		757	3.67%	674	3.40%
7.0	Histon Road - South of A14 Sbd	2,219	1,528	3,747	4 - Barton Rd	23,783	22,848	40		873	3.67%	777	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	219	232	451	5 - Grange Rd	2,351	2,231	30		114	4.86%	99	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	355	175	531	5 - Grange Rd	2,764	2,624	30		134	4.86%	116	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	222	73	296	5 - Grange Rd	1,541	1,463	20		75	4.86%	65	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	91	212	303	5 - Grange Rd	1,578	1,498	20		77	4.86%	66	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	162	398	559	5 - Grange Rd	2,914	2,766	30		142	4.86%	122	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	404	238	642	5 - Grange Rd	3,344	3,175	30		162	4.86%	140	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd	30	196	227	6 - Site Access	1,065	821	20		71	6.64%	51	6.26%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd	196	67	263	6 - Site Access	1,236	953	20		82	6.64%	60	6.26%
11.1	Proposed Madingley Rd West Access to NWC Nbd	203	959	1,162	6 - Site Access	5,460	4,208	20		362	6.64%	263	6.26%
11.1	Proposed Madingley Rd West Access to NWC Sbd	942	304	1,246	6 - Site Access	5,853	4,510	20		388	6.64%	282	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Nbd	99	490	589	6 - Site Access	2,768	2,133	20		184	6.64%	133	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Sbd	541	111	652	6 - Site Access	3,065	2,362	20		203	6.64%	148	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Sbd	249	318	567	6 - Site Access	2,663	2,052	20		177	6.64%	128	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Nbd	240	340	580	6 - Site Access	2,724	2,099	20		181	6.64%	131	6.26%
12.0	Western Access to Madingley Rd Nbd	139	775	914	6 - Site Access	4,295	3,310	20		285	6.64%	207	6.26%
12.0	Western Access to Madingley Rd Sbd	1,173	141	1,315	6 - Site Access	6,178	4,761	20		410	6.64%	298	6.26%
12.1	High Cross Access to Madingley Rd Nbd	443	1,017	1,460	6 - Site Access	6,862	5,288	25		455	6.64%	331	6.26%
12.1	High Cross Access to Madingley Rd Sbd	993	433	1,425	6 - Site Access	6,698	5,161	25		445	6.64%	323	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	239	962	1,201	6 - Site Access	5,646	4,351	25		375	6.64%	272	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	965	204	1,169	6 - Site Access	5,492	4,232	25		364	6.64%	265	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access			0	6 - Site Access	161	128	30		11	6.64%	8	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access			0	6 - Site Access	158	126	30		10	6.64%	8	6.26%
12.4	Clerk Maxwell Rd Sbd - north of Car Park Access			0	6 - Site Access	1,229	980	30		82	6.64%	61	6.26%
12.4	Clerk Maxwell Rd Nbd - north of Car Park Access			0	6 - Site Access	1,252	998	30		83	6.64%	62	6.26%

31500 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2031 Do Something Mitigated Flows

Prepared By: M Balding 21/11/2019

Checked by: J Hopkins 21/11/2019

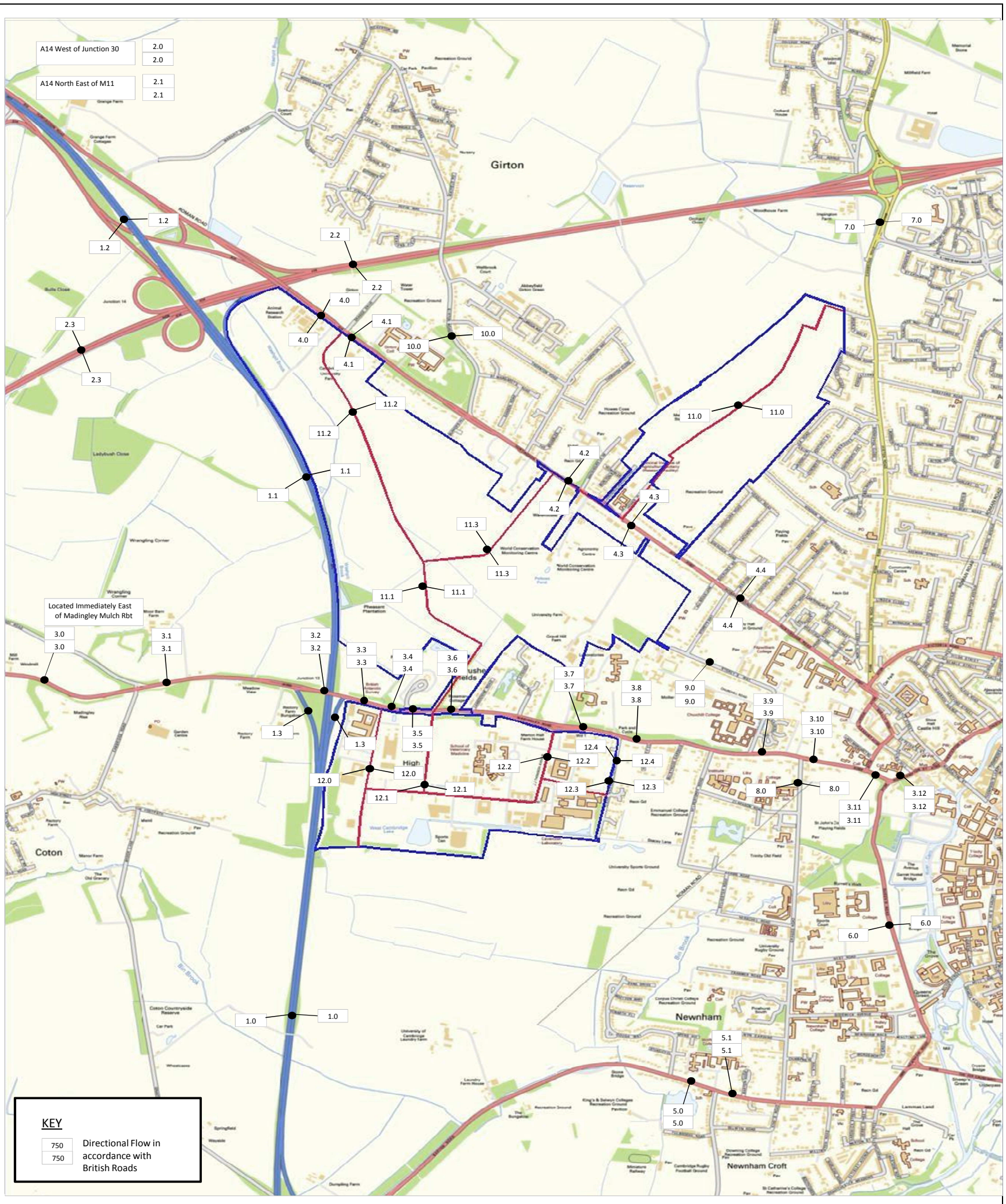
123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			**5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)**			**6. Site Access**		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2031 Do Something Mitigated Flows										
		2031 Do Something Mitigated Flows								>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link		Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	3,891	4,125	8,016	1 - M11	50,895	50,810	70		7,991	15.70%	7,891	15.53%
1.0	M11 - J12 - J13 - Sbd	4,081	4,004	8,085	1 - M11	51,330	51,244	70		8,059	15.70%	7,958	15.53%
1.1	M11 J13 -J14 - Nbd	2,473	3,257	5,730	1 - M11	36,377	36,316	70		5,712	15.70%	5,640	15.53%
1.1	M11 J13 -J14 - Sbd	2,997	2,691	5,689	1 - M11	36,115	36,055	70		5,670	15.70%	5,599	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,626	2,387	4,013	1 - M11	25,480	25,437	70		4,001	15.70%	3,950	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,365	1,737	4,102	1 - M11	26,042	25,998	70		4,089	15.70%	4,038	15.53%
1.3	M11 J13 off-slip - Nbd	1,318	1,228	2,545	1 - M11	16,160	16,133	70		2,537	15.70%	2,505	15.53%
1.3	M11 J13 on-slip - Sbd	697	1,245	1,942	1 - M11	12,329	12,309	70		1,936	15.70%	1,912	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	4,122	3,689	7,811	2 - A14	44,542	40,987	70		8,346	18.74%	7,511	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,396	4,663	8,059	2 - A14	45,955	42,287	70		8,611	18.74%	7,749	18.33%
2.1	A14 North West of M11 J14 - Ebd	4,437	4,021	8,458	2 - A14	48,230	44,380	70		9,037	18.74%	8,133	18.33%
2.1	A14 North West M11 J14 - Wbd	3,602	4,727	8,329	2 - A14	47,493	43,702	70		8,899	18.74%	8,009	18.33%
2.2	A14 West of J32 Interchange - Ebd	4,124	4,116	8,241	2 - A14	46,993	43,242	70		8,805	18.74%	7,924	18.33%
2.2	A14 West of J32 Interchange - Wbd	4,092	4,135	8,227	2 - A14	46,916	43,171	70		8,791	18.74%	7,911	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,722	849	2,571	2 - A14	14,663	13,493	70		2,747	18.74%	2,473	18.33%
2.3	A428 - West of M11 J14 - Wbd	885	1,329	2,214	2 - A14	12,626	11,619	70		2,366	18.74%	2,129	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	424	933	1,357	3 - Madingley Rd	9,416	9,085	50		540	5.73%	497	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	909	1,175	2,085	3 - Madingley Rd	14,468	13,959	50		829	5.73%	764	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	1,023	1,501	2,523	3 - Madingley Rd	17,511	16,896	40		1,003	5.73%	925	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	785	1,149	1,934	3 - Madingley Rd	13,418	12,946	40		769	5.73%	709	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	1,424	1,569	2,993	3 - Madingley Rd	20,770	20,040	40		1,190	5.73%	1,097	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	347	507	854	3 - Madingley Rd	5,927	5,718	40		340	5.73%	313	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,140	847	1,987	4 - Barton Rd	12,612	12,116	40		463	3.67%	412	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	759	1,216	1,975	4 - Barton Rd	12,537	12,044	40		460	3.67%	409	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	755	1,466	2,221	4 - Barton Rd	14,098	13,544	40		517	3.67%	460	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,049	794	1,843	4 - Barton Rd	11,696	11,236	40		429	3.67%	382	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	786	1,441	2,227	4 - Barton Rd	14,133	13,578	40		519	3.67%	461	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,051	831	1,881	4 - Barton Rd	11,941	11,471	40		438	3.67%	390	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,119	801	1,920	4 - Barton Rd	12,184	11,705	40		447	3.67%	398	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	873	1,270	2,143	4 - Barton Rd	13,603	13,068	40		499	3.67%	444	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	1,094	1,415	2,510	4 - Barton Rd	15,928	15,302	30		584	3.67%	520	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	1,535	1,186	2,722	4 - Barton Rd	17,275	16,596	30		634	3.67%	564	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	1,043	1,413	2,456	4 - Barton Rd	15,586	14,974	30		572	3.67%	509	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	1,529	1,104	2,633	4 - Barton Rd	16,711	16,054	30		613	3.67%	546	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	849	933	1,781	4 - Barton Rd	11,306	10,862	30		415	3.67%	369	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	1,057	799	1,856	4 - Barton Rd	11,777	11,314	30		432	3.67%	385	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	836	1,022	1,858	4 - Barton Rd	11,794	11,330	30		433	3.67%	385	3.40%

3.10	Madingley Rd - East of Grange Road Wbd	1,149	783	1,933	4 - Barton Rd	12,266	11,784	30		450	3.67%	401	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	900	907	1,806	4 - Barton Rd	11,463	11,013	30		421	3.67%	374	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	925	835	1,760	4 - Barton Rd	11,171	10,732	30		410	3.67%	365	3.40%
3.12	Northampton St - West of Pound Hill Ebd	560	971	1,532	4 - Barton Rd	9,721	9,339	30		357	3.67%	317	3.40%
3.12	Northampton St - West of Pound Hill Wbd	825	703	1,528	4 - Barton Rd	9,701	9,320	30		356	3.67%	317	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	549	1,098	1,647	4 - Barton Rd	10,452	10,041	60		383	3.67%	341	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	802	580	1,382	4 - Barton Rd	8,770	8,425	60		322	3.67%	286	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	451	807	1,258	4 - Barton Rd	7,985	7,671	30		293	3.67%	261	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	461	469	930	4 - Barton Rd	5,902	5,670	30		217	3.67%	193	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	680	1,312	1,992	4 - Barton Rd	12,643	12,146	30		464	3.67%	413	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access SEbd	923	834	1,757	4 - Barton Rd	11,151	10,713	30		409	3.67%	364	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	634	1,402	2,037	4 - Barton Rd	12,927	12,419	30		474	3.67%	422	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	1,273	811	2,083	4 - Barton Rd	13,222	12,703	30		485	3.67%	432	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	612	1,276	1,888	4 - Barton Rd	11,983	11,512	30		440	3.67%	391	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	1,140	806	1,946	4 - Barton Rd	12,350	11,864	30		453	3.67%	403	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,186	539	1,725	4 - Barton Rd	10,946	10,516	30		402	3.67%	357	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	329	1,028	1,357	4 - Barton Rd	8,612	8,273	30		316	3.67%	281	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	674	489	1,163	4 - Barton Rd	7,383	7,093	30		271	3.67%	241	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	310	992	1,302	4 - Barton Rd	8,261	7,937	30		303	3.67%	270	3.40%
6.0	Queen's Rd - North of West Rd Nbd	651	792	1,443	4 - Barton Rd	9,156	8,797	30		336	3.67%	299	3.40%
6.0	Queen's Rd - North of West Rd Sbd	895	707	1,602	4 - Barton Rd	10,169	9,769	30		373	3.67%	332	3.40%
7.0	Histon Road - South of A14 Nbd	1,221	1,909	3,130	4 - Barton Rd	19,869	19,088	40		729	3.67%	649	3.40%
7.0	Histon Road - South of A14 Sbd	2,099	1,528	3,627	4 - Barton Rd	23,021	22,116	40		845	3.67%	752	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	119	232	351	5 - Grange Rd	1,830	1,737	30		89	4.86%	77	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	355	75	431	5 - Grange Rd	2,243	2,130	30		109	4.86%	94	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	222	73	296	5 - Grange Rd	1,541	1,463	20		75	4.86%	65	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	91	212	303	5 - Grange Rd	1,578	1,498	20		77	4.86%	66	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	162	398	559	5 - Grange Rd	2,914	2,766	30		142	4.86%	122	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	404	238	642	5 - Grange Rd	3,344	3,175	30		162	4.86%	140	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd	30	196	227	6 - Site Access	1,065	821	20		71	6.64%	51	6.26%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd	196	67	263	6 - Site Access	1,236	953	20		82	6.64%	60	6.26%
11.1	Proposed Madingley Rd West Access to NWC Nbd	203	759	962	6 - Site Access	4,520	3,483	20		300	6.64%	218	6.26%
11.1	Proposed Madingley Rd West Access to NWC Sbd	742	304	1,046	6 - Site Access	4,913	3,786	20		326	6.64%	237	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Nbd	99	290	389	6 - Site Access	1,828	1,408	20		121	6.64%	88	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Sbd	341	111	452	6 - Site Access	2,125	1,638	20		141	6.64%	102	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Sbd	249	318	567	6 - Site Access	2,663	2,052	20		177	6.64%	128	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Nbd	240	340	580	6 - Site Access	2,724	2,099	20		181	6.64%	131	6.26%
12.0	Western Access to Madingley Rd Nbd	139	286	425	6 - Site Access	1,997	1,539	20		133	6.64%	96	6.26%
12.0	Western Access to Madingley Rd Sbd	684	141	826	6 - Site Access	3,881	2,990	20		258	6.64%	187	6.26%
12.1	High Cross Access to Madingley Rd Nbd	443	817	1,260	6 - Site Access	5,922	4,564	25		393	6.64%	286	6.26%
12.1	High Cross Access to Madingley Rd Sbd	793	433	1,225	6 - Site Access	5,758	4,437	25		382	6.64%	278	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	239	712	951	6 - Site Access	4,469	3,444	25		297	6.64%	215	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	715	204	918	6 - Site Access	4,315	3,325	25		286	6.64%	208	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access				6 - Site Access	161	128	30		11	6.64%	8	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access				6 - Site Access	158	126	30		10	6.64%	8	6.26%
12.4	Clerk Maxwell Rd Sbd - north of Car Park Access				6 - Site Access	1,229	980	30		82	6.64%	61	6.26%
12.4	Clerk Maxwell Rd Nbd - north of Car Park Access				6 - Site Access	1,252	998	30		83	6.64%	62	6.26%

Appendix 10.2 Link reference plan



Link Reference Diagram

Appendix 10.3 Assessment of construction movements

11 Construction Traffic

11.1 Introduction

11.1.1 This section identifies the potential peak movements associated with the construction of the Development, and assesses the effects of these movements on the surrounding highway network.

11.2 Assessment of the peak Construction movements

11.2.1 The assessment of the peak construction movements is contained in Appendix 11.1.

11.2.2 The assumed Initial Phase Peak Daily Construction traffic flows are summarised in Table 11.1:

Table 11.1 – Peak Daily Construction Movements

Activity	Max Light Vehicle Movts / day			Max Heavy Vehicle Movts / day			Max Total Vehicle Movts / day		
	In	Out	Tot	In	Out	Tot	In	Out	Tot
Earthworks	10	10	20	82	82	164	92	92	184
On-Site Drainage	4	4	8	4	4	8	8	8	16
Carriageway construction	6	6	12	60	60	120	66	66	132
Building construction	10	10	20	0	0	0	10	10	20
Total	**30**	**30**	**60**	**146**	**146**	**292**	**176**	**176**	**352**

11.2.3 These flows are used to assess the impact of the Development on the surrounding highway network.

11.3 Assessment of the peak Construction impact

11.3.1 Of the Construction flows summarised above, only a limited number of car and HGV movements would typically occur during the peak hours: the working hours of most operatives would not coincide with the network peak, and construction processes would be programmed to avoid reliance on deliveries of concrete and bituminous materials during the more congested periods. As there would be only a limited number of Construction movements in the peak hours, no peak hour assessment has been made.

11.3.2 The following assumptions are made with respect to the assignment of these construction trips:

i) no heavy vehicle will be permitted to access the Development from the east through the City of Cambridge – all movements will be from the M11 or A1303;

ii) the operatives are assumed to be resident locally, and would arrive from the following destinations:

- Madingley Road (East) - 30%
- A14 (North West) - 25% (reassigning via Madingley Road)
- M11 (South) - 10%
- A14 (East) - 25% (reassigning via Madingley Road)
- A1303 / A428 - 10%

iii) reflecting the potential supplier locations, it is assumed that material deliveries will arrive from the following destinations:

- Madingley Road (East) - 0%
- A14 (North West) - 35% (reassigning via M11 Junction 12)
- M11 (South) - 25%
- A14 (East) - 25% (reassigning via M11 Junction 12)
- A1303 / A428 - 15%

11.3.3 On the basis of this worst case assessment of the construction activity trip generation, a worst case assessment of the likely impact on daily flow is shown in Table 11.2 with respect to the 2019 Base Year flows. The flows in this table assume that all access will be from M11 Junction 13 and Madingley Road:

Table 11.2: Construction traffic impacts – Pre Opening

Link No	Link	Base 2019 Daily Flow (24hr, 7 day 1-way flows)		Estimated Daily Construction Traffic (1-way)		Increase		
		All Vehs	Heavy Vehs	Light Vehs	Heavy Vehs	All Vehs	All Vehs	Heavy Vehs
1.0	M11 - J12 - J13 - Nbd	46,169	7,170	3	124	127	0.3%	1.7%
1.0	M11 - J12 - J13 - Sbd	46,168	7,170	3	124	127	0.3%	1.7%
1.1	M11 J13 -J14 - Nbd	34,193	5,310	0	88	88	0.3%	1.7%
1.1	M11 J13 -J14 - Sbd	33,653	5,226	0	88	88	0.3%	1.7%
1.3	M11 J13 off-slip - Nbd	13,615	2,114	3	124	127	0.9%	5.9%
1.3	M11 J13 on-slip - Sbd	9,634	1,496	3	124	127	1.3%	8.3%
2.0	A14 West of J30 (Bar Hill) - Ebd	39,106	7,166	8	51	59	0.2%	0.7%
2.0	A14 West of J30 (Bar Hill) - Wbd	40,642	7,448	8	51	59	0.1%	0.7%
2.1	A14 North East of M11 J14 - Ebd	38,641	7,081	8	51	59	0.2%	0.7%

Link No	Link	Base 2019 Daily Flow (24hr, 7 day 1-way flows)		Estimated Daily Construction Traffic (1-way)		Increase		
		All Vehs	Heavy Vehs	Light Vehs	Heavy Vehs	All Vehs	All Vehs	Heavy Vehs
2.1	A14 North East M11 J14 – Wbd	38,527	7,060	8	51	59	0.2%	0.7%
2.2	A14 West of J32 Interchange - Ebd	40,733	7,465	8	37	44	0.1%	0.5%
2.2	A14 West of J32 Interchange - Wbd	40,733	7,465	8	37	44	0.1%	0.5%
3.0	A1303 East of Madingley Mulch Rbt Ebd	6,949	380	3	22	25	0.4%	5.8%
3.0	A1303 East of Madingley Mulch Rbt Wbd	12,013	658	3	22	25	0.2%	3.3%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	15,718	861	3	22	25	0.2%	2.6%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	11,295	618	3	22	25	0.2%	3.6%
3.2	Madingley Rd on Over Bridge M11 Ebd	18,065	989	6	146	152	0.8%	14.8%
3.2	Madingley Rd on Over Bridge M11 Wbd	8,148	446	3	22	25	0.3%	4.9%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	12,534	426	6	146	152	1.2%	34.3%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	12,742	433	6	146	152	1.2%	33.7%
3.4	Madingley Rd - West of P&R Access Wbd	12,952	440	6	146	152	1.2%	33.2%
3.4	Madingley Rd - West of P&R Access Ebd	12,713	432	6	146	152	1.2%	33.8%
3.5	Madingley Rd - East of P&R Access Wbd	12,161	413	6	146	152	1.2%	35.4%
3.5	Madingley Rd - East of P&R Access Ebd	12,119	412	6	146	152	1.3%	35.4%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	9,705	330	6	146	152	1.6%	44.2%

Link No	Link	Base 2019 Daily Flow (24hr, 7 day 1-way flows)		Estimated Daily Construction Traffic (1-way)		Increase		
		All Vehs	Heavy Vehs	Light Vehs	Heavy Vehs	All Vehs	All Vehs	Heavy Vehs
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	10,069	342	6	146	152	1.5%	42.7%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	8,360	284	24	0	24	0.3%	0.0%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	8,945	304	24	0	24	0.3%	0.0%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	8,140	277	24	0	24	0.3%	0.0%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	8,732	297	24	0	24	0.3%	0.0%

(Links with minimal impact have not been reported)

11.3.4 In terms of impact due to the construction of the Development, the largest increase in existing flows would be the increase of heavy vehicles on Madingley Road between the M11 and the Site Access, where there would be a circa 40% increase in existing heavy vehicles. Nevertheless, this would remain well within the overall capacity of the road – and subsumed within the negligible 1.5% all vehicle increase.

11.3.5 On all other routes, the increase in general traffic resulting from the construction activity is considered to be negligible.

Appendix 11.1 - Assessment of Construction Movements

Summary of Assessment

11.1 The construction activities that generate the highest volume of daily trips normally relate to:

i) removal of material off-site;

ii) the construction of a carriageway; or

iii) the casting of foundations for a major building.

11.2 As the majority of these could occur during the Initial Phase, the peak construction movements generated during this phase have been considered.

11.3 It has been assumed that the following major elements of the Development will be constructed in Year 1 of the Initial Phase:

i) on-site earthworks and landscaping – including construction of balancing ponds, and excavation of building foundations;

ii) construction of the on-site drainage;

iii) construction of a secondary access road and at-grade car parking;

iv) an initial construction phase of a major building.

11.4 The traffic generation of the remainder of the Development to be implemented in other phases would be less.

11.5 As further activities could not occur simultaneously (for example, the construction of the secondary site access carriageway may prevent other construction activities on site that day), this assessment considers a realistic peak construction movement.

11.6 The movements generated by these activities are considered individually.

Earthworks

11.7 As there is no requirement for the construction of large noise bunds, nor is land available for landscaping, the material arising during excavation will need to be removed off-site. Until a contractor is appointed and the disposal site identified, it is uncertain unto where this material will be removed to.

11.8 This operation is likely to be programmed away from the winter months, to minimise the days lost to poor weather.

11.9 The daily movements are assumed to include:

i) fuel deliveries and maintenance - assumed to be 2 heavy vehicle trips per day;

ii) a total of ten heavy vehicles, serving two excavators, each making eight journeys per day – a total of 80 heavy movements per day;

iii) operatives' journeys to work trips - assumed to be 20 operatives, 10 car trips per day with 2 occupants per vehicle.

On-site drainage

11.10 The majority of the on-site drainage construction works are assumed to be undertaken during the first year. As on-site storage of materials will be limited, most of the drainage construction works are unlikely to generate high volumes of light or heavy vehicle movements on the surrounding highway network.

11.11 The daily movements are assumed to include:

i) deliveries of aggregate, pipe materials and concrete supplies for drainage chambers – assumed to be 4 heavy vehicle trips per day;

ii) operatives' journeys to work trips - assumed to be 8 operatives, 4 car trips per day with 2 occupants per vehicle.

Carriageway Construction

11.12 For the purposes of deriving a reasonable worst case assessment, it is assumed that there would be a total of 12 operatives on site, with one paving machine receiving deliveries every 10 minutes through the day for ten hours. The daily movements are assumed to include:

i) a total of 60 heavy vehicle trips delivering the bitumen;

ii) operatives' journeys to work trips - assumed to be 12 operatives, 6 car trips per day with 2 occupants per vehicle.

11.13 The number of days when the carriageway construction operation is on-going at full capacity and generating these higher levels of flow are anticipated to be limited due to the limited area of carriageway construction required. It is thought that these flows would be generated on carriageway construction work on around 10 days in total across the whole project.

Initial construction works to a major building

11.14 The main construction of the buildings is assumed to start after the first year. However, it has been assumed that initial groundworks would start to one building in the first year.

11.15 For the purposes of deriving a reasonable worst case assessment, the works are assumed to consist of the casting of an average 750mm slab, across an area of 2,000m^2. This base is assumed to be cast in 5 days.

11.16 it is assumed that there would be a total of 20 operatives on site, receiving concrete deliveries every 10 minutes through the day for ten hours. The daily movements are assumed to include:

i) a total of 50 heavy vehicle trips delivering the concrete (6m^3 per wagon);

ii) operatives' journeys to work trips (assumed to be 20 operatives, 10 car trips per day with 2 occupants per vehicle).

Total movements

11.17 As part of the Construction Access Strategy, a Construction Environment Management Plan (CEMP) will be prepared. The CEMP will set out the University's aim to reduce the transport impacts of the construction traffic servicing the Site, and the movements associated with construction waste. This CEMP will apply to all the individual construction sites within the Development, and will manage when activities generating significant levels of movement on the network may occur.

11.18 As such, the peak movements associated with each of the above activities will be managed: the University will manage when the carriageway and building construction peak delivery days may occur, only one of these may occur on one day.

11.19 As such, for the purposes of this assessment it is assumed that the CEMP would programme the works so that the initial construction works (the concrete casting) would not occur at the same time as the carriageway construction.

11.20 The assumed Initial Phase Peak Daily Construction traffic flows are summarised in Table 11.1:

Table 11.1 – Peak Daily Construction Movements

Activity	Max Light Vehicle Movts / day			Max Heavy Vehicle Movts / day			Max Total Vehicle Movts / day		
Earthworks	10	10	20	82	82	164	92	92	184
On-Site Drainage	4	4	8	4	4	8	8	8	16
Carriageway construction	6	6	12	60	60	120	66	66	132
Building construction	10	10	20	0	0	0	10	10	20
Total	**30**	**30**	**60**	**146**	**146**	**292**	**176**	**176**	**352**

11.21 These flows are used to assess the impact of the Development on the surrounding highway network.

Appendix 11.1 Air quality human receptors

Table 11.1.1 Modelled Sensitive Human Receptor Locations

Receptor	Location	Grid Reference		Modelled Height (m)
		X	Y	
Off-Site Receptors				
R1	1, Huntingdon Road A14	540529.2	262275.8	1.5
R2	3-4, Elm Grange, A14 Huntingdon Rd	541055.0	261919.1	1.5
R3	118, Girton Road	542557.7	261483.0	4.5
R4	102, Girton Road	542552.3	261394.3	1.5
R5	84, Girton Road	542593.2	261265.7	1.5
R6	2, Girton Road	542677.2	260682.6	1.5
R7	North View, Huntingdon Road A14	542680.6	260659.8	1.5
R8	Holly Nurseries. Huntington Road	542969.7	260410.5	1.5
R9	71-81, Huntingdon Road	543202.1	260288.1	1.5
R10	141, Huntingdon Road	543699.2	259848.4	1.5
R11	139, Huntingdon Road	543736.2	259822.8	1.5
R12	1 to 81, Victoria Road	544291.4	259428.7	4.5
R13	26, Northampton Street	544458.2	258988.4	1.5
R14	36, Northampton Street	544409.5	258961.7	1.5
R15	52, Newnham Road	544500.0	257706.9	1.5
R16	9, Madingley Road	544039.2	259059.4	1.5
R17	11, Madingley Road	544010.7	259059.4	1.5
R18	19 to 39 Benians Ct	543870.0	259118.7	1.5
R19	23, Madingley Road	543800.9	259079.5	1.5
R20	53, Madingley Road	543314.2	259141.3	1.5
R21_N6*	14, Conduit Head Road	542881.3	259285.4	1.5
R22_N5*	Whitehouse, Conduit Head Road	542842.9	259296.3	1.5
R23_N3*	2, Merton Hall, Madingley Road	542777.3	259266.7	1.5
R24_N4*	36, Madingley Road	542728.6	259315.1	1.5
R25_N2*	2, Lansdowne Road	542707.2	259315.7	1.5
R26_N1*	2, Rosemary Cottages, Madingley Road	542616.5	259317.6	1.5
R27	63-71, Turning Way	542702.7	259632.6	1.5
R28_W*	1 to 10, Refectory Farm Chalets	541889.4	259238.4	4.5
R29	Moor Barn Farm Cottages	541509.0	259460.6	1.5
R30_W*	Rectory Farm Chalets	541874.8	259282.2	1.5
R31_SW*	77, The Footpath	541660.3	258812.8	1.5
R32	Mill Farm, Madingley Road	540770.4	259479.4	1.5
On-Site Receptors				
On Site 1*	Residential and Nursery (ground floor only)	542829.1	258921.8	1.5, 3, 4.5 and 6
On Site 2*	Residential	542816.3	258837.0	1.5, 3, 4.5 and 6
On Site 3*	Nursery (ground floor only)	542660.3	258754.1	1.5

Receptors marked with an * are used in the energy centre modelling

Appendix 11.2 Air quality model verification

Nitrogen Dioxide (NO_2)

Most NO_2 is produced in the atmosphere by the reaction of nitric oxide (NO) with ozone. It is therefore most appropriate to verify the model in terms of primary pollutant emission of nitrogen oxides (NO_x = NO + NO_2). The model has been run to predict the 2018 annual mean road-NOx contribution at six roadside and kerbside monitoring locations (both automatic and diffusion tubes) representative of the model study area. Table 11.2.1 below describes the heights at which the monitoring locations were modelled. The monitoring locations included in the model verification, and listed below, all had data capture in 2018 above 90%.

Table 11.2.1 Modelled Heights of Monitoring Locations

ID	Site Type	Within AQMA	Modelled Height (m)
Automatic Sites (SCDC)			
GIRT	Roadside	No	1.5
Diffusion Tubes (CCC)			
DT19	Roadside	No	2
DT22	Kerbside	No	2
DT23	Roadside	No	2
DT31	Roadside	Yes	2
DT4	Roadside	Yes	2

The model output of road-NOx has been compared with the 'measured' road-NOx, which was calculated from the measured NO_2 concentrations and the NO_2 concentrations within the NOx from NO_2 calculator published by Defra.

A primary adjustment factor was determined as the slope of the best fit line between the 'measured' road contribution and the model derived road contribution, forced through zero (Figure 11.2.1). This factor was then applied to the modelled road-NOx concentration for each monitoring Site to provide adjusted modelled road-NOx concentrations. The total NO_2 concentrations were then determined by combining the adjusted modelled road-NOx concentrations with the predicted background NO_2 concentration within the NOx from NO_2 calculator. A secondary adjustment factor was finally calculated as the slope of the best fit line applied to the adjusted data and forced through zero (Figure 11.2.2).

The following primary and secondary adjustment factors have been applied to all modelled NO_2 data:

- Primary adjustment factor: 1.4355
- Secondary adjustment factor: 1.026

The results imply that the model was under-predicting the road-NOx contribution. This is a common experience with this and most other models. The final NO_2 adjustment is minor.

Figure 11.2.3 compares final adjusted modelled total NO_2 at each of the monitoring sites, to measured total NO_2, and shows the 1:1 relationship, as well as ±10% and ±25% of the 1:1 line. The majority of the points lie within the ±25% line with the exception of monitoring location DT22, which measured 30.4 µg/m³ in 2018. This monitoring point was left in the verification as it provided a slightly higher verification factor than otherwise would have been obtained without the monitoring point. The reasons for the under-prediction at this point could not be ascertained, and it is considered that there are likely to be local factors affecting concentrations in the area which cannot be accurately represented in the model.

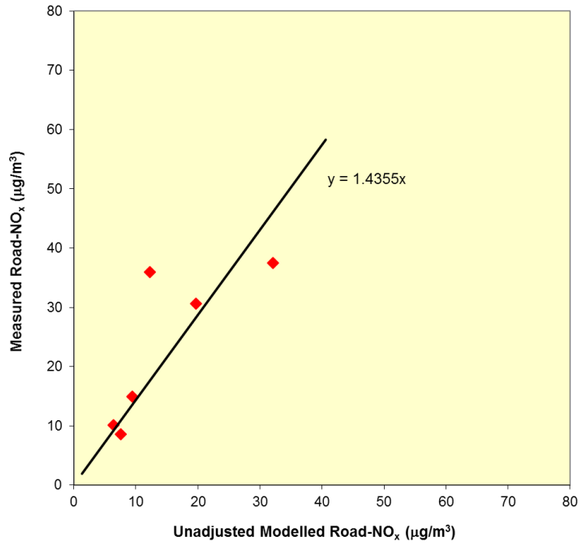


Figure 11.2.1: Comparison of Measured Road-NO_x with Unadjusted Modelled Road-NO_x Concentrations

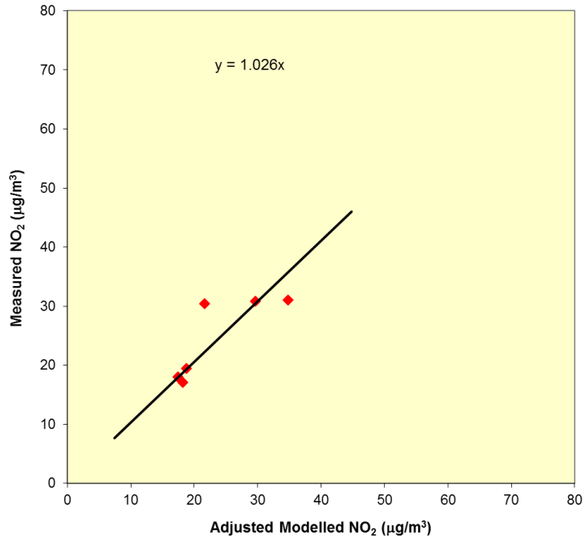


Figure 11.2.2: Comparison of Measured NO2 with Adjusted Modelled NO2 Concentrations

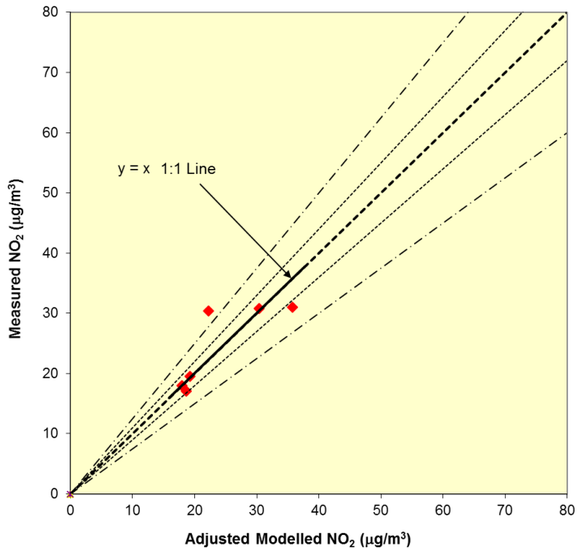


Figure 11.2.3: Comparison of Measured NO2 with Fully Adjusted Modelled NO2 Concentrations

PM_{10} and $PM_{2.5}$

PM_{10} and $PM_{2.5}$ monitoring is carried out at the SCDC GIRT automatic monitor. However, as the PM_{10} and $PM_{2.5}$ concentrations measured at this monitoring site were only just above the background, it was considered conservative to apply the primary adjustment factor calculated for NO_2 concentrations to the modelled-road PM_{10} and $PM_{2.5}$ concentrations.

Appendix 11.3 Traffic data used for the air quality assessment

Table 11.3.1 Traffic Data used for Modelling

Road Link	Description	2018 Baseline		Key Phase 1 scenario- Without Development		Key Phase 1 scenario- With Development		Full Development scenario- Without Development		Full Development scenario - With Development		Full Development with Transport Mitigation Scenario	
		AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
1.0	M11 - J12 - J13 - Nbd	45,412	15.53%	48,899	15.53%	49,332	15.53%	50,553	15.53%	52,014	15.53%	50,810	15.53%
1.0	M11 - J12 - J13 - Sbd	45,411	15.53%	49,312	15.53%	49,459	15.53%	51,442	15.53%	52,449	15.53%	51,244	15.53%
1.1	M11 J13 -J14 - Nbd	33,632	15.53%	35,622	15.53%	35,396	15.53%	36,611	15.53%	36,316	15.53%	36,316	15.53%
1.1	M11 J13 -J14 - Sbd	33,101	15.53%	35,155	15.53%	34,940	15.53%	36,403	15.53%	36,055	15.53%	36,055	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	23,248	15.53%	24,782	15.53%	24,594	15.53%	25,688	15.53%	25,437	15.53%	25,437	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	23,668	15.53%	25,204	15.53%	25,022	15.53%	26,275	15.53%	25,998	15.53%	25,998	15.53%
1.3	M11 J13 off-slip - Nbd	13,392	15.53%	14,922	15.53%	15,574	15.53%	15,575	15.53%	17,337	15.53%	16,133	15.53%
1.3	M11 J13 on-slip - Sbd	9,477	15.53%	11,271	15.53%	11,639	15.53%	12,152	15.53%	13,513	15.53%	12,309	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	38,464	18.33%	39,589	18.33%	40,366	18.33%	40,198	18.33%	42,036	18.33%	40,987	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	39,976	18.33%	41,282	18.33%	41,853	18.33%	41,891	18.33%	43,336	18.33%	42,287	18.33%
2.1	A14 North West of M11 J14 - Ebd	38,007	18.33%	39,361	18.33%	41,874	18.33%	40,662	18.33%	45,430	18.33%	44,380	18.33%
2.1	A14 North West M11 J14 - Wbd	37,896	18.33%	39,306	18.33%	41,630	18.33%	40,534	18.33%	44,751	18.33%	43,702	18.33%
2.2	A14 West of J32 Interchange - Ebd	40,065	18.33%	42,222	18.33%	42,017	18.33%	43,523	18.33%	43,242	18.33%	43,242	18.33%
2.2	A14 West of J32 Interchange - Wbd	40,065	18.33%	42,237	18.33%	42,027	18.33%	43,464	18.33%	43,171	18.33%	43,171	18.33%
2.3	A428 -West of M11 J14 - Ebd	12,449	18.33%	13,036	18.33%	12,991	18.33%	13,608	18.33%	13,493	18.33%	13,493	18.33%
2.3	A428 - West of M11 J14 - Wbd	10,654	18.33%	11,176	18.33%	11,135	18.33%	11,727	18.33%	11,619	18.33%	11,619	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	6,835	5.47%	7,765	5.47%	7,991	5.47%	8,602	5.47%	9,269	5.47%	9,085	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	11,817	5.47%	12,849	5.47%	12,990	5.47%	13,639	5.47%	14,143	5.47%	13,959	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	15,461	5.47%	15,723	5.47%	15,874	5.47%	16,513	5.47%	17,079	5.47%	16,896	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	11,110	5.47%	11,541	5.47%	11,796	5.47%	12,385	5.47%	13,130	5.47%	12,946	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	17,768	5.47%	19,367	5.47%	20,347	5.47%	20,612	5.47%	23,294	5.47%	20,040	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	8,014	5.47%	7,822	5.47%	8,015	5.47%	8,324	5.47%	8,972	5.47%	5,718	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	12,327	3.40%	13,381	3.40%	14,319	3.40%	14,174	3.40%	16,717	3.40%	12,116	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	12,534	3.40%	13,693	3.40%	14,257	3.40%	14,650	3.40%	16,645	3.40%	12,044	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	12,741	3.40%	13,903	3.40%	14,588	3.40%	15,326	3.40%	15,162	3.40%	13,544	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	12,504	3.40%	13,561	3.40%	14,553	3.40%	15,224	3.40%	12,855	3.40%	11,236	3.40%

Road Link	Description	2018 Baseline		Key Phase 1 scenario- Without Development		Key Phase 1 scenario- With Development		Full Development scenario- Without Development		Full Development scenario - With Development		Full Development with Transport Mitigation Scenario	
		AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
3.5	Madingley Rd - East of P&R Access Wbd	11,962	3.40%	13,111	3.40%	13,899	3.40%	14,637	3.40%	14,473	3.40%	13,578	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	11,920	3.40%	12,966	3.40%	14,066	3.40%	14,736	3.40%	12,367	3.40%	11,471	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	9,545	3.40%	10,444	3.40%	12,619	3.40%	11,563	3.40%	12,601	3.40%	11,705	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	9,904	3.40%	10,964	3.40%	12,615	3.40%	12,179	3.40%	13,964	3.40%	13,068	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	8,222	3.40%	9,317	3.40%	10,244	3.40%	14,725	3.40%	17,354	3.40%	15,302	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	8,799	3.40%	9,544	3.40%	10,494	3.40%	15,962	3.40%	18,648	3.40%	16,596	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	8,007	3.40%	9,125	3.40	10,434	3.40	14,249	3.40	16,879	3.40%	14,974	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	8,589	3.40%	9,358	3.40	11,071	3.40	15,511	3.40	17,959	3.40%	16,054	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	7,834	3.40%	8,955	3.40%	10,370	3.40%	9,589	3.40%	12,766	3.40%	10,862	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	7,689	3.40%	8,714	3.40%	10,529	3.40%	9,293	3.40%	13,219	3.40%	11,314	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	7,834	3.40%	8,913	3.40%	10,274	3.40%	9,534	3.40%	12,626	3.40%	11,330	3.40%
3.10	Madingley Rd - East of Grange Road Wbd	7,689	3.40%	8,685	3.40%	10,435	3.40%	9,258	3.40%	13,079	3.40%	11,784	3.40%
3.11	Madingley Rd - West of Queen's Rd/Northampton St R'bout Ebd	8,645	3.40%	9,987	3.40%	10,169	3.40%	10,426	3.40%	11,576	3.40%	11,013	3.40%
3.11	Madingley Rd - West of Queen's Rd/Northampton St R'bout Wbd	8,115	3.40%	9,541	3.40%	9,776	3.40%	9,956	3.40%	11,295	3.40%	10,732	3.40%
3.12	Northampton St - West of Pound Hill Ebd	6,986	3.40%	8,009	3.40%	8,115	3.40%	8,460	3.40%	9,339	3.40%	9,339	3.40%
3.12	Northampton St - West of Pound Hill Wbd	7,093	3.40%	8,322	3.40%	8,284	3.40%	8,810	3.40%	9,320	3.40%	9,320	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	6,352	3.40%	8,261	3.40%	9,093	3.40%	9,029	3.40%	11,261	3.40%	10,041	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	4,580	3.40%	6,083	3.40%	7,217	3.40%	6,852	3.40%	9,644	3.40%	8,425	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	6,352	3.40%	7,164	3.40%	7,069	3.40%	7,798	3.40%	7,671	3.40%	7,671	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	4,580	3.40%	5,053	3.40%	5,014	3.40%	5,730	3.40%	5,670	3.40%	5,670	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	8,346	3.40%	10,978	3.40%	10,918	3.40%	11,923	3.40%	12,146	3.40%	12,146	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access SEbd	7,015	3.40%	9,977	3.40%	9,460	3.40%	11,105	3.40%	10,713	3.40%	10,713	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	9,005	3.40%	11,608	3.40%	11,474	3.40%	12,517	3.40%	12,419	3.40%	12,419	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	9,145	3.40%	12,236	3.40%	11,624	3.40%	13,480	3.40%	12,703	3.40%	12,703	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	8,465	3.40%	10,931	3.40%	10,706	3.40%	11,815	3.40%	11,512	3.40%	11,512	3.40%

Road Link	Description	2018 Baseline		Key Phase 1 scenario- Without Development		Key Phase 1 scenario- With Development		Full Development scenario- Without Development		Full Development scenario - With Development		Full Development with Transport Mitigation Scenario	
		AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
4.4	Huntingdon Rd - East of Storey's Way SEbd	8,392	3.40%	11,585	3.40%	10,911	3.40%	12,793	3.40%	11,864	3.40%	11,864	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	10,008	3.40%	10,363	3.40%	10,350	3.40%	10,466	3.40%	10,516	3.40%	10,516	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	7,931	3.40%	8,184	3.40%	8,176	3.40%	8,276	3.40%	8,273	3.40%	8,273	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	6,641	3.40%	6,939	3.40%	6,927	3.40%	7,043	3.40%	7,093	3.40%	7,093	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	7,600	3.40%	7,847	3.40%	7,840	3.40%	7,939	3.40%	7,937	3.40%	7,937	3.40%
6.0	Queen's Rd - North of West Rd Nbd	6,998	3.40%	7,557	3.40%	8,186	3.40%	7,905	3.40%	9,360	3.40%	8,797	3.40%
6.0	Queen's Rd - North of West Rd Sbd	8,334	3.40%	8,892	3.40%	9,458	3.40%	9,264	3.40%	10,333	3.40%	9,769	3.40%
7.0	Histon Road - South of A14 Nbd	16,067	3.40%	17,600	3.40%	18,504	3.40%	18,490	3.40%	19,820	3.40%	19,088	3.40%
7.0	Histon Road - South of A14 Sbd	19,053	3.40%	20,245	3.40%	21,551	3.40%	21,038	3.40%	22,848	3.40%	22,116	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	2,029	4.43%	2,110	4.43%	2,155	4.43%	2,154	4.43%	2,231	4.43%	1,737	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	2,425	4.43%	2,512	4.43%	2,549	4.43%	2,562	4.43%	2,624	4.43%	2,130	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	1,761	4.43%	1,455	4.43%	1,454	4.43%	1,465	4.43%	1,463	4.43%	1,463	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	1,573	4.43%	1,488	4.43%	1,488	4.43%	1,503	4.43%	1,498	4.43%	1,498	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	2,406	4.43%	2,646	4.43%	2,653	4.43%	2,691	4.43%	2,766	4.43%	2,766	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	2,792	4.43%	3,023	4.43%	3,046	4.43%	3,068	4.43%	3,175	4.43%	3,175	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd	0	0	343	6.26%	380	6.26%	730	6.26%	821	6.26%	821	6.26%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd	0	0	425	6.26%	447	6.26%	896	6.26%	953	6.26%	953	6.26%
11.1	Proposed Madingley Rd West Access to NWC Nbd	0	0	1,814	6.26%	2,589	6.26%	2,242	6.26%	4,208	6.26%	3,483	6.26%
11.1	Proposed Madingley Rd West Access to NWC Sbd	0	0	1,836	6.26%	2,693	6.26%	2,289	6.26%	4,510	6.26%	3,786	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Nbd	0	0	648	6.26%	1,202	6.26%	735	6.26%	2,133	6.26%	1,408	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Sbd	0	0	612	6.26%	1,308	6.26%	674	6.26%	2,362	6.26%	1,638	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Sbd	0	0	1,452	6.26%	1,436	6.26%	1,854	6.26%	2,052	6.26%	2,052	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Nbd	0	0	1,840	6.26%	1,511	6.26%	2,336	6.26%	2,099	6.26%	2,099	6.26%
12.0	Western Access to Madingley Rd Nbd	0	0	0	0	0	0	0	6.26%	3,310	6.26%	1,539	6.26%
12.0	Western Access to Madingley Rd Sbd	0	0	0	0	0	0	0	6.26%	4,761	6.26%	2,990	6.26%
12.1	High Cross Access to Madingley Rd Nbd	1,689	6.26%	1,450	6.26%	3,276	6.26%	1,450	6.26%	5,288	6.26%	4,564	6.26%

Road Link	Description	2018 Baseline		Key Phase 1 scenario- Without Development		Key Phase 1 scenario- With Development		Full Development scenario- Without Development		Full Development scenario - With Development		Full Development with Transport Mitigation Scenario	
		AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV	AADT	%HDV
12.1	High Cross Access to Madingley Rd Sbd	1,530	6.26%	1,348	6.26%	3,132	6.26%	1,348	6.26%	5,161	6.26%	4,437	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	958	6.26%	1,167	6.26%	962	6.26%	1,167	6.26%	4,351	6.26%	3,444	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	1,015	6.26%	916	6.26%	1,141	6.26%	916	6.26%	4,232	6.26%	3,325	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access	150	6.26%	235	6.26%	128	6.26%	235	6.26%	128	6.26%	128	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access	167	6.26%	231	6.26%	126	6.26%	231	6.26%	126	6.26%	126	6.26%
12.4	Clerk Maxwell Rd Sbd - north of Car Park Access	431	6.26%	470	6.26%	980	6.26%	470	6.26%	980	6.26%	980	6.26%
12.4	Clerk Maxwell Rd Nbd - north of Car Park Access	445	6.26%	479	6.26%	998	6.64%	479	6.26%	998	6.26%	998	6.26%

Appendix 11.4 Energy centre modelling inputs

The following tables summarise the stack parameters used in the assessment.

Table 11.4.1 Summary of the Stack Parameters

Parameters	Stack Diameter (m)	Exhaust Gas Flow Rate (m^3/s)	Exhaust Temperature (℃)	NO_x Emission Rate (g/s)
CHP	0.6	4.52	120	0.726
10 MW Boiler	0.7	5.77	180	0.35
5 MW Boiler	0.535	3.37	180	0.20

Table 11.4.2 Stacks Heights

Grid Reference	Stack Height (m)
542166_258940 to 542169_258139	27 (46mAOD)

Table 11.4.3 Building Dimensions

Building 1	Grid reference	Height (m)	Length (m)	Width (m)	Angle (°)
1	542191_259131.7	18	133	371	96
2	542161.1_258847.7	19	133	200	96
3	542393.4_259147.9	18	172	259	95
4	542378.6_258979.1	22	172	80	95
5	542673.4_259048.2	22	360	314	103
6	542761.8_259220.2	18	461	59	103

Appendix 11.5 Predicted concentrations of air quality emissions at baseline scenarios

Table 11.5.1 Predicted baseline concentrations at human receptors (2018, Key Phase 1 and Full Development Scenarios)

Receptor	Annual Mean (µg/m³)								
	2018 Baseline			Key Phase 1 Scenario - Without Development			Full Development Scenario - Without Development		
	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$	NO_2	PM_{10}	$PM_{2.5}$
R1	29.2	20.3	12.1	23.9	19.6	11.5	18.5	19.0	10.9
R2	27.7	18.7	11.6	24.0	18.2	11.1	19.0	17.6	10.6
R3	27.0	18.8	11.9	22.5	18.2	11.3	17.6	17.6	10.8
R4	28.9	19.1	12.0	24.0	18.5	11.5	18.6	17.9	10.9
R5	20.2	17.8	11.3	17.2	17.3	10.8	13.9	16.7	10.2
R6	16.8	17.2	10.7	14.5	16.7	10.2	11.9	16.1	9.7
R7	18.3	17.4	10.8	15.9	16.9	10.4	13.0	16.4	9.9
R8	16.5	17.2	10.7	14.7	16.7	10.2	12.1	16.2	9.8
R9	18.4	16.4	10.5	17.3	16.1	10.2	14.2	15.6	9.7
R10	16.8	16.2	10.4	15.1	15.8	10.0	12.5	15.2	9.5
R11	17.0	16.3	10.4	15.3	15.8	10.0	12.7	15.3	9.5
R12	25.3	16.8	11.1	22.9	16.3	10.7	18.8	15.8	10.2
R13	27.9	16.7	10.9	25.2	16.3	10.5	20.5	15.8	10.0
R14	24.7	16.1	10.5	22.1	15.6	10.1	18.2	15.0	9.6
R15	39.0	18.8	12.1	33.5	18.3	11.6	26.0	17.7	11.1
R16	21.3	16.2	10.7	18.8	15.6	10.2	15.8	15.0	9.7
R17	20.2	16.0	10.6	17.8	15.4	10.1	15.0	14.8	9.6
R18	17.8	16.3	10.4	15.6	15.8	10.0	13.0	15.3	9.5
R19	16.8	16.2	10.3	14.7	15.6	9.9	12.9	15.3	9.5
R20	15.4	16.0	10.2	13.5	15.5	9.8	12.0	15.1	9.4
R21_N6	17.8	17.7	11.1	15.4	17.2	10.6	12.7	16.7	10.1
R22_N5	17.8	17.7	11.1	15.3	17.2	10.6	12.6	16.7	10.1
R23_N3	17.5	17.7	11.1	15.1	17.2	10.6	12.4	16.6	10.1
R24_N4	17.7	17.7	11.1	15.3	17.2	10.6	12.6	16.6	10.1
R25_N2	17.8	17.7	11.1	15.4	17.2	10.6	12.7	16.7	10.1
R26_N1	18.7	17.8	11.2	16.2	17.3	10.7	13.3	16.8	10.2
R27	14.7	17.1	10.8	13.6	16.8	10.4	11.3	16.2	9.9
R28_W	12.8	15.9	10.0	11.0	15.3	9.5	9.2	14.7	9.0
R29	18.1	16.7	10.5	15.3	16.1	10.0	12.4	15.5	9.5
R30_W	12.9	15.9	10.0	11.1	15.3	9.5	9.2	14.7	9.0
R31_SW	13.0	16.9	10.5	11.3	16.4	10.0	9.5	15.8	9.5
R32	15.6	16.3	10.2	13.7	15.8	9.7	11.2	15.2	9.2
On site 1A	12.7	17.3	10.5	11.1	16.7	10.0	9.3	16.1	9.5
On site 1B	12.7	17.3	10.5	11.1	16.7	10.0	9.3	16.1	9.5
On site 1C	12.7	17.3	10.5	11.1	16.7	10.0	9.3	16.1	9.5
On site 1D	12.7	17.3	10.5	11.1	16.7	10.0	9.3	16.1	9.5
On site 2A	12.7	17.2	10.5	11.0	16.7	10.0	9.3	16.1	9.5
On site 2B	12.7	17.2	10.5	11.0	16.7	10.0	9.3	16.1	9.5
On site 2C	12.7	17.2	10.5	11.0	16.7	10.0	9.3	16.1	9.5
On site 2D	12.7	17.2	10.5	11.0	16.7	10.0	9.3	16.1	9.5
On site 3A	12.6	17.2	10.5	11.0	16.7	10.0	9.3	16.1	9.5
Objectives	**40**	**40**	**25**	**40**	**40**	**25**	**40**	**40**	**25**

Table 11.5.2 Predicted baseline NOx concentrations, nitrogen deposition and acid deposition at ecological receptors (2018)

2018			
Receptor and Distance from kerb (m)	**Total NO_x ($\mu g/m^3$)**	**Nitrogen Deposition (kgN/ha/yr)**	**Acid Deposition (keq/ha/yr)**
Madingley Wood SSSI – Broadleaved, Mixed and Yew Woodland			
T1- 0m	39.2	33.2	2.60
T1- 5m	28.1	31.6	2.49
T1- 10m	23.5	30.9	2.44
T1- 15m	21.1	30.5	2.41
T1- 20m	19.5	30.3	2.39
T1- 30m	17.8	30.0	2.37
T1- 40m	16.7	29.8	2.36
T1- 50m	16.1	29.7	2.35
T1- 75m	15.2	29.6	2.34
T1- 100m	14.7	29.5	2.34
T1- 125m	14.4	29.4	2.33
T1- 150m	14.1	29.4	2.33
T1- 175m	14.0	29.4	2.33
T1- 200m	13.9	29.4	2.33
CRITICAL LEVEL / LOAD	**30**	**15**	**10.86**
Exceedances of the critical load/level are highlighted in bold.			

Table 11.5.3 Predicted baseline NOx concentrations, nitrogen deposition and acid deposition at ecological receptors (Key Phase 1 Scenario)

Key Phase 1 Scenario			
Receptor and Distance from kerb (m)	**Total NO_x ($\mu g/m^3$)**	**Nitrogen Deposition (kgN/ha/yr)**	**Acid Deposition (keq/ha/yr)**
Madingley Wood SSSI – Broadleaved, Mixed and Yew Woodland			
T1- 0m	33.7	32.7	2.56
T1- 5m	24.2	31.2	2.46
T1- 10m	20.3	30.6	2.42
T1- 15m	18.2	30.3	2.39
T1- 20m	16.9	30.1	2.38
T1- 30m	15.4	29.9	2.36
T1- 40m	14.5	29.7	2.35
T1- 50m	14.0	29.6	2.35
T1- 75m	13.2	29.5	2.34
T1- 100m	12.7	29.4	2.33
T1- 125m	12.5	29.4	2.33
T1- 150m	12.3	29.4	2.33
T1- 175m	12.2	29.3	2.33
T1- 200m	12.1	29.3	2.32
CRITICAL LEVEL / LOAD	**30**	**15**	**10.86**
Exceedances of the critical load/level are highlighted in bold.			

Table 11.5.4 Predicted baseline NOx concentrations, nitrogen deposition and acid deposition at ecological receptors (Full Development Scenario)

Full Development Scenario			
Receptor and Distance from kerb (m)	**Total NO_x ($\mu g/m^3$)**	**Nitrogen Deposition (kgN/ha/yr)**	**Acid Deposition (keq/ha/yr)**
Madingley Wood SSSI – Broadleaved, Mixed and Yew Woodland			
T1- 0m	26.5	31.8	2.50
T1- 5m	19.3	30.7	2.42
T1- 10m	16.4	30.3	2.39
T1- 15m	14.8	30.0	2.37
T1- 20m	13.8	29.9	2.36
T1- 30m	12.7	29.7	2.35
T1- 40m	12.0	29.6	2.34
T1- 50m	11.6	29.5	2.34
T1- 75m	11.0	29.4	2.33
T1- 100m	10.7	29.4	2.33
T1- 125m	10.5	29.3	2.32
T1- 150m	10.4	29.3	2.32
T1- 175m	10.3	29.3	2.32
T1- 200m	10.2	29.3	2.32
CRITICAL LEVEL / LOAD	**30**	**15**	**10.86**
Exceedances of the critical load/level are highlighted in bold.			

Appendix 11.6 Predicted future concentrations of air quality emissions for impact scenarios (human health receptors)

Key Phase 1 Scenario

Table 11.6.1 Predicted concentrations of NO_2 (µg/m^3), % change and impact at each receptor for Key Phase 1 Scenario

Receptor	Key Phase 1 - Without Development	Key Phase 1 - With Development	Difference	% Change*	Impact
R1	23.9	24.5	0.61	2%	Negligible
R2	24.0	24.5	0.43	1%	Negligible
R3	22.5	22.5	-0.02	0%	Negligible
R4	24.0	24.0	-0.02	0%	Negligible
R5	17.2	17.2	0.01	0%	Negligible
R6	14.5	14.5	0.00	0%	Negligible
R7	15.9	15.9	-0.02	0%	Negligible
R8	14.7	14.7	-0.05	0%	Negligible
R9	17.3	17.1	-0.15	0%	Negligible
R10	15.1	15.0	-0.05	0%	Negligible
R11	15.3	15.2	-0.07	0%	Negligible
R12	22.9	23.0	0.08	0%	Negligible
R13	25.2	25.3	0.08	0%	Negligible
R14	22.1	22.2	0.15	0%	Negligible
R15	33.5	34.9	1.40	3%	Slight Adverse
R16	18.8	19.4	0.57	1%	Negligible
R17	17.8	18.3	0.42	1%	Negligible
R18	15.6	16.3	0.69	2%	Negligible
R19	14.7	15.2	0.51	1%	Negligible
R20	13.5	13.8	0.37	1%	Negligible
R21_N6	15.4	15.9	0.54	1%	Negligible
R22_N5	15.3	15.9	0.54	1%	Negligible
R23_N3	15.1	15.6	0.51	1%	Negligible
R24_N4	15.3	15.8	0.53	1%	Negligible
R25_N2	15.4	16.0	0.56	1%	Negligible
R26_N1	16.2	16.9	0.74	2%	Negligible
R27	13.6	14.1	0.48	1%	Negligible
R28_W	11.0	11.1	0.04	0%	Negligible
R29	15.3	15.4	0.09	0%	Negligible
R30_W	11.1	11.1	0.04	0%	Negligible
R31_SW	11.3	11.3	0.01	0%	Negligible
R32	13.7	13.8	0.08	0%	Negligible
On site 1A	11.1	11.1	0.03	0%	Negligible
On site 1B	11.1	11.1	0.04	0%	Negligible
On site 1C	11.1	11.1	0.04	0%	Negligible
On site 1D	11.1	11.1	0.04	0%	Negligible
On site 2A	11.0	11.0	0.03	0%	Negligible
On site 2B	11.0	11.0	0.03	0%	Negligible
On site 2C	11.0	11.0	0.03	0%	Negligible
On site 2D	11.0	11.0	0.03	0%	Negligible
On site 3A	11.0	11.0	0.03	0%	Negligible
Objective	**40**		**-**		
*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.					

Table 11.6.2 Predicted Concentrations of PM_{10} (µg/m^3), % change and impact at each receptor in Key Phase 1 Scenario

Receptor	Key Phase 1 - Without Development	Key Phase 1 - With Development	Difference	% Change*	Impact
R1	19.6	19.7	0.08	0%	Negligible
R2	18.2	18.3	0.07	0%	Negligible
R3	18.2	18.2	0.00	0%	Negligible
R4	18.5	18.5	0.00	0%	Negligible
R5	17.3	17.3	0.00	0%	Negligible
R6	16.7	16.7	0.00	0%	Negligible
R7	16.9	16.9	0.00	0%	Negligible
R8	16.7	16.7	-0.01	0%	Negligible
R9	16.1	16.1	-0.03	0%	Negligible

Receptor	Key Phase 1 - Without Development	Key Phase 1 - With Development	Difference	% Change*	Impact
R10	15.8	15.8	-0.01	0%	Negligible
R11	15.8	15.8	-0.02	0%	Negligible
R12	16.3	16.4	0.02	0%	Negligible
R13	16.3	16.3	0.02	0%	Negligible
R14	15.6	15.6	0.03	0%	Negligible
R15	18.3	18.5	0.28	1%	Negligible
R16	15.6	15.7	0.10	0%	Negligible
R17	15.4	15.5	0.07	0%	Negligible
R18	15.8	15.9	0.13	0%	Negligible
R19	15.6	15.7	0.09	0%	Negligible
R20	15.5	15.5	0.08	0%	Negligible
R21_N6	17.2	17.3	0.13	0%	Negligible
R22_N5	17.2	17.3	0.13	0%	Negligible
R23_N3	17.2	17.3	0.12	0%	Negligible
R24_N4	17.2	17.3	0.12	0%	Negligible
R25_N2	17.2	17.3	0.13	0%	Negligible
R26_N1	17.3	17.5	0.16	0%	Negligible
R27	16.8	16.8	0.09	0%	Negligible
R28_W	15.3	15.3	0.01	0%	Negligible
R29	16.1	16.1	0.02	0%	Negligible
R30_W	15.3	15.3	0.01	0%	Negligible
R31_SW	16.4	16.4	0.00	0%	Negligible
R32	15.8	15.8	0.02	0%	Negligible
On site 1A	16.7	16.7	0.01	0%	Negligible
On site 1B	16.7	16.7	0.01	0%	Negligible
On site 1C	16.7	16.7	0.01	0%	Negligible
On site 1D	16.7	16.7	0.01	0%	Negligible
On site 2A	16.7	16.7	0.01	0%	Negligible
On site 2B	16.7	16.7	0.01	0%	Negligible
On site 2C	16.7	16.7	0.01	0%	Negligible
On site 2D	16.7	16.7	0.01	0%	Negligible
On site 3A	16.7	16.7	0.01	0%	Negligible

Receptor	Key Phase 1 - Without Development	Key Phase 1 - With Development	Difference	% Change*	Impact
Objective	**40**		-		
*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.					

Table 11.6.3 Predicted concentrations of PM2.5 (µg/m3), % change and impact at each receptor in Key Phase 1 Scenario

Receptor	Key Phase 1 - Without Development	Key Phase 1 - 2021 With Development	Difference	% Change*	Impact
R1	11.5	11.6	0.05	0%	Negligible
R2	11.1	11.1	0.04	0%	Negligible
R3	11.3	11.3	0.00	0%	Negligible
R4	11.5	11.5	0.00	0%	Negligible
R5	10.8	10.8	0.00	0%	Negligible
R6	10.2	10.2	0.00	0%	Negligible
R7	10.4	10.4	0.00	0%	Negligible
R8	10.2	10.2	0.00	0%	Negligible
R9	10.2	10.1	-0.02	0%	Negligible
R10	10.0	10.0	-0.01	0%	Negligible
R11	10.0	10.0	-0.01	0%	Negligible
R12	10.7	10.7	0.01	0%	Negligible
R13	10.5	10.5	0.01	0%	Negligible
R14	10.1	10.1	0.02	0%	Negligible
R15	11.6	11.8	0.16	1%	Negligible
R16	10.2	10.3	0.06	0%	Negligible
R17	10.1	10.2	0.04	0%	Negligible
R18	10.0	10.0	0.07	0%	Negligible
R19	9.9	9.9	0.05	0%	Negligible
R20	9.8	9.8	0.04	0%	Negligible
R21_N6	10.6	10.7	0.07	0%	Negligible
R22_N5	10.6	10.7	0.07	0%	Negligible
R23_N3	10.6	10.7	0.07	0%	Negligible
R24_N4	10.6	10.7	0.07	0%	Negligible
R25_N2	10.6	10.7	0.07	0%	Negligible
R26_N1	10.7	10.8	0.09	0%	Negligible

Receptor	Key Phase 1 - Without Development	Key Phase 1 - 2021 With Development	Difference	% Change*	Impact
R27	10.4	10.4	0.05	0%	Negligible
R28_W	9.5	9.5	0.00	0%	Negligible
R29	10.0	10.0	0.01	0%	Negligible
R30_W	9.5	9.5	0.00	0%	Negligible
R31_SW	10.0	10.0	0.00	0%	Negligible
R32	9.7	9.7	0.01	0%	Negligible
On site 1A	10.0	10.0	0.00	0%	Negligible
On site 1B	10.0	10.0	0.00	0%	Negligible
On site 1C	10.0	10.0	0.00	0%	Negligible
On site 1D	10.0	10.0	0.00	0%	Negligible
On site 2A	10.0	10.0	0.00	0%	Negligible
On site 2B	10.0	10.0	0.00	0%	Negligible
On site 2C	10.0	10.0	0.00	0%	Negligible
On site 2D	10.0	10.0	0.00	0%	Negligible
On site 3A	10.0	10.0	0.00	0%	Negligible
Objective	**25**		**-**		
*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.					

Full Development Scenario

Table 11.6.4 Predicted concentrations of NO_2 (µg/m^3), % change and impact at each receptor in Full Development Scenario

Receptor	Full Development Scenario - Without Development	Full Development Scenario - With Development	Difference	% Change*	Impact
R1	18.5	19.3	0.79	2%	Negligible
R2	19.0	19.9	0.81	2%	Negligible
R3	17.6	17.6	0.00	0%	Negligible
R4	18.6	18.7	0.02	0%	Negligible
R5	13.9	13.9	0.05	0%	Negligible
R6	11.9	11.9	0.03	0%	Negligible
R7	13.0	13.0	0.00	0%	Negligible
R8	12.1	12.1	0.00	0%	Negligible
R9	14.2	14.2	-0.01	0%	Negligible
R10	12.5	12.5	-0.05	0%	Negligible
R11	12.7	12.6	-0.07	0%	Negligible
R12	18.8	18.9	0.12	0%	Negligible
R13	20.5	21.2	0.68	2%	Negligible
R14	18.2	18.7	0.58	1%	Negligible
R15	26.0	28.1	2.12	5%	Negligible
R16	15.8	16.6	0.87	2%	Negligible
R17	15.0	15.7	0.64	2%	Negligible
R18	13.0	14.0	1.01	3%	Negligible
R19	12.9	13.6	0.63	2%	Negligible
R20	12.0	12.4	0.43	1%	Negligible
R21_N6	12.7	13.0	0.37	1%	Negligible
R22_N5	12.6	13.0	0.36	1%	Negligible
R23_N3	12.4	12.7	0.33	1%	Negligible
R24_N4	12.6	12.9	0.36	1%	Negligible
R25_N2	12.7	13.0	0.37	1%	Negligible
R26_N1	13.3	13.8	0.51	1%	Negligible
R27	11.3	12.1	0.79	2%	Negligible
R28_W	9.2	9.3	0.07	0%	Negligible
R29	12.4	12.7	0.23	1%	Negligible
R30_W	9.2	9.3	0.08	0%	Negligible
R31_SW	9.5	9.5	0.01	0%	Negligible
R32	11.2	11.4	0.19	0%	Negligible
On site 1A	9.3	9.4	0.10	0%	Negligible
On site 1B	9.3	9.4	0.10	0%	Negligible
On site 1C	9.3	9.4	0.09	0%	Negligible
On site 1D	9.3	9.4	0.09	0%	Negligible
On site 2A	9.3	9.4	0.07	0%	Negligible
On site 2B	9.3	9.4	0.07	0%	Negligible
On site 2C	9.3	9.4	0.07	0%	Negligible

Receptor	Full Development Scenario - Without Development	Full Development Scenario - With Development	Difference	% Change*	Impact
On site 2D	9.3	9.4	0.07	0%	Negligible
On site 3A	9.3	9.3	0.04	0%	Negligible
Objective	**40**		**-**		
*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.					

Table 11.6.5 Predicted concentrations of PM_{10} (µg/m^3), % change and impact at each receptor in Full Development Scenario

Receptor	Full Development Scenario - Without Development	Full Development Scenario - With Development	Difference	% Change*	Impact
R1	19.0	19.1	0.14	0%	Negligible
R2	17.6	17.8	0.17	0%	Negligible
R3	17.6	17.6	0.00	0%	Negligible
R4	17.9	17.9	0.01	0%	Negligible
R5	16.7	16.7	0.01	0%	Negligible
R6	16.1	16.1	0.01	0%	Negligible
R7	16.4	16.4	0.00	0%	Negligible
R8	16.2	16.2	0.00	0%	Negligible
R9	15.6	15.6	0.00	0%	Negligible
R10	15.2	15.2	-0.02	0%	Negligible
R11	15.3	15.3	-0.03	0%	Negligible
R12	15.8	15.8	0.03	0%	Negligible
R13	15.8	15.9	0.18	0%	Negligible
R14	15.0	15.2	0.15	0%	Negligible
R15	17.7	18.3	0.57	1%	Negligible
R16	15.0	15.2	0.21	1%	Negligible
R17	14.8	15.0	0.16	0%	Negligible
R18	15.3	15.5	0.27	1%	Negligible
R19	15.3	15.4	0.17	0%	Negligible
R20	15.1	15.2	0.13	0%	Negligible
R21_N6	16.7	16.8	0.11	0%	Negligible
R22_N5	16.7	16.8	0.11	0%	Negligible
R23_N3	16.6	16.7	0.10	0%	Negligible
R24_N4	16.6	16.8	0.11	0%	Negligible
R25_N2	16.7	16.8	0.11	0%	Negligible
R26_N1	16.8	17.0	0.15	0%	Negligible
R27	16.2	16.4	0.21	1%	Negligible
R28_W	14.7	14.7	0.02	0%	Negligible
R29	15.5	15.6	0.05	0%	Negligible
R30_W	14.7	14.7	0.02	0%	Negligible
R31_SW	15.8	15.8	0.00	0%	Negligible
R32	15.2	15.2	0.05	0%	Negligible
On site 1A	16.1	16.1	0.03	0%	Negligible
On site 1B	16.1	16.1	0.03	0%	Negligible
On site 1C	16.1	16.1	0.03	0%	Negligible
On site 1D	16.1	16.1	0.03	0%	Negligible
On site 2A	16.1	16.1	0.02	0%	Negligible
On site 2B	16.1	16.1	0.02	0%	Negligible
On site 2C	16.1	16.1	0.02	0%	Negligible
On site 2D	16.1	16.1	0.02	0%	Negligible
On site 3A	16.1	16.1	0.01	0%	Negligible
Objective	**40**		-		
*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.					

Table 11.6.6 Predicted concentrations of $PM_{2.5}$ (µg/m^3), % change and impact at each receptor in Full Development Scenario

Receptor	Full Development Scenario - Without Development	Full Development Scenario - With Development	Difference	% Change*	Impact
R1	10.9	11.0	0.09	0%	Negligible
R2	10.6	10.7	0.10	0%	Negligible
R3	10.8	10.8	0.00	0%	Negligible
R4	10.9	10.9	0.00	0%	Negligible
R5	10.2	10.2	0.01	0%	Negligible
R6	9.7	9.7	0.00	0%	Negligible
R7	9.9	9.9	0.00	0%	Negligible
R8	9.8	9.8	0.00	0%	Negligible
R9	9.7	9.7	0.00	0%	Negligible
R10	9.5	9.5	-0.01	0%	Negligible
R11	9.5	9.5	-0.01	0%	Negligible
R12	10.2	10.2	0.02	0%	Negligible
R13	10.0	10.1	0.10	0%	Negligible
R14	9.6	9.6	0.08	0%	Negligible
R15	11.1	11.4	0.32	1%	Negligible
R16	9.7	9.9	0.12	0%	Negligible
R17	9.6	9.7	0.09	0%	Negligible
R18	9.5	9.6	0.15	1%	Negligible
R19	9.5	9.6	0.09	0%	Negligible
R20	9.4	9.4	0.07	0%	Negligible
R21_N6	10.1	10.2	0.06	0%	Negligible
R22_N5	10.1	10.2	0.06	0%	Negligible
R23_N3	10.1	10.2	0.06	0%	Negligible
R24_N4	10.1	10.2	0.06	0%	Negligible
R25_N2	10.1	10.2	0.06	0%	Negligible
R26_N1	10.2	10.3	0.08	0%	Negligible
R27	9.9	10.0	0.12	0%	Negligible
R28_W	9.0	9.0	0.01	0%	Negligible
R29	9.5	9.5	0.03	0%	Negligible
R30_W	9.0	9.0	0.01	0%	Negligible
R31_SW	9.5	9.5	0.00	0%	Negligible
R32	9.2	9.3	0.03	0%	Negligible
On site 1A	9.5	9.5	0.02	0%	Negligible
On site 1B	9.5	9.5	0.02	0%	Negligible
On site 1C	9.5	9.5	0.02	0%	Negligible
On site 1D	9.5	9.5	0.01	0%	Negligible
On site 2A	9.5	9.5	0.01	0%	Negligible
On site 2B	9.5	9.5	0.01	0%	Negligible
On site 2C	9.5	9.5	0.01	0%	Negligible
On site 2D	9.5	9.5	0.01	0%	Negligible
On site 3A	9.5	9.5	0.01	0%	Negligible
Objective	**25**		**-**		
*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.					

Full Development Transport Mitigation Scenario

Table 11.6.7 Predicted concentrations of NO_2 (µg/m^3), % change and impact at each receptor in Full Development (including transport mitigation) scenario

Receptor	Full Development (mitigated) Scenario - Without Development	Full Development (mitigated) Scenario - With Development	Difference	% Change*	Impact
R1	18.5	19.1	0.60	1%	Negligible
R2	19.0	19.4	0.40	1%	Negligible
R3	17.6	17.6	-0.01	0%	Negligible
R4	18.6	18.7	0.01	0%	Negligible
R5	13.9	13.9	0.04	0%	Negligible
R6	11.9	11.9	0.02	0%	Negligible
R7	13.0	13.0	-0.02	0%	Negligible
R8	12.1	12.1	-0.02	0%	Negligible
R9	14.2	14.2	-0.02	0%	Negligible
R10	12.5	12.4	-0.07	0%	Negligible
R11	12.7	12.6	-0.09	0%	Negligible
R12	18.8	18.8	0.00	0%	Negligible
R13	20.5	21.1	0.64	2%	Negligible
R14	18.2	18.6	0.46	1%	Negligible
R15	26.0	27.2	1.20	3%	Negligible
R16	15.8	16.1	0.38	1%	Negligible
R17	15.0	15.3	0.22	1%	Negligible
R18	13.0	13.4	0.45	1%	Negligible
R19	12.9	13.1	0.22	1%	Negligible
R20	12.0	12.1	0.15	0%	Negligible
R21_N6	12.7	12.8	0.16	0%	Negligible
R22_N5	12.6	12.8	0.15	0%	Negligible
R23_N3	12.4	12.6	0.14	0%	Negligible
R24_N4	12.6	12.7	0.15	0%	Negligible
R25_N2	12.7	12.8	0.16	0%	Negligible
R26_N1	13.3	13.5	0.24	1%	Negligible
R27	11.3	11.8	0.50	1%	Negligible
R28_W	9.2	9.2	0.01	0%	Negligible
R29	12.4	12.6	0.16	0%	Negligible
R30_W	9.2	9.2	0.01	0%	Negligible
R31_SW	9.5	9.5	0.00	0%	Negligible
R32	11.2	11.4	0.13	0%	Negligible
On site 1A	9.3	9.4	0.06	0%	Negligible
On site 1B	9.3	9.4	0.06	0%	Negligible
On site 1C	9.3	9.4	0.06	0%	Negligible
On site 1D	9.3	9.4	0.05	0%	Negligible
On site 2A	9.3	9.3	0.04	0%	Negligible
On site 2B	9.3	9.3	0.04	0%	Negligible
On site 2C	9.3	9.3	0.04	0%	Negligible
On site 2D	9.3	9.3	0.04	0%	Negligible
On site 3A	9.3	9.3	0.02	0%	Negligible
Objective	**40**		**-**		

*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.

Table 11.6.8 Predicted concentrations of PM10 (µg/m3), % change and impact at each receptor in Full Development (including transport mitigation) scenario

Receptor	Full Development (mitigated) Scenario - Without Development	Full Development (mitigated) Scenario - With Development	Difference	% Change*	Impact
R1	19.0	19.1	0.11	0%	Negligible
R2	17.6	17.7	0.08	0%	Negligible
R3	17.6	17.6	0.00	0%	Negligible
R4	17.9	17.9	0.00	0%	Negligible
R5	16.7	16.7	0.01	0%	Negligible
R6	16.1	16.1	0.00	0%	Negligible
R7	16.4	16.4	0.00	0%	Negligible
R8	16.2	16.2	0.00	0%	Negligible
R9	15.6	15.6	-0.01	0%	Negligible
R10	15.2	15.2	-0.02	0%	Negligible
R11	15.3	15.3	-0.03	0%	Negligible
R12	15.8	15.8	0.00	0%	Negligible
R13	15.8	15.9	0.17	0%	Negligible
R14	15.0	15.1	0.11	0%	Negligible
R15	17.7	18.0	0.31	1%	Negligible
R16	15.0	15.1	0.09	0%	Negligible
R17	14.8	14.9	0.05	0%	Negligible
R18	15.3	15.4	0.12	0%	Negligible
R19	15.3	15.3	0.05	0%	Negligible
R20	15.1	15.1	0.04	0%	Negligible
R21_N6	16.7	16.7	0.05	0%	Negligible
R22_N5	16.7	16.7	0.05	0%	Negligible
R23_N3	16.6	16.6	0.04	0%	Negligible
R24_N4	16.6	16.7	0.05	0%	Negligible
R25_N2	16.7	16.7	0.05	0%	Negligible
R26_N1	16.8	16.9	0.07	0%	Negligible
R27	16.2	16.3	0.13	0%	Negligible
R28_W	14.7	14.7	0.00	0%	Negligible
R29	15.5	15.6	0.03	0%	Negligible
R30_W	14.7	14.7	0.00	0%	Negligible
R31_SW	15.8	15.8	0.00	0%	Negligible
R32	15.2	15.2	0.03	0%	Negligible
On site 1A	16.1	16.1	0.02	0%	Negligible
On site 1B	16.1	16.1	0.02	0%	Negligible
On site 1C	16.1	16.1	0.02	0%	Negligible
On site 1D	16.1	16.1	0.02	0%	Negligible
On site 2A	16.1	16.1	0.01	0%	Negligible
On site 2B	16.1	16.1	0.01	0%	Negligible
On site 2C	16.1	16.1	0.01	0%	Negligible
On site 2D	16.1	16.1	0.01	0%	Negligible
On site 3A	16.1	16.1	0.01	0%	Negligible
Objective	**40**		-		

*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.

Table 11.6.9 Predicted concentrations of PM2.5 (µg/m3), % change and impact at each receptor in Full Development (including transport mitigation) Scenario

Receptor	Full Development (mitigated) Scenario - Without Development	Full Development (mitigated) Scenario - With Development	Difference	% Change*	Impact
R1	10.9	11.0	0.07	0%	Negligible
R2	10.6	10.6	0.05	0%	Negligible
R3	10.8	10.8	0.00	0%	Negligible
R4	10.9	10.9	0.00	0%	Negligible
R5	10.2	10.2	0.00	0%	Negligible
R6	9.7	9.7	0.00	0%	Negligible
R7	9.9	9.9	0.00	0%	Negligible
R8	9.8	9.8	0.00	0%	Negligible
R9	9.7	9.7	0.00	0%	Negligible
R10	9.5	9.5	-0.01	0%	Negligible
R11	9.5	9.5	-0.02	0%	Negligible
R12	10.2	10.2	0.00	0%	Negligible
R13	10.0	10.1	0.10	0%	Negligible
R14	9.6	9.6	0.06	0%	Negligible
R15	11.1	11.2	0.18	1%	Negligible
R16	9.7	9.8	0.05	0%	Negligible
R17	9.6	9.7	0.03	0%	Negligible
R18	9.5	9.6	0.07	0%	Negligible
R19	9.5	9.5	0.03	0%	Negligible
R20	9.4	9.4	0.02	0%	Negligible
R21_N6	10.1	10.2	0.03	0%	Negligible
R22_N5	10.1	10.2	0.03	0%	Negligible
R23_N3	10.1	10.1	0.02	0%	Negligible
R24_N4	10.1	10.2	0.03	0%	Negligible
R25_N2	10.1	10.2	0.03	0%	Negligible
R26_N1	10.2	10.3	0.04	0%	Negligible
R27	9.9	10.0	0.07	0%	Negligible
R28_W	9.0	9.0	0.00	0%	Negligible
R29	9.5	9.5	0.02	0%	Negligible
R30_W	9.0	9.0	0.00	0%	Negligible
R31_SW	9.5	9.5	0.00	0%	Negligible
R32	9.2	9.3	0.02	0%	Negligible
On site 1A	9.5	9.5	0.01	0%	Negligible
On site 1B	9.5	9.5	0.01	0%	Negligible
On site 1C	9.5	9.5	0.01	0%	Negligible
On site 1D	9.5	9.5	0.01	0%	Negligible
On site 2A	9.5	9.5	0.01	0%	Negligible
On site 2B	9.5	9.5	0.01	0%	Negligible
On site 2C	9.5	9.5	0.01	0%	Negligible
On site 2D	9.5	9.5	0.01	0%	Negligible
On site 3A	9.5	9.5	0.00	0%	Negligible
Objective	**25**		**-**		
*Rounded to nearest whole number in accordance with the IAQM 2017 guidance.					

Appendix 11.7 Predicted future concentrations of air quality emissions for impact scenarios (ecological receptors)

Key Phase 1 Scenario

Table 11.7.1 Predicted concentrations at ecological receptors in Key Phase 1 scenario without and with the Proposed Development in place

Receptor and Distance from Kerb	Key Phase 1 - Without Development			Key Phase 1 - With Development		
	Total NO_x ($\mu g/m^3$)	Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)	Total NO_x ($\mu g/m^3$)	Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)
T1- 0m	33.7	32.7	2.56	34.1	32.7	2.57
T1- 5m	24.2	31.2	2.46	24.4	31.3	2.46
T1- 10m	20.3	30.6	2.42	20.5	30.7	2.42
T1- 15m	18.2	30.3	2.39	18.3	30.3	2.40
T1- 20m	16.9	30.1	2.38	17.0	30.1	2.38
T1- 30m	15.4	29.9	2.36	15.5	29.9	2.36
T1- 40m	14.5	29.7	2.35	14.6	29.7	2.35
T1- 50m	14.0	29.6	2.35	14.0	29.6	2.35
T1- 75m	13.2	29.5	2.34	13.2	29.5	2.34
T1- 100m	12.7	29.4	2.33	12.8	29.4	2.33
T1- 125m	12.5	29.4	2.33	12.5	29.4	2.33
T1- 150m	12.3	29.4	2.33	12.3	29.4	2.33
T1- 175m	12.2	29.3	2.33	12.2	29.3	2.33
T1- 200m	12.1	29.3	2.32	12.1	29.3	2.33
CRITICAL LOAD/LEVEL	**30**	**15**	**10.86**	**30**	**15**	**10.86**
Exceedances of the critical load/level are highlighted in bold.						

Table 11.7.2 Predicted scheme contribution in Key Phase 1 scenario

Receptor and Distance from Kerb	Key Phase 1 Scheme Contribution					
	Total NO_x ($\mu g/m^3$)		Nitrogen Deposition (kgN/ha/yr)		Acid Deposition (keqN/ha/yr)	
	NO_x	%	N Deposition	%	Acid Deposition	%
T1- 0m	0.4	1.3	0.06	0.4	0.004	0.04
T1- 5m	0.2	0.8	0.04	0.2	0.003	0.02
T1- 10m	0.2	0.5	0.02	0.2	0.002	0.02
T1- 15m	0.1	0.4	0.02	0.1	0.001	0.01

Receptor and Distance from Kerb	Key Phase 1 Scheme Contribution					
	Total NO_x ($\mu g/m^3$)		Nitrogen Deposition (kgN/ha/yr)		Acid Deposition (keqN/ha/yr)	
	NO_x	%	N Deposition	%	Acid Deposition	%
T1- 20m	0.1	0.3	0.01	0.1	0.001	0.01
T1- 30m	0.1	0.3	0.01	0.1	0.001	0.01
T1- 40m	0.1	0.2	0.01	0.1	0.001	0.01
T1- 50m	0.1	0.2	0.01	0.1	0.001	0.01
T1- 75m	0.0	0.1	0.01	0.0	0.000	0.00
T1- 100m	0.0	0.1	0.00	0.0	0.000	0.00
T1- 125m	0.0	0.1	0.01	0.0	0.000	0.00
T1- 150m	0.0	0.1	0.01	0.0	0.000	0.00
T1- 175m	0.0	0.1	0.00	0.0	0.000	0.00
T1- 200m	0.0	0.1	0.00	0.0	0.000	0.00
Exceedances of 1% of the critical level/load highlighted in bold.						

Full Development Scenario

Table 11.7.3 Predicted concentrations at ecological receptors in Full Development scenario without and with the Proposed Development in place

Receptor and Distance from Kerb	Full Development Scenario - Without Development			Full Development Scenario - With Development		
	Total NO_x ($\mu g/m^3$)	Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)	Total NO_x ($\mu g/m^3$)	Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)
T1- 0m	26.5	31.8	2.50	27.4	32.0	2.51
T1- 5m	19.3	30.7	2.42	19.9	30.8	2.43
T1- 10m	16.4	30.3	2.39	16.8	30.3	2.40
T1- 15m	14.8	30.0	2.37	15.1	30.1	2.38
T1- 20m	13.8	29.9	2.36	14.1	29.9	2.37
T1- 30m	12.7	29.7	2.35	12.9	29.7	2.35
T1- 40m	12.0	29.6	2.34	12.2	29.6	2.34
T1- 50m	11.6	29.5	2.34	11.7	29.5	2.34
T1- 75m	11.0	29.4	2.33	11.1	29.4	2.33
T1- 100m	10.7	29.4	2.33	10.8	29.4	2.33
T1- 125m	10.5	29.3	2.32	10.6	29.3	2.33
T1- 150m	10.4	29.3	2.32	10.4	29.3	2.32
T1- 175m	10.3	29.3	2.32	10.3	29.3	2.32
T1- 200m	10.2	29.3	2.32	10.3	29.3	2.32
CRITICAL LOAD/LEVEL	**30**	**15**	**10.86**	**30**	**15**	**10.86**
Exceedances of the critical load/level are highlighted in bold.						

Table 11.7.4 Predicted scheme contribution in Full Development scenario

Receptor and Distance from Kerb	Full Development Scenario Scheme Contribution					
	Total NO_x ($\mu g/m^3$)		Nitrogen Deposition (kgN/ha/yr)		Acid Deposition (keqN/ha/yr)	
	NO_x	%	N Deposition	%	Acid Deposition	%
T1- 0m	0.9	3.0	0.13	0.9	0.009	0.09
T1- 5m	0.5	1.7	0.08	0.5	0.006	0.05
T1- 10m	0.4	1.2	0.06	0.4	0.004	0.04
T1- 15m	0.3	0.9	0.04	0.3	0.003	0.03
T1- 20m	0.2	0.8	0.04	0.2	0.003	0.02
T1- 30m	0.2	0.6	0.03	0.2	0.002	0.02
T1- 40m	0.1	0.4	0.02	0.2	0.002	0.02
T1- 50m	0.1	0.4	0.02	0.1	0.001	0.01
T1- 75m	0.1	0.3	0.01	0.1	0.001	0.01
T1- 100m	0.1	0.2	0.01	0.1	0.001	0.01
T1- 125m	0.1	0.2	0.01	0.1	0.001	0.01
T1- 150m	0.0	0.2	0.01	0.0	0.000	0.00
T1- 175m	0.0	0.1	0.01	0.0	0.000	0.00
T1- 200m	0.0	0.1	0.01	0.0	0.000	0.00
Exceedances of 1% of the critical level/load highlighted in bold.						

Full Development Transport Mitigation Scenario

Table 11.7.5 Predicted concentrations at ecological receptors in Full Development (with transport mitigation) scenario without and with the Proposed Development in place

Receptor and Distance from Kerb	Full Development (mitigated) - Without Development			Full Development (mitigated) - With Development		
	Total NO_x ($\mu g/m^3$)	Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)	Total NO_x ($\mu g/m^3$)	Nitrogen Deposition (kgN/ha/yr)	Acid Deposition (keq/ha/yr)
T1- 0m	26.5	31.8	2.50	27.1	31.9	2.51
T1- 5m	19.3	30.7	2.42	19.7	30.8	2.43
T1- 10m	16.4	30.3	2.39	16.7	30.3	2.39
T1- 15m	14.8	30.0	2.37	15.0	30.0	2.38
T1- 20m	13.8	29.9	2.36	14.0	29.9	2.36
T1- 30m	12.7	29.7	2.35	12.8	29.7	2.35
T1- 40m	12.0	29.6	2.34	12.1	29.6	2.34
T1- 50m	11.6	29.5	2.34	11.7	29.5	2.34
T1- 75m	11.0	29.4	2.33	11.1	29.4	2.33
T1- 100m	10.7	29.4	2.33	10.8	29.4	2.33
T1- 125m	10.5	29.3	2.32	10.6	29.3	2.33
T1- 150m	10.4	29.3	2.32	10.4	29.3	2.32
T1- 175m	10.3	29.3	2.32	10.3	29.3	2.32
T1- 200m	10.2	29.3	2.32	10.2	29.3	2.32
CRITICAL LOAD/LEVEL	**30**	**15**	**10.86**	**30**	**15**	**10.86**
Exceedances of the critical load/level are highlighted in bold.						

Table 11.7.6 Predicted scheme contribution in Full Development (including transport mitigation) scenario

Receptor and Distance from Kerb	**Full Development (mitigated) Scheme Contribution**					
	Total NO_x ($\mu g/m^3$)		**Nitrogen Deposition (kgN/ha/yr)**		**Acid Deposition (keqN/ha/yr)**	
	NO_x	**%**	**N Deposition**	**%**	**Acid Deposition**	**%**
T1- 0m	0.6	2.0	0.09	0.6	0.007	0.06
T1- 5m	0.4	1.2	0.05	0.4	0.004	0.03
T1- 10m	0.2	0.8	0.04	0.3	0.003	0.03
T1- 15m	0.2	0.6	0.03	0.2	0.002	0.02
T1- 20m	0.2	0.5	0.02	0.2	0.002	0.02
T1- 30m	0.1	0.4	0.02	0.1	0.001	0.01
T1- 40m	0.1	0.3	0.01	0.1	0.001	0.01
T1- 50m	0.1	0.2	0.01	0.1	0.001	0.01
T1- 75m	0.1	0.2	0.01	0.1	0.001	0.01
T1- 100m	0.0	0.1	0.01	0.0	0.000	0.00
T1- 125m	0.0	0.1	0.01	0.0	0.000	0.00
T1- 150m	0.0	0.1	0.01	0.0	0.000	0.00
T1- 175m	0.0	0.1	0.00	0.0	0.000	0.00
T1- 200m	0.0	0.1	0.00	0.0	0.000	0.00
Exceedances of 1% of the critical level/load highlighted in bold.						

Appendix 11.8 Predicted energy centre emission concentrations

Table 11.8.1 Maximum annual mean NO_2 Process Contribution (PC) at human receptors

Receptor	PC (µg/m^3)	%EAL*
R21_N6	0.5	1.2
R22_N5	0.5	1.3
R23_N3	0.6	1.5
R24_N4	0.7	1.6
R25_N2	0.6	1.6
R26_N1	0.8	1.9
R28_W	0.6	1.5
R30_W	0.6	1.4
R31_SW	0.3	0.7
On site 1A	0.4	1.0
On site 1B	0.4	1.0
On site 1C	0.4	1.0
On site 1D	0.4	1.0
On site 2A	0.3	0.7
On site 2B	0.3	0.7
On site 2C	0.3	0.7
On site 2D	0.3	0.7
On site 3A	0.3	0.7
*EAL = 40 µg/m^3		

Table 11.8.2 Maximum hourly mean NO_2 PC at human receptors

Receptor	PC (µg/m^3)	%EAL*
R21_N6	44.2	22.1
R22_N5	43.6	21.8
R23_N3	43.6	21.8
R24_N4	39.8	19.9
R25_N2	39.8	19.9
R26_N1	34.2	17.1
R28_W	19.8	9.9
R30_W	17.6	8.8
R31_SW	12.9	6.4
On site 1A	49.7	24.9
On site 1B	49.7	24.9
On site 1C	49.7	24.9
On site 1D	49.7	24.9
On site 2A	43.6	21.8
On site 2B	43.6	21.8
On site 2C	43.6	21.8
On site 2D	43.6	21.8
On site 3A	13.1	6.5
*EAL = 200 µg/m^3		

Key Phase 1 Scenario

Table 11.8.3 Total NO_2 annual mean Predicted Environmental Concentration (PEC) in Key Phase 1 scenario

Receptor	Baseline (µg/m³)	PEC (µg/m³)	%EAL*
R21_N6	15.9	16.4	41.0
R22_N5	15.9	16.4	41.0
R23_N3	15.6	16.2	40.5
R24_N4	15.8	16.5	41.2
R25_N2	16.0	16.6	41.5
R26_N1	16.9	17.7	44.2
R28_W	11.1	11.7	29.2
R30_W	11.1	11.7	29.2
R31_SW	11.3	11.6	28.9
On site 1A	11.1	11.5	28.8
On site 1B	11.1	11.5	28.8
On site 1C	11.1	11.5	28.8
On site 1D	11.1	11.5	28.7
On site 2A	11.0	11.3	28.3
On site 2B	11.0	11.3	28.3
On site 2C	11.0	11.3	28.3
On site 2D	11.0	11.3	28.3
On site 3A	11.0	11.3	28.2
*EAL = 40 µg/m³			

Table 11.8.4 Total NO_2 hourly mean PEC in Key Phase 1 scenario

Receptor	Baseline (µg/m³)	PEC (µg/m³)	%EAL*
R21_N6	31.8	76.1	38.0
R22_N5	31.8	75.4	37.7
R23_N3	31.2	74.8	37.4
R24_N4	31.6	71.5	35.7
R25_N2	31.9	71.8	35.9
R26_N1	33.9	68.1	34.1
R28_W	22.2	42.0	21.0
R30_W	22.3	39.9	19.9
R31_SW	22.6	35.4	17.7
On site 1A	22.2	71.9	36.0
On site 1B	22.2	71.9	36.0
On site 1C	22.2	71.9	36.0
On site 1D	22.2	71.9	36.0
On site 2A	22.1	65.7	32.8
On site 2B	22.1	65.7	32.8
On site 2C	22.1	65.7	32.8
On site 2D	22.1	65.7	32.8
On site 3A	22.0	35.1	17.5
*EAL = 200 µg/m³			

Full Development Scenario

Table 11.8.5 Total NO_2 Annual Mean Predicted Environmental Concentration in Full Development scenario

Receptor	Baseline (µg/m³)	PEC (µg/m³)	%EAL*
R21_N6	13.0	13.5	33.7
R22_N5	13.0	13.5	33.8
R23_N3	12.7	13.3	33.3
R24_N4	12.9	13.6	33.9
R25_N2	13.0	13.7	34.2
R26_N1	13.8	14.5	36.3
R28_W	9.3	9.9	24.6
R30_W	9.3	9.9	24.6
R31_SW	9.5	9.8	24.4
On site 1A	9.4	9.8	24.6
On site 1B	9.4	9.8	24.6
On site 1C	9.4	9.8	24.6
On site 1D	9.4	9.8	24.6
On site 2A	9.4	9.6	24.1
On site 2B	9.4	9.6	24.1
On site 2C	9.4	9.6	24.1
On site 2D	9.4	9.6	24.1
On site 3A	9.3	9.6	24.0
*EAL = 40 µg/m³			

Table 11.8.6 Total NO_2 hourly mean PEC in Full Development scenario

Receptor	Baseline (µg/m³)	PEC (µg/m³)	%EAL*
R21_N6	26.1	70.3	35.1
R22_N5	26.0	69.6	34.8
R23_N3	25.5	69.1	34.6
R24_N4	25.8	65.7	32.8
R25_N2	26.0	65.9	32.9
R26_N1	27.6	61.8	30.9
R28_W	18.5	38.3	19.2
R30_W	18.6	36.2	18.1
R31_SW	18.9	31.8	15.9
On site 1A	18.9	68.6	34.3
On site 1B	18.9	68.6	34.3
On site 1C	18.9	68.6	34.3
On site 1D	18.9	68.6	34.3
On site 2A	18.7	62.3	31.2
On site 2B	18.7	62.3	31.2
On site 2C	18.7	62.3	31.2
On site 2D	18.7	62.3	31.2
On site 3A	18.6	31.7	15.8
*EAL = 200 µg/m³			

Appendix 11.9 Road traffic emission factors

Introduction

Atmospheric dispersion modelling is used to determine the effect of future development traffic on local air quality. The modelling utilises predictions of the composition and emissions profile of the vehicle fleet which are produced by Defra in the emissions factor toolkit (EFT) with the fleet composition and emissions profiles provided on a year by year basis; the most recent update is V9.0 and includes data from 2017 to 2030

The modelling of future traffic impacts requires consideration of uncertainty as to the accuracy of the emission factors, as well as uncertainty introduced by the modelling process and the traffic data on which the predictions are based. This has become more important in recent years as it has been realised that previous versions of the EFT were likely to have significantly underestimated the real-world NOx emissions of the vehicle fleet primarily resulting from diesel vehicles.

Emission Factor Toolkit

The EFT contains estimates of the future composition of the vehicle fleet in terms of the age and type of vehicles. The composition of the vehicle fleet is primarily related to the age of the vehicles (in terms of their emissions class) and the fuel that they use (i.e. petrol, diesel or electric). In general terms, as new vehicles replace older vehicles, and as the emissions performance of vehicles is generally taken to improve over time, both current and historical versions of the EFT predict very large reductions in NOx emissions in the future. It is also obvious that the further one looks into the future, the more uncertain the predictions become as they depend on the rate of vehicle renewal and the size and fuel mix of the vehicles bought; which are all estimates.

The emissions performance of the vehicles in the EFT is classified in terms of Euro type approval testing; Euro 1 to 6 (with Euro 6 vechielce split into 6a, 6b, 6c and 6d) concerning light duty vehicles and Euro I to VI heavy duty vehicles. Whilst the introduction of each Euro class has generally seen a tightening of emission standards, the standards up until 2017 were based on laboratory testing of vehicles. The emissions performance of the vehicles in real world driving conditions has been higher than the laboratory testing results, especially for diesel vehicles. This factor was not recognised in earlier versions of the EFT, and combined with the fact that diesel vehicles have much higher NOx emissions than petrol vehicles and there has been a very large increase in the number of diesel vehicles on the road, has meant that the NOx emissions and NO_2 concentrations did not reduce as was anticipated.

Emissions in the EFT

The EFT database was updated in May 2019 to v9.0. It now uses NOx emissions factors for the vehicles taken from the European Environment Agency's COPERT 5 database and the 2019 update included changes to the fleet mix due largely to the London Low Emissions Zone.

The EFT considers the real-world performance of Euro 6ab diesel cars, applying a high conformity factor to these vehicles. For Euro 6c and Euro 6d vehicles, it assumes that the RDE is effective in bringing down vehicle emissions, but does not assume that vehicle emissions will be as low as the conformity factors in the RDE testing. The EFT therefore incorporates an assumption that diesel car NOx emissions will be higher in real world driving conditions than the testing standards allow.

AQC reviewed their approach to vehicle emissions following publication of EFT v8.0. CURED v3A was formulated assuming that light duty vehicle emissions are as per EFT v8.0 up until Euro 6c. Euro 6d vehicles are assumed to have the same emissions as Euro 6c. Emissions from HDVs are assumed to be as per the EFT v8.0. Vehicle emissions using CURED v3A can be considered to be a worst-case sensitivity test post 2020. CURED v3A has not been revised following the publication of EFT v9.0.

Figure 11.9.1 shows the relative decline in vehicle NOx emissions predicted for an urban road (outside London) with 5% Heavy Duty Vehicle traffic, travelling at 36kph.

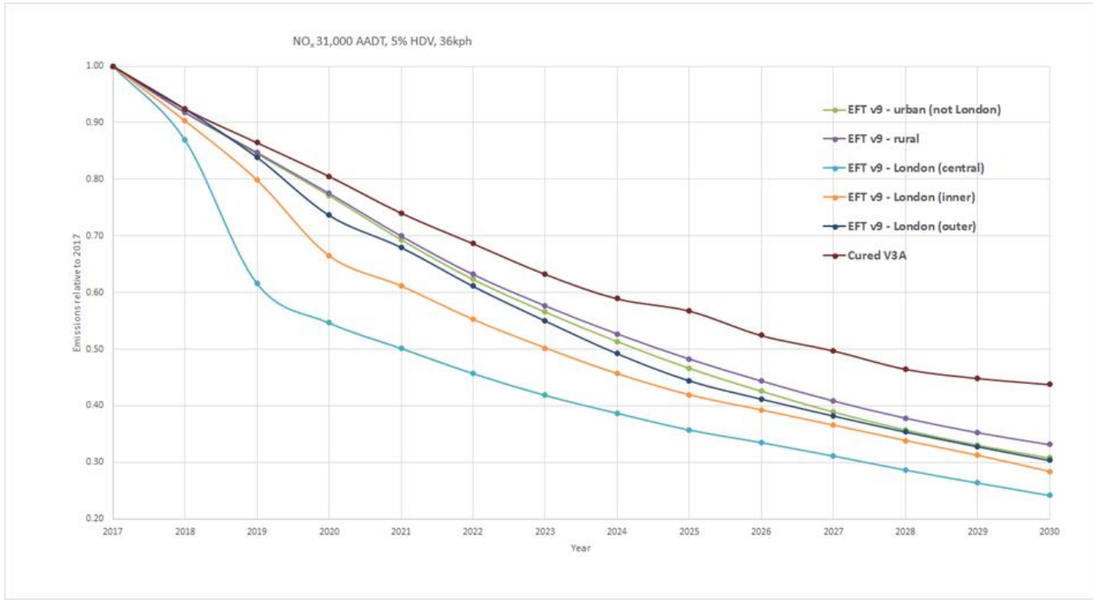


Figure 11.9.1 the relative decline in vehicle NOx emissions predicted for an urban road (outside London) with 5% Heavy Duty Vehicle traffic, travelling at 36kph

For emission years prior to 2021, outside of London the CURED v3A methodology is likely to give similar results to using the EFT v9.0 data. Post 2021, when the introduction of Euro 6d begins to take effect, then CURED v3A and the EFT v9.0 begin to diverge particularly in central London as a result of the ULEZ.

Future Year Assessment Methodology

The selection of emission factors for a future year assessment depends partly on the situation regarding the assessment to be undertaken. Where pollutant concentrations are low and are unlikely to exceed threshold levels, then one may take a conservative approach and keep emission factors at current levels. This will produce a conservative result, but as the result will be 'acceptable' in terms of leading to no exceedances of NAQO, then it is a reasonable approach to adopt as it avoids uncertainty as to whether there will be exceedances in the future.

In contrast, where pollutant concentrations are high, then a different approach to uncertainty is required. In addition, for a formal Environmental Impact Assessment the legal requirement is to assess 'likely significant effects'. This is not 'worst case' significant effects, but 'likely' significant effects and therefore must allow for a degree of uncertainty in the predictions.

As discussed previously, the use of the verification factor in the modelling takes account, amongst other things, of the difference in the real world emissions performance of vehicles in the fleet. For developments outside of London up until 2021, the current EFT is considered to be reasonably accurate and precautionary as to NOx emissions as the problem with the performance of diesel vehicles has been recognised. As such, one is justified in using the emission factors for the year of the assessment as the uncertainty in the emission factors is taken account of by using the verification factor.

Developments post 2021 will increasingly be influenced by the assumption that the RDE testing of diesel vehicles is effective, which may or may not turn out to be the case. In essence, the result is likely to lie between the EFT and CURED curves of the previous graph. This is likely to become less important as the actual levels of emissions is significantly reduced in the future.

Appendix 11.10 Air Quality Mitigation Statement

West Cambridge Development

Outline Air Quality Mitigation Statement

On behalf of

UNIVERSITY OF CAMBRIDGE

Project Ref: 45339_AQMS | Rev 1 | Date: September 2020

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Document Control Sheet

Project Name: West Cambridge Development
Project Ref: 45339/AQMS
Report Title: Outline Air Quality Mitigation Statement
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For and on behalf of Stantec UK Limited				

Revision	Date	Description	Prepared	Reviewed	Approved
Draft	September 2020	Draft for Client Comment	PB	KH/JH	GC

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Appendices

1 Introduction

The University of Cambridge (the 'Applicant') has commissioned Stantec UK Ltd to prepare an outline Air Quality Mitigation Statement (AQMS) in relation to the West Cambridge Development as per the requirements of the Greater Cambridge (GC) Sustainable Design and Construction Supplementary Planning Document (SPD), (GC, January 2020).

The University of Cambridge submitted an outline planning application (planning reference: 16/1134/OUT) for a new masterplan at their West Cambridge site to Cambridge City Council in June 2016; the development description is:

> *"Outline planning permission with all matters reserved is sought for up to 383,300m² of development comprising up to 370,000m² of academic floorspace (Class D1 space), commercial/research institute floorspace (Class B1b and sui generis research uses), of which not more than 170,000m² will be commercial floorspace (Class B1b); up to 2,500m² nursery floorspace (Class D1); up to 1000m² of retail/food and drink floorspace (Classes A1-A5); up to 4,100m² and not less than 3,000m² for assembly and leisure floorspace (Class D2); up to 5,700m² of sui generis uses, including Energy Centre and Data Centre; associated infrastructure including roads (including adaptations to highway junctions on Madingley Road), pedestrian, cycle and vehicle routes, parking, drainage, open spaces, landscaping and earthworks; and demolition of existing buildings and breaking up of hardstanding."*

The planning application was amended and further information was provided to Cambridge City Council in October 2017, and a further ES Addendum was submitted in September 2020 with updates to Air Quality and Transport Assessments which this AQMS accompanies.

The AQMS outlines the applied methodology (as per the requirements of the GC Sustainable Design and Construction SPD) and draws primarily on the updated Air Quality and Transport Chapters of the August 2020 ES to identify both the air quality-related mitigation measures to reduce emissions to air and the resultant reduction in impacts at relevant receptor locations to identify the acceptability of the mitigation package.

2 Methodology

The GC Sustainable Design and Construction SPD outlines the following hierarchy of mitigating air quality impacts of developments:

The reduction of emissions from transport involves reducing the need for occupants to travel outside the site and to encourage use of active transport (i.e. walking and cycling) or lower emitting forms transport (i.e. public transport, car sharing or Electric Vehicles) and can include measures that are incorporated within the physical design or mitigation to encourage the required behaviour change.

Similarly, for emissions associated with the heating of buildings, design measures can reduce the requirement for this (i.e. energy efficient design) and selection of low emission heating plant.

2.1 Design

The GC Sustainable Design and Construction SPD identifies the following possible design measures to reduce air quality impacts (not all will be appropriate to the West Cambridge development):

- Installation of electric vehicle charge points;
- Car free development;
- Reduced car parking provision/parking restrictions;
- Reserved parking for EV/car clubs;
- Design/layout of the development to promote walking, cycling and public transport;
- Design and layout of infrastructure to increase separation, for example, set buildings back from the roadside;
- Locate habitable spaces away from busy roads;
- Arrange site to separate polluting and sensitive uses;
- Arrange site to centrally locate trip attractors;
- Ensure high quality walking and cycling routes;
- Plan mixed-use developments where appropriate;
- Home Zones;
- Consider impact on local road network;
- Avoid creation of non-dispersive canyons;
- Install combined heat and power (CHP) to the emissions standards set out in Appendix 3 (of the SPD);
- Provision of efficient electric heating, low or ultra-low NOx boilers only;
- Incorporation of solar thermal and/or PV technology to reduce emissions;
- Incorporation of air source or ground source heat pumps to reduce emissions.

2.2 Mitigate

The GC Sustainable Design and Construction SPD indicates that where design measures alone cannot fully reduce the impact to an 'acceptable level', that mitigation measures may be used to either protect receptors or minimise emissions. The GC Sustainable Design and Construction SPD provides the following possible mitigation measures to reduce air quality impacts (not all will be appropriate to the West Cambridge development):

- Dust Management Plan, where appropriate (for major sites, this may be incorporated into a Construction and Environmental Management Plan);
- Support access to a car share scheme, with financial incentives and promotion;

- Provision of bike hire scheme, including E-bikes and off-gauge bikes;
- Travel planning;
- Mechanical ventilation with clean air intake, if appropriate;
- Eco-driving training, where appropriate;
- Low emission fleet strategy;
- Large-scale major developments could consider:
  - Support measures to reduce the need to travel:
    - Alternative working practices – flexitime, teleworking, homeworking, videoconferencing, compressed work periods.
    - Local sourcing of staff, products and raw materials.
    - Development and use of hub distribution centres employing low emission deliveries.
    - Provision of discounted on-site shopping, eating, child-care, banking facilities.
  - Support measures to reduce polluting motorised vehicle use:
    - Use of pooled low emission vehicles – cars, vans, taxis, bicycles.
    - Provision of dedicated low emission shuttle bus including managed pick-up and drop-off.
    - Contribution to the emerging low emission vehicle refuelling infrastructure.
    - Contribution to site low emission waste collection services.
    - Incentives for the take-up of low emission vehicle technologies and fuels.
  - Measures to support improved public transport:
    - Provision of new or enhanced public transport services to the site.
    - Shuttle services to public transport interchange, rail station or park and ride facilities.
    - Support improving information systems for public transport.
    - Supporting city free bus expansion schemes.
    - Promoting low emission bus service provision.
    - Support air quality monitoring programmes.
    - Subsidised bus passes
  - Further measures to promote walking and cycling:
    - Improvements to district walking and cycling networks including lighting, shelters, and information points and timetables.
    - Support cycle training and awareness schemes.
    - Guaranteed ride home in emergencies.
    - Support secure and safe cycle parking facilities.
    - Installation of charge points for EV bikes
    - Provision of pool EV bikes
  - Measures to promote sustainable travel plans:
    - Support local travel to school and school travel plans initiatives.
    - Marketing aimed at persuading a switch to sustainable modes with incentives
    - Promotion of subsidised/sponsored travel plan measures
    - Supporting community/local organisation groups to promote sustainable travel

2.3 Offsetting

The GC Sustainable Design and Construction SPD indicates that, whilst a last resort, where mitigation measures cannot reduce impacts to an 'acceptable level', in some circumstances financial contributions to offsetting may be required.

Where residual impacts are not considered acceptable the SPD (para 3.6.170) indicates that an indication of the financial commitment required for offsetting emissions can be determined using DEFRA's damage cost toolkit.

3 Description of Development

West Cambridge is an academic and commercial research development in the western side of Cambridge promoted by the University of Cambridge, allocated in the Cambridge Local Plan 2018.

The Site is located approximately 800m to the west from the Cambridge City AQMA which encompasses the inner ring road and a buffer zone around the ring road and its junctions with main feeder roads. This AQMA was declared by CCC due to exceedances of the annual mean NO_2 objective. In addition, South Cambridge District Council (SCDC) has also declared an AQMA due to exceedances of the annual mean NO_2 objective, comprising an area along the A14 between Bar Hill and Milton, approximately 2,500m north of the Site.

The existing masterplan for West Cambridge that was granted an approval in 1999 forms the basis of the current development on the Site. Together with the pre-existing development on the Site, the 1999 masterplan envisaged just under 275,000m^2 of development, approximately 47% of which would be academic, 15% research institute and 22% commercial research.

Policy 19 of the Cambridge Local Plan 2018 promotes the densification of the West Cambridge through a revised masterplan subject to a number of conditions. The University of Cambridge is producing a new masterplan for the Site which increases the amount of development to approximately 500,280m^2.as follows:

Table 3-1 Summary of Proposed Development Land use

Land-Use (GFA)	**Existing Implemented Development (m^2)**	**1999 Consent Not Implemented (m^2)**	**Existing Devt to be Demolished (m^2)**	**Proposed Additional Devt to Full Devt (m^2)**	**TOTAL FULL DEVT (m^2)**
Academic Research (m^2)	102,259	-27,576	-44,350	200,000	**257,909**
Commercial Research and Research Institute (m^2)	40,386	52,086		170,000	**210,386**
Nursery (m^2)	650			2,500	**3,150**
Shop, Café Restaurant, Pub - A1-A5 (m^2)				1,000	**1,000**
Assembly and Leisure	6,060	-4,060		4,100	**10,160**
Residential (m^2)	10,680		-680		**10,000 (206 units)**
Ancillary Infrastructure (data centre, energy centre)	4,515		-2,540	5,700	**7,675**
Total (m^2)	**164,550**	**83,722**	**-47,570**	**383,300**	**500,280**
Car Parking (spaces)		**3,150**		**4,390 (maximum)**	

3.1 Traffic Generation

In order to assess the potential worst case traffic generation for the West Cambridge Development, current travel data from a number of surveys (as detailed in the Transport Chapter of the ES) for differing land uses have been applied, including:

- Academic Research - derived from person trip survey data undertaken at the Department of Materials Science and Metallurgy at West Cambridge;

- Commercial Research - trip rates from a synthesised 12 hour data set has been calculated for Commercial Research assessed with reference to four recent Commercial Developments.
- Commercial - in the wider area development zones - TRICS trip rate for Office per employee;
- for all Other land uses – use has been made of the appropriate TRICS trip rates.

This traffic generation data is summarised in Table 3-2 and distributed across the Highway network (as summarised in Appendix 6.1 and 7.3 of the ES).

Whilst this assessment has been agreed with the highway authorities, it reflects historical travel patterns, and has made no allowance for changing travel behaviours – with less reliance upon use of cars being observed – or for the increased usage of EV cars reducing emissions. As the data summarised in Table 3-2 reflect a worst case assessment, a “Monitor and Manage” approach has been agreed with the highway and planning authorities – where the impact of future phases of West Cambridge would be assessed at stages through the development’s progression: to avoid commitments to excessive highway capacity being provided now, the necessary mitigation measures would be reconsidered at these stages within the context of future observed movements.

3.2 Building Emissions

As stated in the Energy Strategy, the preferred energy solution for the West Cambridge development is to deliver a fully site-wide solution. The site wide solution remains as put forward in the planning application in 2016 (and updates) with Energy demand minimised through design, use of PV optimised and with the buildings linked together via a heat network, and a single large energy centre proposed to deliver most of the heat to the site. This would be served by gas-fired CHP in the short to medium term, but with the option to replace this with another technology at a later date when this becomes preferable. There is the potential that instead of a centralised energy centre, heat will be provided for each building or clusters of buildings across the site, with part of the energy provision being provided by ground or air source heat pumps.

In a distributed energy scenario, each combustion source will be much smaller than a centralised energy centre and the overall quantity of emissions will be lower. Therefore, the Air Quality assessment is based on the application for the site-wide solution with CHP technology as this is considered to be a worst-case scenario in terms of emissions to air.

Table 3-2 Summary of Traffic Generation

Scenario		Academic Research Staff		Commercial and Other land uses		Total		Site Total Traffic Generation 24hr AADT
		In	Out	In	Out	In	Out	
2019 Base (Combined)	AM	-	-	-	-	402	329	5,598
	PM	-	-	-	-	359	456	
2021 Do Minimum – 1999 Consented Devt	AM	165	20	1,253	236	1,418	256	11,425
	PM	28	219	218	1,016	246	1,235	
2021 Do Something – Proposed Initial Phase of Devt	AM	190	23	1,020	192	1,210	215	9,806
	PM	32	252	172	827	204	1,079	
2031 Do Minimum – 1999 Consented Devt	AM	165	20	1,242	235	1,407	255	11,349
	PM	28	220	217	1,007	245	1,227	
2031 Do Something – Proposed Devt	AM	291	36	1,887	351	2,178	387	17,508
	PM	49	389	307	1,525	356	1,914	
2031 Do Something – Proposed Devt with Mitigation Strategy	AM	-	-	-	-	1,130	387	9,918
	PM	-	-	-	-	356	866	

Note: 24hr AADT calculated from sum of AM/PM peak and factor of 3.62 to combined AM/PM peak flows for Site Access derived from survey data

4 Summary of Environmental Impact Assessment

Given the scale and nature of the development there will inevitably be residual emissions to air and impacts and these residual impacts has been assessed in the ES.

4.1 Traffic Related Emissions

Acknowledging that these reflect a worst case assessment, the predicted concentrations of NO_2, PM_{10} and $PM_{2.5}$ at the modelled existing receptor locations in the 'Key Phase 1' and 'Full Development' scenarios, both without and with the Proposed Development in place are presented in Appendix 7.6 of the ES and summarised in the following sections.

Key Phase 1 scenario

For the Key Phase 1 scenario, without and with the development in place, NO_2, PM_{10} and $PM_{2.5}$ concentrations are not predicted to exceed the air quality strategy objectives at any of the modelled receptor locations.

The changes in annual mean NO_2 concentrations range from 0% (i.e., less than 0.5%) to 3% of the objective when rounded to the nearest whole number and there are no predicted exceedances of the relevant objectives. The changes in annual mean PM_{10} and $PM_{2.5}$ concentrations range from 0% to 1% when rounded to the nearest whole number. The impact on annual mean NO_2 concentrations are described as negligible at the majority of the receptor locations, except for R15 where the impact is described as slight adverse. The impacts on annual mean PM_{10} and $PM_{2.5}$ concentrations are described as negligible at all modelled receptor locations.

Considering the conservative nature of the modelling by applying 2021 emission factors and background concentrations when only a small proportion of Key Phase 1 could be operational by then, the air quality effects of road traffic associated with the Key Phase 1 development are considered to be not significant and there are no predicted exceedances of the relevant objectives.

Full Development scenario

In the Full Development scenario, without and with the Full Development in place, NO_2, PM_{10} and $PM_{2.5}$ concentrations are not predicted to exceed the air quality strategy objectives at any of the modelled receptor locations.

When the worst case assessment flows are assessed, the changes in annual mean NO_2 concentrations range from 0% (i.e. less than 0.5%) to 5% of the objective when rounded to the nearest whole number. The changes in annual mean PM_{10} and $PM_{2.5}$ concentrations range from 0% to 1% when rounded to the nearest whole number. The impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations are described as negligible at all modelled receptor locations.

Even with these worst case assessment flows being considered, the air quality effects of road traffic associated with the full development are considered to be not significant and there are no predicted exceedances of the relevant objectives.

Full development including transport mitigation scenario

The changes in annual mean NO_2 concentrations range from 0% (i.e. less than 0.5%) to 3% of the objective when rounded to the nearest whole number. The changes in annual mean PM_{10} and $PM_{2.5}$ concentrations range from 0% to 1% when rounded to the nearest whole number. The impacts on annual mean NO_2, PM_{10} and $PM_{2.5}$ concentrations are described as negligible at all modelled receptor locations.

Even assuming a worst case assessment in terms of numbers of vehicles assessed, and not allowing for the increased usage of EV car with minimal emissions, the air quality effects of road traffic associated with the Full Development scenario (including transport mitigation) are considered to be not significant and there are no predicted exceedances of the relevant objectives.

4.2 Building Related Emissions

The air quality assessment has been based on a conceptual design for the energy centre. This is for three CHP engines to be installed operating for 5,590, 3,630 and 2,785 hours per year. In addition, in order to provide heat when the CHP is unavailable, up to three 10MW and one 5MW boilers would be required. The CHP would operate preferentially to the boilers; with the CHP heat generator estimated to be 31,000MWH/yr. The boiler heat generation would be 15,000MWH/yr.

The energy centre location is a zone in the south-west of the Site. The energy centre flues were located in the worst-case locations for dispersion in the zone - i.e., on the northern side of the zone. The CHP engines were assumed to be Jenbacher type G engines operating on natural gas with NO_x emissions of 256mg/Nm^3 (@5% oxygen), consistent with the emission limits for new equipment within the Medium Combustion Plant Directive. The boilers were assumed to be Cochran Thermox natural gas boilers with NOx emissions of 100 mg/Nm^3 (3% oxygen).

Predicted concentrations from the energy centre emissions are presented in Appendix 7.8.

There are no predicted exceedances of the air quality strategy objectives as a result of emissions from the energy centre. The maximum change in annual mean NO_2 concentrations is 0.8 µg/m^3 (1.9% of the air quality objective) which occurs at receptor R26_N1. The maximum change in hourly NO_2 concentrations is 49.7 µg/m^3 (24.9% of the air quality objective) which occurs at on-site receptor 1A. When considered in conjunction with the baseline concentrations, the maximum annual mean impact at the worst-case receptor is described as negligible. The maximum hourly impact at the worst-case receptor is described as slight adverse.

Given that there are no exceedances of air quality strategy objectives, the effect of the energy centre emissions is considered to be not significant.

5 AQ Mitigating Design Features

5.1 Electric Vehicle Charging

Theme 5 of the Cambridge Air Quality Action Plan (Maintaining Low Emissions) introduced the requirement for installation of electric vehicle charge points as follows:

- Any new or replacement car park will have EV Charge Points;
- Intensification of use at a site will require additional EV charge point provision;
- A site-wide EV charging strategy for large-scale Major sites – detailing the location and phasing of the charge point installations;
  - One slow EV Charge Point for each dwelling with allocated parking;
  - At least one slow EV Charge Point for every two dwellings with communal parking (at least half of all non-allocated parking spaces to have electric vehicle slow charging points);
  - At least one slow EV Charge Point for every two parking spaces in non-residential developments;
  - At least one rapid EV Charge Point for every 1,000m^2 non-residential floor space (as per the Institute of Air Quality Management guidance) or one fast EV Charge Point for every 1,000m^2 non-residential floor space. (If the installation of a rapid charge point is technically Impossible due to grid supply constraints, evidence must be provided);
- Large scale major developments will also have at least one rapid EV charge point, or at least one fast EV charge point (if the installation of a rapid charge point is technically impossible due to grid supply constraints evidence must be provided);
- Installation of passive charge points - electric vehicle charging infrastructure for future activation - at all vehicle parking spaces without active charge points (to provide 100% coverage);

Combinations of provision can be proposed, depending upon the requirements of the future site users. The electric vehicle charging strategy for the West Cambridge Development will reflect the above requirements and be reviewed at each Reserved Matters Application as part of the Car Park Monitoring Review to ensure provision remains appropriate.

5.2 Car Parking Restrictions

The Car Parking Delivery Framework outlines that the University is committed to delivering a high quality development. Under-provision of car parking within the Site could be detrimental to the street-scene, with “fly-parking” occurring across the area. Similarly, an over-generous provision would be equally likely to be detrimental to the sustainability credentials of the Development, with excessive numbers of car driver trips attracted by the easy car parking provision.

The proposed maximum car parking standards to be applied at West Cambridge have been derived with initial reference to the maximum car parking standard applied at the adjacent North West Cambridge Development, and the current car parking patronage at West Cambridge. The proposed car parking maximum standards are summarised in Table 5-1.

Table 5-1 Car Parking Maximum Provision Proposals

Land-Use	Development Phase	Car Parking Provision (Maxima)
Academic Research	Initial	1 car parking space per 4 staff
		No provision for students
	Later	1 car parking space per 5 staff
		No provision for students
Commercial Research	Initial	1 car parking space per 40m^2 GFA
	Later	1 car parking space per 70m^2 GFA

Using the above maxima standards, the following maximum car parking provision is identified, and compared to that consented in 1999:

Table 2: Car Parking Provision

Development Phase	Car Parking Provision (spaces)
Current Car Parking Provision (excluding Park and Cycle)	1,571
Extant Consent Car Parking Provision	3,150
Initial Phase	2,570
Full Development	4,390

To ensure that the proposed car parking provision remains appropriate throughout the development progression, and to control levels of car parking being provided to appropriate levels – i.e., with a view to providing lower numbers of spaces than these levels - a Car Parking Monitoring Review document will be submitted:

- in support of each Reserved Matters Application for all individual plots; and
- in the event of no Reserved Matters Applications being made for two years after the previous one until West Cambridge has completed to an agreed level.

The details of this review are contained in Appendix 8.2 of the Transport Assessment.

5.3 Walking and Cycling Infrastructure

Pedestrian and Cycle connections through new areas of development within West Cambridge will be reviewed so that these will both:

- ensure quality accessibility and connectivity to the surrounding areas; and
- significantly enhance and improve the linkages between existing developments by providing direct quality links on desire lines.

A mitigation strategy has been developed to improve conditions for cyclists and pedestrians to aim to increase the number of those choosing walking or cycling as their mode of travel which includes:

- Direct, quality North-South footway and cycleway provision across West Cambridge linking between Madingley Road and Coton Path using the Western Access, High Cross, JJ Thomson Avenue and Clerk Maxwell Road;
- The East - West Shared Space Link to provide the main east - west spine for Pedestrians and Cyclists connecting Clerk Maxwell Road and High Cross with access to a number of plots and lower-hierarchy Cycle routes;
- all vehicle routes being designed for a 20mph speed limit using passive speed management measures such as constrained widths and the use of shared surface areas. This low-speed environment is primarily to control vehicle speeds, but in so doing will create a safer and more attractive environment for pedestrians and cyclists;
- Footways being provided on both sides of the on-site streets and at the Site Access locations. Controlled crossing points would be provided, and traffic calming measures would be present to reduce traffic speed and to ease pedestrian movement; and
- The University supports the principles of a strategic scheme along Madingley Road improving links between West Cambridge and popular destinations towards the East / City, and will make contributions such a strategic scheme.

5.4 Impact of Site Traffic on local road network

The worst case assessment impact of Site Traffic on the local network has been assessed in detail in the ES and a range of mitigation measures already form part of the consented scheme.

The University has offered Developer contributions to the County Council for area-wide strategic transport solutions to reduce vehicle impact in the area – including along the A428 / A1303 Corridor - to reduce existing vehicle movements along Madingley Road. Further, the University has offered a fully funded package of further public transport enhancements along strategic routes to reduce the need to complete longer distance journeys by car.

To provide additional environmental enhancement in the locality of West Cambridge, the University will contribute towards the costs of the necessary traffic regulation order to implement a further reduced speed limit along Madingley Road between the Development's Western Access Road and High Cross junctions. The lower vehicle speeds will provide benefit for existing users of Madingley Road, as well as for the pedestrians and cyclists generated by West Cambridge.

5.5 Building Related Design Mitigation

The design of the buildings will ensure they provide a high level of energy efficiency with BREAAM 'excellent' rating needing to be demonstrated as part of a Sustainability Statement for each Reserved Matters Application.

The Energy Strategy will ensure that zero-emission sources are applied where appropriate, such as the optimisation of PV solar power, and any combustion-based heat or power generation plant will meet the requirements of the GC Sustainable Design and Construction SPD as regards emission to air as follows:

- All gas boilers to have low NO_x emissions (boilers that meet a dry NO_x emission rating of 40mg/kWh);
- Minimum emission standards for CHP emissions (Spark ignition engine: less than 150 $mgNO_x/Nm^3$, Compression ignition engine: less than 400 $mgNO_x/Nm^3$, Gas turbine: less than 50 $mgNO_x/Nm^3$).

6 Additional Mitigation

6.1 Reduce the Need to Travel

The Transport Strategy (as summarised in Part 4 of the Transport Assessment) identifies a wide range of transport management measures that were formulated in order to:

- by delivering employment development within a sustainably located location within Cambridge, enable development occupiers to use sustainable modes of travel instead of private cars;
- decrease the journey to work trip distance across the Cambridge area by providing employment land-use within the City complementary to the existing and future residential land-uses; and
- taking advantage of the conveniently located facilities on North West Cambridge – the retail, the primary education and the community facilities - that would reduce the need to travel elsewhere during the working day.

6.2 Support Measures to Reduce polluting motorised vehicle use

To reduce vehicle emissions, the University will:

- commit to providing an appropriate number of EV charging points based on the GC SPD for future permanent car park spaces provided at West Cambridge for private car-based trips;
- provide an appropriate number of EV charging stations to cater for electric cycles - to support these emerging green transport initiatives;
- require the West Cambridge bus services to be delivered with high-quality, low-emission vehicles, with low floor, step-free access; and
- consider low or zero emission technology for their site-based service vehicles; and
- consider offering EV car club vehicles.

6.3 Support improved Public Transport

The scale of the Proposed Development means that there will be both a high quantum of demand for public transport, and a number of locations that will need to be connected to West Cambridge.

A developer contribution would be provided by the University to fund the necessary Transport mitigation measures, and would be applied in an agreed manner by the Joint Authorities. This will include contributions to the area-wide strategic mass-transit transport schemes to improve non-car movement in the Cambridge Sub-Region, especially along the A428 / A1303 Corridor.

To provide resilience to the delivery progress of these area-wide strategic solutions, an independent transport strategy has also been identified in the Transport Assessment that would also adequately mitigate the transport impact of the Development in isolation, should there be delays to the deliveries of these schemes. As such, the West Cambridge outline planning application does not rely on others to deliver these strategic mitigation solutions.

The strategy, detailed within Section 7 of the Transport Assessment, includes:

On-site Infrastructure

In order to maintain the attractiveness of bus services to the Site, the following additional measures would be provided:

- high quality bus stops on new links served by buses;

- further bus priority measures - selected vehicle detection for buses through any new traffic signal controlled junctions to improve the flow of buses or enable passengers to access facilities; and
- a review of the information and incentives on offer.

Bus Service Strategy

The proposed final Bus Service strategy is summarised as follows:

- Following discussions with the Joint Authorities, developer contributions are being offered by the University to area-wide strategic mass-transit transport schemes to improve non-car movement in the Cambridge Sub-Region, especially to improve bus movement along the A428 / A1303 Corridor.
- To provide resilience, an independent transport strategy has also been identified in the Transport Assessment that would also adequately mitigate the transport impact of the Development in isolation should there be delays to the deliveries of these strategic schemes. As such, the West Cambridge outline planning application does not rely on the area-wide strategic proposals for mitigation.
- Contributions to the following new and enhanced bus services will be phased in to align with the Development quantum and consequent growth in demand:

  Universal

  - During Key Phase 1, the route would be as the current Universal service – from North West Cambridge and West Cambridge via Cambridge Rail Station and the guided busway to Cambridge Biomedical Campus and Addenbrooke's Hospital.
  - From the start of Key Phase 2 – from 54% build-out - the frequency would be increased on Weekdays to every 10 minutes over the core North West Cambridge to Cambridge Rail Station section, with alternate journeys continuing to Addenbrooke's Hospital. The Saturday service would be maintained at every 20 minutes between North West Cambridge and the Rail Station.

  Arc

  - The proposed Arc service would reflect Cambridgeshire County Council's earlier public transport proposals (referred to within earlier Greater Cambridge Partnership documentation as the "Orbital service").
  - The Arc service would be introduced during Key Phase 2 at around 80% build-out, and would operate on up-to 20-minute frequency from Milton Park & Ride via Cambridge Science Park, Darwin Green, North West Cambridge and West Cambridge to Trumpington Meadows, the Cambridge Biomedical Campus and Addenbrooke's Hospital. The service would operate between West Cambridge and Trumpington Meadows via the M11 motorway.

  Guided Bus

  - There is potential for an additional service operating as a variation to the existing Guided Busway Service B, between Hinchingbrooke – Huntingdon – Cambridge. These journeys would leave the Busway at Orchard Park East, then operate via NIAB (Darwin Green), North West Cambridge to West Cambridge, thereby providing direct links from the A14 corridor.

    Services would commence during Key Phase 2 at around 80% development build-out, with a frequency of up to every 15 minutes during Weekday peak periods.

  Citi 4

  - During Key Phase 1, the existing 20-minute frequency Citi 4 service would be diverted via JJ Thomson Ave, Charles Babbage Rd and High Cross.
  - In the future, should a service reflecting the earlier area-wide transport strategy (GCP) proposals be delivered by the Joint Authorities as part of an emerging area-wide strategy, any University-led proposal to divert and enhance the Citi 4 service would be rescinded as it would be replaced by these area-wide proposals. If not, on completion of West Cambridge the 20-minute through-service to Cambourne would be enhanced by short-workings between the city centre and West Cambridge; these would also operate every 20 minutes to give a 10-minute combined frequency over this section.

6.4 Further Measures to promote Walking and Cycling

To enhance the existing Pedestrian and Cyclist connectivity further, the following pedestrian and cycle infrastructure measures will be provided by the Development:

- an on-going review of future road safety issues, with a fund to deliver road safety mitigation if required;
- enhancements on movements through the Site along the corridor to the north – to Eddington Avenue and Madingley Rise towards North West Cambridge;
- enhancements along the Coton Path / Adams Road / Burrell's Walk route into the City – including contributions towards the widening of the existing Bins Brook Bridge; and
- extending an independent corridor eastwards directly towards the City Centre – along Grange Road, West Road, Queen's Green and Silver Street.

Developer contributions are being offered by the University to area-wide strategic cycling schemes – especially to improve cycle and pedestrian movements along Madingley Road – to assist in its delivery.

To encourage cycling, the Transport Assessment includes:

- Provision of high levels of quality cycle parking, at least to the adopted Cambridge Local Plan 2018 minimum cycle parking standards, within private covered, secure, lit and well-located areas at the destinations, as well as further provision through the Development; and
- All major employers being required to provide associated shower and changing room facilities for walkers and cyclists after their journeys.

Cycle parking spaces will be provided as a minimum in accordance with the following standards set out in the Cambridge Local Plan 2018:

Table 6-1 Minimum Cycle Parking Provision Proposals

Land-Use	Cycle Parking Provision - Minima
Offices	2 space for every 5 members of staff or 1 per 30 sq. m Gross Floor Area (whichever is greater) Some visitor parking on merit
Non-residential higher and further education	2 for every 5 members of staff Cycle parking for 70 per cent of students based on anticipated peak number of students on site at any one time

To accommodate the likely circa 3,600 students and 7,200 staff within Key Phase 1, the Development would be provided with around 7,000 cycle parking spaces to reflect these standards.

6.5 Measures to promote Sustainable Travel Plans

West Cambridge's quality Framework Travel Plan has been prepared, and will form an essential part of the delivery of quality non-car transport to West Cambridge.

To ensure effective implementation and management of the Framework Travel Plan and transport strategy, the University will provide and support the following:

- sufficient staff resource be allocated to provide a Development Transport Coordinator – this Coordinator would be supported in this role by:

- individual Sustainable Travel Behaviour Champions identified from within the community to assist in delivering sustainable travel proposals; and
- individual workplace Travel Plan Coordinators to implement and manage their own measures and strategies;

- the establishment and running of the Transport Stakeholders' Group consisting of key stakeholders - including the University, planning and highway authorities, public transport operators, and representatives of the Development;
- a one-off fall-back Fund for the implementation, management, monitoring and review of the Framework Travel Plan and funding necessary measures in the event of significant variation from the forecast traffic impact for a sustained period of time

In the event of significant variation from forecast values for a sustained period of time, the Development Transport Coordinator, working with the Transport Stakeholders Group, will consider the need for (and, if necessary, implement) measures designed to help meet the forecast outcomes over time.

6.6 Mitigating Construction Dust Related Emissions

The potential emissions of construction dust were assessed as part of the ES and a range of mitigation measures identified based on the level of risk and proposed construction activities. These would inform the Dust Management Plan, which would form part of the Construction Environmental Management Plan (CEMP).

7 Offsetting Emissions

The GC Sustainable Design and Construction SPD indicates that, whilst a last resort, in some circumstances where impacts cannot be reduced to an acceptable level, financial contributions to offsetting may be required and that the DEFRA 'damage cost approach' can provide an indication of the financial commitment required for offsetting emissions can be determined using DEFRA's damage cost toolkit.

The air quality 'damage cost' for the differing traffic scenarios have been determined as presented in Table 7-1.

Table 7-1 Summary of Traffic Emission and Damage Costs

Scenario	Site Total 24hr AADT	NOx		$PM_{2.5}$		Total Damage cost
		Emission t/yr	Damage cost	Emission t/yr	Damage cost	
Baseline (2019 survey)	5598	6.96	£367,686	0.42	£191,307	£558,993
2021 Do Minimum – 1999 Consented Devt	11425	14.23	£751,668	0.85	£391,244	£1,142,912
2021 Do Something – Proposed Initial Phase of Devt	9806	12.21	£645,151	0.73	£335,802	£980,953
2031 Do Minimum – 1999 Consented Devt	11349	9.66	£552,479	0.80	£398,203	£950,682
2031 Do Something – Proposed Devt	17508	14.91	£852,304	1.24	£614,304	£1,466,608
2031 Do Something – Proposed Devt with Mitigation Strategy	9918	9.05	£517,551	0.549	£272,060	£789,611

Notes:
Emissions calculated using EFT9.0 for opening year (i.e. 2021 for initial phase and 2025 for entire development) for all scenarios assuming road type of 'urban (not London)', 3.4% HDVs, speed of 35kph and 10km journey length (as per CC SPD).
Damage Costs calculated using the DEFRA toolkit (May 2020) for a 5-year period and pollutant unit damage costs for 'road transport urban large' and Central Present Value.

The calculated damage costs for the differing scenarios range from ~£560,000 (for the 2019 existing baseline scenario) to £1.5 million for the Full Development without mitigation; a maximum increase of less than £1 million. The mitigation strategy significantly reduces the emissions to air and associated 'damage cost' to less than £800,000 (for the entire site). This would be an increase of less than £250,000 from the current (2019) baseline.

Whilst detailed costing of the package of designed and additional proposed mitigation measures are subject to s106 agreement, the provision of EV charging, public transport funding and active transport infrastructure would significantly exceed these calculated air quality damage costs.

Therefore, given the predicted impacts and range of mitigation measures detailed in this AQMS, additional financial contributions to offsite mitigation are not necessary. This is within the context of the University already offering support to appropriate air quality-related schemes such as active travel, low emission public transport, low emission EV refuelling infrastructure and considering low emission service vehicles.

References

Department of the Environment, Food and Rural Affairs (DEFRA) (2019e). *Air Quality Damage Cost Guidance*.

Greater Cambridge (GC) (January 2020) *Sustainable Design and Construction Supplementary Planning Document.*

Stantec UK Ltd (August 2020) *West Cambridge Development 2020 Transport Assessment*.

Stantec UK Ltd (August 2020) *West Cambridge Development Framework Travel Plan*.

Appendix A Glossary

Abbreviations	Meaning
AADT	Annual Average Daily Traffic
AQAP	Air Quality Action Plan
AQMA	Air Quality Management Area
CHP	Combined Heat and Power
Defra	Department for Environment, Food and Rural Affairs
DfT	Department for Transport
EFT	Emission Factor Toolkit
EV	Electric Vehicle
GC	Greater Cambridge Shared Planning Service (Cambridge City Council and South Cambridgeshire District Council)
GFA	Gross Floor Area
HDV	Heavy Duty Vehicle; a vehicle with a gross vehicle weight greater than 3.5 tonnes. Includes Heavy Goods Vehicles and buses
IAQM	Institute of Air Quality Management
LA	Local Authority
LAQM	Local Air Quality Management
NAQO	National Air Quality Objective as set out in the Air Quality Strategy and the Air Quality Regulations
NO_2	Nitrogen Dioxide
NO_x	Oxides of nitrogen generally considered to be nitric oxide and NO_2. Its main source is from combustion of fossil fuels, including petrol and diesel used in road vehicles
NPPF	National Planning Policy Framework
PM_{10}/$PM_{2.5}$	Small airborne particles less than 10 / 2.5 µm in diameter
PRoW	Public Right of Way
PPG	Planning Practice Guidance

Appendix B Cambridge City Council Air Quality Mitigation Statement Checklist

Name and address of site	West Cambridge Site Madingley Road Cambridge Cambridgeshire
Description of proposed development • Small-scale or large-scale Major site • GFA compared with existing • Type (residential, commercial, academic, research, other) • Proximity to pollution sources	Presented in Section 3 of the AQMS
Additional information • AADT trip generation • Parking arrangements including reserved spaces for EV/car clubs/disabled; comparison of current and proposed provision • Heating provision, type and fuel, location of flue vent • Is the site in the Air Quality Management Area? • Is the site in a Smoke Control Area? • Is a detailed Air Quality Assessment provided? • Layout if adjacent to busy road	Presented in Section 3 & 4 of the AQMS
Design Features	Presented in Section 5 of the AQMS
Mitigation Proposed	Presented in Section 6 of the AQMS
1 Electric heating or low NOx boilers	YES, optimised PV solar and BREAAM ‘excellent’ rating.
2, Low-emission standards for CHP, where appropriate	YES
3. EV charge point where there are car parking spaces (number, type) or EVCP strategy	Presented in Section 5.1. Provision will be reviewed as part of each Reserved Matters Application to ensure it remains appropriate.
4. Demolition and construction or Dust Management Plan	YES, CEMP will be provided for each Reserved Matters Application.
5. Other mitigation measures	Wide range of measures to provide infrastructure and encourage behaviour change to active travel and public transport.
Offset offered	Additional financial contributions to offsite mitigation are not necessary as the University is already committed to supporting appropriate air quality-related schemes such as active travel, low emission transport, low emission refuelling infrastructure and considering low emission service vehicles.

Appendix 12.1 2019 base flows

45339 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2019 Base Flows

Prepared By: T Althorpe 05/08/2019

Checked by: E Moran 06/08/2019

123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)			6. Site Access		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2019 Base Flows									
		2019 Base Flows								>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link	Tempro Factor Used	Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	3,582	3,702	7,284	1 - M11	46,246	46,169	70	2016 to 2019 S Cam 009 Motorway	7,261	15.70%	7,170	15.53%
1.0	M11 - J12 - J13 - Sbd	3,699	3,585	7,284	1 - M11	46,246	46,168	70	2016 to 2019 S Cam 009 Motorway	7,261	15.70%	7,170	15.53%
1.1	M11 J13 -J14 - Nbd	2,329	3,066	5,395	1 - M11	34,250	34,193	70	2014 to 2019 S Cam 009 Motorway	5,378	15.70%	5,310	15.53%
1.1	M11 J13 -J14 - Sbd	2,808	2,502	5,310	1 - M11	33,709	33,653	70	2014 to 2019 S Cam 009 Motorway	5,293	15.70%	5,226	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,507	2,222	3,729	1 - M11	23,674	23,635	70	2013 to 2019 S Cam 009 Motorway	3,717	15.70%	3,670	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,207	1,589	3,797	1 - M11	24,103	24,063	70	2013 to 2019 S Cam 009 Motorway	3,784	15.70%	3,737	15.53%
1.3	M11 J13 off-slip - Nbd	1,152	996	2,148	1 - M11	13,638	13,615	70	2018 to 2019 S Cam 009 Motorway	2,141	15.70%	2,114	15.53%
1.3	M11 J13 on-slip - Sbd	505	1,015	1,520	1 - M11	9,651	9,634	70	2018 to 2019 S Cam 009 Motorway	1,515	15.70%	1,496	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	3,913	3,540	7,453	2 - A14	42,498	39,106	70	2013 to 2019 S Cam 009 Rural Trunk Road	7,963	18.74%	7,166	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,271	4,474	7,745	2 - A14	44,167	40,642	70	2013 to 2019 S Cam 009 Rural Trunk Road	8,276	18.74%	7,448	18.33%
2.1	A14 North West of M11 J14 - Ebd	3,881	3,483	7,364	2 - A14	41,994	38,641	70	2015 to 2019 S Cam 009 Rural Trunk Road	7,868	18.74%	7,081	18.33%
2.1	A14 North West M11 J14 - Wbd	3,143	4,199	7,342	2 - A14	41,870	38,527	70	2015 to 2019 S Cam 009 Rural Trunk Road	7,845	18.74%	7,060	18.33%
2.2	A14 West of J32 Interchange - Ebd	3,928	3,834	7,763	2 - A14	44,266	40,733	70	2016 to 2019 S Cam 009 Rural Trunk Road	8,294	18.74%	7,465	18.33%
2.2	A14 West of J32 Interchange - Wbd	3,831	3,932	7,763	2 - A14	44,267	40,733	70	2016 to 2019 S Cam 009 Rural Trunk Road	8,294	18.74%	7,465	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,654	759	2,412	2 - A14	13,755	12,657	70	2014 to 2019 S Cam 009 Urban Trunk	2,577	18.74%	2,319	18.33%
2.3	A428 - West of M11 J14 - Wbd	798	1,267	2,064	2 - A14	11,771	10,832	70	2014 to 2019 S Cam 009 Urban Trunk	2,206	18.74%	1,985	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	498	540	1,038	3 - Madingley Rd	7,203	6,949	50	2016 to 2019 S Cam 009 Rural Principal	413	5.73%	380	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	542	1,252	1,794	3 - Madingley Rd	12,451	12,013	50	2016 to 2019 S Cam 009 Rural Principal	713	5.73%	658	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	669	1,678	2,347	3 - Madingley Rd	16,291	15,718	40	2018 to 2019 Cam 005 Urban Principal	933	5.73%	861	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	932	755	1,687	3 - Madingley Rd	11,707	11,295	40	2018 to 2019 Cam 005 Urban Principal	671	5.73%	618	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	1,705	993	2,698	3 - Madingley Rd	18,723	18,065	40	2018 to 2019 Cam 005 Urban Principal	1,073	5.73%	989	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	292	924	1,217	3 - Madingley Rd	8,445	8,148	40	2018 to 2019 Cam 005 Urban Principal	484	5.73%	446	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,474	581	2,056	4 - Barton Rd	13,047	12,534	40	2018 to 2019 Cam 005 Urban Principal	479	3.67%	426	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	565	1,524	2,090	4 - Barton Rd	13,263	12,742	40	2018 to 2019 Cam 005 Urban Principal	487	3.67%	433	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	580	1,545	2,124	4 - Barton Rd	13,482	12,952	40	2018 to 2019 Cam 005 Urban Principal	495	3.67%	440	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,485	600	2,085	4 - Barton Rd	13,233	12,713	40	2018 to 2019 Cam 005 Urban Principal	486	3.67%	432	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	602	1,392	1,994	4 - Barton Rd	12,658	12,161	40	2018 to 2019 Cam 005 Urban Principal	464	3.67%	413	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,358	629	1,988	4 - Barton Rd	12,615	12,119	40	2018 to 2019 Cam 005 Urban Principal	463	3.67%	412	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,089	502	1,592	4 - Barton Rd	10,102	9,705	40	2018 to 2019 Cam 005 Urban Principal	371	3.67%	330	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	542	1,109	1,651	4 - Barton Rd	10,481	10,069	40	2018 to 2019 Cam 005 Urban Principal	385	3.67%	342	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	812	559	1,371	4 - Barton Rd	8,702	8,360	30	N/A - 2019 Flows	319	3.67%	284	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	614	853	1,467	4 - Barton Rd	9,311	8,945	30	N/A - 2019 Flows	342	3.67%	304	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	746	589	1,335	4 - Barton Rd	8,473	8,140	30	N/A - 2019 Flows	311	3.67%	277	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	643	789	1,432	4 - Barton Rd	9,089	8,732	30	N/A - 2019 Flows	333	3.67%	297	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	716	591	1,306	4 - Barton Rd	8,291	7,965	30	2015 to 2019 Cam 005 Urban Principal	304	3.67%	271	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	656	626	1,282	4 - Barton Rd	8,137	7,817	30	2015 to 2019 Cam 005 Urban Principal	299	3.67%	266	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	716	591	1,306	4 - Barton Rd	8,291	7,965	30	2015 to 2019 Cam 005 Urban Principal	304	3.67%	271	3.40%
3.10	Madingley Rd - East of Grange Road Wbd	656	626	1,282	4 - Barton Rd	8,137	7,817	30	2015 to 2019 Cam 005 Urban Principal	299	3.67%	266	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	843	598	1,442	4 - Barton Rd	9,149	8,790	30	2015 to 2019 Cam 005 Urban Principal	336	3.67%	299	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	614	739	1,353	4 - Barton Rd	8,587	8,250	30	2015 to 2019 Cam 005 Urban Principal	315	3.67%	280	3.40%
3.12	Northampton St - West of Pound Hill Ebd	484	681	1,165	4 - Barton Rd	7,393	7,102	30	2015 to 2019 Cam 005 Urban Principal	271	3.67%	241	3.40%
3.12	Northampton St - West of Pound Hill Wbd	582	600	1,183	4 - Barton Rd	7,506	7,211	30	2015 to 2019 Cam 005 Urban Principal	275	3.67%	245	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	340	719	1,059	4 - Barton Rd	6,722	6,458	60	2015 to 2019 Cam 005 Urban Principal	247	3.67%	219	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	417	346	764	4 - Barton Rd	4,847	4,656	60	2015 to 2019 Cam 005 Urban Principal	178	3.67%	158	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	340	719	1,059	4 - Barton Rd	6,722	6,458	30	2015 to 2019 Cam 005 Urban Principal	247	3.67%	219	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	417	346	764	4 - Barton Rd	4,847	4,656	30	2015 to 2019 Cam 005 Urban Principal	178	3.67%	158	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	406	986	1,391	4 - Barton Rd	8,831	8,484	30	2015 to 2019 Cam 005 Urban Principal	324	3.67%	288	3.40%

4.2	Huntingdon Rd - East of NWC HRW Access SEbd	698	472	1,170	4 - Barton Rd	7,424	7,132	30	2015 to 2019 Cam 005 Urban Principal	272	3.67%	242	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	463	1,038	1,501	4 - Barton Rd	9,529	9,155	30	2015 to 2019 Cam 005 Urban Principal	350	3.67%	311	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	984	541	1,525	4 - Barton Rd	9,679	9,298	30	2015 to 2019 Cam 005 Urban Principal	355	3.67%	316	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	483	928	1,411	4 - Barton Rd	8,958	8,606	30	2015 to 2019 Cam 005 Urban Principal	329	3.67%	292	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	828	572	1,399	4 - Barton Rd	8,881	8,532	30	2015 to 2019 Cam 005 Urban Principal	326	3.67%	290	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,160	508	1,669	4 - Barton Rd	10,591	10,175	30	2013 to 2019 Cam 007 Urban Principal	389	3.67%	346	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	315	1,007	1,322	4 - Barton Rd	8,392	8,063	30	2013 to 2019 Cam 007 Urban Principal	308	3.67%	274	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	649	458	1,107	4 - Barton Rd	7,028	6,751	30	2015 to 2019 Cam 007 Urban Principal	258	3.67%	229	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	296	971	1,267	4 - Barton Rd	8,042	7,726	30	2015 to 2019 Cam 007 Urban Principal	295	3.67%	263	3.40%
6.0	Queen's Rd - North of West Rd Nbd	484	683	1,167	4 - Barton Rd	7,406	7,115	30	2015 to 2019 Cam 005 Urban Principal	272	3.67%	242	3.40%
6.0	Queen's Rd - North of West Rd Sbd	816	574	1,390	4 - Barton Rd	8,820	8,474	30	2015 to 2019 Cam 005 Urban Principal	324	3.67%	288	3.40%
7.0	Histon Road - South of A14 Nbd	988	1,691	2,679	4 - Barton Rd	17,002	16,334	40	2015 to 2019 Cam 005 Urban Principal	624	3.67%	555	3.40%
7.0	Histon Road - South of A14 Sbd	1,907	1,270	3,177	4 - Barton Rd	20,164	19,372	40	2015 to 2019 Cam 005 Urban Principal	740	3.67%	658	3.40%
7.1	Histon Rd - South of Akeman St Nbd			0	4 - Barton Rd	0	0	30	No Base Flow Data	0	3.67%	0	3.40%
7.1	Histon Rd - South of Akeman St Sbd			0	4 - Barton Rd	0	0	30	No Base Flow Data	0	3.67%	0	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	204	210	414	5 - Grange Rd	2,155	2,046	30	2015 to 2019 Cam 005 Urban Minor	105	4.86%	91	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	335	158	493	5 - Grange Rd	2,568	2,437	30	2015 to 2019 Cam 005 Urban Minor	125	4.86%	108	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	272	86	358	5 - Grange Rd	1,862	1,768	20	2015 to 2019 Cam 005 Urban Minor	90	4.86%	78	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	95	227	322	5 - Grange Rd	1,676	1,591	20	2015 to 2019 Cam 005 Urban Minor	81	4.86%	70	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	143	350	492	5 - Grange Rd	2,564	2,434	30	2015 to 2019 Cam 005 Urban Minor	125	4.86%	108	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	357	211	568	5 - Grange Rd	2,959	2,809	30	2015 to 2019 Cam 005 Urban Minor	144	4.86%	124	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd								Future link - does not exist				
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd								Future link - does not exist				
11.1	Proposed Madingley Rd West Access to NWC Nbd								Future link - does not exist				
11.1	Proposed Madingley Rd West Access to NWC Sbd								Future link - does not exist				
11.2	Proposed Huntingdon Rd West Access to NWC Nbd								Future link - does not exist				
11.2	Proposed Huntingdon Rd West Access to NWC Sbd								Future link - does not exist				
11.3	Proposed Huntingdon Rd East Access to NWC Sbd								Future link - does not exist				
11.3	Proposed Huntingdon Rd East Access to NWC Nbd								Future link - does not exist				
12.0	Western Access to Madingley Rd Nbd								Future link - does not exist				
12.0	Western Access to Madingley Rd Sbd								Future link - does not exist				
12.1	High Cross Access to Madingley Rd Nbd	246	228	474	6 - Site Access	2,228	1,717	30		148	6.64%	107	6.26%
12.1	High Cross Access to Madingley Rd Sbd	144	285	429	6 - Site Access	2,018	1,555	30		134	6.64%	97	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	73	196	269	6 - Site Access	1,264	974	30	N/A - 2019 Flows	84	6.64%	61	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	220	65	285	6 - Site Access	1,339	1,032	30	N/A - 2019 Flows	89	6.64%	65	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access	10	32	42	6 - Site Access	197	152	30	Estimated Flows for Clerk Maxwell Road due to Park + Cycle and on street	13	6.64%	10	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access	38	9	47	6 - Site Access	221	170	30	Estimated Flows for Clerk Maxwell Road due to Park + Cycle and on street	15	6.64%	11	6.26%

45339 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2019 Base Flows

Prepared By: T Althorpe 05/08/2019

Checked by: E Moran 06/08/2019

123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)			6. Site Access		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2019 Base Flows									
		2019 Base Flows								>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link	Tempro Factor Used	Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	3,582	3,702	7,284	1 - M11	46,246	46,169	70	2016 to 2019 S Cam 009 Motorway	7,261	15.70%	7,170	15.53%
1.0	M11 - J12 - J13 - Sbd	3,699	3,585	7,284	1 - M11	46,246	46,168	70	2016 to 2019 S Cam 009 Motorway	7,261	15.70%	7,170	15.53%
1.1	M11 J13 -J14 - Nbd	2,329	3,066	5,395	1 - M11	34,250	34,193	70	2014 to 2019 S Cam 009 Motorway	5,378	15.70%	5,310	15.53%
1.1	M11 J13 -J14 - Sbd	2,808	2,502	5,310	1 - M11	33,709	33,653	70	2014 to 2019 S Cam 009 Motorway	5,293	15.70%	5,226	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,507	2,222	3,729	1 - M11	23,674	23,635	70	2013 to 2019 S Cam 009 Motorway	3,717	15.70%	3,670	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,207	1,589	3,797	1 - M11	24,103	24,063	70	2013 to 2019 S Cam 009 Motorway	3,784	15.70%	3,737	15.53%
1.3	M11 J13 off-slip - Nbd	1,152	996	2,148	1 - M11	13,638	13,615	70	2018 to 2019 S Cam 009 Motorway	2,141	15.70%	2,114	15.53%
1.3	M11 J13 on-slip - Sbd	505	1,015	1,520	1 - M11	9,651	9,634	70	2018 to 2019 S Cam 009 Motorway	1,515	15.70%	1,496	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	3,913	3,540	7,453	2 - A14	42,498	39,106	70	2013 to 2019 S Cam 009 Rural Trunk Road	7,963	18.74%	7,166	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,271	4,474	7,745	2 - A14	44,167	40,642	70	2013 to 2019 S Cam 009 Rural Trunk Road	8,276	18.74%	7,448	18.33%
2.1	A14 North West of M11 J14 - Ebd	3,881	3,483	7,364	2 - A14	41,994	38,641	70	2015 to 2019 S Cam 009 Rural Trunk Road	7,868	18.74%	7,081	18.33%
2.1	A14 North West M11 J14 - Wbd	3,143	4,199	7,342	2 - A14	41,870	38,527	70	2015 to 2019 S Cam 009 Rural Trunk Road	7,845	18.74%	7,060	18.33%
2.2	A14 West of J32 Interchange - Ebd	3,928	3,834	7,763	2 - A14	44,266	40,733	70	2016 to 2019 S Cam 009 Rural Trunk Road	8,294	18.74%	7,465	18.33%
2.2	A14 West of J32 Interchange - Wbd	3,831	3,932	7,763	2 - A14	44,267	40,733	70	2016 to 2019 S Cam 009 Rural Trunk Road	8,294	18.74%	7,465	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,654	759	2,412	2 - A14	13,755	12,657	70	2014 to 2019 S Cam 009 Urban Trunk	2,577	18.74%	2,319	18.33%
2.3	A428 - West of M11 J14 - Wbd	798	1,267	2,064	2 - A14	11,771	10,832	70	2014 to 2019 S Cam 009 Urban Trunk	2,206	18.74%	1,985	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	498	540	1,038	3 - Madingley Rd	7,203	6,949	50	2016 to 2019 S Cam 009 Rural Principal	413	5.73%	380	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	542	1,252	1,794	3 - Madingley Rd	12,451	12,013	50	2016 to 2019 S Cam 009 Rural Principal	713	5.73%	658	5.47%
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3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	932	755	1,687	3 - Madingley Rd	11,707	11,295	40	2018 to 2019 Cam 005 Urban Principal	671	5.73%	618	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	1,705	993	2,698	3 - Madingley Rd	18,723	18,065	40	2018 to 2019 Cam 005 Urban Principal	1,073	5.73%	989	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	292	924	1,217	3 - Madingley Rd	8,445	8,148	40	2018 to 2019 Cam 005 Urban Principal	484	5.73%	446	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,474	581	2,056	4 - Barton Rd	13,047	12,534	40	2018 to 2019 Cam 005 Urban Principal	479	3.67%	426	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	565	1,524	2,090	4 - Barton Rd	13,263	12,742	40	2018 to 2019 Cam 005 Urban Principal	487	3.67%	433	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	580	1,545	2,124	4 - Barton Rd	13,482	12,952	40	2018 to 2019 Cam 005 Urban Principal	495	3.67%	440	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,485	600	2,085	4 - Barton Rd	13,233	12,713	40	2018 to 2019 Cam 005 Urban Principal	486	3.67%	432	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	602	1,392	1,994	4 - Barton Rd	12,658	12,161	40	2018 to 2019 Cam 005 Urban Principal	464	3.67%	413	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,358	629	1,988	4 - Barton Rd	12,615	12,119	40	2018 to 2019 Cam 005 Urban Principal	463	3.67%	412	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,089	502	1,592	4 - Barton Rd	10,102	9,705	40	2018 to 2019 Cam 005 Urban Principal	371	3.67%	330	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	542	1,109	1,651	4 - Barton Rd	10,481	10,069	40	2018 to 2019 Cam 005 Urban Principal	385	3.67%	342	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	812	559	1,371	4 - Barton Rd	8,702	8,360	30	N/A - 2019 Flows	319	3.67%	284	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	614	853	1,467	4 - Barton Rd	9,311	8,945	30	N/A - 2019 Flows	342	3.67%	304	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	746	589	1,335	4 - Barton Rd	8,473	8,140	30	N/A - 2019 Flows	311	3.67%	277	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	643	789	1,432	4 - Barton Rd	9,089	8,732	30	N/A - 2019 Flows	333	3.67%	297	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	716	591	1,306	4 - Barton Rd	8,291	7,965	30	2015 to 2019 Cam 005 Urban Principal	304	3.67%	271	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	656	626	1,282	4 - Barton Rd	8,137	7,817	30	2015 to 2019 Cam 005 Urban Principal	299	3.67%	266	3.40%
3.10	Madingley Rd - East of Grange Road Ebd	716	591	1,306	4 - Barton Rd	8,291	7,965	30	2015 to 2019 Cam 005 Urban Principal	304	3.67%	271	3.40%
3.10	Madingley Rd - East of Grange Road Wbd	656	626	1,282	4 - Barton Rd	8,137	7,817	30	2015 to 2019 Cam 005 Urban Principal	299	3.67%	266	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	843	598	1,442	4 - Barton Rd	9,149	8,790	30	2015 to 2019 Cam 005 Urban Principal	336	3.67%	299	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	614	739	1,353	4 - Barton Rd	8,587	8,250	30	2015 to 2019 Cam 005 Urban Principal	315	3.67%	280	3.40%
3.12	Northampton St - West of Pound Hill Ebd	484	681	1,165	4 - Barton Rd	7,393	7,102	30	2015 to 2019 Cam 005 Urban Principal	271	3.67%	241	3.40%
3.12	Northampton St - West of Pound Hill Wbd	582	600	1,183	4 - Barton Rd	7,506	7,211	30	2015 to 2019 Cam 005 Urban Principal	275	3.67%	245	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	340	719	1,059	4 - Barton Rd	6,722	6,458	60	2015 to 2019 Cam 005 Urban Principal	247	3.67%	219	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	417	346	764	4 - Barton Rd	4,847	4,656	60	2015 to 2019 Cam 005 Urban Principal	178	3.67%	158	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	340	719	1,059	4 - Barton Rd	6,722	6,458	30	2015 to 2019 Cam 005 Urban Principal	247	3.67%	219	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	417	346	764	4 - Barton Rd	4,847	4,656	30	2015 to 2019 Cam 005 Urban Principal	178	3.67%	158	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	406	986	1,391	4 - Barton Rd	8,831	8,484	30	2015 to 2019 Cam 005 Urban Principal	324	3.67%	288	3.40%

4.2	Huntingdon Rd - East of NWC HRW Access SEbd	698	472	1,170	4 - Barton Rd	7,424	7,132	30	2015 to 2019 Cam 005 Urban Principal	272	3.67%	242	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	463	1,038	1,501	4 - Barton Rd	9,529	9,155	30	2015 to 2019 Cam 005 Urban Principal	350	3.67%	311	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	984	541	1,525	4 - Barton Rd	9,679	9,298	30	2015 to 2019 Cam 005 Urban Principal	355	3.67%	316	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	483	928	1,411	4 - Barton Rd	8,958	8,606	30	2015 to 2019 Cam 005 Urban Principal	329	3.67%	292	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	828	572	1,399	4 - Barton Rd	8,881	8,532	30	2015 to 2019 Cam 005 Urban Principal	326	3.67%	290	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,160	508	1,669	4 - Barton Rd	10,591	10,175	30	2013 to 2019 Cam 007 Urban Principal	389	3.67%	346	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	315	1,007	1,322	4 - Barton Rd	8,392	8,063	30	2013 to 2019 Cam 007 Urban Principal	308	3.67%	274	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	649	458	1,107	4 - Barton Rd	7,028	6,751	30	2015 to 2019 Cam 007 Urban Principal	258	3.67%	229	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	296	971	1,267	4 - Barton Rd	8,042	7,726	30	2015 to 2019 Cam 007 Urban Principal	295	3.67%	263	3.40%
6.0	Queen's Rd - North of West Rd Nbd	484	683	1,167	4 - Barton Rd	7,406	7,115	30	2015 to 2019 Cam 005 Urban Principal	272	3.67%	242	3.40%
6.0	Queen's Rd - North of West Rd Sbd	816	574	1,390	4 - Barton Rd	8,820	8,474	30	2015 to 2019 Cam 005 Urban Principal	324	3.67%	288	3.40%
7.0	Histon Road - South of A14 Nbd	988	1,691	2,679	4 - Barton Rd	17,002	16,334	40	2015 to 2019 Cam 005 Urban Principal	624	3.67%	555	3.40%
7.0	Histon Road - South of A14 Sbd	1,907	1,270	3,177	4 - Barton Rd	20,164	19,372	40	2015 to 2019 Cam 005 Urban Principal	740	3.67%	658	3.40%
7.1	Histon Rd - South of Akeman St Nbd			0	4 - Barton Rd	0	0	30	No Base Flow Data	0	3.67%	0	3.40%
7.1	Histon Rd - South of Akeman St Sbd			0	4 - Barton Rd	0	0	30	No Base Flow Data	0	3.67%	0	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	204	210	414	5 - Grange Rd	2,155	2,046	30	2015 to 2019 Cam 005 Urban Minor	105	4.86%	91	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	335	158	493	5 - Grange Rd	2,568	2,437	30	2015 to 2019 Cam 005 Urban Minor	125	4.86%	108	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	272	86	358	5 - Grange Rd	1,862	1,768	20	2015 to 2019 Cam 005 Urban Minor	90	4.86%	78	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	95	227	322	5 - Grange Rd	1,676	1,591	20	2015 to 2019 Cam 005 Urban Minor	81	4.86%	70	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	143	350	492	5 - Grange Rd	2,564	2,434	30	2015 to 2019 Cam 005 Urban Minor	125	4.86%	108	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	357	211	568	5 - Grange Rd	2,959	2,809	30	2015 to 2019 Cam 005 Urban Minor	144	4.86%	124	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd								Future link - does not exist				
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd								Future link - does not exist				
11.1	Proposed Madingley Rd West Access to NWC Nbd								Future link - does not exist				
11.1	Proposed Madingley Rd West Access to NWC Sbd								Future link - does not exist				
11.2	Proposed Huntingdon Rd West Access to NWC Nbd								Future link - does not exist				
11.2	Proposed Huntingdon Rd West Access to NWC Sbd								Future link - does not exist				
11.3	Proposed Huntingdon Rd East Access to NWC Sbd								Future link - does not exist				
11.3	Proposed Huntingdon Rd East Access to NWC Nbd								Future link - does not exist				
12.0	Western Access to Madingley Rd Nbd								Future link - does not exist				
12.0	Western Access to Madingley Rd Sbd								Future link - does not exist				
12.1	High Cross Access to Madingley Rd Nbd	246	228	474	6 - Site Access	2,228	1,717	30		148	6.64%	107	6.26%
12.1	High Cross Access to Madingley Rd Sbd	144	285	429	6 - Site Access	2,018	1,555	30		134	6.64%	97	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	73	196	269	6 - Site Access	1,264	974	30	N/A - 2019 Flows	84	6.64%	61	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	220	65	285	6 - Site Access	1,339	1,032	30	N/A - 2019 Flows	89	6.64%	65	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access	10	32	42	6 - Site Access	197	152	30	Estimated Flows for Clerk Maxwell Road due to Park + Cycle and on street	13	6.64%	10	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access	38	9	47	6 - Site Access	221	170	30	Estimated Flows for Clerk Maxwell Road due to Park + Cycle and on street	15	6.64%	11	6.26%

31500 West Cambridge

Flows for Environmental Statement - Transport Air Quality and Noise Assessments

2031 ES DM Flows

Prepared By: M Balding 06/09/2019

Checked by: J Hopkins 12/09/2019

123	AM / PM Peak Hour 2 Way Flows (0800-0900, 1700-1800)
123	18hr 5 day Flows (0600 - 0000)
123	24hr 7 day Flows (0000 - 0000)

Factors from combined Peak to 18 & 24 hours	1. M11 between J12 and J13 from TRADS (used to represent motorway classifications)			2. A14 between J30 and J32 and A428 Interchange with M11 J13 (used to represent Strategic A Road Dual Carriageways)			3. Madingley Road 150m west of M11 J13 (used to represent rural A road classifications)		
Vehicles	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.34	1.00	5.70	5.25	1.00	6.94	6.70
% >3.5t of the 18hr / 24hr data		15.70%	15.53%		18.74%	18.33%		5.73%	5.47%
	4. Barton Road 150m west of junction with Grantchester Road (used to represent urban strategic road classifications)			5.Grange Road between Madingley Rd and Clarkson Rd (used to represent unclassified urban roads)			6. Site Access		
	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 5 Day Average	Combined AM/PM Peak (assumed to reflect the Average Weekday)	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average	Combined AM/PM Peak	18hr - Combined Av Weekday Peak Hr to 5 Day Average	24hr - Combined Av Weekday Peak Hr to 7 Day Average
Total vehicles	1.00	6.35	6.10	1.00	5.21	4.94	1.00	4.70	3.62
% >3.5t of the 18hr / 24hr data		3.67%	3.40%		4.86%	4.43%		6.64%	6.26%

		2031 ES DM Flows										
		2031 ES DM Flows							>3.5 tonne % and Associated Number of Vehicles		>3.5 tonne % and Associated Number of Vehicles	
No.	Link / Notes Refer to Reference Link Plan	Total one-way Vehicles AM Peak	Total one-way Vehicles PM Peak	Total one-way Vehicles AM & PM Peaks Combined	Data used to synthesise 18 & 24 hour flows and >3.5t flows	Observed / estimated Combined one-way 18hr Base 5d flows	Observed / estimated Combined one-way 24hr Base 7d flows	Speed Limit of Link		Observed / estimated 18 hr 5d >3.5t flow	Observed / estimated 18 hr 5d >3.5t %	Observed / estimated 24 hr 7d >3.5t flow	Observed / estimated 24 hr 7d >3.5t %
1.0	M11 - J12 - J13 - Nbd	3,829	4,147	7,976	1 - M11	50,638	50,553	70		7,951	15.70%	7,851	15.53%
1.0	M11 - J12 - J13 - Sbd	4,126	3,990	8,116	1 - M11	51,528	51,442	70		8,090	15.70%	7,989	15.53%
1.1	M11 J13 -J14 - Nbd	2,498	3,278	5,776	1 - M11	36,672	36,611	70		5,758	15.70%	5,686	15.53%
1.1	M11 J13 -J14 - Sbd	3,037	2,707	5,743	1 - M11	36,464	36,403	70		5,725	15.70%	5,653	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Nbd	1,647	2,406	4,053	1 - M11	25,731	25,688	70		4,040	15.70%	3,989	15.53%
1.2	M11 between A14 Ebd on-slip / Huntingdon Rd on slip - Sbd	2,396	1,749	4,146	1 - M11	26,319	26,275	70		4,132	15.70%	4,080	15.53%
1.3	M11 J13 off-slip - Nbd	1,230	1,227	2,457	1 - M11	15,601	15,575	70		2,450	15.70%	2,419	15.53%
1.3	M11 J13 on-slip - Sbd	701	1,216	1,917	1 - M11	12,172	12,152	70		1,911	15.70%	1,887	15.53%
2.0	A14 West of J30 (Bar Hill) - Ebd	3,990	3,671	7,661	2 - A14	43,685	40,198	70		8,185	18.74%	7,367	18.33%
2.0	A14 West of J30 (Bar Hill) - Wbd	3,375	4,609	7,983	2 - A14	45,525	41,891	70		8,530	18.74%	7,677	18.33%
2.1	A14 North West of M11 J14 - Ebd	3,969	3,780	7,749	2 - A14	44,190	40,662	70		8,280	18.74%	7,452	18.33%
2.1	A14 North West M11 J14 - Wbd	3,436	4,289	7,725	2 - A14	44,050	40,534	70		8,254	18.74%	7,428	18.33%
2.2	A14 West of J32 Interchange - Ebd	4,137	4,158	8,295	2 - A14	47,299	43,523	70		8,862	18.74%	7,976	18.33%
2.2	A14 West of J32 Interchange - Wbd	4,150	4,133	8,283	2 - A14	47,235	43,464	70		8,850	18.74%	7,965	18.33%
2.3	A428 -West of M11 J14 - Ebd	1,729	864	2,593	2 - A14	14,788	13,608	70		2,771	18.74%	2,494	18.33%
2.3	A428 - West of M11 J14 - Wbd	905	1,330	2,235	2 - A14	12,744	11,727	70		2,388	18.74%	2,149	18.33%
3.0	A1303 East of Madingley Mulch R'bout Ebd	621	664	1,285	3 - Madingley Rd	8,916	8,602	50		511	5.73%	471	5.47%
3.0	A1303 East of Madingley Mulch R'bout Wbd	645	1,392	2,037	3 - Madingley Rd	14,136	13,639	50		810	5.73%	747	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Wbd	757	1,709	2,466	3 - Madingley Rd	17,115	16,513	40		981	5.73%	904	5.47%
3.1	Madingley Rd - East of Cambridge Rd Crossroads Ebd	970	880	1,850	3 - Madingley Rd	12,836	12,385	40		735	5.73%	678	5.47%
3.2	Madingley Rd on Over Bridge M11 Ebd	1,785	1,293	3,078	3 - Madingley Rd	21,363	20,612	40		1,224	5.73%	1,128	5.47%
3.2	Madingley Rd on Over Bridge M11 Wbd	345	898	1,243	3 - Madingley Rd	8,627	8,324	40		494	5.73%	456	5.47%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Ebd	1,489	836	2,325	4 - Barton Rd	14,754	14,174	40		541	3.67%	482	3.40%
3.3	Madingley Rd between M11 Sbd On Slip - Proposed Madingley Rd West Access Wbd	750	1,653	2,403	4 - Barton Rd	15,250	14,650	40		559	3.67%	498	3.40%
3.4	Madingley Rd - West of P&R Access Wbd	779	1,734	2,514	4 - Barton Rd	15,953	15,326	40		585	3.67%	521	3.40%
3.4	Madingley Rd - West of P&R Access Ebd	1,638	859	2,497	4 - Barton Rd	15,846	15,224	40		581	3.67%	517	3.40%
3.5	Madingley Rd - East of P&R Access Wbd	810	1,590	2,401	4 - Barton Rd	15,236	14,637	40		559	3.67%	497	3.40%
3.5	Madingley Rd - East of P&R Access Ebd	1,521	896	2,417	4 - Barton Rd	15,339	14,736	40		563	3.67%	501	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Ebd	1,271	625	1,896	4 - Barton Rd	12,036	11,563	40		442	3.67%	393	3.40%
3.6	Madingley Rd - East of Proposed High Cross Access Wbd	678	1,319	1,997	4 - Barton Rd	12,678	12,179	40		465	3.67%	414	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Ebd	1,111	1,304	2,415	4 - Barton Rd	15,327	14,725	30		562	3.67%	500	3.40%
3.7	Madingley Rd - East of JJ Thomson Ave Wbd	1,454	1,164	2,618	4 - Barton Rd	16,615	15,962	30		610	3.67%	543	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Ebd	1,035	1,302	2,337	4 - Barton Rd	14,832	14,249	30		544	3.67%	484	3.40%
3.8	Madingley Rd - East of Clerk Maxwell Rd Wbd	1,448	1,096	2,544	4 - Barton Rd	16,145	15,511	30		592	3.67%	527	3.40%
3.9	Madingley Rd - East of Storey's Way Ebd	850	723	1,573	4 - Barton Rd	9,982	9,589	30		366	3.67%	326	3.40%
3.9	Madingley Rd - East of Storey's Way Wbd	702	822	1,524	4 - Barton Rd	9,673	9,293	30		355	3.67%	316	3.40%

3.10	Madingley Rd - East of Grange Road Ebd	840	724	1,564	4 - Barton Rd	9,924	9,534	30		364	3.67%	324	3.40%
3.10	Madingley Rd - East of Grange Road Wbd	707	812	1,518	4 - Barton Rd	9,637	9,258	30		354	3.67%	315	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Ebd	976	734	1,710	4 - Barton Rd	10,853	10,426	30		398	3.67%	354	3.40%
3.11	Madingley Rd - West of Queen's Rd / Northampton St R'bout Wbd	711	922	1,633	4 - Barton Rd	10,363	9,956	30		380	3.67%	338	3.40%
3.12	Northampton St - West of Pound Hill Ebd	533	855	1,388	4 - Barton Rd	8,807	8,460	30		323	3.67%	288	3.40%
3.12	Northampton St - West of Pound Hill Wbd	754	690	1,445	4 - Barton Rd	9,170	8,810	30		336	3.67%	299	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access NWbd	528	953	1,481	4 - Barton Rd	9,399	9,029	60		345	3.67%	307	3.40%
4.0	Huntingdon Rd - West of Proposed NWC HRW Access SEbd	564	560	1,124	4 - Barton Rd	7,132	6,852	60		262	3.67%	233	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College NWbd	480	799	1,279	4 - Barton Rd	8,117	7,798	30		298	3.67%	265	3.40%
4.1	Huntingdon Rd - South East of Grange Drive opposite Girton College SEbd	458	482	940	4 - Barton Rd	5,964	5,730	30		219	3.67%	195	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access NWbd	637	1,318	1,955	4 - Barton Rd	12,411	11,923	30		455	3.67%	405	3.40%
4.2	Huntingdon Rd - East of NWC HRW Access SEbd	1,035	786	1,821	4 - Barton Rd	11,560	11,105	30		424	3.67%	377	3.40%
4.3	Huntingdon Rd - East of NIAB Access NWbd	621	1,432	2,053	4 - Barton Rd	13,029	12,517	30		478	3.67%	425	3.40%
4.3	Huntingdon Rd - East of NIAB Access SEbd	1,420	791	2,211	4 - Barton Rd	14,032	13,480	30		515	3.67%	458	3.40%
4.4	Huntingdon Rd - East of Storey's Way NWbd	625	1,312	1,938	4 - Barton Rd	12,298	11,815	30		451	3.67%	402	3.40%
4.4	Huntingdon Rd - East of Storey's Way SEbd	1,284	814	2,098	4 - Barton Rd	13,316	12,793	30		489	3.67%	435	3.40%
5.0	Barton Rd - West of Grantchester Rd Ebd	1,185	532	1,716	4 - Barton Rd	10,894	10,466	30		400	3.67%	356	3.40%
5.0	Barton Rd - West of Grantchester Rd Wbd	330	1,027	1,357	4 - Barton Rd	8,614	8,276	30		316	3.67%	281	3.40%
5.1	Barton Rd - East of Grantchester Rd Ebd	674	481	1,155	4 - Barton Rd	7,331	7,043	30		269	3.67%	239	3.40%
5.1	Barton Rd - East of Grantchester Rd Wbd	311	991	1,302	4 - Barton Rd	8,264	7,939	30		303	3.67%	270	3.40%
6.0	Queen's Rd - North of West Rd Nbd	526	770	1,296	4 - Barton Rd	8,228	7,905	30		302	3.67%	269	3.40%
6.0	Queen's Rd - North of West Rd Sbd	905	614	1,519	4 - Barton Rd	9,643	9,264	30		354	3.67%	315	3.40%
7.0	Histon Road - South of A14 Nbd	1,208	1,824	3,032	4 - Barton Rd	19,246	18,490	40		706	3.67%	628	3.40%
7.0	Histon Road - South of A14 Sbd	1,940	1,510	3,450	4 - Barton Rd	21,898	21,038	40		803	3.67%	715	3.40%
8.0	Grange Rd - South of Madingley Rd Nbd	207	229	436	5 - Grange Rd	2,269	2,154	30		110	4.86%	95	4.43%
8.0	Grange Rd - South of Madingley Rd Sbd	353	165	518	5 - Grange Rd	2,699	2,562	30		131	4.86%	113	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Ebd	223	74	296	5 - Grange Rd	1,543	1,465	20		75	4.86%	65	4.43%
9.0	Storey's Way - between Madingley Rd and Huntingdon Rd Wbd	91	213	304	5 - Grange Rd	1,583	1,503	20		77	4.86%	67	4.43%
10.0	Girton Rd - North of Huntingdon Rd Nbd	161	383	544	5 - Grange Rd	2,834	2,691	30		138	4.86%	119	4.43%
10.0	Girton Rd - North of Huntingdon Rd Sbd	385	236	621	5 - Grange Rd	3,232	3,068	30		157	4.86%	136	4.43%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Nbd	20	181	202	6 - Site Access	947	730	20		63	6.64%	46	6.26%
11.0	Proposed NIAB Access - between Huntingdon Rd and Histon Rd Sbd	191	57	247	6 - Site Access	1,163	896	20		77	6.64%	56	6.26%
11.1	Proposed Madingley Rd West Access to NWC Nbd	104	515	619	6 - Site Access	2,909	2,242	20		193	6.64%	140	6.26%
11.1	Proposed Madingley Rd West Access to NWC Sbd	398	234	632	6 - Site Access	2,970	2,289	20		197	6.64%	143	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Nbd	49	154	203	6 - Site Access	954	735	20		63	6.64%	46	6.26%
11.2	Proposed Huntingdon Rd West Access to NWC Sbd	107	79	186	6 - Site Access	874	674	20		58	6.64%	42	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Sbd	177	335	512	6 - Site Access	2,406	1,854	20		160	6.64%	116	6.26%
11.3	Proposed Huntingdon Rd East Access to NWC Nbd	374	271	645	6 - Site Access	3,031	2,336	20		201	6.64%	146	6.26%
12.0	Western Access to Madingley Rd Nbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
12.0	Western Access to Madingley Rd Sbd	0	0	0	6 - Site Access	0	0	20		0	6.64%	0	6.26%
12.1	High Cross Access to Madingley Rd Nbd	228	172	401	6 - Site Access	1,882	1,450	25		125	6.64%	91	6.26%
12.1	High Cross Access to Madingley Rd Sbd	81	292	372	6 - Site Access	1,750	1,348	25		116	6.64%	84	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Nbd	62	260	322	6 - Site Access	1,514	1,167	25		100	6.64%	73	6.26%
12.2	JJ Thomson Ave Access to Madingley Rd Sbd	195	58	253	6 - Site Access	1,188	916	25		79	6.64%	57	6.26%
12.3	Clerk Maxwell Rd Nbd - south of Car Park Access			0	6 - Site Access	295	235	30		20	6.64%	15	6.26%
12.3	Clerk Maxwell Rd Sbd - south of Car Park Access			0	6 - Site Access	290	231	30		19	6.64%	14	6.26%

Appendix 12.2 Baseline sound survey result

Date	Duration	LAeq	LAFmax	LAF90
(2016/02/22 12:30:23.00)	(0:14:36.0)	54.4	78.6	48.7
(2016/02/22 12:45:03.00)	(0:14:56.0)	50.4	62.1	48.6
(2016/02/22 13:00:03.00)	(0:14:56.0)	50.7	64.1	48.6
(2016/02/22 13:15:03.00)	(0:14:56.0)	50.6	69.3	48.5
(2016/02/22 13:30:03.00)	(0:14:56.0)	49.9	59.2	48.3
(2016/02/22 13:45:03.00)	(0:14:56.0)	50.9	67.7	48.8
(2016/02/22 14:00:03.00)	(0:14:56.0)	51	65.2	49.1
(2016/02/22 14:15:03.00)	(0:14:56.0)	50.4	56.9	48.7
(2016/02/22 14:30:03.00)	(0:14:56.0)	53.6	70.5	49.2
(2016/02/22 14:45:03.00)	(0:14:56.0)	50.8	61.7	48.7
(2016/02/22 15:00:03.00)	(0:14:56.0)	50.3	61.6	48.7
(2016/02/22 15:15:04.00)	(0:14:55.0)	51.4	62.5	48.7
(2016/02/22 15:30:03.00)	(0:14:56.0)	50.7	63.5	48.6
(2016/02/22 15:45:03.00)	(0:14:56.0)	50.6	62.3	48.6
(2016/02/22 16:00:03.00)	(0:14:56.0)	50.2	63.5	48.6
(2016/02/22 16:15:03.00)	(0:14:56.0)	51.4	66.5	47.8
(2016/02/22 16:30:04.00)	(0:14:55.0)	52.4	65.9	48.1
(2016/02/22 16:45:03.00)	(0:14:56.0)	50.8	64.7	49
(2016/02/22 17:00:03.00)	(0:14:56.0)	51.2	61.5	49
(2016/02/22 17:15:03.00)	(0:14:56.0)	51.5	67	49.5
(2016/02/22 17:30:03.00)	(0:14:56.0)	50.4	61.7	48.8
(2016/02/22 17:45:03.00)	(0:14:56.0)	50.9	67.4	48.4
(2016/02/22 18:00:03.00)	(0:14:56.0)	50.6	56.8	49.4
(2016/02/22 18:15:03.00)	(0:14:56.0)	50.3	60.7	48.6
(2016/02/22 18:30:03.00)	(0:14:56.0)	50.7	58	49.1
(2016/02/22 18:45:03.00)	(0:14:56.0)	50.6	60.5	49.1
(2016/02/22 19:00:04.00)	(0:14:55.0)	50.5	56.4	49.4
(2016/02/22 19:15:03.00)	(0:14:56.0)	50.7	63.4	48.9
(2016/02/22 19:30:03.00)	(0:14:56.0)	50.2	56	48.6
(2016/02/22 19:45:03.00)	(0:14:56.0)	50.1	56.4	48.5
(2016/02/22 20:00:03.00)	(0:14:56.0)	49.7	60.2	47.7
(2016/02/22 20:15:04.00)	(0:14:55.0)	48.4	55.3	47
(2016/02/22 20:30:03.00)	(0:14:56.0)	49.8	57.2	47.8
(2016/02/22 20:45:03.00)	(0:14:56.0)	50.7	68.3	48.9
(2016/02/22 21:00:03.00)	(0:14:56.0)	49.2	57.5	47.6
(2016/02/22 21:15:03.00)	(0:14:56.0)	49.6	54.3	48.1
(2016/02/22 21:30:03.00)	(0:14:56.0)	49.2	55.9	47.4
(2016/02/22 21:45:03.00)	(0:14:56.0)	48.9	59.8	47.2
(2016/02/22 22:00:04.00)	(0:14:55.0)	48.5	59.3	46.5
(2016/02/22 22:15:03.00)	(0:14:56.0)	48.6	54.2	46.8
(2016/02/22 22:30:03.00)	(0:14:56.0)	47.6	53.7	45.6
(2016/02/22 22:45:03.00)	(0:14:56.0)	48.8	63	46.5
(2016/02/22 23:00:03.00)	(0:14:56.0)	47.9	57.5	45.8
(2016/02/22 23:15:04.00)	(0:14:55.0)	48	53.8	46.1
(2016/02/22 23:30:03.00)	(0:14:56.0)	47.4	53.4	45.5
(2016/02/22 23:45:03.00)	(0:14:56.0)	46.4	57	44.1
(2016/02/23 00:00:04.00)	(0:14:55.0)	45.9	53.3	43.8
(2016/02/23 00:15:03.00)	(0:14:56.0)	46	58.3	43.7

Date	Duration	LAeq	LAFmax	LAF90
(2016/02/23 00:30:04.00)	(0:14:55.0)	45.8	51.2	43.6
(2016/02/23 00:45:03.00)	(0:14:56.0)	46.1	55.5	44
(2016/02/23 01:00:03.00)	(0:14:56.0)	44.1	50.6	42.1
(2016/02/23 01:15:03.00)	(0:14:56.0)	43.9	49.6	42.1
(2016/02/23 01:30:03.00)	(0:14:56.0)	46	57.9	42.9
(2016/02/23 01:45:03.00)	(0:14:56.0)	46.5	59.3	42.3
(2016/02/23 02:00:03.00)	(0:14:56.0)	46.3	58.8	41.6
(2016/02/23 02:15:03.00)	(0:14:56.0)	46.5	57.9	42.7
(2016/02/23 02:30:03.00)	(0:14:56.0)	46	58.2	42.6
(2016/02/23 02:45:03.00)	(0:14:56.0)	46.4	59.9	42.4
(2016/02/23 03:00:03.00)	(0:14:56.0)	45.6	57.7	42.2
(2016/02/23 03:15:03.00)	(0:14:56.0)	47.1	59.4	41.9
(2016/02/23 03:30:03.00)	(0:14:56.0)	45.4	59.8	42
(2016/02/23 03:45:03.00)	(0:14:56.0)	47	63.1	41.9
(2016/02/23 04:00:03.00)	(0:14:56.0)	47.8	62.3	43.3
(2016/02/23 04:15:03.00)	(0:14:56.0)	45.9	51.9	43.9
(2016/02/23 04:30:03.00)	(0:14:56.0)	46.9	60.3	44.1
(2016/02/23 04:45:04.00)	(0:14:55.0)	47.2	58	44.2
(2016/02/23 05:00:03.00)	(0:14:56.0)	47.9	57.9	46.1
(2016/02/23 05:15:03.00)	(0:14:56.0)	48.5	52.3	46.9
(2016/02/23 05:30:03.00)	(0:14:56.0)	50	58.2	47.6
(2016/02/23 05:45:03.00)	(0:14:56.0)	50.2	58.9	48.2
(2016/02/23 06:00:04.00)	(0:14:55.0)	50.7	59.8	49.1
(2016/02/23 06:15:03.00)	(0:14:56.0)	52.2	62.4	49.8
(2016/02/23 06:30:03.00)	(0:14:56.0)	51.8	64.5	50.2
(2016/02/23 06:45:03.00)	(0:14:56.0)	53.4	70	51
(2016/02/23 07:00:03.00)	(0:14:56.0)	52.9	64.8	51.2
(2016/02/23 07:15:03.00)	(0:14:56.0)	53.5	64.3	51.4
(2016/02/23 07:30:03.00)	(0:14:56.0)	53.9	67.2	51.2
(2016/02/23 07:45:03.00)	(0:14:56.0)	54.3	68.6	50.9
(2016/02/23 08:00:03.00)	(0:14:56.0)	52.7	62.8	50.9
(2016/02/23 08:15:03.00)	(0:14:56.0)	52	63	50.5
(2016/02/23 08:30:03.00)	(0:14:56.0)	52.5	69.2	49.9
(2016/02/23 08:45:04.00)	(0:14:55.0)	51.7	64.9	49
(2016/02/23 09:00:03.00)	(0:14:56.0)	52.3	64.1	48.5
(2016/02/23 09:15:03.00)	(0:14:56.0)	50.3	64.7	47.7
(2016/02/23 09:30:03.00)	(0:14:56.0)	50.2	64.2	47.7
(2016/02/23 09:45:03.00)	(0:14:56.0)	53.6	70.3	47.8
(2016/02/23 10:00:04.00)	(0:14:55.0)	49.8	64.3	46.7
(2016/02/23 10:15:03.00)	(0:14:56.0)	49.7	63.9	46.7
(2016/02/23 10:30:03.00)	(0:14:56.0)	48.6	63.2	45.8
(2016/02/23 10:45:03.00)	(0:14:56.0)	50	64.9	46.7
(2016/02/23 11:00:03.00)	(0:14:56.0)	51	63.8	45.8
(2016/02/23 11:15:03.00)	(0:14:56.0)	49.9	67.2	45.8
(2016/02/23 11:30:04.00)	(0:14:55.0)	50.6	65	47.1
(2016/02/23 11:45:03.00)	(0:14:56.0)	51.3	67.3	46.9
(2016/02/23 12:00:03.00)	(0:14:56.0)	50.2	63.8	46.6
(2016/02/23 12:15:03.00)	(0:14:56.0)	48.6	59.3	45.7
(2016/02/23 12:30:03.00)	(0:14:56.0)	48.8	65.4	45.8

Date	Duration	LAeq	LAFmax	LAF90
(2016/02/23 12:45:03.00)	(0:14:56.0)	48.5	57.8	45.7
(2016/02/23 13:00:03.00)	(0:14:56.0)	48.1	63.5	45.5
(2016/02/23 13:15:03.00)	(0:14:56.0)	51.1	72.1	45.2
(2016/02/23 13:30:03.00)	(0:14:56.0)	50.4	63.5	46.1
(2016/02/23 13:45:03.00)	(0:14:56.0)	51.3	70.7	46
(2016/02/23 14:00:03.00)	(0:14:56.0)	48.6	62.7	46.6
(2016/02/23 14:15:04.00)	(0:14:55.0)	52.8	69.9	46.3
(2016/02/23 14:30:03.00)	(0:14:56.0)	50.3	66.3	45.9
(2016/02/23 14:45:03.00)	(0:14:56.0)	51	61.6	48.8
(2016/02/23 15:00:03.00)	(0:14:56.0)	51.7	64.9	47.7
(2016/02/23 15:15:03.00)	(0:14:56.0)	51.7	65	46.7
(2016/02/23 15:30:04.00)	(0:14:55.0)	50.3	63.1	46.4
(2016/02/23 15:45:03.00)	(0:14:56.0)	51.3	68.3	46.3
(2016/02/23 16:00:03.00)	(0:14:56.0)	49.1	60	47.3
(2016/02/23 16:15:03.00)	(0:14:56.0)	49.7	61.7	47.5
(2016/02/23 16:30:03.00)	(0:14:56.0)	51.2	62.2	47.3
(2016/02/23 16:45:03.00)	(0:14:56.0)	49.8	61.4	47.3
(2016/02/23 17:00:03.00)	(0:14:56.0)	50.6	63.8	47.2
(2016/02/23 17:15:03.00)	(0:14:56.0)	52	65.7	47.4
(2016/02/23 17:30:03.00)	(0:14:56.0)	50.5	64.1	47.5
(2016/02/23 17:45:03.00)	(0:14:56.0)	50.6	71.2	48.7
(2016/02/23 18:00:03.00)	(0:14:56.0)	49.7	66.9	47.5
(2016/02/23 18:15:04.00)	(0:14:55.0)	50	61.7	47.7
(2016/02/23 18:30:03.00)	(0:14:56.0)	50.6	61.8	48.2
(2016/02/23 18:45:03.00)	(0:14:56.0)	50.4	61.4	48.5
(2016/02/23 19:00:03.00)	(0:14:56.0)	51.6	68.6	48.9
(2016/02/23 19:15:03.00)	(0:14:56.0)	50.6	65	48.5
(2016/02/23 19:30:04.00)	(0:14:55.0)	50	61	47.5
(2016/02/23 19:45:03.00)	(0:14:56.0)	49.3	60.4	47.3
(2016/02/23 20:00:03.00)	(0:14:56.0)	50.7	65.9	46.6
(2016/02/23 20:15:03.00)	(0:14:56.0)	48.8	56.7	45.6
(2016/02/23 20:30:03.00)	(0:14:56.0)	48.1	55.9	45.5
(2016/02/23 20:45:03.00)	(0:14:56.0)	49.6	56.4	45.7
(2016/02/23 21:00:03.00)	(0:14:56.0)	46.2	52	44.3
(2016/02/23 21:15:03.00)	(0:14:56.0)	47.1	51.2	44.6
(2016/02/23 21:30:03.00)	(0:14:56.0)	47.4	56.9	45.3
(2016/02/23 21:45:03.00)	(0:14:56.0)	46.8	53.2	45
(2016/02/23 22:00:03.00)	(0:14:56.0)	45.8	56	44
(2016/02/23 22:15:04.00)	(0:14:55.0)	44.5	54.3	42.6
(2016/02/23 22:30:03.00)	(0:14:56.0)	44.2	52.5	43
(2016/02/23 22:45:03.00)	(0:14:56.0)	44.2	49.3	42.4
(2016/02/23 23:00:03.00)	(0:14:56.0)	43.3	46.6	42.1
(2016/02/23 23:15:03.00)	(0:14:56.0)	43	48.3	41.5
(2016/02/23 23:30:04.00)	(0:14:55.0)	42.6	47.6	41
(2016/02/23 23:45:03.00)	(0:14:56.0)	43.8	56.1	41.7
(2016/02/24 00:00:04.00)	(0:14:55.0)	45.8	62.1	41.6
(2016/02/24 00:15:03.00)	(0:14:56.0)	42.9	48.3	41.2
(2016/02/24 00:30:03.00)	(0:14:56.0)	43.9	48.6	41.7
(2016/02/24 00:45:03.00)	(0:14:56.0)	43.6	50.6	40.4

Date	Duration	LAeq	LAFmax	LAF90
(2016/02/24 01:00:03.00)	(0:14:56.0)	41.6	48.4	39.9
(2016/02/24 01:15:03.00)	(0:14:56.0)	42.3	53.5	40.2
(2016/02/24 01:30:03.00)	(0:14:56.0)	43.3	57	41.1
(2016/02/24 01:45:03.00)	(0:14:56.0)	46.6	53	43.7
(2016/02/24 02:00:03.00)	(0:14:56.0)	45.2	64.3	40.4
(2016/02/24 02:15:04.00)	(0:14:55.0)	42.9	49.9	41.2
(2016/02/24 02:30:03.00)	(0:14:56.0)	42.2	47.9	40.4
(2016/02/24 02:45:03.00)	(0:14:56.0)	43.5	49.3	41.6
(2016/02/24 03:00:03.00)	(0:14:56.0)	44.9	50.6	42
(2016/02/24 03:15:03.00)	(0:14:56.0)	44	49.9	41.4
(2016/02/24 03:30:03.00)	(0:14:56.0)	47	53.7	43.5
(2016/02/24 03:45:03.00)	(0:14:56.0)	46.7	56.2	44.3
(2016/02/24 04:00:03.00)	(0:14:56.0)	48	58.3	44
(2016/02/24 04:15:03.00)	(0:14:56.0)	48.5	55.4	45.5
(2016/02/24 04:30:03.00)	(0:14:56.0)	47.9	55.1	45.3
(2016/02/24 04:45:04.00)	(0:14:55.0)	48.5	58	46.3
(2016/02/24 05:00:03.00)	(0:14:56.0)	47.7	61.2	44.4
(2016/02/24 05:15:03.00)	(0:14:56.0)	50.2	54.5	48.4
(2016/02/24 05:30:03.00)	(0:14:56.0)	51.1	61.3	47.6
(2016/02/24 05:45:03.00)	(0:14:56.0)	49.4	61.3	47.5
(2016/02/24 06:00:03.00)	(0:14:56.0)	51	56.9	48.6
(2016/02/24 06:15:03.00)	(0:14:56.0)	52.7	63.7	49.8
(2016/02/24 06:30:03.00)	(0:14:56.0)	54.4	76.3	50.8
(2016/02/24 06:45:03.00)	(0:14:56.0)	53.4	61.1	51.9
(2016/02/24 07:00:03.00)	(0:14:56.0)	54.6	69.4	52.2
(2016/02/24 07:15:03.00)	(0:14:56.0)	53.9	69.1	51.9
(2016/02/24 07:30:04.00)	(0:14:55.0)	52.2	61.5	49.7
(2016/02/24 07:45:03.00)	(0:14:56.0)	51.9	78.6	49
(2016/02/24 08:00:03.00)	(0:14:56.0)	51.5	71.6	49.9
(2016/02/24 08:15:03.00)	(0:14:56.0)	51.1	58.8	49.1
(2016/02/24 08:30:03.00)	(0:14:56.0)	51.2	62.7	48.5
(2016/02/24 08:45:04.00)	(0:14:55.0)	51.4	64.2	49.2
(2016/02/24 09:00:03.00)	(0:14:56.0)	52.1	68	47.4
(2016/02/24 09:15:03.00)	(0:14:56.0)	50.3	63.3	46.2
(2016/02/24 09:30:03.00)	(0:14:56.0)	48.8	65.8	44.7
(2016/02/24 09:45:03.00)	(0:14:56.0)	52.5	70.7	45.6
(2016/02/24 10:00:03.00)	(0:14:56.0)	54.1	70.6	46.2
(2016/02/24 10:15:03.00)	(0:14:56.0)	47.9	63.5	43.7
(2016/02/24 10:30:03.00)	(0:14:56.0)	50.7	71.7	43.3
(2016/02/24 10:45:03.00)	(0:14:56.0)	47.9	62.1	42.7
(2016/02/24 11:00:03.00)	(0:14:56.0)	45.2	64.3	42.7
(2016/02/24 11:15:04.00)	(0:14:55.0)	48.1	66.4	42.4
(2016/02/24 11:30:03.00)	(0:14:56.0)	50.6	66.9	43.3
(2016/02/24 11:45:03.00)	(0:14:56.0)	50.8	80.9	43.4
(2016/02/24 12:00:03.00)	(0:1:29.0)	54.4	74	44.3
(2016/08/26 12:02:00.00)	(0:0:16.0)	45.4	50.7	42.9
(2016/08/26 12:02:28.00)	(0:12:31.0)	50.1	73.7	41.8
(2016/08/26 12:15:02.00)	(0:14:57.0)	45	65.1	41.8
(2016/08/26 12:30:02.00)	(0:14:57.0)	44.7	64	41.8

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/26 12:45:02.00)	(0:14:57.0)	43.9	64.8	41.2
(2016/08/26 13:00:03.00)	(0:14:56.0)	45.5	67.8	41.4
(2016/08/26 13:15:02.00)	(0:14:57.0)	43	55.8	40.9
(2016/08/26 13:30:02.00)	(0:14:57.0)	43.8	59.4	41.6
(2016/08/26 13:45:02.00)	(0:14:57.0)	46.6	65.9	41.5
(2016/08/26 14:00:03.00)	(0:14:56.0)	47.8	67.4	40.9
(2016/08/26 14:15:02.00)	(0:14:57.0)	45.3	57.7	41.7
(2016/08/26 14:30:02.00)	(0:14:57.0)	46.4	60.8	42.6
(2016/08/26 14:45:02.00)	(0:14:57.0)	53.8	77.8	42.2
(2016/08/26 15:00:02.00)	(0:14:57.0)	46	63.5	42
(2016/08/26 15:15:02.00)	(0:14:57.0)	45.1	65.2	41.6
(2016/08/26 15:30:02.00)	(0:14:57.0)	46.8	64.7	41.6
(2016/08/26 15:45:02.00)	(0:14:57.0)	44.8	61.6	41.9
(2016/08/26 16:00:02.00)	(0:14:57.0)	45.1	61.5	41.9
(2016/08/26 16:15:02.00)	(0:14:57.0)	48.6	68.5	42.6
(2016/08/26 16:30:02.00)	(0:14:57.0)	49.7	67.7	42.9
(2016/08/26 16:45:02.00)	(0:14:57.0)	45.4	56.6	42.1
(2016/08/26 17:00:02.00)	(0:14:57.0)	44.6	59.1	41.8
(2016/08/26 17:15:02.00)	(0:14:57.0)	43.9	54.9	41.5
(2016/08/26 17:30:02.00)	(0:14:57.0)	49.6	66.6	42.5
(2016/08/26 17:45:02.00)	(0:14:57.0)	46.1	68	42.5
(2016/08/26 18:00:02.00)	(0:14:57.0)	45.9	59.2	43.1
(2016/08/26 18:15:02.00)	(0:14:57.0)	44.6	55.5	42.2
(2016/08/26 18:30:02.00)	(0:14:57.0)	47.3	67.7	42.4
(2016/08/26 18:45:02.00)	(0:14:57.0)	46	69	41.5
(2016/08/26 19:00:02.00)	(0:14:57.0)	47.1	63.6	42.1
(2016/08/26 19:15:02.00)	(0:14:57.0)	49.1	67.8	43.2
(2016/08/26 19:30:02.00)	(0:14:57.0)	52.3	72.2	43.2
(2016/08/26 19:45:03.00)	(0:14:56.0)	45.9	62.2	43.2
(2016/08/26 20:00:02.00)	(0:14:57.0)	46.1	57.4	43.5
(2016/08/26 20:15:03.00)	(0:14:56.0)	52.9	69.7	44.9
(2016/08/26 20:30:03.00)	(0:14:57.0)	46.3	52.8	44.6
(2016/08/26 20:45:02.00)	(0:14:57.0)	45.9	55.4	44
(2016/08/26 21:00:03.00)	(0:14:56.0)	46.8	58.7	44.9
(2016/08/26 21:15:02.00)	(0:14:57.0)	46.6	55.8	44.3
(2016/08/26 21:30:02.00)	(0:14:57.0)	45.9	51.8	43.9
(2016/08/26 21:45:04.00)	(0:14:55.0)	45.4	55.7	42.9
(2016/08/26 22:00:02.00)	(0:14:57.0)	44.6	50.1	42.5
(2016/08/26 22:15:02.00)	(0:14:57.0)	43.8	49.4	41.6
(2016/08/26 22:30:03.00)	(0:14:56.0)	42.6	55.7	39.6
(2016/08/26 22:45:02.00)	(0:14:57.0)	42.6	54.6	39.7
(2016/08/26 23:00:02.00)	(0:14:57.0)	42.3	54.9	39.7
(2016/08/26 23:15:03.00)	(0:14:56.0)	42.3	49.5	38.7
(2016/08/26 23:30:02.00)	(0:14:57.0)	41.2	47.4	38.8
(2016/08/26 23:45:03.00)	(0:14:56.0)	43.2	62.3	38.5
(2016/08/27 00:00:03.00)	(0:14:56.0)	40.7	46.9	38.5
(2016/08/27 00:15:03.00)	(0:14:56.0)	41.8	53.3	39
(2016/08/27 00:30:02.00)	(0:14:57.0)	41.1	54.3	37.8
(2016/08/27 00:45:02.00)	(0:14:57.0)	40.4	48.4	37.6

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/27 01:00:02.00)	(0:14:57.0)	40.2	51.6	37.4
(2016/08/27 01:15:02.00)	(0:14:57.0)	40.8	51.5	37
(2016/08/27 01:30:02.00)	(0:14:57.0)	39.5	45.9	36.7
(2016/08/27 01:45:02.00)	(0:14:57.0)	39	46.4	36.7
(2016/08/27 02:00:02.00)	(0:14:57.0)	38.6	45.8	36.3
(2016/08/27 02:15:02.00)	(0:14:57.0)	38.1	46.7	36.2
(2016/08/27 02:30:02.00)	(0:14:57.0)	38	46.7	35.3
(2016/08/27 02:45:02.00)	(0:14:57.0)	38.1	49	35.4
(2016/08/27 03:00:02.00)	(0:14:57.0)	38.1	51.3	35.3
(2016/08/27 03:15:02.00)	(0:14:57.0)	36.3	50	34.3
(2016/08/27 03:30:02.00)	(0:14:57.0)	35.7	46.4	33.3
(2016/08/27 03:45:02.00)	(0:14:57.0)	36.3	45.7	32.6
(2016/08/27 04:00:02.00)	(0:14:57.0)	34.8	43.3	32.1
(2016/08/27 04:15:02.00)	(0:14:57.0)	35	44.2	31.4
(2016/08/27 04:30:02.00)	(0:14:57.0)	33.9	43.6	31.3
(2016/08/27 04:45:02.00)	(0:14:57.0)	34.5	44.7	31.7
(2016/08/27 05:00:02.00)	(0:14:57.0)	34.7	48.2	31.9
(2016/08/27 05:15:02.00)	(0:14:57.0)	41.7	65.3	32.4
(2016/08/27 05:30:02.00)	(0:14:57.0)	46.7	68.1	34.4
(2016/08/27 05:45:02.00)	(0:14:57.0)	51.5	68.2	35.5
(2016/08/27 06:00:02.00)	(0:14:57.0)	48.8	67.6	36.8
(2016/08/27 06:15:02.00)	(0:14:57.0)	43.2	58.3	37
(2016/08/27 06:30:02.00)	(0:14:57.0)	50.4	69.7	37.3
(2016/08/27 06:45:03.00)	(0:14:56.0)	43.7	66.3	37.2
(2016/08/27 07:00:02.00)	(0:14:57.0)	47	65.3	37.7
(2016/08/27 07:15:02.00)	(0:14:57.0)	48.9	66.8	39.3
(2016/08/27 07:30:02.00)	(0:14:57.0)	50	67.2	38.6
(2016/08/27 07:45:02.00)	(0:14:57.0)	50.6	66.3	39.6
(2016/08/27 08:00:02.00)	(0:14:57.0)	43	54.4	39.5
(2016/08/27 08:15:02.00)	(0:14:57.0)	46.9	68.5	39.2
(2016/08/27 08:30:02.00)	(0:14:57.0)	45.3	66.3	40.1
(2016/08/27 08:45:03.00)	(0:14:56.0)	43.9	57.7	40.2
(2016/08/27 09:00:03.00)	(0:14:56.0)	49.1	66.7	40.5
(2016/08/27 09:15:02.00)	(0:14:57.0)	45.6	61.6	42.2
(2016/08/27 09:30:02.00)	(0:14:57.0)	45.9	62.2	40.9
(2016/08/27 09:45:03.00)	(0:14:56.0)	46.5	68	41.3
(2016/08/27 10:00:02.00)	(0:14:57.0)	45.1	58.9	41.6
(2016/08/27 10:15:03.00)	(0:14:56.0)	44.7	59.6	40.8
(2016/08/27 10:30:03.00)	(0:14:56.0)	45.6	57.5	42.2
(2016/08/27 10:45:02.00)	(0:14:57.0)	44.7	52.2	42.2
(2016/08/27 11:00:02.00)	(0:14:57.0)	50.5	68.6	43
(2016/08/27 11:15:03.00)	(0:14:56.0)	45.7	56.8	42.6
(2016/08/27 11:30:02.00)	(0:14:57.0)	45.1	58.3	41.7
(2016/08/27 11:45:03.00)	(0:14:56.0)	45.1	57.2	42
(2016/08/27 12:00:03.00)	(0:14:56.0)	45.3	57.1	42.2
(2016/08/27 12:15:02.00)	(0:14:57.0)	48.5	67.5	43.5
(2016/08/27 12:30:03.00)	(0:14:56.0)	46.3	65.1	43.2
(2016/08/27 12:45:03.00)	(0:14:56.0)	45.5	62.7	42.7
(2016/08/27 13:00:02.00)	(0:14:57.0)	47.8	72.8	42.4

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/27 13:15:03.00)	(0:14:56.0)	45.8	60.1	42.9
(2016/08/27 13:30:02.00)	(0:14:57.0)	47	64.4	43.3
(2016/08/27 13:45:02.00)	(0:14:57.0)	52	65.9	44
(2016/08/27 14:00:03.00)	(0:14:56.0)	47.6	67.9	43.2
(2016/08/27 14:15:03.00)	(0:14:56.0)	47.6	66.5	43.5
(2016/08/27 14:30:02.00)	(0:14:57.0)	50.3	65.9	43.3
(2016/08/27 14:45:03.00)	(0:14:56.0)	51	75.5	44.3
(2016/08/27 15:00:03.00)	(0:14:56.0)	51.4	65.8	44.7
(2016/08/27 15:15:02.00)	(0:14:57.0)	49.6	66.8	43.9
(2016/08/27 15:30:03.00)	(0:14:56.0)	49.5	65.5	44.4
(2016/08/27 15:45:02.00)	(0:14:57.0)	50	62.7	44.8
(2016/08/27 16:00:03.00)	(0:14:56.0)	53.8	68.4	52.7
(2016/08/27 16:15:03.00)	(0:14:56.0)	48.9	69.4	43.4
(2016/08/27 16:30:03.00)	(0:14:56.0)	49.7	64.5	43.9
(2016/08/27 16:45:03.00)	(0:14:56.0)	47.3	69.6	43.5
(2016/08/27 17:00:04.00)	(0:14:55.0)	46.6	59.2	43.2
(2016/08/27 17:15:03.00)	(0:14:56.0)	45.9	68.8	41.5
(2016/08/27 17:30:03.00)	(0:14:56.0)	46.6	69.8	40.9
(2016/08/27 17:45:03.00)	(0:14:56.0)	44.2	58.9	40.3
(2016/08/27 18:00:03.00)	(0:14:56.0)	45.8	58.4	41.6
(2016/08/27 18:15:03.00)	(0:14:56.0)	46.4	60.3	43.8
(2016/08/27 18:30:03.00)	(0:14:56.0)	49.3	65.9	42.8
(2016/08/27 18:45:03.00)	(0:14:57.0)	45.7	58.9	42.8
(2016/08/27 19:00:03.00)	(0:14:56.0)	46.5	67	42.1
(2016/08/27 19:15:03.00)	(0:14:56.0)	50.4	67.6	42.7
(2016/08/27 19:30:03.00)	(0:14:56.0)	44.5	59.4	41.4
(2016/08/27 19:45:03.00)	(0:14:56.0)	45.9	65.3	42.5
(2016/08/27 20:00:03.00)	(0:14:56.0)	47.3	65.4	41.6
(2016/08/27 20:15:03.00)	(0:14:56.0)	44.9	67.2	40.6
(2016/08/27 20:30:03.00)	(0:14:56.0)	42.4	52.4	40
(2016/08/27 20:45:03.00)	(0:14:56.0)	44.6	62.2	40.2
(2016/08/27 21:00:03.00)	(0:14:56.0)	41.3	46	39.2
(2016/08/27 21:15:03.00)	(0:14:56.0)	41.3	49.6	39.1
(2016/08/27 21:30:03.00)	(0:14:56.0)	41.8	48.1	39.3
(2016/08/27 21:45:03.00)	(0:14:56.0)	41.3	52.7	39.4
(2016/08/27 22:00:03.00)	(0:14:56.0)	41.8	56.6	39
(2016/08/27 22:15:03.00)	(0:14:56.0)	41.8	50.6	38.7
(2016/08/27 22:30:03.00)	(0:14:56.0)	40.5	48.9	37.7
(2016/08/27 22:45:03.00)	(0:14:56.0)	42.4	60	37.7
(2016/08/27 23:00:03.00)	(0:14:56.0)	39.5	47.1	36.7
(2016/08/27 23:15:03.00)	(0:14:56.0)	39.4	46.4	36.6
(2016/08/27 23:30:03.00)	(0:14:56.0)	39.1	47.8	35.9
(2016/08/27 23:45:03.00)	(0:14:56.0)	38.5	47.5	35.9
(2016/08/28 00:00:03.00)	(0:14:56.0)	38.8	48.7	35.9
(2016/08/28 00:15:03.00)	(0:14:56.0)	39.1	49.7	35.9
(2016/08/28 00:30:02.00)	(0:14:57.0)	39	48.5	35.6
(2016/08/28 00:45:02.00)	(0:14:57.0)	38.8	46.5	35.8
(2016/08/28 01:00:02.00)	(0:14:57.0)	37.8	45.3	35.4
(2016/08/28 01:15:02.00)	(0:14:57.0)	38.4	48.9	36

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/28 01:30:02.00)	(0:14:57.0)	38.7	47.3	37.4
(2016/08/28 01:45:02.00)	(0:14:57.0)	39.2	48.9	37.2
(2016/08/28 02:00:02.00)	(0:14:57.0)	38.8	42.7	37.2
(2016/08/28 02:15:02.00)	(0:14:57.0)	38.5	46.1	36.7
(2016/08/28 02:30:02.00)	(0:14:57.0)	39.4	49.8	36.8
(2016/08/28 02:45:03.00)	(0:14:56.0)	38.9	48.4	36.7
(2016/08/28 03:00:02.00)	(0:14:57.0)	39.7	47.8	37.6
(2016/08/28 03:15:02.00)	(0:14:57.0)	40	55.6	37.6
(2016/08/28 03:30:02.00)	(0:14:57.0)	40.5	48.9	38.1
(2016/08/28 03:45:02.00)	(0:14:57.0)	40.2	45.8	38.7
(2016/08/28 04:00:02.00)	(0:14:57.0)	41	47.6	39.1
(2016/08/28 04:15:02.00)	(0:14:57.0)	41.4	49.3	38.8
(2016/08/28 04:30:02.00)	(0:14:57.0)	41.6	51.5	39
(2016/08/28 04:45:02.00)	(0:14:57.0)	41	48.3	39.1
(2016/08/28 05:00:03.00)	(0:14:56.0)	41.3	47.9	39.5
(2016/08/28 05:15:02.00)	(0:14:57.0)	41.4	45.6	39.7
(2016/08/28 05:30:02.00)	(0:14:57.0)	42.5	64.6	39.4
(2016/08/28 05:45:02.00)	(0:14:57.0)	49.1	68.1	40.6
(2016/08/28 06:00:03.00)	(0:14:56.0)	47.1	65.4	39.9
(2016/08/28 06:15:02.00)	(0:14:57.0)	47.3	67.1	40.1
(2016/08/28 06:30:02.00)	(0:14:57.0)	47.9	67.9	40
(2016/08/28 06:45:02.00)	(0:14:57.0)	43.2	62.7	40.2
(2016/08/28 07:00:02.00)	(0:14:57.0)	42.9	53.5	41.3
(2016/08/28 07:15:02.00)	(0:14:57.0)	46.8	68.4	40.5
(2016/08/28 07:30:03.00)	(0:14:56.0)	48.1	68	39.9
(2016/08/28 07:45:02.00)	(0:14:57.0)	45.5	61.2	41.1
(2016/08/28 08:00:02.00)	(0:14:57.0)	45.1	60.7	42.2
(2016/08/28 08:15:03.00)	(0:14:56.0)	43.4	57.2	41.7
(2016/08/28 08:30:03.00)	(0:14:56.0)	43.7	57.7	41
(2016/08/28 08:45:03.00)	(0:14:56.0)	44.3	55.2	42.2
(2016/08/28 09:00:02.00)	(0:14:57.0)	44.7	57.5	43
(2016/08/28 09:15:02.00)	(0:14:57.0)	46.7	61.1	44.6
(2016/08/28 09:30:02.00)	(0:14:57.0)	47.4	62.7	44.7
(2016/08/28 09:45:02.00)	(0:14:57.0)	47	66.8	44.2
(2016/08/28 10:00:02.00)	(0:14:57.0)	47.8	64.6	44.1
(2016/08/28 10:15:02.00)	(0:14:57.0)	46.5	62.8	44.6
(2016/08/28 10:30:03.00)	(0:14:56.0)	46.6	61.2	44.4
(2016/08/28 10:45:03.00)	(0:14:56.0)	49.7	66.3	45.5
(2016/08/28 11:00:02.00)	(0:14:57.0)	46.6	66.8	43.6
(2016/08/28 11:15:02.00)	(0:14:57.0)	46	64.2	44
(2016/08/28 11:30:02.00)	(0:14:57.0)	46.8	60.8	43.7
(2016/08/28 11:45:02.00)	(0:14:57.0)	48.4	66	43.5
(2016/08/28 12:00:03.00)	(0:14:56.0)	46	61.7	43.7
(2016/08/28 12:15:03.00)	(0:14:56.0)	47.1	66	43.9
(2016/08/28 12:30:03.00)	(0:14:56.0)	49.2	66.3	44.8
(2016/08/28 12:45:03.00)	(0:14:56.0)	44.6	59.8	42.6
(2016/08/28 13:00:03.00)	(0:14:56.0)	46.7	67.5	42.9
(2016/08/28 13:15:02.00)	(0:14:57.0)	43.6	52.6	42.3
(2016/08/28 13:30:03.00)	(0:14:56.0)	43.8	53.6	41.7

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/28 13:45:03.00)	(0:14:56.0)	44.5	56.1	42.8
(2016/08/28 14:00:03.00)	(0:14:56.0)	44.9	60.6	42.9
(2016/08/28 14:15:02.00)	(0:14:57.0)	46.9	63.4	42.9
(2016/08/28 14:30:03.00)	(0:14:56.0)	45.7	64.1	43.7
(2016/08/28 14:45:02.00)	(0:14:57.0)	45.1	56.7	42.7
(2016/08/28 15:00:04.00)	(0:14:55.0)	48.3	66.1	41.7
(2016/08/28 15:15:02.00)	(0:14:57.0)	44.3	55.6	42.5
(2016/08/28 15:30:03.00)	(0:14:56.0)	44.8	58.7	42.4
(2016/08/28 15:45:03.00)	(0:14:56.0)	50	67.2	44.3
(2016/08/28 16:00:03.00)	(0:14:56.0)	55.8	71.7	46.6
(2016/08/28 16:15:03.00)	(0:14:56.0)	50.4	58	47.7
(2016/08/28 16:30:03.00)	(0:14:56.0)	49.9	63.8	48
(2016/08/28 16:45:04.00)	(0:14:55.0)	51.4	68.6	48.4
(2016/08/28 17:00:03.00)	(0:14:56.0)	48.6	62	43.9
(2016/08/28 17:15:03.00)	(0:14:56.0)	48.4	61.6	45.1
(2016/08/28 17:30:03.00)	(0:14:56.0)	46.1	57.5	44.8
(2016/08/28 17:45:03.00)	(0:14:56.0)	47.2	61.6	45.4
(2016/08/28 18:00:03.00)	(0:14:56.0)	45.8	59.4	44.1
(2016/08/28 18:15:03.00)	(0:14:56.0)	50	67.8	43.9
(2016/08/28 18:30:03.00)	(0:14:56.0)	46.6	66.8	43.4
(2016/08/28 18:45:02.00)	(0:14:57.0)	46.1	60.4	44.3
(2016/08/28 19:00:04.00)	(0:14:55.0)	50.8	67.5	42.2
(2016/08/28 19:15:03.00)	(0:14:57.0)	47.5	66	42.3
(2016/08/28 19:30:03.00)	(0:14:56.0)	51.1	68.3	42.6
(2016/08/28 19:45:03.00)	(0:14:56.0)	45.7	65	42.7
(2016/08/28 20:00:03.00)	(0:14:56.0)	47.1	66.6	41.6
(2016/08/28 20:15:03.00)	(0:14:56.0)	44.8	65.8	40.2
(2016/08/28 20:30:03.00)	(0:14:56.0)	41.4	52.4	39
(2016/08/28 20:45:03.00)	(0:14:56.0)	48.3	56.4	40.3
(2016/08/28 21:00:03.00)	(0:14:56.0)	49.6	54.4	46.3
(2016/08/28 21:15:03.00)	(0:14:56.0)	46.2	53.5	41.2
(2016/08/28 21:30:03.00)	(0:14:56.0)	43.2	57.6	40.6
(2016/08/28 21:45:03.00)	(0:14:56.0)	43	48.4	40.2
(2016/08/28 22:00:03.00)	(0:14:56.0)	42.5	57.2	38.3
(2016/08/28 22:15:03.00)	(0:14:56.0)	42.1	50.8	38.2
(2016/08/28 22:30:03.00)	(0:14:56.0)	41.1	48.7	38.1
(2016/08/28 22:45:03.00)	(0:14:56.0)	41.1	59.4	37
(2016/08/28 23:00:03.00)	(0:14:56.0)	39.4	49.7	36.6
(2016/08/28 23:15:03.00)	(0:14:56.0)	40.1	61.7	36.9
(2016/08/28 23:30:03.00)	(0:14:56.0)	42.3	63	35.9
(2016/08/28 23:45:03.00)	(0:14:56.0)	39.5	48.2	36.1
(2016/08/29 00:00:03.00)	(0:14:56.0)	40	49.1	37.2
(2016/08/29 00:15:04.00)	(0:14:55.0)	38.6	46.7	36.1
(2016/08/29 00:30:02.00)	(0:14:57.0)	38	48.3	35.7
(2016/08/29 00:45:03.00)	(0:14:56.0)	38.6	44.5	36.4
(2016/08/29 01:00:02.00)	(0:14:57.0)	38.2	44.9	35.4
(2016/08/29 01:15:02.00)	(0:14:57.0)	38.1	46.7	35.2
(2016/08/29 01:30:02.00)	(0:14:57.0)	37.4	44.1	35.3
(2016/08/29 01:45:02.00)	(0:14:57.0)	38.8	45.7	36.9

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/29 02:00:02.00)	(0:14:57.0)	38.8	49.3	36.1
(2016/08/29 02:15:02.00)	(0:14:57.0)	38.4	48.2	36.2
(2016/08/29 02:30:02.00)	(0:14:57.0)	38.3	44.2	36.6
(2016/08/29 02:45:02.00)	(0:14:57.0)	42.2	60.4	37.5
(2016/08/29 03:00:02.00)	(0:14:57.0)	39.4	51.8	36.8
(2016/08/29 03:15:03.00)	(0:14:56.0)	39.4	46.9	37.5
(2016/08/29 03:30:02.00)	(0:14:57.0)	39.8	50.8	37.5
(2016/08/29 03:45:02.00)	(0:14:57.0)	40.1	49.8	37.7
(2016/08/29 04:00:02.00)	(0:14:57.0)	37.4	43.7	35.5
(2016/08/29 04:15:02.00)	(0:14:57.0)	38.5	46	37
(2016/08/29 04:30:02.00)	(0:14:57.0)	39.2	45.4	37.3
(2016/08/29 04:45:02.00)	(0:14:57.0)	39.5	45	37.8
(2016/08/29 05:00:02.00)	(0:14:57.0)	39.9	45.9	38
(2016/08/29 05:15:02.00)	(0:14:57.0)	41.7	52.6	39.2
(2016/08/29 05:30:02.00)	(0:14:57.0)	49.3	66.7	40.8
(2016/08/29 05:45:02.00)	(0:14:57.0)	50.6	68.9	41.8
(2016/08/29 06:00:02.00)	(0:14:57.0)	45.3	65.1	41.7
(2016/08/29 06:15:02.00)	(0:14:57.0)	48.7	68.8	42.8
(2016/08/29 06:30:02.00)	(0:14:57.0)	46.5	61.4	42.3
(2016/08/29 06:45:02.00)	(0:14:57.0)	48.8	66.9	43.1
(2016/08/29 07:00:02.00)	(0:14:57.0)	48.8	66.6	41.5
(2016/08/29 07:15:02.00)	(0:14:57.0)	48.3	66.6	42.2
(2016/08/29 07:30:02.00)	(0:14:57.0)	50.8	68.7	40.7
(2016/08/29 07:45:04.00)	(0:14:55.0)	44.6	65	38.7
(2016/08/29 08:00:02.00)	(0:14:57.0)	46.4	66.9	37
(2016/08/29 08:15:03.00)	(0:14:56.0)	51.4	69.2	37.4
(2016/08/29 08:30:02.00)	(0:14:57.0)	50.3	67.8	37.8
(2016/08/29 08:45:02.00)	(0:14:57.0)	51.3	67.1	38.9
(2016/08/29 09:00:02.00)	(0:14:57.0)	46.5	66.9	37.2
(2016/08/29 09:15:03.00)	(0:14:56.0)	45.4	67.6	39.1
(2016/08/29 09:30:02.00)	(0:14:57.0)	50.2	68.3	38.9
(2016/08/29 09:45:02.00)	(0:14:57.0)	42.6	59.8	38.6
(2016/08/29 10:00:03.00)	(0:14:56.0)	46.5	61.7	39.4
(2016/08/29 10:15:03.00)	(0:14:56.0)	45.2	61.5	39.5
(2016/08/29 10:30:03.00)	(0:14:56.0)	44.8	56	40.5
(2016/08/29 10:45:03.00)	(0:14:56.0)	43.6	54.5	40.1
(2016/08/29 11:00:02.00)	(0:14:57.0)	44.2	61.3	39.9
(2016/08/29 11:15:03.00)	(0:14:56.0)	43.9	58.1	40.2
(2016/08/29 11:30:03.00)	(0:14:56.0)	45.7	63.1	41.1
(2016/08/29 11:45:03.00)	(0:14:56.0)	43.1	53.7	40.7
(2016/08/29 12:00:03.00)	(0:14:56.0)	44.6	58.7	40.9
(2016/08/29 12:15:03.00)	(0:14:56.0)	43.9	57	40.9
(2016/08/29 12:30:03.00)	(0:14:56.0)	45.4	67.2	41.8
(2016/08/29 12:45:02.00)	(0:14:57.0)	46.3	64.7	41.7
(2016/08/29 13:00:03.00)	(0:14:56.0)	47.5	61.5	41.4
(2016/08/29 13:15:02.00)	(0:14:57.0)	48.3	67.2	41.2
(2016/08/29 13:30:03.00)	(0:14:56.0)	44	62.4	40.7
(2016/08/29 13:45:03.00)	(0:14:56.0)	45.4	62.3	40.4
(2016/08/29 14:00:02.00)	(0:14:57.0)	45.8	61.4	41.3

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/29 14:15:03.00)	(0:14:56.0)	45.7	62.6	42.2
(2016/08/29 14:30:03.00)	(0:14:56.0)	45.4	62	41.6
(2016/08/29 14:45:03.00)	(0:14:56.0)	48.4	67.7	42.5
(2016/08/29 15:00:02.00)	(0:14:57.0)	47	65.1	43.1
(2016/08/29 15:15:03.00)	(0:14:56.0)	47	66.2	42.9
(2016/08/29 15:30:02.00)	(0:14:57.0)	46.8	63.8	43.3
(2016/08/29 15:45:03.00)	(0:14:56.0)	46.5	62.9	43.3
(2016/08/29 16:00:02.00)	(0:14:57.0)	44.8	55.6	42.8
(2016/08/29 16:15:03.00)	(0:14:56.0)	45.2	61.1	43
(2016/08/29 16:30:03.00)	(0:14:56.0)	44.9	59	43
(2016/08/29 16:45:02.00)	(0:14:57.0)	45.2	56.5	42.6
(2016/08/29 17:00:04.00)	(0:14:55.0)	45.1	62	42.5
(2016/08/29 17:15:03.00)	(0:14:56.0)	50.9	67.5	43.8
(2016/08/29 17:30:03.00)	(0:14:56.0)	47.1	63.6	43.7
(2016/08/29 17:45:03.00)	(0:14:56.0)	47	64.7	44.1
(2016/08/29 18:00:03.00)	(0:14:56.0)	46.1	61.5	43.8
(2016/08/29 18:15:03.00)	(0:14:56.0)	46.8	67.6	43.7
(2016/08/29 18:30:03.00)	(0:14:56.0)	47.3	71.2	43.4
(2016/08/29 18:45:03.00)	(0:14:56.0)	45.4	62.2	42.8
(2016/08/29 19:00:02.00)	(0:14:57.0)	46	57.8	42.7
(2016/08/29 19:15:03.00)	(0:14:56.0)	44.9	55.5	42.6
(2016/08/29 19:30:03.00)	(0:14:56.0)	46.8	67.4	43.6
(2016/08/29 19:45:03.00)	(0:14:56.0)	48.1	66.2	44
(2016/08/29 20:00:03.00)	(0:14:56.0)	46.6	68	43.2
(2016/08/29 20:15:03.00)	(0:14:56.0)	45.6	55.9	42.5
(2016/08/29 20:30:03.00)	(0:14:56.0)	45	56.3	41.5
(2016/08/29 20:45:03.00)	(0:14:56.0)	44.9	57.6	42.1
(2016/08/29 21:00:03.00)	(0:14:56.0)	44.4	50.7	42.3
(2016/08/29 21:15:03.00)	(0:14:56.0)	43.7	51.9	42.2
(2016/08/29 21:30:03.00)	(0:14:56.0)	44.2	52.5	41.6
(2016/08/29 21:45:03.00)	(0:14:56.0)	43.3	49.8	40.9
(2016/08/29 22:00:03.00)	(0:14:56.0)	42.4	58.3	40.1
(2016/08/29 22:15:03.00)	(0:14:56.0)	42.5	53.7	39.9
(2016/08/29 22:30:03.00)	(0:14:56.0)	42.4	50.6	40.1
(2016/08/29 22:45:03.00)	(0:14:56.0)	42.8	51.3	40.9
(2016/08/29 23:00:03.00)	(0:14:56.0)	42.5	51.6	40.7
(2016/08/29 23:15:03.00)	(0:14:56.0)	42	45.8	40.9
(2016/08/29 23:30:03.00)	(0:14:56.0)	41.9	48.8	40.1
(2016/08/29 23:45:03.00)	(0:14:56.0)	42.7	50.3	40.7
(2016/08/30 00:00:03.00)	(0:14:56.0)	40.7	50.4	39.1
(2016/08/30 00:15:04.00)	(0:14:55.0)	39.6	44.9	38.2
(2016/08/30 00:30:02.00)	(0:14:57.0)	40.5	48.8	38.1
(2016/08/30 00:45:02.00)	(0:14:57.0)	40.6	48.8	39.3
(2016/08/30 01:00:03.00)	(0:14:56.0)	40.7	45.2	39.3
(2016/08/30 01:15:02.00)	(0:14:57.0)	40.9	47	39
(2016/08/30 01:30:02.00)	(0:14:57.0)	41.9	49.3	39.5
(2016/08/30 01:45:02.00)	(0:14:57.0)	41.1	46.9	39.1
(2016/08/30 02:00:02.00)	(0:14:57.0)	39.7	46.3	38.1
(2016/08/30 02:15:02.00)	(0:14:57.0)	40.3	47.8	38

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/30 02:30:02.00)	(0:14:57.0)	40.7	48.2	37.8
(2016/08/30 02:45:02.00)	(0:14:57.0)	41.3	48.6	38.4
(2016/08/30 03:00:02.00)	(0:14:57.0)	40.5	47.1	38
(2016/08/30 03:15:02.00)	(0:14:57.0)	42	47.9	40
(2016/08/30 03:30:02.00)	(0:14:57.0)	43	47.9	40.9
(2016/08/30 03:45:02.00)	(0:14:57.0)	44.2	51.5	42.3
(2016/08/30 04:00:02.00)	(0:14:57.0)	45.3	54	43.4
(2016/08/30 04:15:02.00)	(0:14:57.0)	44.2	49.4	42.5
(2016/08/30 04:30:02.00)	(0:14:57.0)	43.4	46.5	42.3
(2016/08/30 04:45:02.00)	(0:14:57.0)	45.4	50.3	43.5
(2016/08/30 05:00:02.00)	(0:14:57.0)	45.6	51.2	43.9
(2016/08/30 05:15:02.00)	(0:14:57.0)	47	64.3	45.2
(2016/08/30 05:30:02.00)	(0:14:57.0)	51.6	67.8	46.7
(2016/08/30 05:45:02.00)	(0:14:57.0)	51.5	67.5	48.5
(2016/08/30 06:00:02.00)	(0:14:57.0)	51.3	67	47.8
(2016/08/30 06:15:02.00)	(0:14:57.0)	52.2	67.3	48.6
(2016/08/30 06:30:03.00)	(0:14:56.0)	52.9	68.7	50
(2016/08/30 06:45:02.00)	(0:14:57.0)	53	66.9	49.9
(2016/08/30 07:00:02.00)	(0:14:57.0)	52	62.5	50.2
(2016/08/30 07:15:02.00)	(0:14:57.0)	51.7	65.6	49.4
(2016/08/30 07:30:02.00)	(0:14:57.0)	53.6	68	50.5
(2016/08/30 07:45:02.00)	(0:14:57.0)	52.4	67	48.1
(2016/08/30 08:00:02.00)	(0:14:57.0)	49.7	62.4	45.4
(2016/08/30 08:15:03.00)	(0:14:56.0)	49.8	67.2	42.3
(2016/08/30 08:30:02.00)	(0:14:57.0)	45.4	63.9	41.9
(2016/08/30 08:45:03.00)	(0:14:56.0)	48.6	67.5	40.9
(2016/08/30 09:00:02.00)	(0:14:57.0)	48.5	66.6	39
(2016/08/30 09:15:02.00)	(0:14:57.0)	47.1	66.7	39.1
(2016/08/30 09:30:02.00)	(0:14:57.0)	45	60.2	39.1
(2016/08/30 09:45:03.00)	(0:14:56.0)	42.7	58	39.9
(2016/08/30 10:00:02.00)	(0:14:57.0)	47.2	64.8	39.9
(2016/08/30 10:15:02.00)	(0:14:57.0)	41.9	56.6	39.4
(2016/08/30 10:30:03.00)	(0:14:56.0)	44.1	62.5	39.5
(2016/08/30 10:45:02.00)	(0:14:57.0)	42.3	59	38.9
(2016/08/30 11:00:03.00)	(0:14:56.0)	42	58.2	39.5
(2016/08/30 11:15:03.00)	(0:14:57.0)	41.8	54.1	39.2
(2016/08/30 11:30:03.00)	(0:14:56.0)	42.1	57.1	39.5
(2016/08/30 11:45:03.00)	(0:14:56.0)	42.3	63.7	39.7
(2016/08/30 12:00:02.00)	(0:14:57.0)	42.3	59.1	39.2
(2016/08/30 12:15:03.00)	(0:14:56.0)	42.1	62.6	39.3
(2016/08/30 12:30:03.00)	(0:14:56.0)	41.4	55.7	39.2
(2016/08/30 12:45:02.00)	(0:14:57.0)	41.1	52.7	38.9
(2016/08/30 13:00:03.00)	(0:14:56.0)	41.8	58.1	38.8
(2016/08/30 13:15:03.00)	(0:14:56.0)	41.2	54.3	38.6
(2016/08/30 13:30:03.00)	(0:14:56.0)	41.8	65.3	38.4
(2016/08/30 13:45:03.00)	(0:14:56.0)	40.5	56.2	38
(2016/08/30 14:00:03.00)	(0:14:56.0)	50.3	62.7	38.4
(2016/08/30 14:15:02.00)	(0:14:57.0)	56.7	67.1	48.4
(2016/08/30 14:30:03.00)	(0:14:56.0)	42.6	62.3	38.5

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/30 14:45:03.00)	(0:14:56.0)	45.9	63.5	39.1
(2016/08/30 15:00:02.00)	(0:14:57.0)	43.2	58	39.4
(2016/08/30 15:15:03.00)	(0:14:56.0)	43.9	57.2	39.2
(2016/08/30 15:30:03.00)	(0:14:56.0)	43	63.3	40.1
(2016/08/30 15:45:03.00)	(0:14:56.0)	42.9	64.1	39.7
(2016/08/30 16:00:03.00)	(0:14:56.0)	43.1	59.5	39.8
(2016/08/30 16:15:03.00)	(0:14:56.0)	43.3	59.6	39.2
(2016/08/30 16:30:03.00)	(0:14:56.0)	43	63.3	38.8
(2016/08/30 16:45:03.00)	(0:14:56.0)	41.3	61.6	38.7
(2016/08/30 17:00:02.00)	(0:14:57.0)	47.8	66.1	39.1
(2016/08/30 17:15:03.00)	(0:14:56.0)	44.6	62.4	39.1
(2016/08/30 17:30:03.00)	(0:14:56.0)	41.9	53.9	39.8
(2016/08/30 17:45:02.00)	(0:14:57.0)	51.3	66.9	40.5
(2016/08/30 18:00:03.00)	(0:14:56.0)	43	63.6	39.9
(2016/08/30 18:15:02.00)	(0:14:57.0)	45.6	65.4	40.6
(2016/08/30 18:30:03.00)	(0:14:56.0)	45.6	67.1	40.6
(2016/08/30 18:45:03.00)	(0:14:56.0)	44.8	62.5	41.1
(2016/08/30 19:00:03.00)	(0:14:56.0)	47.3	65.4	41.1
(2016/08/30 19:15:03.00)	(0:14:56.0)	44.6	59.8	41.8
(2016/08/30 19:30:03.00)	(0:14:56.0)	44.2	55.3	41.8
(2016/08/30 19:45:03.00)	(0:14:56.0)	47.1	62.6	42.7
(2016/08/30 20:00:04.00)	(0:14:55.0)	50.2	67.1	42.1
(2016/08/30 20:15:03.00)	(0:14:56.0)	42.2	55.7	39.2
(2016/08/30 20:30:03.00)	(0:14:56.0)	41.4	52.8	38.8
(2016/08/30 20:45:03.00)	(0:14:56.0)	42.2	53.1	39.3
(2016/08/30 21:00:03.00)	(0:14:56.0)	41.9	57.4	39.3
(2016/08/30 21:15:03.00)	(0:14:56.0)	42.1	57.5	39.3
(2016/08/30 21:30:03.00)	(0:14:56.0)	41.5	52.9	40
(2016/08/30 21:45:03.00)	(0:14:56.0)	42.5	49.2	40.8
(2016/08/30 22:00:03.00)	(0:14:56.0)	42.8	51.8	40.4
(2016/08/30 22:15:04.00)	(0:14:55.0)	42.6	48.9	41
(2016/08/30 22:30:03.00)	(0:14:56.0)	42.6	49	40.6
(2016/08/30 22:45:03.00)	(0:14:56.0)	42.8	51	40.3
(2016/08/30 23:00:03.00)	(0:14:56.0)	42.1	55.2	39.9
(2016/08/30 23:15:03.00)	(0:14:56.0)	42.6	50.6	39.7
(2016/08/30 23:30:03.00)	(0:14:56.0)	41.7	48.7	39.9
(2016/08/30 23:45:03.00)	(0:14:56.0)	43.3	59.6	40.4
(2016/08/31 00:00:03.00)	(0:14:56.0)	41.8	49	39.7
(2016/08/31 00:15:04.00)	(0:14:55.0)	42.5	49.1	40.4
(2016/08/31 00:30:02.00)	(0:14:57.0)	41.1	46	39.2
(2016/08/31 00:45:02.00)	(0:14:57.0)	41.6	51.4	39.2
(2016/08/31 01:00:02.00)	(0:14:57.0)	40.9	51.1	38.5
(2016/08/31 01:15:02.00)	(0:14:57.0)	40.6	50.2	37.5
(2016/08/31 01:30:02.00)	(0:14:57.0)	41.3	52.1	38.1
(2016/08/31 01:45:02.00)	(0:14:57.0)	40.3	48.7	37.8
(2016/08/31 02:00:02.00)	(0:14:57.0)	39.7	46.2	37.5
(2016/08/31 02:15:02.00)	(0:14:57.0)	40.5	52.8	37.3
(2016/08/31 02:30:02.00)	(0:14:57.0)	40.9	51.2	37
(2016/08/31 02:45:02.00)	(0:14:57.0)	41.3	50.5	37

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/31 03:00:02.00)	(0:14:57.0)	39.4	47.9	36.3
(2016/08/31 03:15:02.00)	(0:14:57.0)	39.7	47.8	36.1
(2016/08/31 03:30:02.00)	(0:14:57.0)	41.6	48.3	38.1
(2016/08/31 03:45:02.00)	(0:14:57.0)	43.6	52.3	40.3
(2016/08/31 04:00:02.00)	(0:14:57.0)	43.1	67.7	39.7
(2016/08/31 04:15:03.00)	(0:14:56.0)	42.9	48.7	40.9
(2016/08/31 04:30:02.00)	(0:14:57.0)	44.6	52.8	42.7
(2016/08/31 04:45:02.00)	(0:14:57.0)	45.3	51.3	43.3
(2016/08/31 05:00:02.00)	(0:14:57.0)	47.8	54.8	44
(2016/08/31 05:15:02.00)	(0:14:57.0)	49.8	65.2	46.3
(2016/08/31 05:30:02.00)	(0:14:57.0)	51.1	68	47.2
(2016/08/31 05:45:02.00)	(0:14:57.0)	54.3	68.2	48.5
(2016/08/31 06:00:02.00)	(0:14:57.0)	52.2	69.3	48.1
(2016/08/31 06:15:02.00)	(0:14:57.0)	53.3	69.2	50.2
(2016/08/31 06:30:03.00)	(0:14:56.0)	50.5	58.5	48.7
(2016/08/31 06:45:02.00)	(0:14:57.0)	52.4	66.8	50.5
(2016/08/31 07:00:02.00)	(0:14:57.0)	54.7	69.6	51.4
(2016/08/31 07:15:02.00)	(0:14:57.0)	52	66.8	49.7
(2016/08/31 07:30:02.00)	(0:14:57.0)	55.1	68.9	50.2
(2016/08/31 07:45:02.00)	(0:14:57.0)	58	73.2	48.1
(2016/08/31 08:00:02.00)	(0:14:57.0)	52.7	69.1	45.4
(2016/08/31 08:15:02.00)	(0:14:57.0)	44.9	57.4	42.5
(2016/08/31 08:30:03.00)	(0:14:56.0)	47	64.7	42.4
(2016/08/31 08:45:02.00)	(0:14:57.0)	50.1	68	41.9
(2016/08/31 09:00:03.00)	(0:14:56.0)	44	59.3	41.9
(2016/08/31 09:15:02.00)	(0:14:57.0)	43.9	57.1	41.4
(2016/08/31 09:30:02.00)	(0:14:57.0)	43.4	53.5	41.5
(2016/08/31 09:45:02.00)	(0:14:57.0)	46.9	64.4	42.6
(2016/08/31 10:00:02.00)	(0:14:57.0)	44.5	59.4	42.8
(2016/08/31 10:15:03.00)	(0:14:56.0)	46.4	63.2	43.3
(2016/08/31 10:30:02.00)	(0:14:57.0)	47	65.2	43.7
(2016/08/31 10:45:03.00)	(0:14:56.0)	46.8	66.8	43.3
(2016/08/31 11:00:02.00)	(0:14:57.0)	48	63.1	43.4
(2016/08/31 11:15:03.00)	(0:14:56.0)	44.6	55.4	42.8
(2016/08/31 11:30:02.00)	(0:14:57.0)	47.1	63.6	44
(2016/08/31 11:45:03.00)	(0:14:56.0)	46.4	69.6	44.5
(2016/08/31 12:00:02.00)	(0:14:57.0)	45.6	55.7	44.1
(2016/08/31 12:15:03.00)	(0:14:57.0)	44.9	54.4	43.4
(2016/08/31 12:30:03.00)	(0:14:56.0)	44.7	58.7	42.9
(2016/08/31 12:45:03.00)	(0:14:56.0)	45.3	58.8	42.5
(2016/08/31 13:00:03.00)	(0:14:56.0)	43.8	53.7	42.1
(2016/08/31 13:15:03.00)	(0:14:56.0)	44.8	60.4	42.1
(2016/08/31 13:30:02.00)	(0:14:57.0)	45.6	68.4	42.8
(2016/08/31 13:45:03.00)	(0:14:56.0)	45.2	62.6	43.4
(2016/08/31 14:00:02.00)	(0:14:57.0)	45.5	55.1	43.8
(2016/08/31 14:15:03.00)	(0:14:56.0)	46.2	59.1	44.7
(2016/08/31 14:30:03.00)	(0:14:57.0)	46.6	65.6	44.5
(2016/08/31 14:45:03.00)	(0:14:56.0)	47.1	56.2	45.6
(2016/08/31 15:00:02.00)	(0:14:57.0)	47.6	59.4	45.6

Date	Duration	LAeq	LAFmax	LAF90
(2016/08/31 15:15:03.00)	(0:14:56.0)	47.1	54	45.7
(2016/08/31 15:30:02.00)	(0:14:57.0)	45.5	52.1	44.1
(2016/08/31 15:45:03.00)	(0:14:56.0)	45.6	52.4	44.1
(2016/08/31 16:00:04.00)	(0:14:55.0)	46.4	56.1	45.1
(2016/08/31 16:15:02.00)	(0:14:57.0)	45.1	54.6	43.8
(2016/08/31 16:30:03.00)	(0:14:56.0)	45.6	52.9	44.1
(2016/08/31 16:45:03.00)	(0:14:56.0)	45	61	43.1
(2016/08/31 17:00:02.00)	(0:14:57.0)	44.7	59.4	43.2
(2016/08/31 17:15:03.00)	(0:14:56.0)	45.2	53.8	43.5
(2016/08/31 17:30:03.00)	(0:14:56.0)	45.7	54.8	44.3
(2016/08/31 17:45:03.00)	(0:14:56.0)	46.1	60.2	44.5
(2016/08/31 18:00:03.00)	(0:14:56.0)	46.9	55.6	45.5
(2016/08/31 18:15:03.00)	(0:14:56.0)	47.1	56.7	45.4
(2016/08/31 18:30:03.00)	(0:14:56.0)	46.3	57.5	44.7
(2016/08/31 18:45:03.00)	(0:14:56.0)	47.9	59.2	45.5
(2016/08/31 19:00:03.00)	(0:14:56.0)	47.2	62.1	45.7
(2016/08/31 19:15:03.00)	(0:14:56.0)	46.3	60.8	44.6
(2016/08/31 19:30:03.00)	(0:14:56.0)	46.3	56.1	44.5
(2016/08/31 19:45:03.00)	(0:14:56.0)	47.4	65.8	44.5
(2016/08/31 20:00:03.00)	(0:14:56.0)	46.1	61	43.6
(2016/08/31 20:15:03.00)	(0:14:56.0)	50.2	68.2	44.5
(2016/08/31 20:30:03.00)	(0:14:56.0)	46	58.5	44.2
(2016/08/31 20:45:03.00)	(0:14:56.0)	45.5	56.4	44
(2016/08/31 21:00:03.00)	(0:14:56.0)	46.1	53.1	44.6
(2016/08/31 21:15:03.00)	(0:14:56.0)	46.2	60.8	44.1
(2016/08/31 21:30:03.00)	(0:14:56.0)	45.2	57.2	43.3
(2016/08/31 21:45:03.00)	(0:14:56.0)	46.1	55.5	44.6
(2016/08/31 22:00:03.00)	(0:14:56.0)	46.4	54.9	44.6
(2016/08/31 22:15:03.00)	(0:14:56.0)	46.3	52.1	44.8
(2016/08/31 22:30:03.00)	(0:14:56.0)	45.3	52	43.7
(2016/08/31 22:45:03.00)	(0:14:56.0)	45.9	52.9	44.2
(2016/08/31 23:00:03.00)	(0:14:56.0)	45.7	64.5	43.3
(2016/08/31 23:15:03.00)	(0:14:56.0)	44	49.5	42
(2016/08/31 23:30:03.00)	(0:14:56.0)	43.6	49	42
(2016/08/31 23:45:03.00)	(0:14:56.0)	42.4	55.5	40.4
(2016/09/01 00:00:04.00)	(0:14:55.0)	43.4	51.7	40.9
(2016/09/01 00:15:03.00)	(0:14:56.0)	42.8	52.7	40.7
(2016/09/01 00:30:02.00)	(0:14:57.0)	43.2	50.2	41.3
(2016/09/01 00:45:02.00)	(0:14:57.0)	42.9	50.3	41.3
(2016/09/01 01:00:02.00)	(0:14:57.0)	41.8	47.3	40.3
(2016/09/01 01:15:02.00)	(0:14:57.0)	42.7	48	40.7
(2016/09/01 01:30:02.00)	(0:14:57.0)	42.9	48.2	41
(2016/09/01 01:45:02.00)	(0:14:57.0)	42.5	50.9	40.2
(2016/09/01 02:00:03.00)	(0:14:56.0)	42.1	50	40.2
(2016/09/01 02:15:02.00)	(0:14:57.0)	46.2	68.9	40
(2016/09/01 02:30:02.00)	(0:14:57.0)	41.9	50.3	39.8
(2016/09/01 02:45:02.00)	(0:14:57.0)	42.4	49.8	40.2
(2016/09/01 03:00:02.00)	(0:14:57.0)	41.8	47.4	39.9
(2016/09/01 03:15:02.00)	(0:14:57.0)	41.8	49	40

Date	Duration	LAeq	LAFmax	LAF90
(2016/09/01 03:30:02.00)	(0:14:57.0)	43.1	48.3	41.3
(2016/09/01 03:45:03.00)	(0:14:56.0)	42.8	46.7	41.4
(2016/09/01 04:00:02.00)	(0:14:57.0)	42.4	48.2	40.3
(2016/09/01 04:15:02.00)	(0:14:57.0)	42.6	48.3	40.9
(2016/09/01 04:30:02.00)	(0:14:57.0)	44.6	49.3	42.9
(2016/09/01 04:45:02.00)	(0:14:57.0)	43.5	47.6	42.3
(2016/09/01 05:00:03.00)	(0:14:56.0)	44.2	48.4	42.6
(2016/09/01 05:15:02.00)	(0:14:57.0)	45.6	58.9	44.1
(2016/09/01 05:30:02.00)	(0:14:57.0)	52.2	68.4	44.7
(2016/09/01 05:45:02.00)	(0:14:57.0)	50.2	67.1	46.7
(2016/09/01 06:00:02.00)	(0:14:57.0)	50.4	72	47.8
(2016/09/01 06:15:02.00)	(0:14:57.0)	52.5	69.3	48
(2016/09/01 06:30:02.00)	(0:14:57.0)	52.3	60.8	51.2
(2016/09/01 06:45:02.00)	(0:14:57.0)	53.4	75.8	51.5
(2016/09/01 07:00:02.00)	(0:14:57.0)	51.9	67.6	49.3
(2016/09/01 07:15:02.00)	(0:14:57.0)	51.7	68.4	48.5
(2016/09/01 07:30:02.00)	(0:14:57.0)	51.5	68.6	46.9
(2016/09/01 07:45:02.00)	(0:14:57.0)	48.5	67.9	45.5
(2016/09/01 08:00:03.00)	(0:14:56.0)	49.1	67.6	42.8
(2016/09/01 08:15:02.00)	(0:14:57.0)	45.5	60.7	42
(2016/09/01 08:30:02.00)	(0:14:57.0)	50.1	68.2	42.5
(2016/09/01 08:45:02.00)	(0:14:57.0)	46.4	66.3	42.3

Appendix 12.3 Noise and vibration impact assessment

UNIVERSITY OF CAMBRIDGE

MAX FORDHAM

The Civil Engineering Building

Noise & Vibration Impact Assessment

Rev F

October 2016

Noise and Vibration Impact Assessment

Prepared by Max Fordham

Submitted as part of the planning application for the Civil Engineering Building

On the West Cambridge Site, Madingley Road, Cambridge

Version Rev F

Dated October 2016

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ISSUE HISTORY

Issue	Date	Description
*	30/02/2016	For Information
A	13/07/2016	For Information
B	09/09/2016	For Information
C	28/09/2016	For Information
D	30/09/2016	For Information
E	30/09/2016	For Information
F	07/10/2016	For Planning Submission

MAX FORDHAM LLP TEAM CONTRIBUTORS

Engineer	Role
Peter Leonard	Project Acoustic Engineer
Anthony Chilton	Acoustic Team Leader
Josh Rodell	Graduate Acoustic Engineer

CONTENTS

1.0 INTRODUCTION

Max Fordham LLP have been appointed to provide acoustic design and advice for the new building on behalf of Grimshaw Architects.

An acoustic noise survey has been undertaken in order to establish the existing acoustic environment and baseline noise levels. A calculation of the airborne noise levels resulting from the proposed development has been prepared and an assessment of the significance of noise impact at the nearest noise sensitive receptors has been made. This report presents and summarises the results of this noise impact assessment.

Sound Space Vision, on behalf of Smith & Wallwork Ltd, have undertaken an assessment of the vibration impact from the proposed development and this vibration impact assessment is included in the appendices of this report.

2.0 RELEVANT STANDARDS AND GUIDANCE

2.1 National Planning Policy Framework

The NPPF sets out the Government's planning policies for England and how these are expected to be applied. Section 11 paragraph 123 of NPPF states that planning policies and decisions should aim to:

- Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put upon them because of changes in nearby land uses since they were established;
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;"

2.2 Noise Policy Statement for England

The Department for Environmental Food and Rural Affairs published the NPSE in 2010. This document is intended to apply to all forms of noise other than that which occurs in the workplace and includes environmental noise and neighbourhood noise in all forms.

The NPSE contains an explanatory notes which defines the NOEL, LOAEL and SOAEL terms which are used in the NPPF:

NOEL – No Observed Effect Level: This is the level below which no effect can be detected. In simple terms, below this level there is no detectable effect on health and quality of life due to the noise

LOAEL – Lowest Observed Adverse Effect Level: This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level: This is the level above which significant adverse effects on health and quality of life occur

2.3 National Planning Practice Guidance

The NPPG published in 2014 states that "noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment".

The NPPG provides advice on how to determine the impact of noise, including whether or not a significant adverse effect "is occurring or likely to occur" and whether or not a "good standard of amenity can be achieved".

2.4 Local Noise Policy

Cambridge Environmental Health have confirmed that the noise impact requirements, relating to *'mechanical and electrical building services and other sound of an industrial and/or commercial nature, in order to protect the quality of life / amenity of neighbouring premises'* are as follows:

> *"To satisfy any plant noise assessment or noise insulation condition, the rating level (in accordance with BS4142:2014) from all plant, equipment and vents etc (collectively) associated with this*

application should be less than or equal to the existing background level (L90) at the boundary of the premises subject to this application and having regard to noise sensitive premises."

Policy 4/13 "Pollution and Amenity" of the Cambridge City Council's Local Plan (July, 2006) states:

"Development will only be permitted which:

a. does not lead to significant adverse effects on health, the environment and amenity from pollution; or

b. which can minimise any significant adverse effects through the use of appropriate reduction or mitigation measures.

Proposals that are sensitive to pollution, and located close to existing pollution sources, will be permitted only where adequate pollution mitigation measures are provided as part of the development package."

3.0 BACKGROUND NOISE SURVEY

Two long term noise surveys have been undertaken by Max Fordham LLP in order to establish the existing background noise levels at the site of the proposed building.

A 48-hour noise survey was undertaken from the 22nd – 24th February 2016, during a period where the roads are busy (few people on holiday). A second, 140-hour, noise survey was undertaken at the same location from the 26th August to 1st September 2016, during a school and university holidays when the traffic is much lighter. This survey period incorporates weekdays and weekends. There was a bank holiday Monday during this measurement period which for the purposes of this survey is assumed to be similar to a weekend day.

It is expected that noise levels during the weekend will be similar both within and outside of summer holiday periods.

The chosen measurement location is considered to be representative of the noise levels experienced at the nearest residential property to the proposed development, at The Lawns of Clerk Maxwell Road.

3.1 Survey Procedure

For both surveys a sound level meter was set up to make consecutive 15 minute noise throughout the survey duration.

The microphone of the sound level meter was mounted on a tripod externally, approximately 1.5m from the ground (See Figure 1 and Figure 2). This position is considered to be free-field and representative of noise levels experienced at the nearest noise sensitive properties to the proposed development. A weather protection kit was used. The sound level meter was calibrated at the beginning and end of the survey period and no significant drift was observed.

The weather conditions throughout the survey in February were moderately cold with wind speeds typically below 4m/s and no precipitation. During the survey in August the weather conditions were warm (typically between 15 and 25 degrees Celsius) with wind speeds typically below 5m/s. There were 2 short periods of rainfall (approx. 40 mins) during the survey at around 4pm and 9pm 28th August 2016.

All weather data is obtained from Atomwide Weather Station in Cambridge, approximately 1km from the measurement location.

A microphone windshield was used during all measurements. The weather conditions are not considered to have affected the noise survey results in any significant way during either survey.

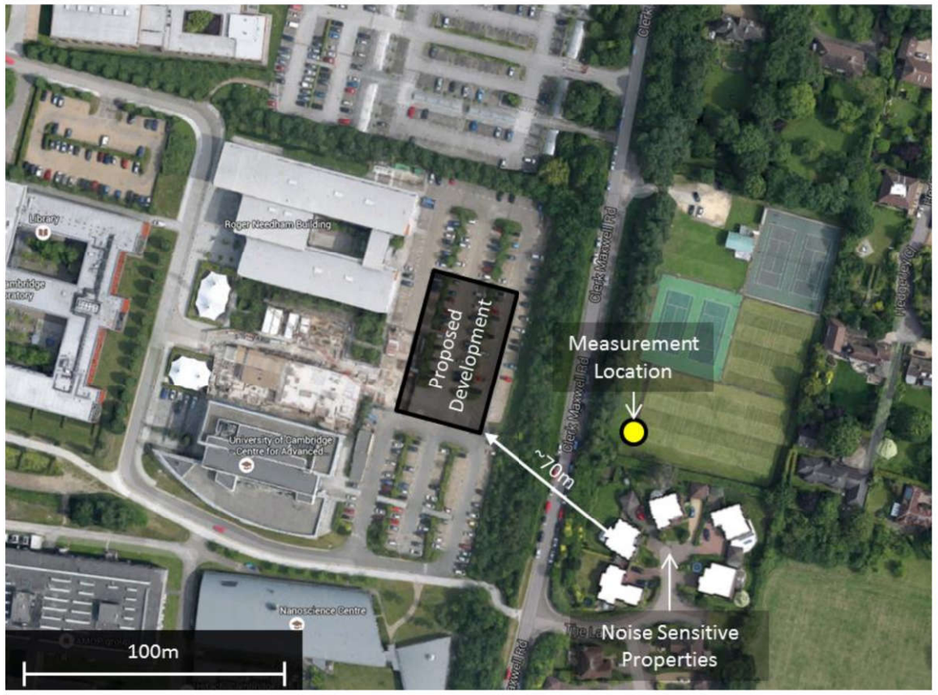


Figure 1 - Site Plan & Measurement Location

Figure 2 - Photo of 48-hour Survey

3.2 Survey Equipment

Table 1 and Table 2 below give details of the equipment used during the long term noise surveys and the dates are the relevant accredited calibration. Copies of calibration certificates are available upon request.

Item	Make	Type	Serial no.	Calibration Intervals	Last Calibrated	Next Due Calibration
Class 1 sound level meter	Norsonic	140	1405942	2 years	20/03/2014	20/03/2016
Microphone	Norsonic	1225	208215	2 years	20/03/2014	20/03/2016
Microphone preamplifier	Norsonic	1209	15804	2 years	20/03/2014	20/03/2016
Calibrator	Norsonic	1251	34059	1 year	11/04/2015	11/04/2016
A calibration check was undertaken using the sound pressure level calibrator producing 114.0 dB at an octave band centre frequency of 1000 Hz with reference to 2×10^{-5} N m^{-2} before and after the tests.						

Table 1 - 1st Survey Sound Level Meter and Calibrator Information

Item	Make	Type	Serial no.	Calibration Intervals	Last Calibrated	Next Due Calibration
Class 1 sound level meter	Norsonic	140	1405942	2 years	11/04/2016	11/04/2018
Microphone	Norsonic	1225	208215	2 years	11/04/2016	11/04/2018
Microphone preamplifier	Norsonic	1209	15804	2 years	11/04/2016	11/04/2018
Calibrator	Norsonic	1251	34059	1 year	11/04/2016	11/04/2017
A calibration check was undertaken using the sound pressure level calibrator producing 114.0 dB at an octave band centre frequency of 1000 Hz with reference to 2×10^{-5} N m^{-2} before and after the tests.						

Table 2 - 2nd Survey Sound Level Meter and Calibrator Information

3.3 Survey Results

The results of the noise surveys are presented graphically in Figure 3 and Figure 4 below. Table 3 gives a summary of the minimum background, "representative" background and logarithmic average values for day, evening and night time periods.

It is assumed that the differences in noise level between the two surveys is due to a reduced level of activity around in the local area during the second survey because it was during the summer holiday period. Values are separated further to show values for week days during busier seasons, week days outside busy seasons and weekends. In some respects the February survey results are likely to be more representative for the normal noise levels on site but to ensure acceptable noise levels the limits have been set on the more onerous survey.

BS4142:2014 states that the impact of noise should be assessed in comparison to the background noise level. However when obtaining the background noise level it is also noted that *"the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods".*

The proposed method of obtaining "typical" background noise levels is to discount the highest 20% of values in order to ensure outlying erroneous values are discounted then take the median of the remaining values to be representative of the background level. Therefore the 40th percentile value of background noise levels is used as a "representative" background noise level.

Histograms of the background noise level for each day, evening and night period are shown in Appendix A – Background Noise Level Histograms.

Parameter	Time Period	Busy Week	Holiday Week	Weekend
$L_{A90,15min}$ Minimum	Day (8am – 6pm)	42	38	37
	Eve (6pm - 11pm)	42	39	37
	Night (11pm – 8am)	40	36	31
$L_{A90,15min}$ 40th Percentile	Day (8am – 6pm)	47	42	42
	Eve (6pm - 11pm)	47	42	41
	Night (11pm – 8am)	43	40	37
$L_{Aeq,T}$	Day (8am – 6pm)	51	47	48
	Eve (6pm - 11pm)	49	46	46
	Night (11pm – 8am)	49	48	44

Table 3 - Summary of Noise Survey Results

In order to allow an assessment for particular time periods the representative background noise levels for Saturday mornings (9am to 1pm) have also been calculated as:

- Minimum $L_{A90,15min\ (9am-1pm)}$ = 41dB
- 40th Percentile $L_{A90,15min\ (9am-1pm)}$ = 42dB
- $L_{Aeq,(9am\ -\ 1pm)}$ = 47dB

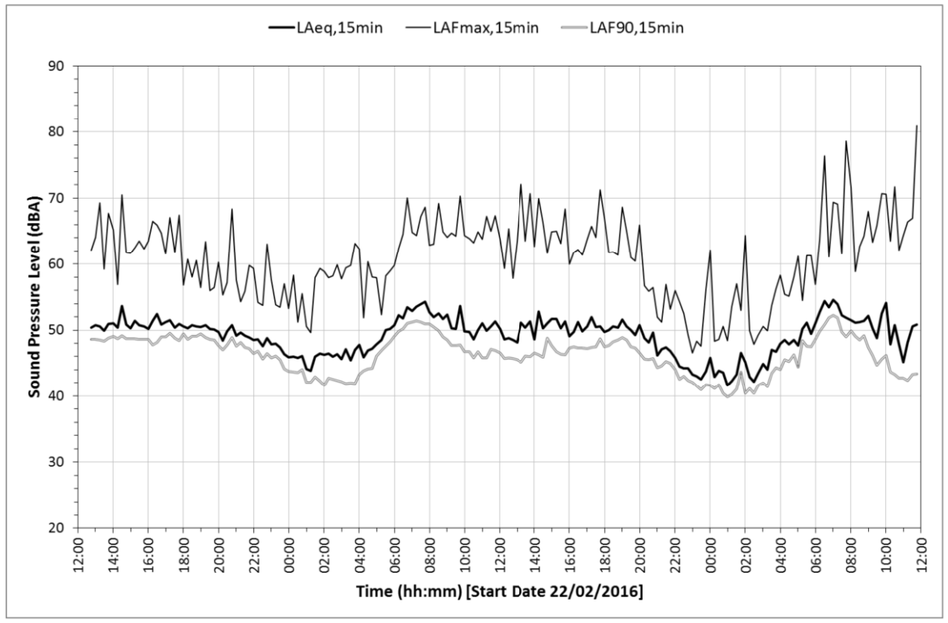


Figure 3- Summary of Survey Results (Feb Survey)

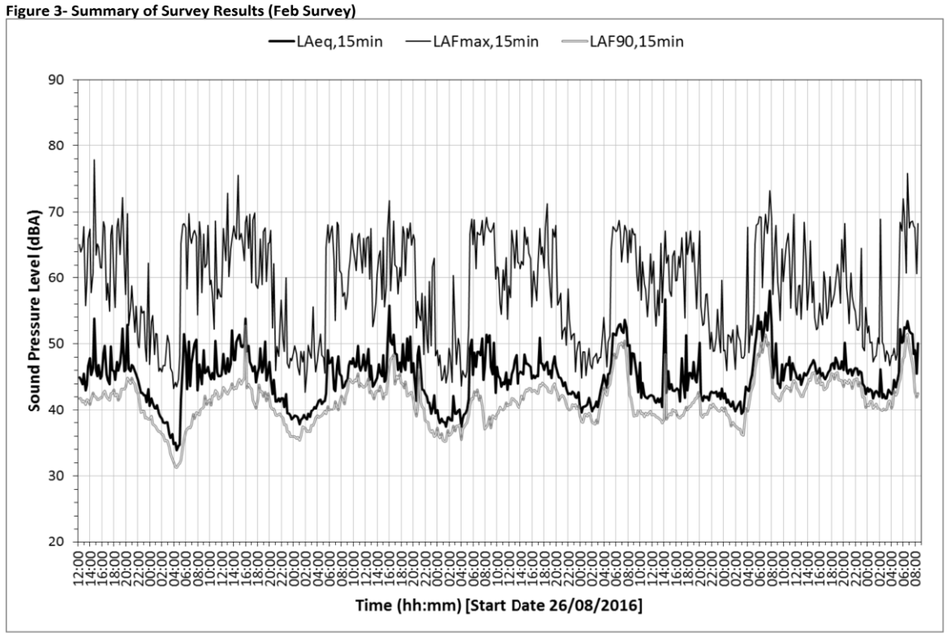


Figure 4 - Summary of Survey Results (Aug Survey)

4.0 TARGET NOISE LEVELS

There are two sources of noise which have been identified by the design team and Cambridge City Council as having a potential impact on nearby residents:

- Plant & Machinery Noise: Including both noise from fixed external plant and noise from machinery used within the structures lab.
- Delivery Access Road: Noise from vehicles on the access road, making deliveries to the structures lab.

4.1 Plant & Machinery

In order to avoid noise from the proposed site causing a noise impact on the nearby residential properties it is critical that noise from machinery and equipment is sufficiently attenuated. The usual method for rating and assessing industrial sound is set out in British Standard 4142:2014.

BS 4142 states that an estimate of the impact of the specific sound can be obtained by subtracting the background sound level from the rating level. The specific sound is the level of the new sound source (i.e. Concrete Mixer etc.) and the rating level is the specific sound level with penalties applied to account for certain characteristics of the sound.

It is then stated that:

- *A difference of around +10dB or more is likely to be an indication of a significant adverse impact.*
- *A difference of around +5dB is likely to be an indication of an adverse impact.*
- *Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.*

Cambridge Council have confirmed that an assessment should be made at the boundary of the proposed development and that the noise rating level should not exceed the background noise level as per the local authority noise policy described in Section 2.4.

4.2 Delivery Access Road

The delivery access road is a noise source which is associated with the development (rather than a public access road) and as such the local authority have requested that it should be assessed under the criteria of sound of an industrial/commercial nature as per BS 4142:2014

5.0 PLANT & MACHINERY NOISE LEVELS

5.1 Engineering Machinery Noise Levels

On 3rd February 2016 measurements were made of the equipment and machinery within the existing Cambridge University Engineering Department building on Trumpington Street, Cambridge.

The items of equipment measured were a concrete mixer, a concrete beam shaker and a jackhammer. See Figure 5 for photos of the items of machinery that were measured.

Figure 5 - Photos of Machinery

Measurements were taken at a distance far enough away from the item of machinery in order to ensure that the measurements were taken within the reverberant sound field of the room, rather than the direct sound field.

Table 4 and Figure 6 show the 1/3rd octave band reverberant sound pressure levels for each item of machinery measured.

It should be noted that the use of the jack hammer is only occasional, but is included in this assessment to demonstrate that the worst case is still acceptable.

Frequency (Hz)	Concrete Mixer	Beam Shaker	Jack Hammer
50	65.6	90.9	50.7
63	71.9	94.3	51.1
80	72.5	83.1	52.9
100	81.8	70.8	55.9
125	79.7	84	63.0
160	85.8	79.1	62.8
200	79.6	75.8	62.9
250	77.8	72.1	71.5
315	76.8	74.6	72.7
400	79.4	76.7	80.5
500	81.2	78.6	84.8
630	79.7	79.6	84.0
800	82.2	78.2	85.8
1000	84	78.3	82.6
1250	85.4	79.9	81.0
1600	87.7	79.8	82.2
2000	89.2	74.1	83.4
2500	87.5	72.3	81.2
3150	86.9	70.3	81.8
4000	88.2	67.5	83.9
5000	87.6	64.4	81.5
6300	84.3	61.1	85.7
8000	81.1	59.3	82.0
A-Weighted	**97.9**	**87.6**	**94.6**

Table 4 - Machinery Reverberant Sound Pressure Levels (dB)

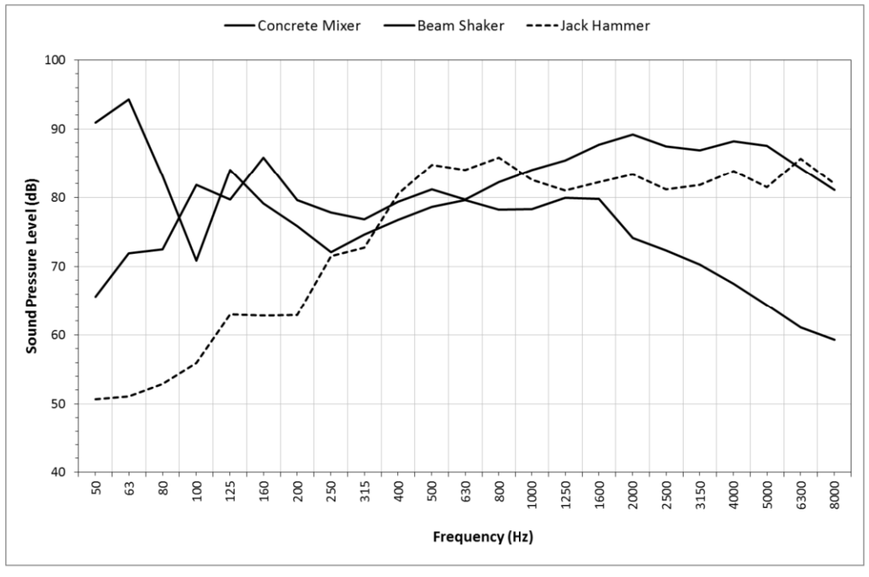


Figure 6 - Machinery Reverberant Sound Pressure Levels (dB)

5.2 Mechanical Plant Equipment Noise Levels

The complete extent and acoustic performance of mechanical plant is not finalised at this stage, however below is a summary of the main plant items that are expected to form part of a noise impact assessment:

- Ground floor internal plant room – Central heating & cooling plant
- Roof plant – Fume cupboard extract fan
- Local ventilation plant – A number of labs, offices and meetings contain local MVHR units and/or fan-coil units.

There are currently no emergency generators or large items of external plant equipment within the current proposals.

6.0 ACCESS ROAD NOISE LEVELS

British Standard 5228 Part 1: 2009 "Code of practice for noise and vibration on construction and open sites" has various information and guidelines on noise from plant, machinery and vehicles. Annex C of BS5228 provides "current sound level data on site equipment and site activities" and the relevant levels are reproduced below along with an average value which will be used for the assessment.

Table	Ref no.	Description	Power Rating [kW]	Weight [t]	Lmax at 10m [dB] in Frequency Octave Bands [Hz]								
					63	125	250	500	1k	2k	4k	8k	dBA
C.11	6	Lorry	343	29	92	82	76	78	77	76	74	68	83
C.11	16	Lorry	235	26	86	81	74	76	73	72	69	60	79
C.11	19	Lorry	201	26	87	76	73	81	79	75	68	62	83
C.11	20	Lorry	160	18	91	76	79	78	80	76	70	64	83
Average					**89**	**79**	**76**	**78**	**77**	**75**	**70**	**64**	**82**

Table 5 - BS5228-1 Lorry Lmax Levels

Noise levels of an idling vehicle (specifically a Dumper Truck in this case) can also be taken from Annex C of BS5228-1:2009 and are reproduced below:

Description	Leq at 10m [dB] in Frequency Octave Bands [Hz]								
	63	125	250	500	1k	2k	4k	8k	dBA
Idling Vehicle (BS5228-1 Table C.4 Ref 5)	73	64	55	55	60	56	50	43	63

Table 6 - BS5228-1 Idling Vehicle Leq

7.0 PROPOSED FAÇADE PERFORMANCE

The façade of the proposed building is approximately 78m from the façade of the nearest residential property and 60m from the garden boundary fence of the nearest residential property. The façade is specified to be constructed of the following elements:

Façade Element	Area (m^2)	Sound Reduction Rw (dB)	Transmission Coefficient, t	Area weighted transmission
Ventilation Opening	12	36	0.00025	0.0030
Glazing	28	41	0.00008	0.0022
Sliding Door	73	47	0.00002	0.0015
Solid Façade	82	47	0.00002	0.0016
Total	**195**	**43.7**	**0.00004**	**0.0083**
Formula	A	R	10^(-0.1 x R)	t x A

Table 7 - Proposed Façade Performance

Accounting for the area of the façade and external propagation over a distance of 60m there will be a weighted sound level difference between the internal reverberant noise level of the proposed building and the level at the garden boundary of the nearest residential property of 70dB.

Description	Formula	Reduction
Reverberant level to sound intensity in façade	10Log(4)	6dB
Sound reduction of facade	Refer to Table 7	43.7dB
Area source propagation to 2.9m	No attenuation from area source	0dB
Line source propagation to 6.4m	10Log(6.4/2.9)	3.5dB
Point source propagation to 60m	$10Log(60^2/6.4^2)$	19.5dB
Hemispherical propagation correction	-10Log(2)	-3dB
Total Attenuation		**70dB**

Table 8 - Facade Noise Propagation Calculation

8.0 ACCESS ROAD PROPERTIES

An assessment of the noise levels from deliveries using the proposed access road will be made at the nearest noise sensitive property which is approximately 78m from the engineering building façade and 57m from the access road (at its closest point). See Figure 8.

There is an earth mound between the engineering building and the nearest residents. At the area directly outside the structures lab, where deliveries are expected to be made, the mound is at a height of approximately 2m above ground level. Along the length of the access road, the height of the earth mound varies and a height of 1.5m above ground level is taken for the purposes of this assessment. Figure 7 shows the measured ground heights of the proposed service access road, the earth mound on the site boundary and the height of Clerk Maxwell road.

The height of the receptor point is taken as being at a first floor window, approximately 4.5m above ground level. It is understood that the ground height at the location of the sensitive receptor is approximately 1.4m lower than the reference ground height of the service road. Therefore the receptor is taken to be 3.1m.

Table 9 below summarises the distances and reference heights of the noise sensitive receptor locations.

Location Parameter	Residential Façade at 1st Floor	Residential Garden
Distance to engineering building	78m	60m
Distance to access road (closest point)	57m	47m
Assessment height	4.5m	1.5m
Assessment height relative to reference ground level	3.1m	0.1m

Table 9 - Location parameters of sensitive receptors

For the case of a vehicle moving along the access road, a correction is required to convert the Lmax value at 10m to an average (LAeq) value corresponding to the equivalent noise level of the vehicle moving along the access road. It is assumed that vehicles will travel at 20km/h along the access road. Equation F.6 from BS5228-1:2009 gives a method for calculating the equivalent continuous noise level from vehicles that pass along service roads at intervals. This equation will be used to assess the equivalent noise level at the nearest sensitive receptor. Calculation details are given in Section 9.4.

Additionally, it is assumed that vehicles will spend up to 10 minutes idling outside the engineering building. Vehicles will drive into the structures lab of the engineering building and the acoustic doors will be closed before any loading/unloading takes place. There will be no external loading or unloading of vehicles.

As per the methodology of BS4142, the specific sound source is to be evaluated over a reference time interval of 1 hour. It is currently assumed that there will be no more than 1 delivery vehicle within any 1 hour period.

The university have confirmed that there will be approximately 6 HGV (<30 tonne) deliveries per year and all other deliveries will be via light goods vehicles, typically small vans up to 3.5 tonnes.

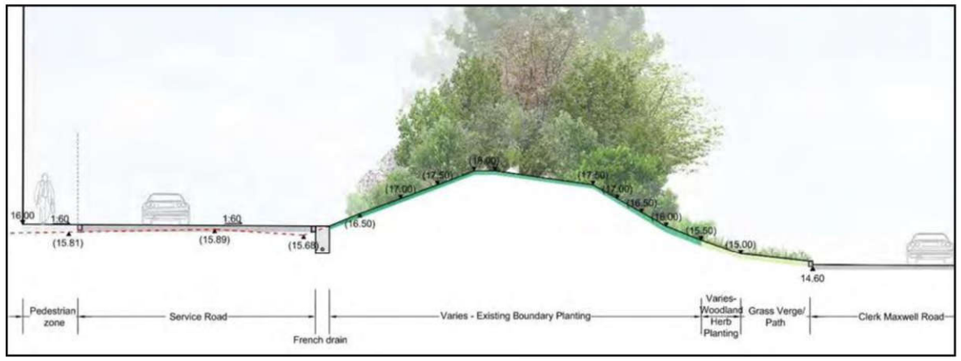


Figure 7 - Section showing relative ground heights

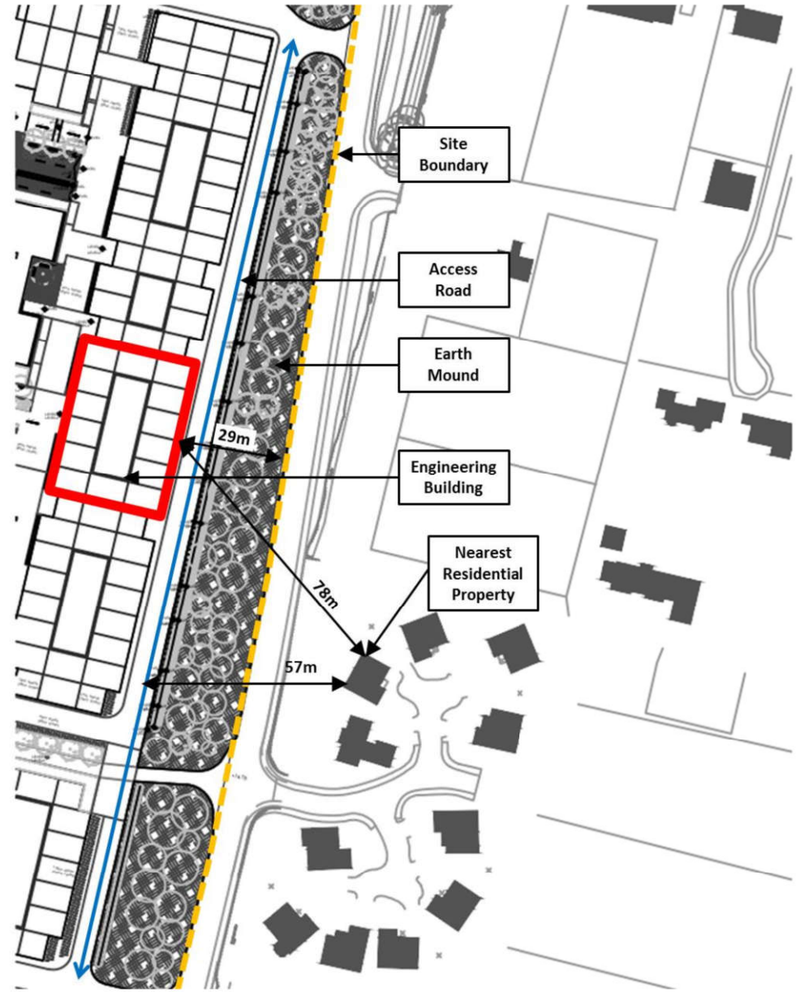


Figure 8 - Site Plan Showing Access Road

9.0 NOISE IMPACT ASSESSMENT

9.1 Engineering Machinery

All engineering machinery (concrete mixers, jack hammer, beam shaker etc.) will be operated internally within the proposed building only. Therefore, the composite façade sound reduction provides the primary means of mitigating any noise impact from this machinery.

The loudest piece of machinery measured was the concrete mixer with a reverberant sound pressure level of 97.9dBA. According to the method in Annex C of British Standard 4142:2014 there is no single 1/3rd octave band sound level that is sufficiently higher than its adjacent bands for the noise source to be considered tonal.

It is proposed that a 3dB penalty should be applied to account for the intermittent nature of the noise source and a further 3dB penalty applied to account for the impulsive nature of the noise source (This applies more to the jack hammer than the concrete mixer, but is applied as a worst case scenario).

Therefore, the noise rating level of the concrete mixer is 104dBA. Subtracting the sound level difference described in Section 7.0 of 70dB, the noise rating level at the garden boundary of the nearest residential property is expected to be 34dB. An assessment at the façade of the residential property would be marginally lower.

As per BS4142:2014, the noise rating level should be compared to the representative background noise level which has been measured to be 47dBA by taking the 40th percentile LA90,15min value.

This noise rating level is **13dBA below** the typical background noise level and easily achieves the target set out in Section 4.1 and is in accordance Cambridge Environmental Health noise impact criteria as detailed in Section 2.4 and 4.0. A summary of the noise rating level in comparison to background noise levels during various time periods is given in Table 10.

It can be seen that the noise rating level from machinery within the engineering building is below the typical background noise level at the boundary of the nearest residential property (garden boundary). However, it is not anticipated that any such machinery would normally be operated outside of the daytime period (8am to 6pm).

Time of Year / Week	Time Period	Typical Background Noise	Excess of Rating (34dBA) Over Background Sound Level
Busy Week	8am – 6pm	47 dBA	-13dBA
	6pm – 11pm	47 dBA	-13dBA
	11pm – 8am	43 dBA	-9dBA
Holiday Week	8am – 6pm	42 dBA	-8dBA
	6pm – 11pm	42 dBA	-8dBA
	11pm – 8am	40 dBA	-6dBA
Weekend	8am – 6pm	42 dBA	-8dBA
	6pm – 11pm	41 dBA	-7dBA
	11pm – 8am	37 dBA	-3dBA

Table 10 - Machinery Noise Impact Assesment

Uncertainty of the Assessment
The measurement of the background noise levels have been taken under repeatable conditions over an extended period of time (~190 hours) covering every day of the week, therefore it is expected that the uncertainty of the background noise level measurement will be very low.

Measurements of the machinery noise levels have been taken from the existing items that the University currently use and are understood to be the same items that will be used within the proposed building. However, the new structures lab is specified to have a much lower reverberation time than the existing building and so it is expected that the reverberant noise level within the structures lab may be up to 5dB less. Sound reduction data for the specified façade performance is taken from laboratory tests reports of the currently proposed products.

The excess of the rating level of the background sound level is -13dBA and so in this instance the uncertainty of the assessment does not have any significance to the outcome of the assessment.

9.2 Engineering Machinery Low Frequency Assessment

During discussions with Cambridge Environmental Services a query has been raised highlighting a concern as to whether low frequencies noise from the engineering machinery may result in a noise impact over above that identified by the A-weighted assessment.

This additional assessment has been included in order to present the anticipated low frequency noise levels at the nearest residents resulting from the use of engineering machinery.

The Beam Shaker was measured as having the highest reverberant sound pressure levels at 50Hz and 63Hz. These were 91dB and 94dB respectively as shown in Table 4. Applying the same characteristic penalties as discussed in Section 9.1 results in Noise Rating Levels of 97dB and 100dB at 50Hz and 63Hz respectively.

The frequency weighted sound reduction index of the façade is calculated to be 44dB in Section 7.0. At 50Hz and 63Hz this is expected to be 18dB with a resulting sound level difference between the internal reverberant noise level of the proposed building and the level at the garden boundary of the nearest residential property of 46dB.

Therefore, the noise rating level of the Beam Shaker at the garden boundary of the nearest residential property would be 51dB and 54dB at 50Hz and 63Hz respectively.

The measured 40th percentile daytime background noise level is 55dB and 54dB at 50hz and 60Hz respectively. Therefore, the low frequency component of the machinery noise level is not significantly above the measured background noise level and it is expected that there would be no adverse impact from low frequency noise.

It should also be noted that the anticipated low frequency noise level of the Beam Shaker at the garden boundary is at approximately the threshold of audibility.

9.3 Mechanical Plant Equipment

The complete extent and acoustic performance of mechanical plant is not finalised at this stage, however a description of the anticipated items of plant equipment are given in Section 5.2.

There are no large external items of plant or emergency generators within the current proposals. All mechanical ventilation units and fan coil units are located internally, local to each room. Therefore any noise impact can be mitigated by ensuring the appropriate selection of atmosphere side attenuators to each item of plant. There may be an externally located fume cupboard extract fan on the roof of the proposed building. If the sound power of this fan exceeds the noise limits then it will need to be mitigated with the use of screening or an acoustic enclosure.

Table 11 gives the total allowable sound power level from all items of plant in order to ensure that the typical background noise level is not exceeded. A margin of 3dBA has been given to allow for addition of engineering machinery noise levels and a distance of 60m has been assumed as the nearest noise sensitive receptor.

The allowable total plant sound power level has been calculated according to the following equation to account for distance propagation (no account of barrier effects have been taken to provide a worst case example).

Allowable Total Plant Sound Power = Limit at Garden Boundary – $10\text{Log}(2/(4\pi r^2))$

Time of Year / Week	Time Period	Typical Background Noise	Noise Rating Limit at Garden Boundary	Allowable Total Plant Sound Power
Busy Week	8am – 6pm	47 dBA	44dBA	88dBA
	6pm – 12pm	46 dBA	43 dBA	87dBA
	12pm – 8am	43 dBA	40 dBA	84dBA
Holiday Week	8am – 6pm	42 dBA	39 dBA	83dBA
	6pm – 12pm	42 dBA	39 dBA	83dBA
	12pm – 8am	40 dBA	37 dBA	81dBA
Weekend	8am – 6pm	42 dBA	39 dBA	83dBA
	6pm – 12pm	40 dBA	37 dBA	81dBA
	12pm – 8am	37 dBA	34 dBA	78dBA

Table 11 - Allowable Total Plant Sound Power Levels

9.4 Delivery Access Road

The noise level from a HGV vehicle moving along the delivery access road and idling outside the engineering building for 10 minutes has been assessed at both the garden boundary of the nearest residential building and the façade of the residential building at 1st floor level.

Table 12 and Table 14 give details of the LAeq,1hr calculation at the residential façade for a moving vehicle and an idling vehicle respectively. Table 16 combines the two LAeq,1hr levels to give a total noise level.

Table 13 and Table 15 give details of the LAeq,1hr calculation at the residential garden boundary for a moving vehicle and an idling vehicle respectively. Table 17 combines the two LAeq,1hr levels to give a total noise level.

	Residential Façade Level	63	125	250	500	1k	2k	4k	8k	dBA
a)	Lorry Lmax at 10m	89	79	76	78	77	75	70	64	82
	Values from BS5228-1 Table C.11. Refer to Table 5 for details									
b)	Lorry Sound Power, Lw	117	107	104	106	105	103	98	92	110
	Lw = Lmax at 10m – $10\text{Log}(2 / 4\pi r^2)$, where r is distance (10m)									
c)	Correction to Leq,1hr	-46	-46	-46	-46	-46	-46	-46	-46	
	As per method in BS5228 equation F.6 : -33 + 10log(Q) – 10Log(v), where Q is vehicles per hour (1), v is average speed (20km/h)									
d)	Distance Attenuation	-18	-18	-18	-18	-18	-18	-18	-18	
	-10Log(r), where r is distance (57m)									
e)	Barrier Attenuation	-5	-5	-5	-5	-5	-6	-7	-9	
	Barrier attenuation as per the Maekawa method: -10log(3 + 20N), N = Δd(2/λ), path difference = 0.0045m									
f)	Reflection Correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	Correction for reflection from façade of engineering building									
g)	Leq,1hr at Receptor	**51**	**41**	**38**	**40**	**38**	**36**	**30**	**22**	**43**
	Leq,1hr at receptor = b + c + d + e + f									

Table 12 - Calculation of LAeq,1hr levels at residential façade from moving vehicle

	Residential Garden Boundary	63	125	250	500	1k	2k	4k	8k	dBA
a)	Lorry Lmax at 10m	89	79	76	78	77	75	70	64	82
	Values from BS5228-1 Table C.11. Refer to Table 5 for details									
b)	Lorry Sound Power, Lw	117	107	104	106	105	103	98	92	110
	Lw = Lmax at 10m – $10\text{Log}(2 / 4\pi r^2)$, where r is distance (10m)									
c)	Correction to Leq,1hr	-46	-46	-46	-46	-46	-46	-46	-46	
	As per method in BS5228 equation F.6 : -33 + 10log(Q) – 10Log(v), where Q is vehicles per hour (1), v is average speed (20km/h)									
d)	Distance Attenuation	-16	-16	-16	-16	-16	-16	-16	-16	
	-10Log(r), where r is distance (40m)									
e)	Barrier Attenuation	-5	-6	-7	-9	-11	-13	-16	-18	
	Barrier attenuation as per the Maekawa method: -10log(3 + 20N), N = Δd(2/λ), path difference = 0.0705m									
f)	Reflection Correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	Correction for reflection from façade of engineering building									
g)	Leq,1hr at Receptor	**52**	**41**	**37**	**38**	**35**	**31**	**23**	**14**	**40**
	Leq,1hr at receptor = b + c + d + e + f									

Table 13 - Calculation of LAeq,1hr levels at residential garden boundary from moving vehicle

	Residential Façade Level	63	125	250	500	1k	2k	4k	8k	dBA
a)	Idling Leq at 10m	73	64	55	55	60	56	50	43	63
	Values from BS5228-1 Table C.4.									
b)	Correction to Leq,1hr	-8	-8	-8	-8	-8	-8	-8	-8	
	As per BS4142: 10Log(Ton / Tref), where Ton is on time (10 minutes) Tref is reference time (60 minutes)									
c)	Distance Attenuation	-18	-18	-18	-18	-18	-18	-18	-18	
	-20Log(r1/r2), where r1 is original distance (10m) and r2 is new distance (76m)									
d)	Barrier Attenuation	-5	-6	-6	-7	-9	-11	-13	-16	
	Barrier attenuation as per the Maekawa method: -10log(3 + 20N), N = Δd(2/λ), path difference = 0.0403m									
e)	Reflection Correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	Correction for reflection from façade of engineering building:									
f)	Leq,1hr at Receptor	**45**	**36**	**26**	**25**	**28**	**22**	**14**	**4**	**31**
	Leq,1hr at receptor = a + b + c + d + e									

Table 14 - Calculation of LAeq,1hr levels at residential façade from idling vehicle

	Residential Garden Boundary	63	125	250	500	1k	2k	4k	8k	dBA
a)	Idling Leq at 10m	73	64	55	55	60	56	50	43	63
	Values from BS5228-1 Table C.4.									
b)	Correction to Leq,1hr	-8	-8	-8	-8	-8	-8	-8	-8	
	As per BS4142: 10Log(Ton / Tref), where Ton is on time (10 minutes) Tref is reference time (60 minutes)									
c)	Distance Attenuation	-15	-15	-15	-15	-15	-15	-15	-15	
	-20Log(r1/r2), where r1 is original distance (10m) and r2 is new distance (58m)									
d)	Barrier Attenuation	-6	-7	-8	-10	-12	-15	-18	-20	
	Barrier attenuation as per the Maekawa method: -10log(3 + 20N), N = Δd(2/λ), path difference = 0.1154m									
e)	Reflection Correction	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	
	Correction for reflection from façade of engineering building: 10Log(2)									
f)	Leq,1hr at Receptor	**47**	**37**	**26**	**25**	**27**	**21**	**12**	**2**	**31**
	Leq,1hr at receptor = a + b + c + d + e									

Table 15 - Calculation of LAeq,1hr levels at residential garden boundary from idling vehicle

Residential Façade Level	63	125	250	500	1k	2k	4k	8k	dBA
Moving Vehicle Leq,1hr	51	41	38	40	38	36	30	22	43
Idling Vehicle Leq,1hr	45	36	26	25	28	22	14	4	31
Total Leq,1hr	52	42	38	40	39	36	30	22	**43**

Table 16 – Total LAeq,1hr level at residential façade

Residential Garden Boundary	63	125	250	500	1k	2k	4k	8k	dBA
Moving Vehicle Leq,1hr	52	41	37	38	35	31	23	14	**40**
Idling Vehicle Leq,1hr	47	37	26	25	27	21	12	2	**31**
Total Leq,1hr	53	43	38	38	36	31	23	14	**40**

Table 17 - Total LAeq,1hr level at residential garden boundary

It can be seen that the most onerous condition is at the façade of the residential building at 1st floor level. Although this assessment location is further away from the access road, it has a reduced barrier effect from the mound due to being assessed at 1st floor level. The noise level to be compared to the typical background noise level is LAeq,1hr = 43dB.

Time of Year / Week	Time Period	Typical Background Noise	Excess of Rating Over Background Sound Level
Busy Week	8am – 6pm	47	-4dBA
	6pm – 11pm	47	-4dBA
Holiday Week	8am – 6pm	42	1dBA
	6pm – 12pm	42	1dBA
Weekend	8am – 6pm	42	1dBA
	6pm – 12pm	41	2dBA
Saturdays	9am – 1pm	42	1dBA

Table 18 – Access Road Noise Impact Assessment

Table 18 gives a comparison of the vehicle noise level at the residential boundary to the typical background noise levels at various time periods. During holiday periods when ambient traffic noise is less

The university are proposing to limit delivery periods to Mon-Fri 8am to 6pm and Saturdays 9am to 1pm. These time periods are highlighted in Table 18. It can be seen that the vehicle noise level exceeds the typical background noise level by no more than 1dBA during holiday weekdays and Saturday mornings. This small exceedance is to be mitigated by minimising the number of such deliveries.

This assessment is based upon the worst case scenario of an articulated lorry (<30 tonne). All other deliveries to the building will be made by a small van and noise levels from such a vehicle are expected to be much lower (by at least 5dBA) and always less than the typical background noise level.

Guidance for assessing the impact of noise is given in Section 11 of BS4141:2014 and states that:

> *"The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating*

level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context"

Values of +5db and +10dB are suggested to be indications of an adverse or significant adverse impact, respectively, depending on the context.

In this case the assessment of impact needs to be modified due to context and the following factors should be considered:

Absolute Sound Level
BS4142 suggests that "where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background." The World Health Organisation (WHO) guidelines for community noise suggest that sound level at the façade of dwellings should not exceed 45dB LAeq so as to avoid sleep disturbance, with a 5dB increase during the day. The background noise level and vehicle noise level are both lower than this value giving an indication that the absolute sound levels are low and unlikely to cause disturbance.

Frequency of Noise Events
The university have advised that deliveries from HGV (articulated lorries) are likely to occur approximately only 6 times per year. This means that a HGV delivery event would happen on <2% of days within a year and only once within that day. Therefore these events can be considered to be very rare and less likely to have adverse effect than an equivalent noise source that is heard every day.

Character and Level of the Residual Sound Compared to the Specific Sound
BS4142 suggests that may be beneficial "to assess the degree to which the specific sound source is likely to be distinguishable and will represent incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound."

Traffic noise is the major component of both the specific noise and the residual sound, it is also apparent that the specific noise source is less than the residual sound level. Therefore the specific sound source would be expected to be less distinguishable and not an incongruous sound.

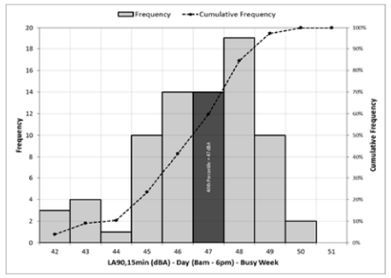
The university are taking reasonable steps to improve the situation for the nearest residents by providing an access road to take vehicles off, further away and screened from, Clerk Maxwell Road and providing an internal area to unload vehicles. In light off this and the contextual factors described above it is proposed that the noise level from deliveries is acceptable providing the following conditions which shall be written into the universities "Servicing and Operational Management Plan":

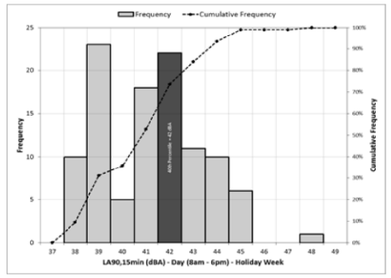
- Typically 1 delivery per day from a small van
- Approximately 6 HGV deliveries per year
- Weekday deliveries between 8am – 6pm
- Saturday deliveries between 9am – 1pm
- No deliveries on Sundays
- All unloading must be done inside the structures lab with acoustic doors closed
- A banksman shall be used when possible to avoid the need for reversing alarms

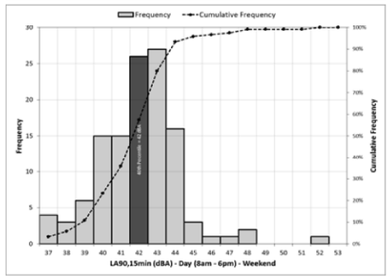
Uncertainty of the Assessment
The measurement of the background noise levels have been taken under repeatable conditions over an extended period of time (~190 hours) covering every day of the week, therefore it is expected that the uncertainty of the background noise level measurement will be very low.

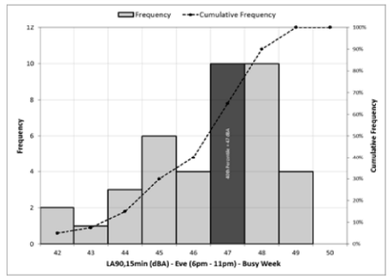
Measurements of the actual vehicles that will be using the service road is not possible at this stage and published sound levels of sub-30 tonne HGV Lorries are taken from BS5228 with an average of 4 values used. The range of values was 4dBA (+1dBA and -3dBA from the average).

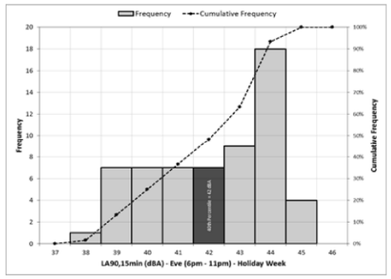
10.0 APPENDIX A – BACKGROUND NOISE LEVEL HISTOGRAMS

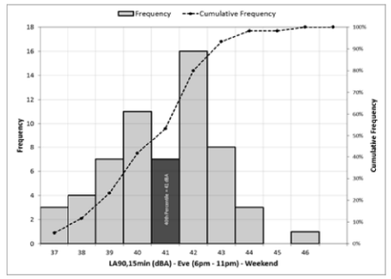


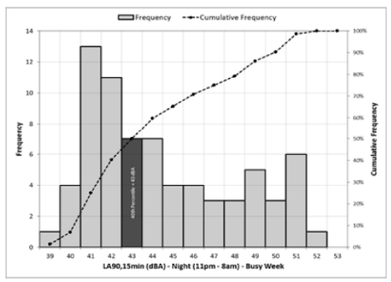


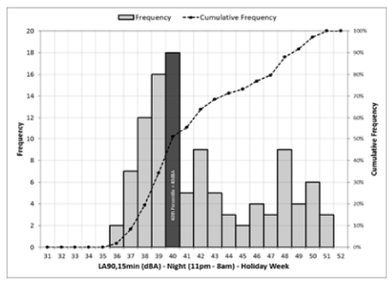


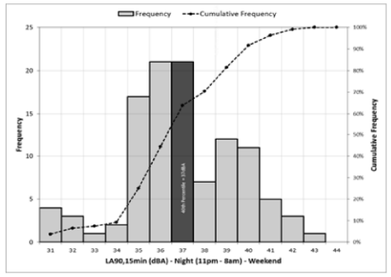












11.0 APPENDIX B – GLOSSARY OF ACOUSTIC TERMS

Sound Pressure Level, SPL or L_P (decibels, dB)

A measure of the instantaneous sound pressure at a point in space. The threshold of hearing occurs at approximately SPL=0 dB (which corresponds to a reference sound pressure of 20μPa).

LP(dB)=20.log10(Measured RMS Sound Pressure (Pa)/20μPa)

where RMS Sound Pressure is the Root-mean-square of the sound pressure at a point, relative to mean atmospheric pressure, over a time period defined by the sound level meter used.

A-Weighted Sound Pressure Level, L_A (dBA)

SPL values are weighted in a way that approximates the frequency response of the human ear and allows sound levels to be expressed as a single figure value.

Equivalent Continuous A-Weighted SPL, $L_{Aeq,T}$ (dBA)

Energy average of the A-weighted sound pressure level over a time period, T. The level of a notional continuous sound that would deliver the same A-weighted sound energy as the actual fluctuating sound over the course of the defined time period, T

Background Noise Level A-Weighted $L_{A90,T}$ (dBA)

A-weighted sound pressure level that is exceeded 90% of the time.

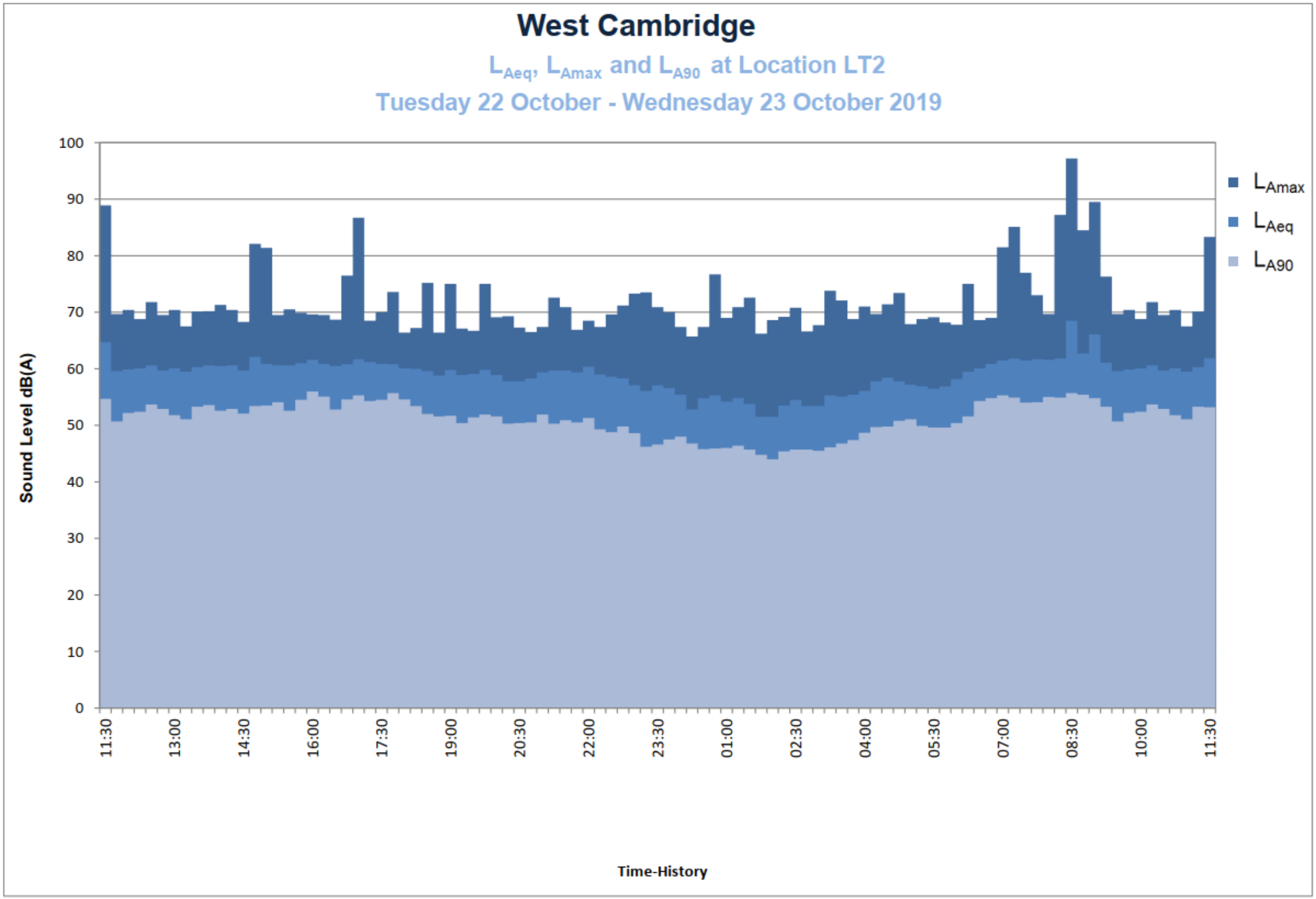
Maximum A-Weighted SPL, L_{AFMax} (dBA)

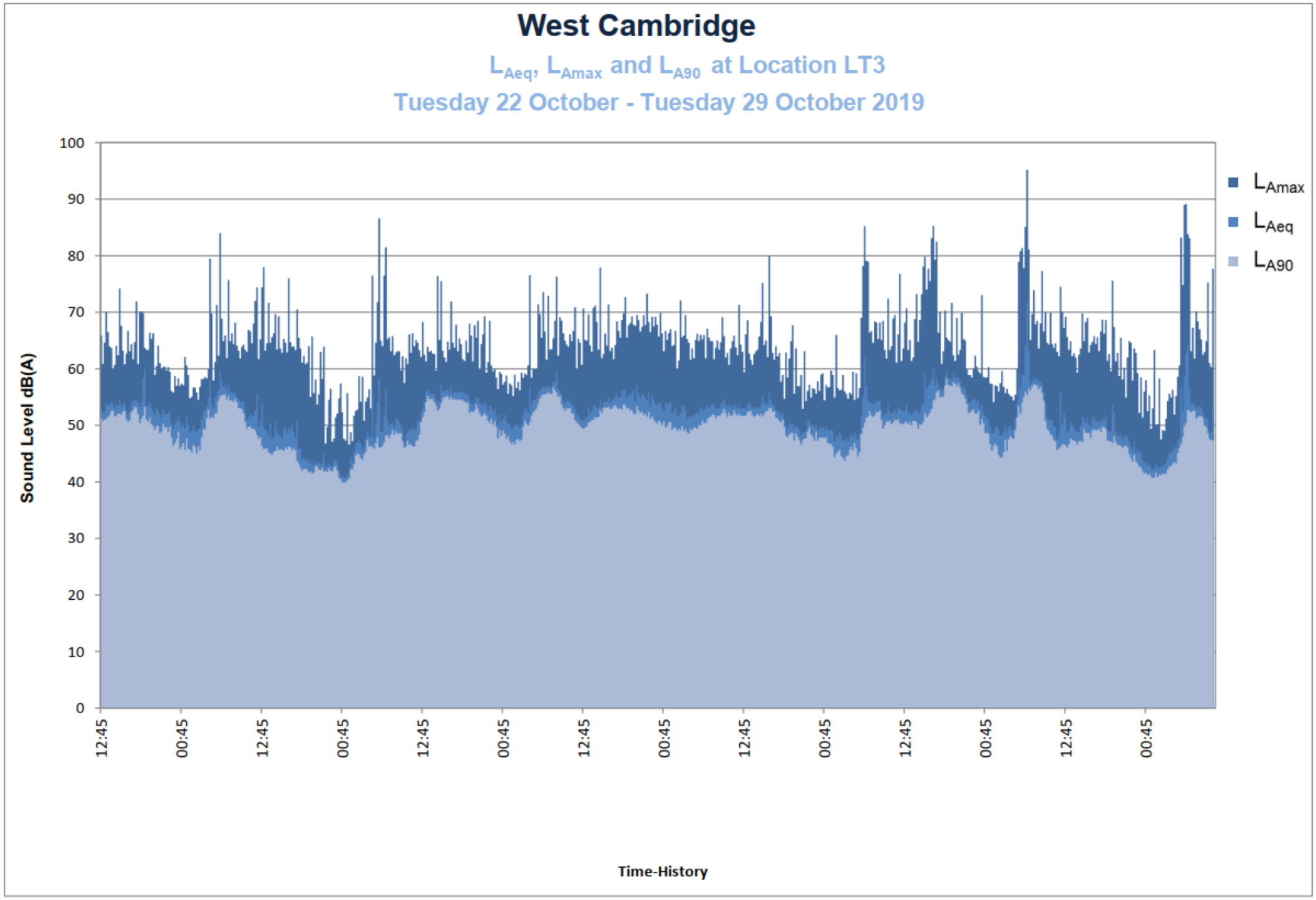
Maximum A-weighted sound pressure level measured with fast time weighting

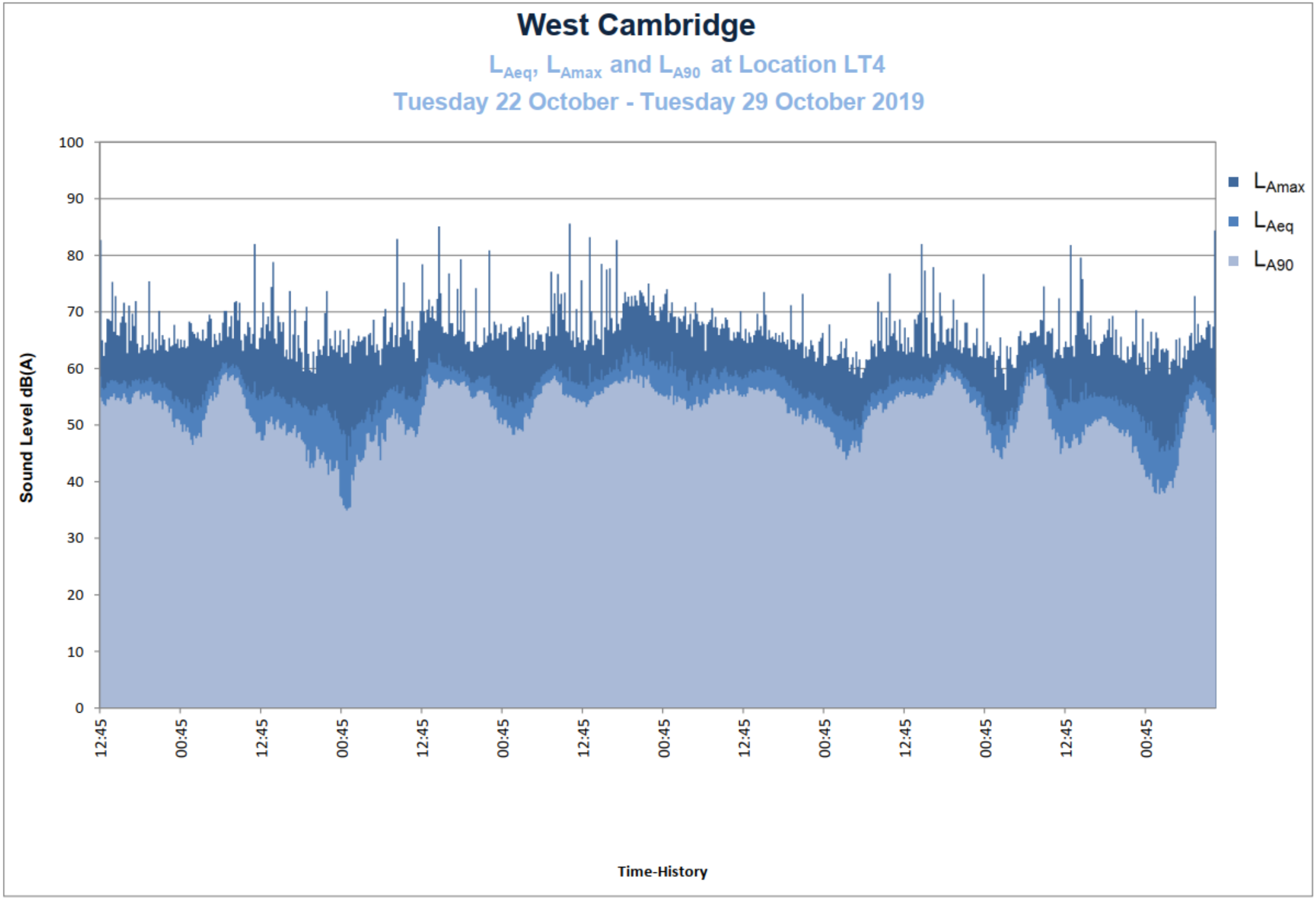
Frequency, f (Hertz, Hz)

The rate of vibration of air molecules which transmit the sound measured in cycles per second or Hertz. The human ear is generally sensitive to sound in the range 20Hz – 20kHz.

Appendix 12.4 Environmental sound survey results




West Cambridge
LAeq, LAmax and LA90 at Location LT3
Tuesday 22 October - Tuesday 29 October 2019
Sound Level dB(A)
100
90
80
70
60
50
40
30
20
10
0
12:45
00:45
12:45
00:45
12:45
00:45
12:45
00:45
12:45
00:45
12:45
00:45
12:45
00:45
LAmax
LAeq
LA90
Time-History


West Cambridge
LAeq, LAmax and LA90 at Location LT4
Tuesday 22 October - Tuesday 29 October 2019
Sound Level dB(A)
100
90
80
70
60
50
40
30
20
10
0
12:45
00:45
LAmax
LAeq
LA90
Time-History

Appendix 12.5 Car park assessment

Receptor 53 Madingley

Car Park	Event	Number of Events	SEL	Average Distance to Receptor (m)	Distance Correction	Location Correction	Corrected SEL	Calculated Sound Level at Receptor (LAeq,1hour)
AM Peak	Car Pass-by and Park	148	74	50	-12	3	65	51
	Engine Starting and Car Pulling Away	40	77	50	-12	3	68	48
	Calculated Sound Level at Receptor (LAeq,1hour)	53						
	Existing Residual Sound Level at Receptor (LAeq,1hour)	61						
	Cumulative Ambient Sound Level at Receptor (LAeq,1hour)	62						
	Difference	1						

Car Park	Event	Number of Events	SEL	Average Distance to Receptor (m)	Distance Correction	Location Correction	Corrected SEL	Calculated Sound Level at Receptor (LAeq,1hour)
PM Peak	Car Pass-by	36	74	50	-12	3	65	45
	Engine Starting and Car Pulling Away	130	77	50	-12	3	68	53
	Calculated Sound Level at Receptor (LAeq,1hour)	54						
	Existing Residual Sound Level at Receptor (LAeq,1hour)	59						
	Cumulative Ambient Sound Level at Receptor (LAeq,1hour)	60						
	Difference	1						

Receptor The Lawns off Clark Maxwell Road

Car Park	Event	Number of Events	SEL	Average Distance to Receptor (m)	Distance Correction	Location Correction	Corrected SEL	Calculated Sound Level at Receptor (LAeq,1hour)
AM Peak	Car Pass-by and Park	148	74	150	-17	3	60	46
	Engine Starting and Car Pulling Away	40	77	150	-17	3	63	43
	Calculated Sound Level at Receptor (LAeq,1hour)	48						
	Existing Residual Sound Level at Receptor (LAeq,1hour)	51						
	Cumulative Ambient Sound Level at Receptor (LAeq,1hour)	53						
	Difference	2						

Car Park	Event	Number of Events	SEL	Average Distance to Receptor (m)	Distance Correction	Location Correction	Corrected SEL	Calculated Sound Level at Receptor (LAeq,1hour)
PM Peak	Car Pass-by	36	74	150	-17	3	60	40
	Engine Starting and Car Pulling Away	130	77	150	-17	3	63	49
	Calculated Sound Level at Receptor (LAeq,1hour)	49						
	Existing Residual Sound Level at Receptor (LAeq,1hour)	49						
	Cumulative Ambient Sound Level at Receptor (LAeq,1hour)	52						
	Difference	3						

Appendix 12.6 HGV servicing activities calculations

BS4142 Assessment Weekday Daytime

	Seconds
Assessment Period	3600

BS4142 Assessment Delivery Noise - Delivery Period	Lorry Arriving	Lorry Door Slam	Opening Lorry Shutter	Removing Support Bars	Moving Roll Cages Inside Lorry	Unloading cages	Wheeling roll cages off into store	Wheeling empty cages from inside store to outside	Loading empty roll cages onto lorry	Securing Support Bars	Closing lorry shutter	Door Slam	Lorry starting	Reversing Alarm	Lorry driving away
Sound Exposure Level (SEL)	68	83	76	88	93	94	97	92	95	88	76	83	89	94	68
Source Measurement Distance	1	1	1	4	3	1	1	4	1	4	1	1	1	1	1
Number of Events	1	1	1	1	14	14	14	14	14	3	1	1	1	1	1
Average Distance to Receptor (m)	20	70	70	70	70	70	70	70	70	70	70	70	70	70	20
Distance Loss	-26	-37	-37	-25	-27	-37	-37	-25	-37	-25	-37	-37	-37	-37	-26
Reflections	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acoustic Feature Correction	0	3	0	0	0	0	0	0	0	0	0	3	0	6	0
Acoustic Screening	0	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	-5	0	0
Rating Level)dB Laeq,1hour)	**6**	**8**	**-2**	**22**	**37**	**28**	**31**	**38**	**29**	**27**	**-2**	**8**	**11**	**27**	**6**
Combined Rating Level (dB Laeq, 1hour)	**42**														
Background Noise Level	**47**														
Comparison	**-5**														

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