Draft North East Cambridge Area Action Plan : Regulation 18 Consultation
Brookgate Land Limited
October 2020

BIDWELLS

LAND AT CAMBRIDGE NORTH

DRAFT NORTH EAST CAMBRIDGE AREA ACTION PLAN : REGULATION 18 CONSULTATION 2020

Quality Assurance

Site name:	Land at Cambridge North
Client name:	Brookgate Land Limited
Type of report:	Regulation 18 Consultation 2020
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Signed	
Date	2 October 2020
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Date	5 October 2020

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Appendix 1

SITE LOCATION PLAN

Appendix 2

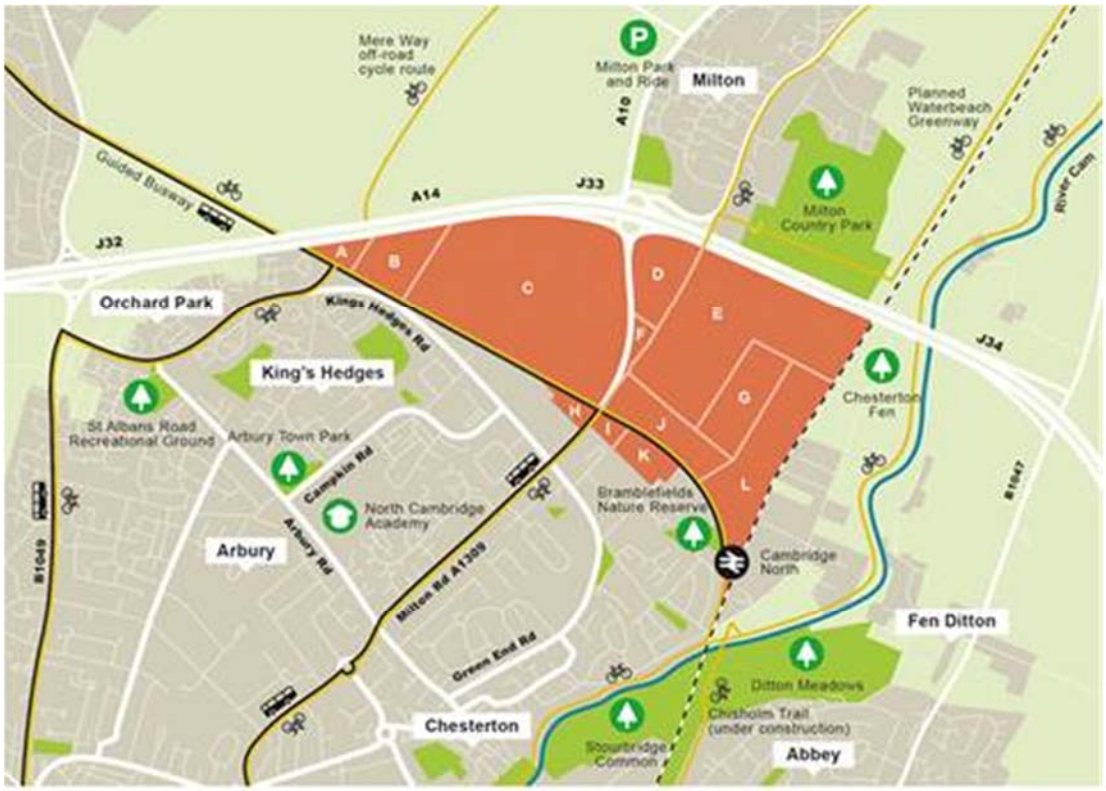
ARUP ODOUR REPORT

1.0 Introduction

Background

1.1 These representations have been prepared by Bidwells LLP on behalf of Brookgate Land Limited ("Brookgate") in respect of Land at Cambridge North ("the Site") and in response to the Draft North East Cambridge Area Action Plan (AAP) Regulation 18 consultation ("the consultation document"). Please refer to **Appendix 1** for site location plan.

1.2 Land at Cambridge North is identified in the consultation document as "Site L" in the figure below, referred to as "Chesterton Sidings".



KEY

- A Well's Triangle (private ownership)
- B Cambridge Regional College
- C Cambridge Science Park (Trinity College)
- D St John's Innovation Park (St Johns College)
- E Cambridge Waste Water Treatment Plant, former Park and Ride and Golf Driving Range (Anglian Water / Cambridge City Council)
- F Merlin Place (private ownership)
- G Cambridge Commercial Park / Cowley Road Industrial Estate (multiple land ownership)
- H Milton Road garage site (private ownership)
- I Trinity Hall Farm Industrial Estate (Trinity Hall College)
- J Cambridge Business Park (The Crown Estate)
- K Nuffield Road Industrial Estate (multiple land ownership)
- L Chesterton Sidings (Network Rail)

Source: Figure 6 : Land ownership within the Area Action Plan boundary, Draft NEC AAP

1.3 The Site is bound by the Cambridge Water Recycling Centre (CWRC) to the north beyond which lies the A14, by the railway line to the east and existing residential development to the south. The Site is bound by the Cambridge Guided Busway (CGB) and existing commercial development to the west.

1.4 Brookgate is the development partner of Network Rail and DB Cargo UK (and through them Freightliner and Tarmac) who own Land at Cambridge North, formerly known as the Chesterton Sidings, and who collectively form the Chesterton Partnership.

1.5 Brookgate has been working as promoter for The Chesterton Partnership in order to secure the rationalisation and redevelopment of the former Chesterton Sidings site. Planning permission has been granted for a 217 bed hotel (under planning application reference S/2372/17/FL) and an office (under planning application reference S/4824/18/VC). Construction has now begun on these two important permissions which will serve to bring life to the Cambridge North station area and act as a catalyst for the development of the wider North East Cambridge AAP.

The Next Phases at Cambridge North

1.6 Brookgate are now seeking to bring forward the next phase of development (the 'residential quarter'), alongside the emerging NEC AAP process, which will further build on the momentum created by the Station development and the hotel and office permissions. This will be followed by the 'commercial quarter' phase and then the remaining land north of Cowley Road is proposed to be brought forward.

1.7 The residential quarter is proposed to provide circa 700 Build to Rent (BTR) homes and circa 12,000 sq m of commercial buildings, with supporting amenity uses. The intention is to submit the application in late 2020. This will dovetail with the initial spatial planning work the design team has worked up in conjunction with the LPA as part of the NEC AAP workshops.

1.8 Brookgate are in the process of preparing a series of technical reports to support the forthcoming application. In particular, they have commissioned an Odour Report to review the potential impacts of the CWRC assuming it remains in its current location. This report also responds to the Council's own Odournet Report (October 2018). The Arup Odour Report is included at **Appendix 2**.

1.9 Brookgate has made clear from the outset and through the NEC AAP workshops their aspiration and intention to bring forward the residential quarter as early as is practicable. The NEC AAP workshops have been extremely useful and clearly demonstrated that the next phase at Cambridge North would not in any way prejudice the outcome of the AAP process and the achievement of the comprehensive vision for the area as a whole that will be established by the NEC AAP. The residential quarter would therefore be a policy compliant application, having regard to other relevant policies in the Plan.

1.10 Brookgate are keen to engage with the Council, stakeholders and the local community to refine and discuss the proposals further as part of the ongoing consultation on the emerging North East Cambridge Area Action Plan.

The level of detail contained in the NEC AAP

1.11 As a general point, it is proposed that the NEC AAP needs to be a flexible document as it has to accommodate significant changes over a 20 year period. Currently as drafted it is too prescriptive in the level of detail provided, in terms of both the policy wording and their supporting diagrams. This is referred to in these representations in response to the relevant specific questions.

1.12 These representations respond to the ten big questions and the draft policies within the consultation document in respect to the redevelopment opportunity at Land at Cambridge North. They should be read in conjunction with the following standalone documents:

- Appendix One: Site Location Plan
- Appendix Two: Arup Odour Report.

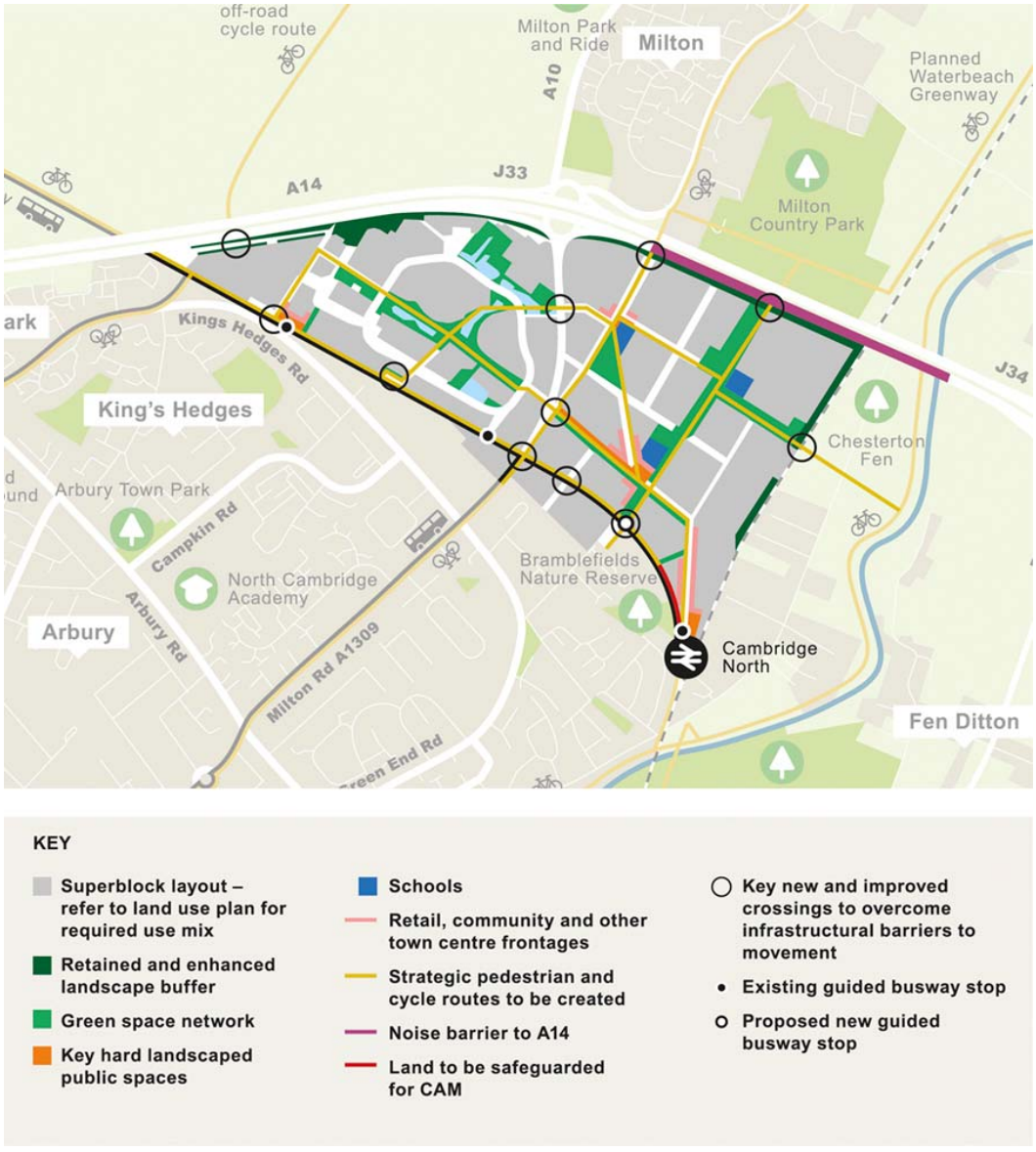
2.0 A Spatial Framework for North East Cambridge

Policy 1 : A comprehensive approach at North East Cambridge

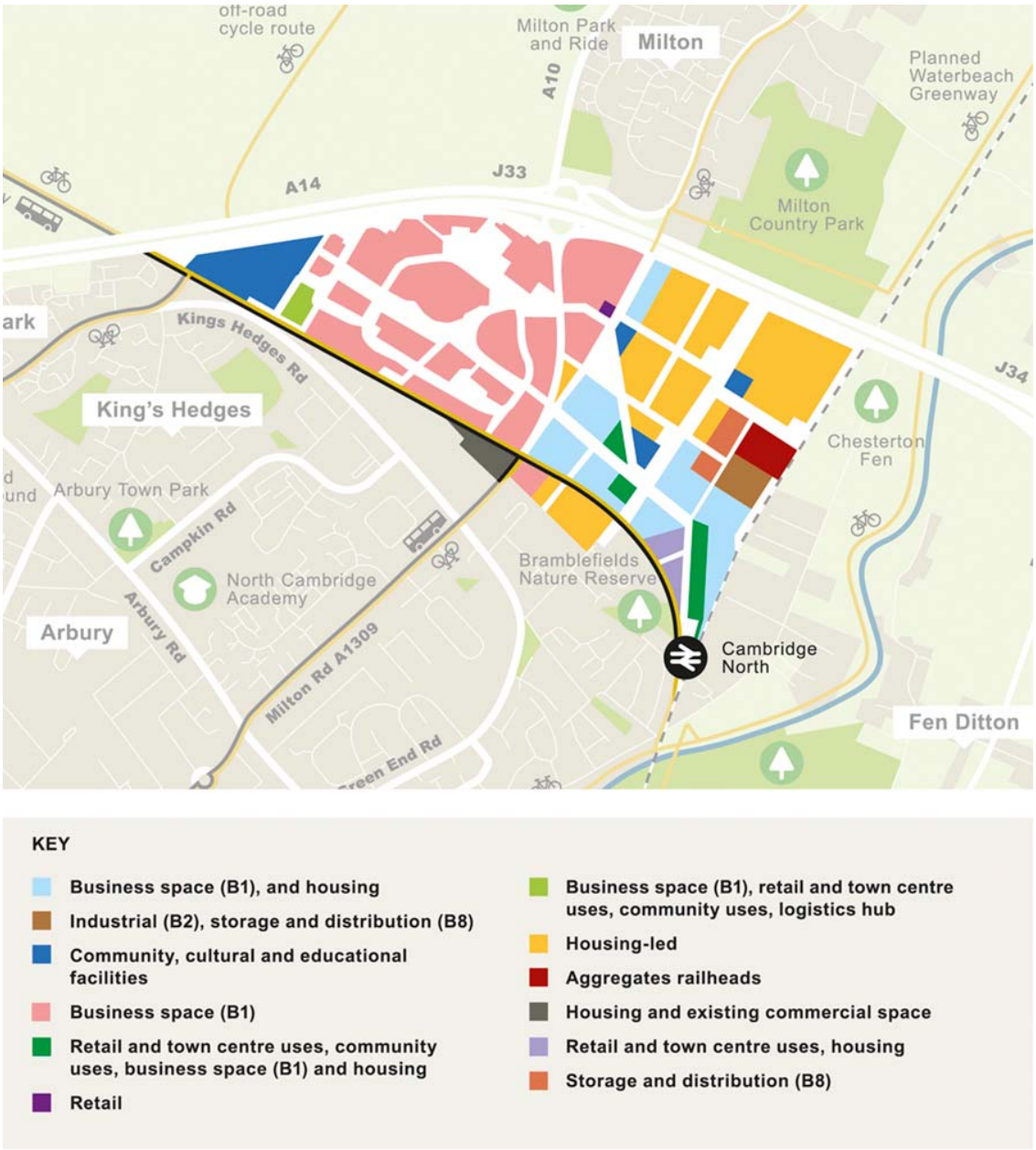
2.1 This Policy sets out the overarching principles for the AAP and how the vision for the AAP will be delivered. It provides the context for the rest of the policies of the Area Action Plan. It states that;

> *"Proposals which contribute to the delivery of the Area Action Plan's vision, strategic objectives, Spatial Framework (Figure 10) and Land Use Plan (Figure 11), all relevant policies including supporting diagrams, adopted 2018 Local Plans and National Planning Policy Framework, will be approved without delay, subject to a full assessment of the particular impacts of the proposals and securing appropriate mitigation measures where necessary."*

2.2 The Spatial Framework and Figure 11 of the Draft NEC AAP are included below for reference.



Source : Figure 10: The Spatial Framework for the Area Acton Plan, Draft NEC AAP



Source : Figure 11 : Proposed land uses within the Area Action Plan boundary, Draft NEC AAP

2.3 Brookgate broadly support the aims of Policy 1, the Spatial Framework and Land Use Plan. However, as referred to under Section 1 of these representations, the supporting diagrams as currently drafted are too precise. They should instead be clearly marked as indicative. Both the Spatial Framework and Land Use Plan also need to recognise the potential for an educational facility within the Cambridge North site, a 16-19 offer in the form of specialist Maths School. This is capable of coming forwards separately to the proposed primary school sites and the potential safeguarded land for a secondary school. Further detail is provided in Section 7 of these representations.

2.4 Comments in respect to other specific elements of both the Spatial Framework and Land Use Plan are provided in the following sections of these representations.

2.5 It also needs to be recognised that the adopted plans of South Cambridgeshire District Council and Cambridge City Council make it clear that planning applications are capable of being submitted and granted planning permission in advance of the AAP being adopted (South

Cambridgeshire Local Plan Policy SS/4 and Cambridge City Local Plan Policy 15). Under both policies, the Cambridge North Site is allocated for high quality mixed-use development, primarily for employment uses such as B1, B2 and B8, as well as a range of supporting commercial, retail, leisure and residential uses (subject to acceptable environmental conditions).

2.6 The approach in the recently adopted local plan in respect of early submissions should not be watered down through the AAP process, indeed, through the AAP process the opportunity to bring Brookgate land forward early should be explicitly acknowledged as beneficial to the regeneration of the area, creating a sense of place and arrival around the new Station and evidencing in commercial terms how the low parking ratios might work.

3.0 Vision for North East Cambridge

3.1 **Question 1 : What do you think about our vision for North East Cambridge?**

3.2 Brookgate supports the proposed vision. The AAP area is the largest brownfield site in Cambridge and is extremely well served by existing public transport. It therefore has the potential to transform into a high-quality gateway to the city and act as a catalyst for the regeneration of the wider area.

3.3 The White Paper " Planning for the Future" sets out a proposed new approach to plan making. North East Cambridge would sit within the Growth Area definition.

4.0 Connected and Integrated

4.1 **Question 2 : Are we creating the right walking and cycling connections to the surrounding areas?**

Policy 16 : Sustainable Connectivity

4.2 Policy 16 sets out how development in the AAP area should create a comprehensive network of routes which are direct, permeable, legible and safe, where people are prioritised over vehicular traffic and can move easily between different forms of sustainable transport in order to complete their journey. The pedestrian and cycle connections are shown on Figure 36 (see below) and listed in Policy 16.

Source : Figure 36 : Strategic walking and cycling routes and mobility hubs, to be retained and created in North East Cambridge, Draft NEC AAP

4.3 Brookgate support the basis of Policy 16. There is a need for area wide non-car interventions to cater for these trips and ensure sites can come forward in accordance with AAP car trip/parking budgets.

4.4 Creating new and improved walking and cycling connectivity to the NEC is essential in creating a development that is not reliant on the car as the primary means of transport. These measures are welcomed. There appears to be an over emphasis on new walking and cycling routes and not enough consideration of improving existing walking and cycling infrastructure in the area.

4.5 In particular:

- Improving existing links to Milton P&R site to Milton Village and the NEC by improving the existing footbridge over the A10 to allow cycle access. Improvement to cycle and walking routes on Milton High Street and connectively to Jane Coston Bridge and the NEC.
- A greater emphasis on the existing very well used walking and cycling route to the south of the site via Moss Bank and the River Cam. This is by far the most direct and safe 'off road' route for pedestrians and cyclist from Cambridge City Centre to the whole of the NEC. And will only become more popular when the Chisholm Trail is opened allowing high quality 'off road' access to the east and south of Cambridge.

4.6 In terms of new cycle links we note that there are no proposals to provide better permeability between the NEC and East Chesterton between the existing Nuffield Road / CGB footway / cycleway link to the north and Moss Bank to the south. This creates an impenetrable barrier along the south western side of the NEC in excess of 600m.

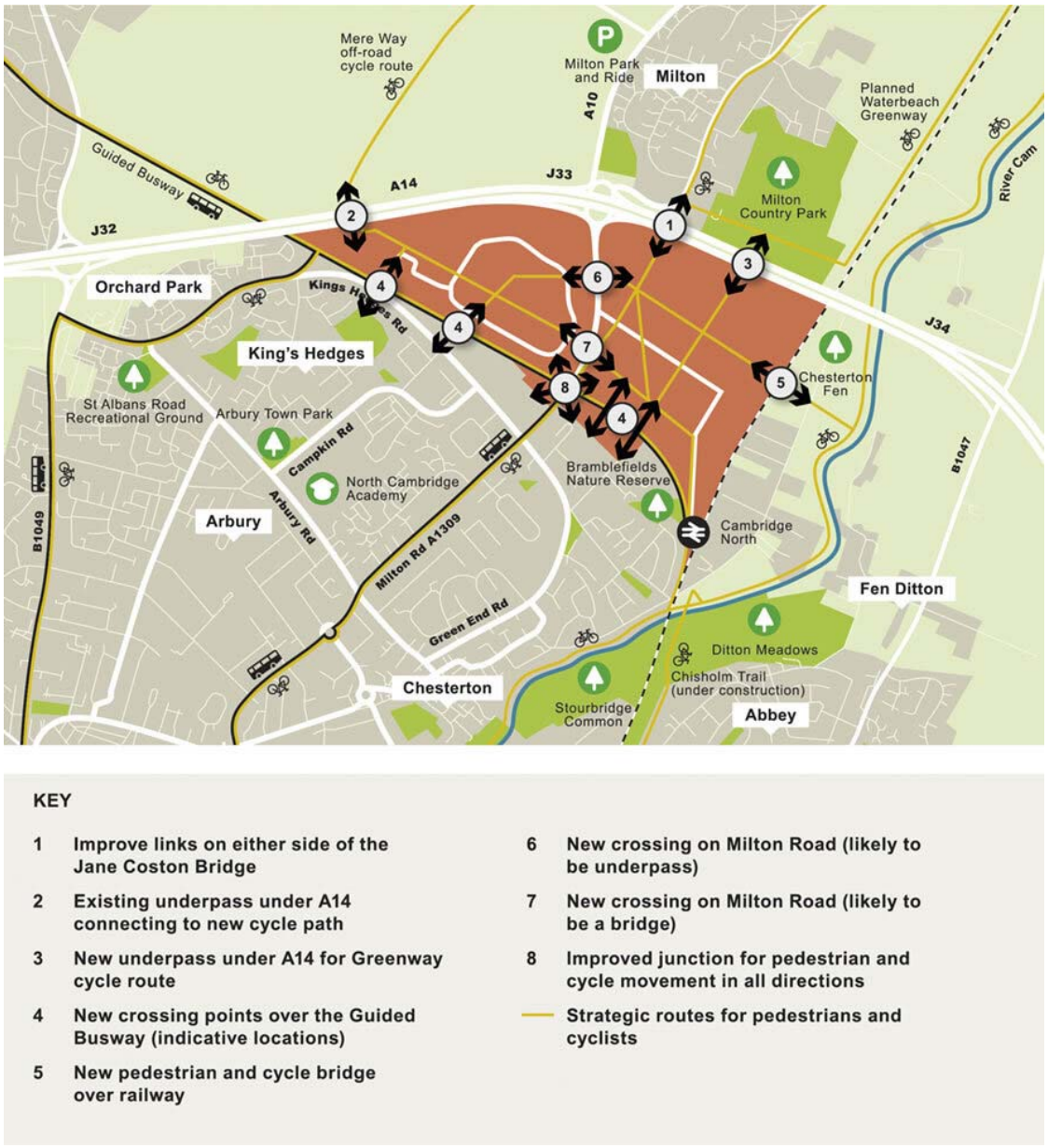
4.7 Brookgate consider this to be a missed opportunity and maintains the current barriers between the NEC and established residential areas. We strongly suggest that a footway / cycleway link is provided through the Bramblefields area (not just wayfinding to the site which would be a very long walk and impractical for most people).

4.8 This will not only provide better connectively between the established residential areas of East Chesterton and the NEC but will also provide easy access to residents and workers on the NEC to enjoy the established areas of public open space at Bramblefields.

4.9 This is a similar approach to the proposals to provide a link from the north of the NEC to Milton Country Park. Clearly any footways and/or cycleway through Bramblefields would need to be design sympathetically within the established parkland, as would be the case for the proposed links to Milton Country Park. We would suggest that a route adjacent to the southern boundary of the allotments (minimising any impact on the established wildlife area) linking in with the established network of path through Bramblefields is included in the NEC proposals.

Policy 17 : Connecting to the wider network

4.10 Policy 17 sets out the new and improved crossings that will need to be delivered by the AAP. It states that development will be required to contribute to new and improved connections for non-motorised users, as shown on Figure 37.



Source : Figure 37 : Overcoming barriers to movement: improved connections for non-motorised users to be created by the Area Action Plan, Draft NEC AAP

4.11 The possible interventions shown on Figure 37 and identified in Policy 17 are broadly similar to those in Table 55 of Transport Evidence Base AAP Report (September 2019).

4.12 Brookgate support the proposed internal and external interventions identified in Policy 17 which will help sites come forward in accordance with the aspirations of the AAP and within the trip/parking budgets. The emphasis must be the promotion of non-car and active modes of travel and delivering a highly connected, and accessible development by walking, cycling and public transport.

4.13 However, blanket financial contributions by developers towards an overall package of interventions may not be appropriate given the geography of the AAP study area, the range of interventions proposed and the delay associated with implementing any charging schedule or equivalent. The current AAP developers forum and emerging transport assessment process will

assist developers in understanding the value of interventions for their sites. This will help inform which interventions developers should target for funding

Policy 18 : Cycle Parking

4.14 This policy sets out the standards and quantities of cycle parking that new development must provide. It states that cycle parking should be provided in excess of the minimum standards set out in Appendix L of the adopted Cambridge Local Plan (2018) and at least 5-10% of cycle parking provision should be designed to accommodate non-standard cycles and should consider appropriate provision for electric charging points.

4.15 Brookgate support the application of the minimum cycle parking standards from the Cambridge Local Plan across the AAP area.

4.16 Cycle parking provision will be very important in encouraging sustainable transport and to assist in delivering on low car use development. Brookgate consider that cycle parking provision above 'minimum standards' may be necessary (depending on demand) and will need to be evidenced as part of the overall transport strategy and assessment work for each development site.

4.17 Opportunities for shared cycle parking between deference land uses is welcomed and supported. The efficient use of cycle parking will be key to responding to the future demands for cycling in the NEC.

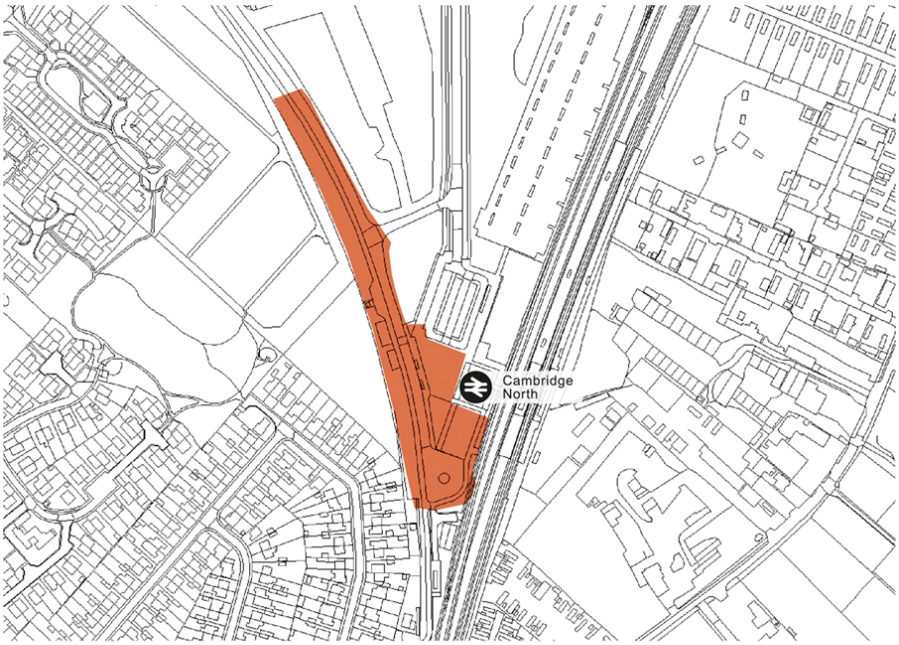
4.18 Cycle parking numbers and type will be provided for future phases of Cambridge North in accordance with these standards and detailed within specific transport assessments.

Policy 19 : Safeguarding for Cambridge Autonomous Metro and Public Transport

4.19 Policy 19 ensures that land is safeguarded for the CAM and other public transport hubs.

4.20 The north portal for the central core section of the CAM is likely to be located within the North East Cambridge AAP boundary. An area of land in close proximity of Cambridge North station (shown on Figure 38 below) is proposed to be safeguarded for the operation of the CAM, including land for the portal/tunnel entrance as well as for construction and maintenance.

4.21 The indicative area safeguarded for CAM portal construction includes the existing station turning circle, bus stops and cycle parking. It also includes land to the west of the guided busway associated with utilities/drainage for the consented office and hotel development at Cambridge North and the next phases of development.



Source : Figure 38: Map showing location of land to be safeguarded for the CAM interchange, Draft NEC AAP

4.22 It is acknowledged that the proposed safeguarding land for CAM is indicative at this stage, However, as it is currently shown in figure 38, the shaded area is wholly Network Rail owned land including Network Rail's station lease area and operational railway land. Any proposed safeguarding of the land would need to be agreed with Network Rail and further engagement with Network Rail is required on this matter as and when it progresses.

4.23 Brookgate understand the aspirations of the Combined Authority to provide a new rapid transport system of Cambridge. However, they are concerned over the lack of information on this important issue and the extensive area of land that is considered necessary to be 'safeguarded'.

4.24 There is no information within the document on the justification for the extent of the area proposed to be 'safeguarded' or its intended use, as tunnel portals or station concourse or construction compounds etc. Brookgate would expect that an evidenced based approach would be driving this exercise and that the area indicated on the plan would be based on the requirements to deliver the CAM scheme.

4.25 Providing a 'safeguarding' area without any detail of what the area is to be used for or indeed why it is required is very unhelpful and will lead to uncertainties during the masterplanning of the area around the station, and significantly affect the ability of the landowners in this area to effectively plan this very important area, to enhance the existing transport interchange (a key requirement of NEC AAP policy) and necessary to achieve further support and enhance sustainable transport modes in the area.

4.26 The land should not be safeguarded in any planning document unless it is clear that CAM Metro is deliverable and funded, any formal designation of land prior to this would be premature. In this context Brookgate would therefore welcome discussions with all stakeholders to understand the

extent and scope of land potentially safeguarded in the context of existing/future development in this area. The AAP will be subject to external scrutiny and it is clear from the North Essex Examination that the presiding Inspector will scrutinise the deliverability of the CAM metro.

Policy 20 : Last mile deliveries

4.27 Policy 20 sets out where the Councils expect delivery hubs to be located and what they should provide. A delivery hub has been identified within Cambridge Science Park Local Centre, as set out in Policy 10c. An additional hub could be located close to Milton Road where it can be accessed directly from the primary street to reduce vehicle movements within the Area Action Plan area.

4.28 Brookgate would support the policy for smaller scale servicing, where appropriate.

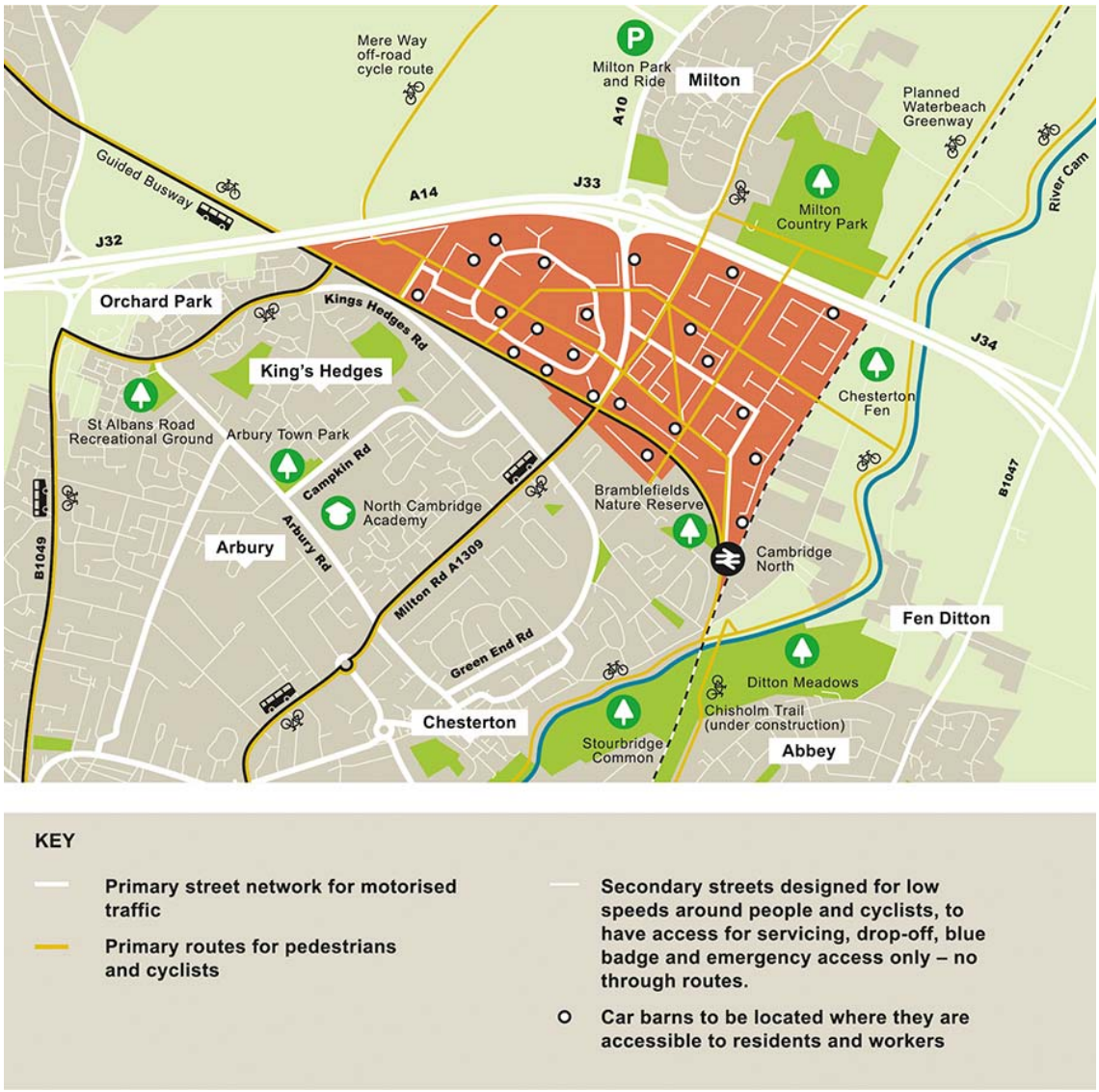
Policy 21 : Street Hierarchy

4.29 Policy 21 describes the primary and secondary street network, and how these streets should be designed to lower vehicle speeds, and with excellent provision for walking and cycling to ensure these remain the travel mode of choice. It also sets out how space efficient car parking should be provided in ‘car barns’ so that residents and workers who need to occasionally use cars, can access private or shared cars.

4.30 The Policy states that NEC should be designed to manage vehicle movements in accordance with the street hierarchy shown in Figure 40 and the design principles described in Policy 7 and shown in Figures 16, 17 and 18. This shows a realignment of the current primary access route along the east-west section of Cowley Road to Cambridge North Station further north so as to avoid HGV, bus and other vehicle movements through the proposed District Centre.

4.31 Chesterton Partnership support priority being given to non-car movements and a permeable layout being provided for walking and cycling throughout the AAP area. However, any realignment of Cowley Road would likely impact on future development aspirations across a number of sites.

4.32 Early engagement will therefore be needed with Cambridgeshire County Council to understand possible alignment and impact on development mix and interaction with highway and interaction with highway, railway uses activities and operations. Careful planning and phasing of the proposed new road layout and network, particularly proposals for Cowley Road, is needed to ensure all access requirements across the site are met at the required times



Source : Figure 40 : Street hierarchy for North East Cambridge, Draft NEC AAP

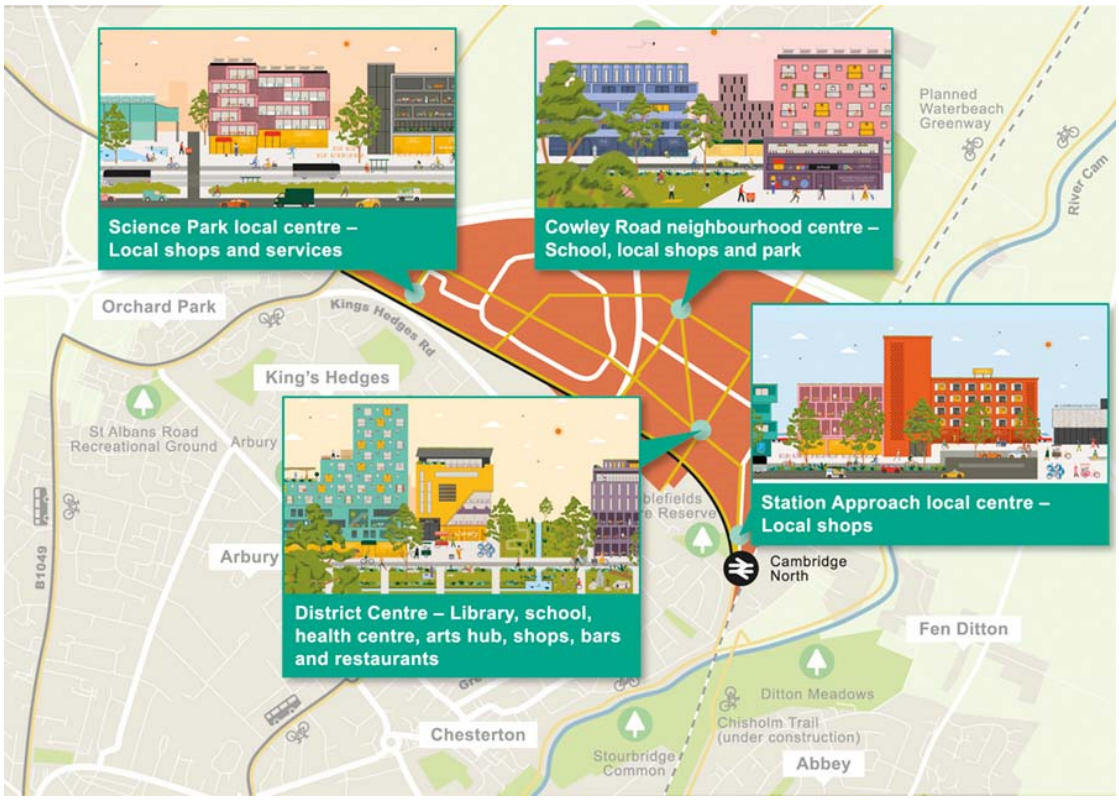
5.0 Social and Cultural Hubs

5.1 **Question 3 : Are the new 'centres' in the right place and do they include the right mix of activity?**

5.2 Four new centres are proposed within the North East Cambridge AAP area for community services, retail, leisure and cultural activity;

- District Centre;
- Science Park local centre;
- Station Approach local centre; and
- Cowley Road neighbourhood centre

5.3 The location of the four new centres are shown in Figure 24 (see below).



Source : Figure 24: Location of new centres in North East Cambridge, Draft NEC AAP

5.4 Policy 10a : North East Cambridge Centres sets out a number of broad criteria for development proposals within the identified centres.

Policy 10d: Station Approach

5.5 Policy 10d sets out more detailed policy guidance for the Station Approach Local Centre, including acceptable land uses, indicative development capacity, phasing and development and design requirements.

5.6 The extent of the land parcel for the Station Approach Local Centre is not clear from Figure 24 but Brookgate broadly support the proposed land uses and indicative development capacities set out in Policy 10d, with the exception of the 100m^2 for community and cultural uses.

5.7 The next phase at Cambridge North is proposing to include for a Specialist Maths School of 200 pupils (opening with 100 initially). The Government has committed to having a 16-19 maths school in every region, 11 in total. The Department for Education (DfE), through the Learning Alliance, has identified the Cambridge North site as an ideal location for this, due to regional accessibility and wider economy and skills concentration.

5.8 The inclusion of a Maths School is compatible and complimentary to the other uses being brought forward in the wider allocation and will not affect the ability to bring forward wider residential and commercial development.

5.9 LocatED is an Arms-Length Body to the Department for Education. It is responsible for buying and developing sites in England to help deliver much needed new school places for thousands of children. It was commissioned to identify and acquire a site within Cambridge to facilitate the school, of c.2,450 sq m.

5.10 An extensive site search was undertaken originally in 2017 and a follow up search in 2018/20 which demonstrated the challenges of land availability and suitability. In 2020, further to this review search (which identified 16 sites), a shortlist of four sites was drawn up. A high level discussion was then held in March 2020 between LocatED's Jacqueline Nixon and the Assistant Director of Planning at GCP (Sharon Brown) to discuss the four shortlisted sites. The Cambridge North site was then chosen as the most suitable.

5.11 The site is the most sustainably located of all of the sites appraised as part of the site search. This is due to its proximity to Cambridge North Station and busway interchange. Maths Schools are expected to have regional accessibility and therefore this is an optimum location for accessibility and sustainability

5.12 Policy 10d therefore needs to recognise the potential to accommodate a Specialist Maths School within the Local Centre of circa 2,450 sq. m.

5.13 Brookgate, in dialogue and agreement with Network Rail, also support the requirement for the existing station car park to be re-provided in a more efficient multi-storey car barn as part of a mixed-use higher density development proposal. This will be included in a future phase of Cambridge North and will involve dialogue with Network Rail, the Train Operating Company (TOC) and Cambridgeshire County Council as appropriate throughout the design and planning process.

5.14 Policy 10d states that development proposals should consider taking the First Public Drain overflow out of its culvert which extends into 'the Knuckle' (the area around the bend in Cowley Road) and flows through to Chesterton Fen.

5.15 The FPD overflow is culverted where it crosses the Cambridge North site. The FPD has already been diverted (and retained in a culvert) as part of the Cambridge North Station project. Brookgate do not consider it appropriate to carry out further works on this drainage asset. The culverted section of the FPD through the Cambridge North site is quite deep and any proposals to 'open up' a section of the drain would be difficult to achieve without steep sided slopes and would inevitably lead to H&S and maintenance issues in perpetuity. Brookgate is supportive of

introducing ‘soft’ SUDS across the whole of the NEC site and to provide visual ‘clues’ to how surface water is managed through the introduction of swales, water bodies and rain gardens. However as discussed above given the practical issues with the existing FPD diversion we do not consider it appropriate to ‘open up’ this section of the drain.

5.16 Policy 10d states that a new public open space (Station Place) along Station Approach should be provided to create an informal space which offers opportunities for people to dwell and interact. Brookgate are broadly supportive of this although the exact siting and quantum of space will need to be determined as part of the future design and planning process.

5.17 The Policy also states that the development and design requirements for the Station Approach Local Centre includes safeguarding land to accommodate the CAM (including interim construction site) adjacent to Cambridge North Station to facilitate a transport hub. Brookgate would welcome discussions with all stakeholders to understand the extent and scope of land safeguarded in the context of existing/future development in this area. Further comment is provided in Section 3 of these representations.

Policy 10e: Cowley Road Neighbourhood Centre

5.18 The supporting text to Policy 10e states that ‘*Beyond the District Centre, a new pedestrian and cycling bridge will connect over Milton Road to Cambridge Science Park’.*

5.19 Brookgate do not support the concept of a bridge over the Milton Road corridor, and are surprised that it is categorically stated in the draft. Brookgate’s transport consultants have consistently made the case (as have other NEC landowners) during the workshops on the NEC AAP that improvements to the ‘at grade’ pedestrian and cycle crossings both at the Science Park entrance and the CGB junction be looked at in more detail before any decision of a bridge is taken forward. Brookgate had thought that this had been agreed by all parties.

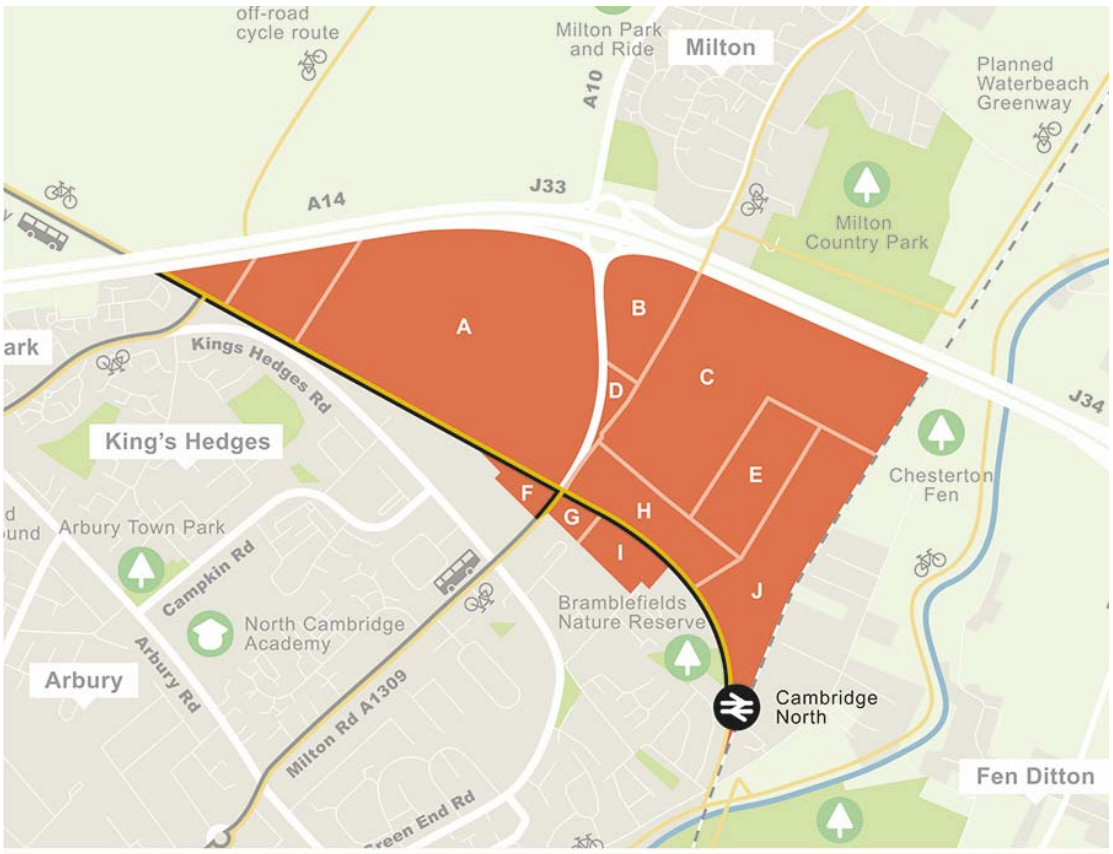
5.20 The fundamental targets of the Greater Cambridge Partnership (GCP) is to reduce vehicle movements into the city centre of Cambridge by up to 20%. This clear policy target should be seen in the context of highway intervention proposed on the Milton Road corridor. Reduced ‘through traffic’ on Milton Road provides the opportunity to give improved priority to pedestrian and cycle movements (a key policy of the draft NEC) and to ‘humanise’ the Milton Rod corridor.

5.21 A grade separated bridge is an outdated 1960s concept and would create an inhospitable vehicle dominated spaces at ground level with people ‘inconvenienced’ on detours over bridges, ramps etc. The proposed bridge on Milton Road is at a location where pedestrians and cyclists need to access the bridge from the north, south, east and west. How can a bridge facilitate all these movements with ramps in excess of 100m long?

6.0 Homes and Workplaces

6.1 **Question 4: Do we have the right balance between new jobs and new homes?**

6.2 Figure 29 of the Draft NEC AAP (see below) sets out the broad locations and quantities of business space, homes and other land uses envisaged for North East Cambridge.



A Cambridge Science Park
70,000m² new business space (B1), 1,150m² new logistics hub (B8), 1,100m² new shops, local services and community facilities

B St John's Innovation Park
35,000m² new business space (B1), 100m² shops and local services

C Anglian Water/ Cambridge City Council site
5,500 new homes, 23,500m² new business space (B1), 9,400m² new shops, local services, community and cultural facilities

D Merlin Place
120 new homes

E Cambridge Commercial Park/ Cowley Road Industrial Estate
500 new homes, 17,500m² new industrial, storage and distribution space (B2 and B8)

F Milton Road garage site
100 new homes

G Trinity Hall Farm Industrial Estate
1,500m² new business space (B1)

H Cambridge Business Park
500 new homes, 68,000m² new business space (B1) 1,500m² shops and local services

I Nuffield Road Industrial Estate
550 new homes

J Chesterton Sidings
730 new homes, 36,500m² new business space (B1) 8,800m² new industrial, storage and distribution space (B2 and B8), 1,100m² new shops and local services

Source : Figure 29 : Map graphic showing broad locations and quantities of business space, homes and other land uses envisaged for North East Cambridge, Draft NEC AAP

Policy 12a: Business

6.3 The Policy states that applications which create new employment floorspace and promote increased jobs and job densities in the Area Action Plan area will be supported where they are consistent with the other policies of the Area Action Plan and adopted Local Development Plan.

6.4 Overall, up to 234,500 sqm of additional B1 floorspace is proposed in the NEC AAP area, in accordance with the distribution set out in the table below.

DEVELOPMENT PARCEL	ADDITIONAL B1 FLOORSPACE
Anglian Water/Cambridge City Council site	Up to 23,500 m^2
Cambridge Business Park	Up to 68,000 m^2
Cambridge Science Park	Up to 70,000 m^2
Chesterton Sidings	Up to 36,500 m^2
Cowley Road Industrial Estate	No net loss of existing plus the re-provision of floorspace from Nuffield Road Industrial Estate
Nuffield Road Industrial Estate	No net loss through the re-provision of existing floorspace to (i) Cowley Road Industrial Estate, or (ii) the wider Area Action Plan area
St John's Innovation Park	Up to 35,000 m^2
Trinity Hall Farm Industrial Estate	Up to 1,500 m^2
TOTAL	**Up to 234,500 m^2**

6.5 The Policy states that '*proposals that exceed these figures will need to be justified in terms of the impact on the trip budget and Area Action Plan wide infrastructure and where the character, role and function of an area will not be compromised*'

6.6 Brookgate support the aims of Policy 12a in terms of creating new employment floorspace and promoting increased jobs and job densities in the AAP area. However, mix and quantum of new employment floorspace should be informed by both market conditions and successful place-making. Bespoke solutions to maximise economic and employment benefits should therefore be secured as part of individual applications rather than through a generic and inflexible policy approach.

6.7 Indeed, initial assessment and design work together with its location adjoining an existing transport hub has indicated that the Chesterton Sidings is capable of accommodating greater than 36,500 m^2 of additional B1 floorspace whilst having no adverse impact on the trip budget or compromising the character, role and function of the area.

6.8 It should also be noted that as of 1 September 2020, the Town and Country Planning (Use Classes) (Amendment) (England) Regulations 2020 amend the Town and Country Planning (Use

Classes) Order 1987. Classes A, B1 and D1 applicable to retail, office and non-residential institutions are removed and a new Class E 'commercial' use has been introduced in their place.

6.9 The Chesterton Sidings site (Land at Cambridge North) is capable of providing significant additional capacity of commercial, Class E, floorspace than that identified in Policy 12a to support the growing office and R&D market, with associated increase in job creation.

6.10 There is a lack of Grade A office space in Cambridge. For the R&D and business services sector, the location decisional drivers are access and ability to recruit the right skill sets. Land at Cambridge North provides this, but the lack of available space and lack of development pipeline puts that resilience at risk and could undermine the growth of the R&D sector. Developing land at Cambridge North can help address the demand and supply imbalance for quality office stock by bringing forward Grade A space in close proximity to an existing transport hub.

6.11 A flexible and positive approach to employment growth should also be adopted in the NEC AAP and considered in light of the CPIER and the target of doubling the regional economic growth (GVA) of Greater Cambridge over the next 25 years. This requires the area going beyond what it has achieved in the past (to double an economy over twenty-five years requires an average annual growth rate of 2.81%. Historically, since 1998, the local economy has only grown at around 2.5%.). Achieving this requires employment growth and more importantly productivity growth, as we are already at comparatively high levels of employment.

6.12 The Science and Technology sector is the engine of the Cambridge Phenomenon that has driven the economy and it will remain an important part of the local economy and job market. Alongside, it is important to have all types of commercial space to provide for a wide range of job opportunities and to serve Greater Cambridge at close quarters to not overly rely on long-distance travel to service the area with goods and services. Further prime office floorspace in high quality developments is also needed to consolidate and expand the world class facilities which have recently put CB1 on the international property investment map.

6.13 The CPIER states that locations with high levels of public transport access, such as Land at Cambridge North, should be identified for businesses with high employment densities. This would include sites within walking distance of train stations, travel hubs and along transport corridors.

> "*by ensuring good quality public transport is in place before development, the number of those new residents who will use the transport is maximised. This is also likely to be the best way to stretch some of the high-value businesses based within and around Cambridge out into wider Cambridgeshire and Peterborough. These companies will not want to be distant from the city, but these clusters could 'grow' out along the transportation links, providing connection to other market towns*." [1]

6.14 Taller prime office buildings should be located close to Cambridge North station in order to focus development at transport hubs; keeping the city compact, but supporting the demand for high quality office space.

[1] CPIER p41

Policy 12b: Industry, storage and distribution

6.15 Policy 12b states that development should ensure there is no net loss of B2 (general industrial) and B8 (storage or distribution) floorspace in North East Cambridge. It continues in stating that the redevelopment of existing premises and the provision of new industrial floorspace should consolidate current activities and promote a mix of uses that includes light industrial, offices, storage and distribution.

6.16 The Policy identifies the following development areas in respect of the Chesterton Sidings site:

- 4,800 sqm of B2 (General Industrial) (min. floorspace)
- 4,000 sqm of B8 (Storage and Distribution) (min. floorspace)

6.17 Brookgate are broadly supportive of the aims of Policy 12b in terms of no net loss of B2 and B8 floorspace in North East Cambridge, subject to ongoing market conditions. However, as referred to under Policy 12a, the quantum and distribution of employment floorspace across the NEC site should be informed by both market conditions and successful place-making and bespoke solutions to maximise economic and employment benefits should be secured as part of individual applications rather than through a generic and inflexible policy approach.

Policy 13a: Housing

6.18 The AAP makes provision for at least 8,000 net dwellings in accordance with the distribution set out in the table below.

DEVELOPMENT PARCEL	MINIMUM NET ADDITIONAL DWELLINGS
Anglian Water/Cambridge City Council site	5,500
Cambridge Business Park	500
Cambridge Science Park	0
Chesterton Sidings	730
Cowley Road Industrial Estate	500
Merlin Place	120
Milton Road Garage Site	100
Nuffield Road Industrial Estate	550
St John's Innovation Park	0
Trinity Hall Farm Industrial Estate	0
TOTAL	**8,000**

6.19 The Policy states that residential units in addition to the table above will need to be considered alongside the other policies of the Area Action Plan and adopted local development plan.

6.20 Brookgate are broadly supportive of Policy 13a and that the housing provision figures are regarded as a minimum. It is important to take a flexible and positive approach and be clear that the AAP does not impose a ceiling on the amount of housing development that may come forward.

6.21 As referred to above, there is a target of doubling the regional economic growth (GVA) of Greater Cambridge over the next 25 years. In order to deliver this 'step change' in economic performance, there is clearly a need to provide for a high level of housing to take account of the pressing and worsening affordability issue and to support the aspiration to grow the Greater Cambridge economy and double the GVA across the Greater Cambridgeshire and Peterborough area.

6.22 The Chesterton Sidings site (Land at Cambridge North) has the potential to continue the successful transformation of this part of the city and address a specific need for more housing to serve the private rented sector, thus making a significant contribution to meeting housing needs within Greater Cambridge in a manner that would diversify housing choices within the market.

Policy 13b: Affordable Housing

6.23 Policy 13b states that the AAP requires 40% of new homes to be delivered as affordable housing.

6.24 Subject to viability testing, the 40% requirement is supported in terms of being applied to the NEC AAP as a whole. The very heavy infrastructure costs and brownfield nature of the land with associated remediation costs must however be recognised and viability is of key importance.

6.25 The Policy also recognises that Build to Rent Schemes deliver fewer than 40% affordable homes, and that this shortfall needs to be made up for by other schemes coming forward in North East Cambridge. This fundamentally misunderstands the contribution BTR makes to housing supply in Cambridge and the LPA must take a more nuanced approach to housing tenures.

Policy 13c: Build to Rent

6.26 Policy 13c states that Build to Rent (BtR) should be provided in a balanced way across North East Cambridge without being the dominant typology of homes in any location to ensure that specific areas contain mixed housing types and tenures. To achieve this, it is proposed that no more than 10% of the total housing across the Area Action Plan should be Build to Rent, i.e a maximum of 800 homes across North East Cambridge. This approach is fundamentally flawed. The 10% cap is an arbitrary number and is not supported by evidence.

6.27 Brookgate support the aims of Policy 13c and the recognition that BtR developments can play an important role in providing overall housing choice within North East Cambridge. However, the restriction on the quantum of BtR units and that they should not be a dominant typology in any location is not supported.

6.28 The AAP instead needs to remain flexible in order to be able to respond to change and take a positive approach to housing development.

6.29 BtR housing responds to a particular local housing need and provides a means of widening housing choice for tenants, particularly those who may be renting long term, and also to deliver much needed housing within a faster timescale.

6.30 Contrary to popular opinion, the private rented sector is not dominated by all-student households, which account for only 7.5% of private rented households, as most students live in dedicated communal establishments. Rather, the Cambridge private rented sector is quite unique with a population profile characterised by young adults and many are in professional or other senior occupations, despite the young age profile.

6.31 These young professional households make-up a considerable proportion of the population and are people who often do not meet the criteria for social rented housing but cannot afford to buy their own home. The private rented sector can provide such accommodation.

6.32 The redevelopment of Land at Cambridge North offers an opportunity to provide a significant amount of rented accommodation in a highly sustainable location, making the best possible use of a brownfield site that is already allocated for residential development.

6.33 The Homes for Londoners Affordable Housing and Viability SPG (2017) confirms the significant benefits that BtR developments can secure in terms of their particular contribution to increasing housing supply, as outlined below:

- attract investment into housing market that otherwise would not be there, particularly since Build to Rent is attractive to institutional investors seeking long-term, inflation-tracking returns;
- accelerate delivery on individual sites as they are less prone to 'absorption constraints' that affect the build-out rates for market sale properties;
- more easily deliver across the housing market cycle as they are less impacted by house price downturns;
- provide a more consistent and at-scale demand for off-site manufacture;
- offer longer-term tenancies and more certainty over long-term availability;
- ensure a commitment to, and investment in, place making through single ownership; and
- provide better management standards and higher quality homes than other parts of the private rented sector.

6.34 Of particular relevance here is the reference to development at scale. In order to be attractive to investors and in turn ensure the development is commercially viable, BtR needs to be of sufficient scale and size. This critical mass is also important not just in terms of the nature of BtR but also in terms of management. Therefore, pepper potting as proposed in the Draft NEC AAP is the wrong approach. The approach others are taking, such as the Greater London Authority, demonstrates a greater understanding of the economics of BtR. More research needs to be undertaken by the Councils to inform the NEC AAP and to recognise the contribution that BtR can make in this location.

6.35 The Cambridge North site is the optimal location for BtR within the NEC AAP site given its proximity to the Cambridge North station and transport interchange. This is a prime requirement for BtR operators.

Policy 13d: Housing for local workers

6.36 Policy 13d states that developments including affordable private rent as part of their affordable housing allocation should demonstrate how these homes will be targeted to meet local worker need. Development proposals for purpose built Private Rented Sector homes such as Build to

Rent, which are offered to employers within and adjacent to North East Cambridge on a block-lease basis, will be supported.

6.37 Land at Cambridge North has the potential to provide key worker accommodation to support the concentration of healthcare services in and around Cambridge.

Policy 13e: Custom Build

6.38 Policy 13e states that, on major developments, 2% of net additional homes should be brought forward as custom finish units. Given the high-density nature of North East Cambridge, it is expected that these would be apartments built to a shell finish where occupiers determine the final layout and internal finish.

7.0 Social and cultural facilities

7.1 **Question 5 : Are we planning for the right community facilities?**

Policy 14: Social, community and cultural infrastructure

7.2 Policy 14 sets out what social and community facilities are expected to be built and how this is to be achieved. It states that development proposals for new community, cultural and leisure facilities will be supported where it meets identified local needs.

7.3 Required on-site social and community infrastructure provision has been identified as the following:

- 3 primary schools (inclusive of nursery provision)
- Safeguarded land for a secondary school (if needed)
- Visual and performing arts hub (including production studios, gallery/museum and theatre/community conference space)
- Community room
- Nursery (pending further engagement with Cambridgeshire County Council)
- Community garden
- Library and community centre
- Health provision (pending further engagement with health providers)
- Indoor sports and swimming provision (pending further engagement with Sports England and through the updating of the Sport Strategies for both Councils)

7.4 The proposed on-site education provision has been informed by an Education Topic Paper prepared by the education authority for the area. The Topic Paper indicates that presently, development at North East Cambridge is not projected to generate sufficient numbers of pupils to warrant the need for a secondary school on-site. Nevertheless, for the proper and long term planning of the area, the Councils consider a cautious approach should be taken and have safeguarded land for a secondary school if it is needed. This is located within Cowley Road Neighbourhood Centre alongside a primary school. Local secondary school provision is to be kept under review throughout the Plan period to determine whether a secondary school at North East Cambridge is required and when it will need to be delivered. Based on the housing trajectory for the Area Action Plan, it is anticipated that if it is required, then it is likely to be delivered towards the end of the Plan period.

7.5 Land at Cambridge North is proposing to include for a Specialist Maths School. The Government has committed to having a 16-19 maths school in every region, 11 in total. The Department for Education (DfE), through the Learning Alliance, has identified the Cambridge North site as an ideal location for this, due to regional accessibility and wider economy and skills concentration.

7.6 Policy 14 as currently drafted only provides policy support where there is recognised ‘local needs’. This is overly restrictive and does not align with the objectives of the NPPF which is to take a proactive, positive and collaborative approach to ensuring that a sufficient choice of school places is available to meet the needs of communities and that LPAs should give great weight to the need to create, expand or alter schools to widen choice in education (paragraph 94).

7.7 It is therefore requested that Policy 14 includes the following wording;

> *"State funded education infrastructure which is capable of meeting wider regional needs will also be supported where this is deliverable and sustainable."*

8.0 Building heights and density

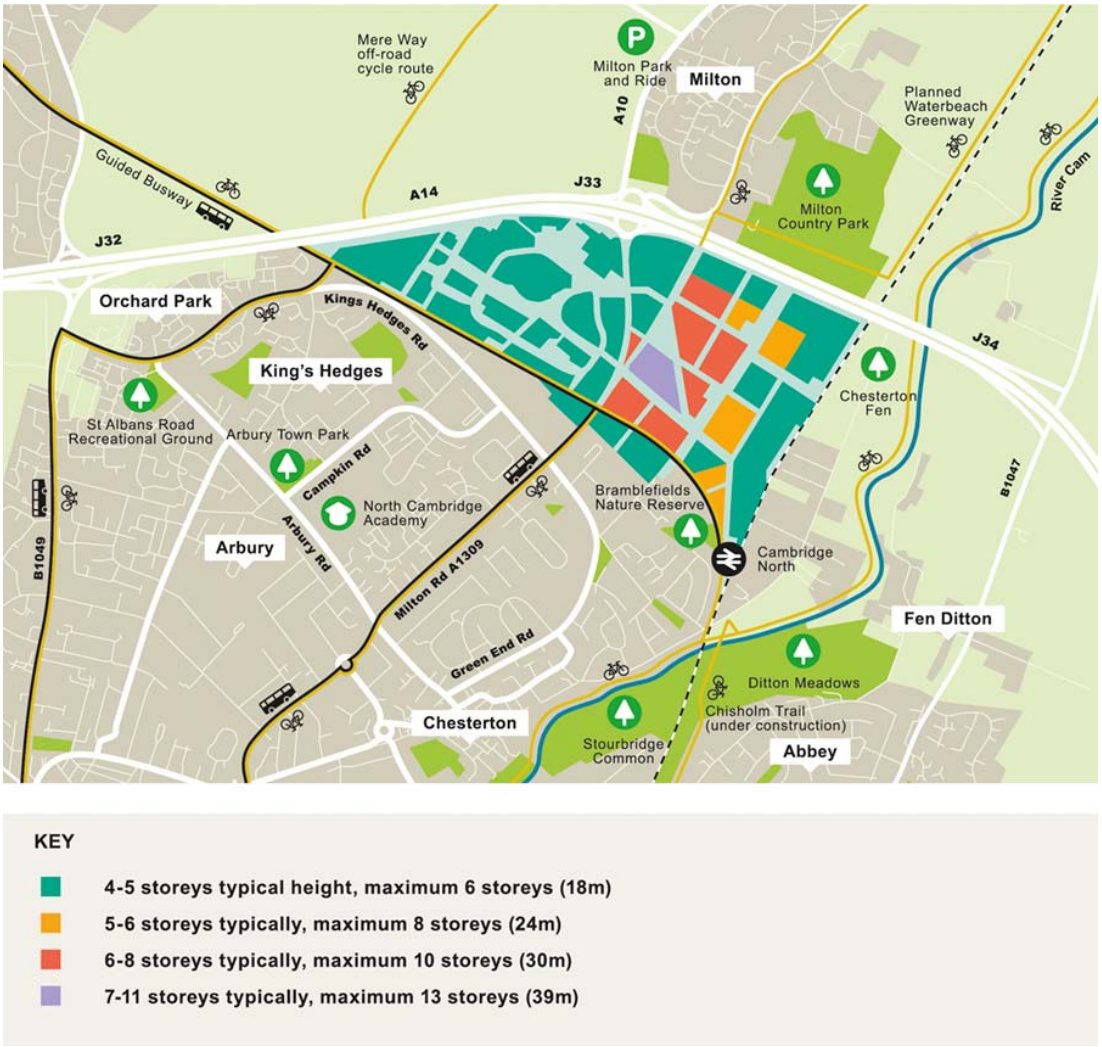
8.1 **Question 6 : Do you think that our approach to distributing building heights and densities is appropriate for the location?"**

Policy 9 : Density, heights, scale and massing

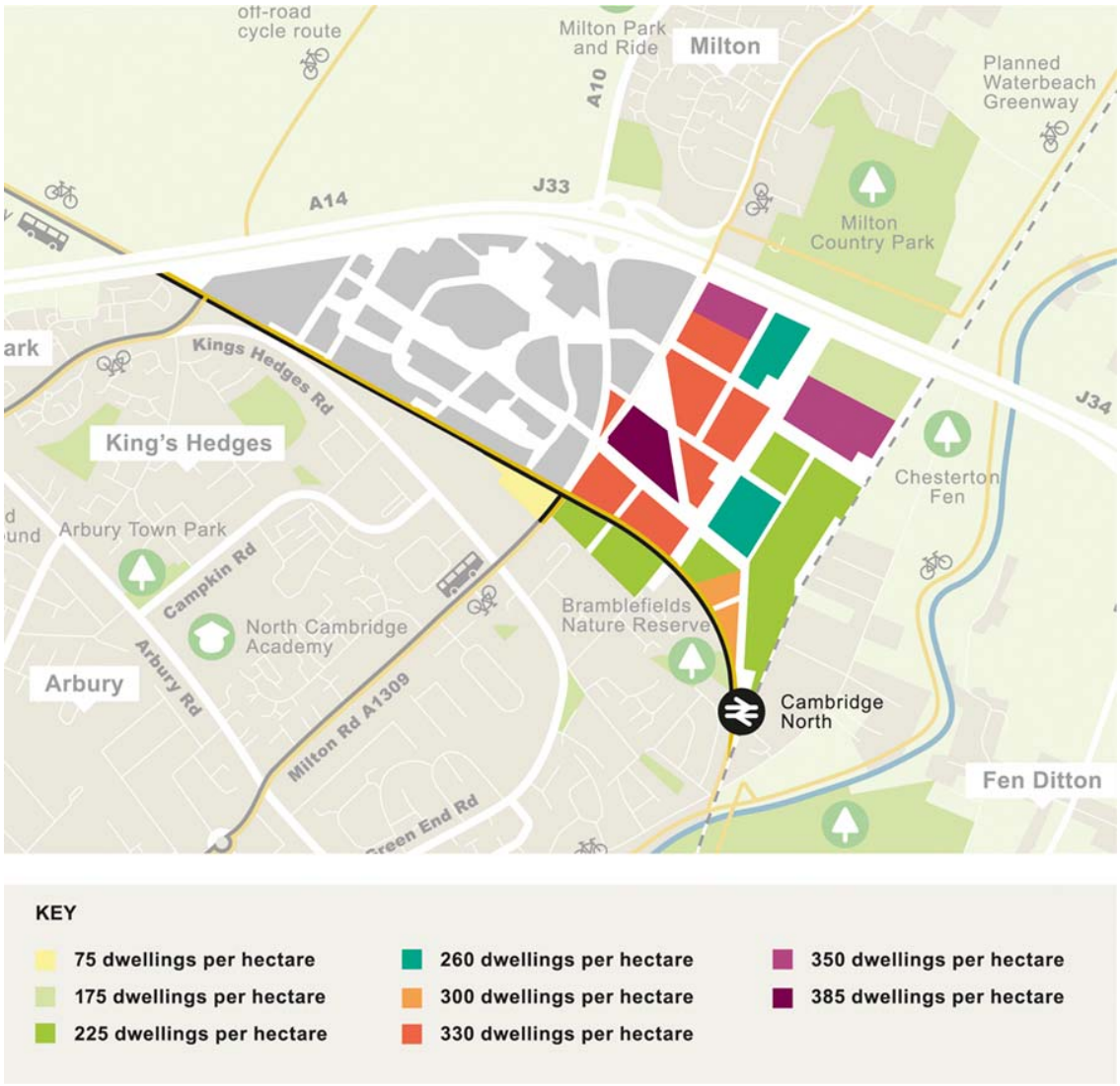
8.2 Policy 9 sets out expected building heights and densities across the area and how the scale and massing (shape) of buildings should consider its impact on the skyline.

8.3 To understand the potential impact of development, the Councils have undertaken a Landscape Character and Visual Impact Appraisal to inform Policy 9 but are also commissioning a Heritage Impact and Townscape Assessment to inform a wider Townscape Strategy for North East Cambridge.

8.4 Policy 9 states that '*development densities and building heights should not exceed those identified on Figure 21 and Figure 23. Densities and intensification of appropriate uses will increase around highly accessible parts of the Area Action Plan area taking into account wider development sensitives, and activity clusters such as the District Centre and Cambridge North Station.'*



Source : Figure 21 : Building heights considered suitable for North East Cambridge, Draft NEC AAP



Source : Figure 23 : Residential densities considered suitable for North East Cambridge, Draft NEC AAP

8.5 Brookgate object to Policy 9 in that the Policy is overly restrictive in stating that building heights 'should not exceed' those identified on Figure 21. 4-5 or 5-6 typical building height in an area around an existing station and public transport interchange is particularly low. Figure 21 also fails to take account of the building heights of the consented hotel and office adjacent to the station (both 7 storeys). Both of these detailed applications demonstrated through detailed technical evidence the acceptability of 7 storeys in this location.

8.6 Furthermore, the maximum heights proposed in Figure 21 are assuming a residential storey height as opposed to an office typical level and do not appear to allow sufficient additional ground floor height for active frontage and alternative uses. It should also be noted that office storey heights have recently increased to be in line with developing national space standards and therefore they may be a small increase when comparing to existing precedents.

8.7 Setting overly restrictive maximum height limits in certain locations and without the proper consideration of the wider planning potential of development sites and wider implications of not maximising those opportunities (by displacing development to other locations that may not be best placed to accommodate it) is a risk to the current approach set out in the NEC AAP. Such a displacement effect presents a lost opportunity in key urban areas of high demand for new accommodation, whether that is for living, working, leisure or other requirements in the built environment.

8.8 With particular reference to Cambridge North, the Site is bounded by the railway line to the east, the A14 to the north, the Cambridge Science Park to the west and the suburban Chesterton to the south. The City Centre is some 3.5km from the site. This physical context presents an opportunity to investigate heights and densities which might not be supported in other locations in Cambridge: taller buildings would have no impact on any existing residential properties with regard to sunlight and daylight but could;

- Make optimal and efficient use of the capacity of the site and release significant development pressure from the historic core of the City;
- Optimise the effectiveness of substantial investment in public transport infrastructure and mobility corridors in terms of improved and more sustainable mobility choices and enhanced opportunities and choices in access to housing, jobs, community and social infrastructure;
- Create an opportunity to define the north east corner of the City with striking buildings visible from the A14;
- Support the additional uses and amenities that will make this a self-supporting district; and
- Assist in reinforcing and contributing to a sense of place, such as indicating the main centres of activity, important street junctions, public spaces and transport interchanges. In this manner increased building height is a key factor in assisting modern placemaking and improving the overall quality of our urban environments.

8.9 The NPPF confirms, at paragraph 118, that planning policies should "*give substantial weight to the value of using suitable brownfield land within settlements for homes and other identified needs"* and *"promote and support the development of under-utilised land and buildings".* The NPPF continues, at paragraph 112, in advising that planning policies should support development that makes efficient use of land, taking into account, *inter alia,* the identified need for different types of housing and other forms of development, and the availability of land suitable for accommodating it.

8.10 The NEC AAP is the largest brownfield site in Cambridge and is served by excellent public transport infrastructure. It therefore presents a significant opportunity to transform into a high-quality gateway to the city and act as a catalyst for the regeneration of the wider area. Opportunities for densification of existing urban areas in locations well served by public transport should therefore be maximised wherever possible.

8.11 The tax payer, through the construction of the Station and the relocation of the water treatment works, will contribute over £300M towards the regeneration of the area. It is therefore imperative that a proper return is achieved on this massive investment in the area and if the Mayor's CAM comes to fruition, further tax payers monies will be secured.

8.12 A high density development would represent efficient use of land in a sustainable location and create the opportunity for people to live close to where they work. A higher density of people also helps to form a critical mass and sense of place to support the range of ancillary retail uses, services and facilities that would come forward alongside the residential and employment accommodation.

8.13 The need for densification in urban parts of Cambridge and adjoining transport hubs is also supported by the Cambridge and Peterborough Independent Economic Review (CPIER), published in September 2018. One of the key recommendations from the review, at 2.3, is to consider some densification, particularly in Cambridge, away from the historic centre, and more on the edges, as and where new development sites comes forward. The CPIER report specifically states that the east side of Cambridge offers significant scope for housing and commercial development:

> *"Such development would have the advantage of being close to the principal centres of employment and the existing rail infrastructure whilst also opening up opportunities for new transport links to connect the main centres of employment more effectively. Most significantly, it includes land which has previously been safeguarded for development and is within the boundaries of the existing urban area so would proving opportunities in line with the existing spatial strategy."*

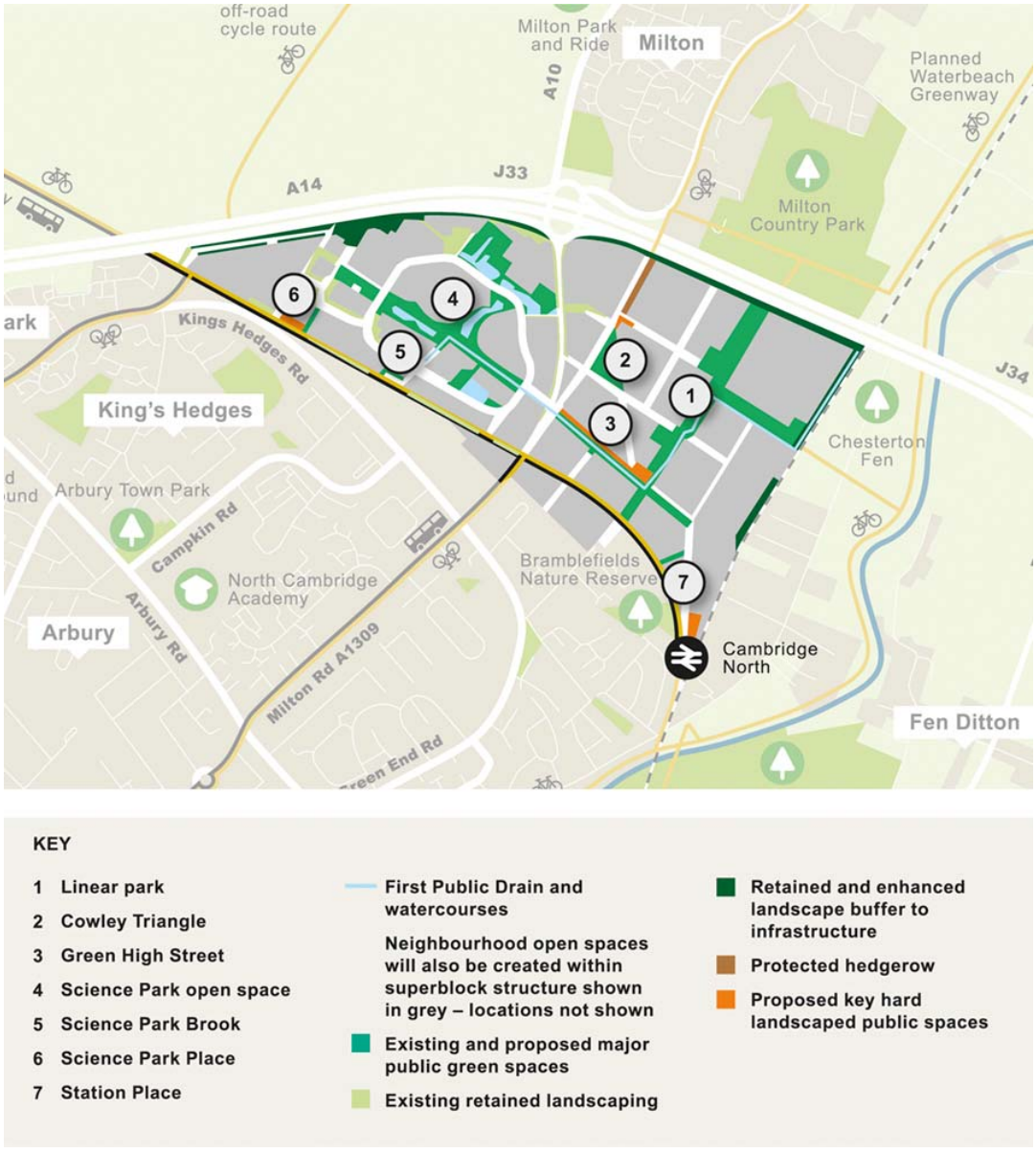
9.0 Open Space

9.1 **Question 7 : Are we planning for the right mix of public open spaces?**

Policy 8 : Open spaces for recreation and sport

9.2 Policy 8 sets out how the AAP area is proposed to create a functional and beautiful open space network, including improving existing open spaces and making the most of assets such as the First Public Drain. Regard is proposed to be had to the Cambridge City local standards of provision of all relevant types of open space (see Cambridge Local Plan 2018, Appendix I or any future replacement) and the Councils' open space and sports strategies, where applicable.

9.3 Policy 8 states '*for development proposals requiring the provision of strategic open space, this must secure in the first instance the siting and amount of strategic open space shown in Figure 19'* (see below).



Source : Figure 19 : Open space network to be created by the Area Action Plan, Draft NEC AAP

9.4 The expectation is that all open space requirements will be met on-site. However, Policy 8 states that any underprovision in the total amount of strategic open space required of a development, beyond that provided as per Figure 19, can be met through new or enhanced offsite provision, including:

- Bramblefields Local Nature Reserve (way-finding)
- Milton Country Park (increasing capacity and way-finding)
- Chesterton Fen (way-finding and accessibility to River Cam including pedestrian and cycle bridge crossing over railway)

9.5 The potential locations for off-site provision are broadly supported but this should not preclude alternative off-site locations coming forward.

9.6 For non-strategic open space requirements, where there are deficiencies in certain types of open space provision in the area surrounding a proposed development, the Councils will seek to prioritise those open spaces deficient in the area.

9.7 The regard to the Cambridge City Council standards is broadly supported but applying the standards uniformly across the NEC AAP area fails to recognise the very different character and functionality of public open space around a major transport interchange and its hinterland. There are numerous examples of successful urban schemes where public open space has been limited in terms of quantum but is of high quality. Small intimate spaces often create the most successful urban experiences.

9.8 The emerging Cambridge North proposals accommodate an area of public open space broadly in the location of 'Station Place'. However, it should be stated that Figure 19 is indicative only and development proposals should instead be informed by successful place making with solutions to open space and public realm secured as part of individual applications rather than through a strict policy approach.

9.9 The proposals for the next phases at Cambridge North offer a series of public open spaces, creating a green network that would include:

- The existing public realm at Cambridge North Station and extension of the tree avenue along Cowley Road;
- A central triangular park of informal open space, south of Cowley Road;
- A green hub at the 'knuckle';
- A spine of linear green spaces, north of Cowley Road; and
- Secondary pocket parks, green walking routes, areas of natural and equipped children's play spaces, and private communal garden and rooftop amenity spaces.

9.9.1 These spaces will form a comprehensive, high quality landscape, that integrates with the proposed new residences, shops, cafes and offices. Cambridge North proposals to the north of Cowley Road, still the in early stages of design, will ensure that new green spaces form a coherent and legible network with other AAP proposed spaces and wider existing spaces such as Milton Park. Green infrastructure proposals would comprise a balanced mix of planting, tree infrastructure, amenity lawn, biodiverse rooftop planting, and hard materials in order to complement and assimilate the building structures into the site and local context; the use of high quality hard materials; a range of street furniture with multiple seating areas; vibrant planting mixes; and trees of varying levels of maturity, including specimens at key junctions.

9.9.2 In regards to qualitative elements of Policy 8, in addition to the high standards of quality, the green spaces will generally reach standards for low maintenance, water efficiency use and climate resilience, through careful selection of materials and plant species and through well-considered maintenance specifications. The green spaces will be publicly accessible and appealing throughout the year, with some exceptions within the residence courtyards and rooftops.

9.10 In terms of the reference to the 'retained and enhanced landscape buffer to infrastructure', shown on Figure 19, and the provision within Policy 8 to protect this area for the purpose of environmental amenity and landscaping, again it should be acknowledged that Figure 19 is indicative only and bespoke solutions are capable of being delivered under individual applications.

9.11 Furthermore, it is assumed that this 'buffer' includes the area between the bus road through the Cambridge North site and the station. We support the principles here of, 'no development' on this section of land however the emerging proposals for management of surface water on the Cambridge North site include some SUDS (swales) within this area. We consider that these proposals are appropriate for this area of the site and would suggest that the use of SUDS measures be included in the list of supported 'ancillary development' in these areas.

10.0 Biodiversity

10.1 **Question 8 : Are we doing enough to improve biodiversity in and around North East Cambridge?**

Policy 5 : Biodiversity and Net Gain

10.2 Policy 5 sets out how new development will achieve biodiversity net gain and measurably improve the biodiversity network across the wider area. It states that development proposals will be required to deliver a minimum of 10% net gain in biodiversity value and shall follow the mitigation hierarchy.

10.3 Where on-site provision is not feasible, greenspace and biodiversity enhancement will need to be provided in alternative ways and/or accommodated off-site. The Councils are proposing a sequential approach to mitigating adverse impacts on biodiversity resources. This is proposed to be achieved on-site in the first instance and then in areas adjacent to North East Cambridge, such as Milton Country Park and Chesterton Fen, before considering wider mitigation measures across the city and further afield.

10.4 As referred to under question 7 in respect of Policy 8, the potential locations for off-site provision are broadly supported but this should not preclude alternative off-site locations coming forward.

10.5 Brookgate broadly support Policy 5. They acknowledge that the existing local policy framework supports the 10% biodiversity net gain requirement even though the legislative framework is not yet in place. The proposals for the next phases at Cambridge North will be able to meet or exceed this target and follow the mitigation hierarchy. Furthermore, green corridors will be designed into the Site to contribute to the creation of a coherent on-site and off-site, high quality ecological network, particularly along the rail corridor N/S axis. The existing vegetation along the guided busway, the northern boundary of the Site and the narrow corridor along the railway fencing are the key features that the Cambridge North proposals will work with.

10.6 On-site mitigation should however be reflective of the baseline ecological conditions. For example, at Cambridge North where the railway sidings context has created habitat that is unusual within the AAP area, mitigating for open mosaic habitat (OMH) is required and this necessitates mainly brown roof planting mixed with a small proportion of green roof.

10.7 Brookgate acknowledge the sequential approach to mitigation set out in Policy 5, with off-site measures to form part of the mitigation strategy and the aspiration to agree improvement projects with the Councils which could include enhancements to Milton Country Park and/or Chesterton Fen. Given the habitats present within the Cambridge North Site, full on-site mitigation is not practicable. However, it is expected that the AAP developments as a whole may require the identification of other additional/alternative sites both within the wider local area, and then other sites elsewhere within Greater Cambridge.

10.8 Brookgate recognise the importance of improving the natural environment and Land at Cambridge North has the potential to provide areas of high quality public realm which recognises the very different character and functionality of public open space around a major transport interchange and its hinterland.

10.9 The proposed residential and commercial quarters at Land at Cambridge North can deliver a successful urban scheme where, despite public open space being limited in terms of quantum can still deliver spaces of high quality, providing green spaces to relax and socialise. Indeed, small intimate spaces often create the most successful urban experiences. New areas of green infrastructure also provide opportunities to mitigate against climate change, through creating resilient new habitats. Strategic off-site opportunities also offer the opportunity to significantly increase biodiversity other than providing site specific biodiversity improvements.

11.0 Discouraging car use

11.1 **Question 9 : Are we doing enough to discourage car travel into this area?**

11.2 In order to create a walkable, cyclable and sustainable neighbourhood which does not increase pressure on the road network around the area, development is proposed to be subject to strict trip budgets which will limit the number of vehicle trips allowed to and from each site, and reduced levels of car parking. Draft Policy 22 : Managing motorised vehicles sets out the trip budget principles and quotas, and the ratio of parking spaces that will be permitted for new development.

11.3 Brookgate is comfortable future phases of Cambridge North can be brought forward in accordance with the external car and parking budgets set out in Draft Policy 22 and the Transport Evidence Base AAP Report (September 2019). CB1 around Cambridge Station provides a strong local example of low parking office and residential development and evidence from CB1 indicates low car parking can work.

11.4 The Site has good public transport connectively, the CGB, frequent local buses (the Citi 2) and Park and Rides services, a mainline railway station and good cycle and pedestrian connectively to Cambridge City Centre and the cycle network in general. The Site can therefore support a low car parking strategy due to the abundance of other non-car mode options available. There are also significant opportunities to further enhance non-car modes of transport and to increase the number of ‘internal trips’. As such, there are significant opportunities to build a community where people can live and work, commuting by foot or bike or public transport within the NEC AAP area and surrounding urban area.

11.5 Furthermore, there are emerging strategic schemes, such as the CAM which will provide a high frequency metro services between the Site and surrounding employment hubs and high-tech clusters of Greater Cambridge.

11.6 With respect to the potential Maths School at Cambridge North, the school will have a Green Travel Plan and will look to minimise car to school transport and maximise encouragement of sustainable forms of transport.

12.0 Climate Change

12.1 **Question 10 : Are we maximising the role that development at North East Cambridge has to play in responding to the climate crisis?"**

Policy 2 : Designing for the climate emergency

12.2 This policy sets out the range of measures that are proposed to be an integral part of the design of new development proposals, in order to ensure that new development responds to the climate emergency. These measures are to ensure that development in North East Cambridge addresses the twin challenges of climate change mitigation and adaptation, in a way that enhances the environmental and social sustainability of the development.

12.3 Brookgate broadly support Policy 2. However, climate change policy and good practice is changing quickly, and the Plan will need to build in suitable flexibility to accommodate these changes within the lifetime of the plan. Climate change scenarios predict extensive changes by 2050, much of which is dependent on government and human action so there is substantial uncertainty over outcomes.

12.4 Allowing for changing technologies and approaches should also help with viability as technology and approaches improve and are more widely adopted, thereby reducing costs. Escalating targets and policies may be able to accommodate these changes, while providing clarity to developers on the costs of development over time.

12.5 Policy 2, part (b), states that development must be climate-proofed to a range of climate risks, including flood risk, overheating and water availability. Specific guidance is then given on how to minimise the risk of overheating and that overheating analysis must be undertaken to include consideration of future climate scenarios using 2050 Promethesus weather data. However this data is based on UKCP09 data rather than UKCP18 climate change projections which are the most recent data.

12.6 Policy 2, part (b) also states that all flat roofs must contain an element of green roof provision. This section of the Policy needs to be more flexible to allow on-site mitigation to be reflective of the baseline ecological conditions. For example, at Cambridge North where the railway sidings context has created habitat that is unusual within the AAP area, mitigating for open mosaic habitat (OMH) is required. The Cambridge North proposals will include a mix of green and brown roof planting but with the majority being brown roof because this is closer to the OMH habitat lost. These brown roofs or a combination of brown and green roof planting will form part of the overall mitigation strategy. Ecologically biodiverse brown roof planting mixed with a small proportion of green roof is more appropriate for the Cambridge North Site given the OMH baseline and this is the strategy that the Councils have approved previously for the consented office and hotel developments.

Policy 3 : Energy and associated infrastructure

12.7 Policy 3 states that an Area Action Plan wide approach to energy and associated infrastructure should be investigated and, where feasible and viable, implemented. The Shared Planning Service has commissioned the development of an Energy and Infrastructure Study and Energy Masterplan for NEC. This will consider the energy options and associated infrastructure requirements needed to support the energy demands of the development and the transition to net

zero carbon, giving consideration to energy use in buildings, battery storage and that required for transportation. It will also give consideration to the development of local energy communities and local collaboration and options for community ownership of decentralised energy opportunities that may arise from the energy masterplan.

12.8 At this stage of the Plan, the site wide energy and infrastructure study and energy masterplan has not been prepared.

12.9 Whilst Brookgate do not oppose the approach set out in Policy 3 in principle, throughout the NEC AAP workshops, Brookgate has made it clear that they have already sourced their power and other such requirements both on and off site in respect of the Chesterton Sidings site.

Policy 4a: Water efficiency, Policy 4b: Water quality and ensuring supply and Policy 4c: Flood Risk and Sustainable Drainage

12.10 Policies 4a, b and c set standards and expectations for development across all water related issues.

12.11 Brookgate broadly support these policies from a climate change resilience and in-combination climate change impacts perspective. However, Policy 4c needs to be aligned with Environment Agency guidance on climate change allowance: (https://www.gov.uk/guidance/flood-risk-assessments-climate-change-allowances).

13.0 Other Comments

Policy 23 : Comprehensive and Coordinated Development

13.1 This Policy states that planning applications for major development within the North East Area Action Plan area will be supported subject to a number of criteria. This includes, *inter alia,* demonstrating the development will make an appropriate and proportionate contribution to site wide infrastructure and be supported by a comprehensive masterplan that accords with the overarching AAP Spatial Framework and other AAP policies, including, where appropriate:

i. The ability to connect and contribute to Area Action Plan-wide utilities and communications grids; and

ii. The setting aside of land for strategic and site-specific infrastructure provision.

13.2 Representations in respect of the setting aside of land for CAM are provided in response to Question 2 and Policy 19 of this statement.

13.3 As referred to in Section 2 of these representations, it also needs to be recognised that the adopted plans of South Cambridgeshire District Council and Cambridge City Council make it clear that planning applications are capable of being submitted and granted planning permission in advance of the AAP being adopted (South Cambridgeshire Local Plan Policy SS/4 and Cambridge City Local Plan Policy 15).

13.4 The approach in the recently adopted local plan in respect of early submissions should not be watered down through the AAP process, indeed, through the AAP process the opportunity to bring forward Land at Cambridge North early should be explicitly acknowledged as beneficial to the regeneration of the area, creating a sense of place and arrival around the new Station and evidencing in commercial terms how the low parking ratios might work.

Policy 25 : Environmental Protection

13.5 The Arup Odour Report concluded that overall the range of evidence available from all the various reported modelling studies, as well as the Arup study, indicate that odour levels on the proposed development site would be below the levels generally considered to have a low risk of adverse odour impacts. The report was based on a further, more detailed odour analysis of the potential for odours at the development site at Cambridge North in response to the Odournet report. Anglian Water collaborated with Arup in terms of inputting into the report and agreed with the methodology adopted within the report.

13.6 The conclusions of the Arup Odour Report are as follows:

> *"A qualitative Source Pathway Receptor assessment concludes that the proposed development site would have a Low to Moderate risk of adverse odour impacts. This is because the development site is more than 400-800m from the more odorous parts of CWRC meaning odours which allows for dispersion and hence dilution of the odours released.*
>
> *Overall the range of evidence available from all the various reported modelling studies and this study indicate that odour levels on the proposed development site would be below the levels generally considered to have a low risk of adverse odour impacts. The only exception is the Odournet study which appears to have made some very pessimistic*

assumptions and the results can only be replicated by nearly doubling the measured odour emission rates on site.

The evidence from modelling studies is further supported by the evidence form the Source, Pathway, Receptor qualitative approach and the sensory assessments. Odour complaints are received at a frequency of once a year (and some are received in areas where all studies would suggest that there is a risk of adverse odour impacts) and the evidence from sniff testing is consistent with the modelling studies undertaken by Arup, Anglian Water and CERC"

13.7 A number of reports have been commissioned on the potential for odour in connection with the CWRC, all of which have reached consistent findings as the Arup Odour Report detailed above, with the exception of the Odournet Report which has far higher readings.

13.8 The evidence from these reports collectively is clear and this allows the LPA to confidently take informed decisions.

Policy 26 : Aggregates and waste sites

13.9 It is proposed that the Cambridge North East Aggregates Railheads at North East Cambridge continues to be safeguarded within the NEC AAP. These are located in the Chesterton Sidings Site and the extent of the safeguarded area is shown in Figure 42 of the AAP (see below).

13.10 However, Policy 26 does support residential and commercial development of the aggregates railheads site if the current operation is relocated off-site, subject to meeting the requirements of the Minerals and Waste Local Plan (or future equivalent), or if the Minerals and Waste Local Plan (or future equivalent) removes the safeguarding policy related to the site.

13.11 Brookgate, as part of their Chesterton Partnership meetings (comprising Brookgate, Network Rail and DB Cargo UK), are in regular liaison with DB Cargo UK and their tenant Tarmac regarding the future potential relocation of the railheads. These discussions have confirmed that there is in principle support for their relocation.

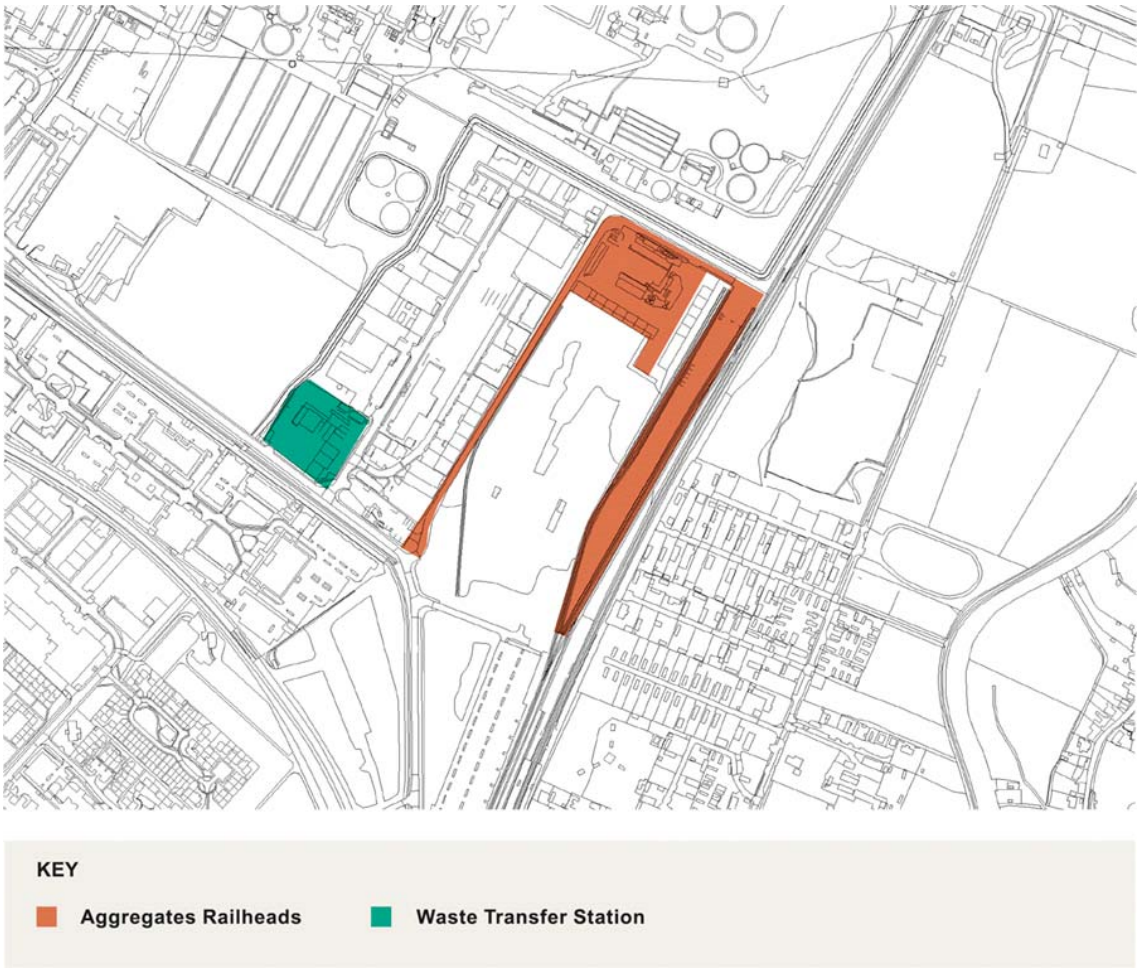


Figure 42: Map showing location of aggregates and waste sites within the Area Action Plan boundary

13.12 In terms of Figure 42 and associated text, the following should be noted;

- The haul road leading to the aggregates and freight lines is not consistent with other diagrams/figures within the AAP i.e. other figures do not include the haul road and possibly assume the aggregates and freight site are relocated;
- The narrow white/non colour strip between the aggregates and freight tracks should also be part of the Aggregates Railheads site, and shaded brown;
- The plan does not show the full extent of the aggregates railheads , including land on Cowley Road;
- The AAP shows mixed and confusing details in relation to the aggregates railheads. It should therefore clearly demonstrate a situation which includes the retention of the aggregates railheads

APPENDIX 1
SITE LOCATION PLAN

Do not scale this drawing. Contractor to confirm all dimensions on site. Notify architect immediately of any discrepancies.

Revisions:

00	VF	24.02.20	Drawn

NR Land Boundary

Key Plan

FORMATION ARCHITECTS

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Project
Cambridge North
Chesterton

Client
Brookgate

Drawing Title
Masterplan
Network Rail Land Boundary

0 20 40 60 ft

Drawn by	Checked by	Scale
VF	VF	1:1250@A0

Status
For Comment

Job number	Drawing number	Revision
6296	**NRLB-01**	**00**

APPENDIX 2
ARUP ODOUR REPORT

Brookgate Ltd
Cambridge North
Odour Assessment

Issue | 18 September 2019

Job number 267983

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ARUP

Document verification

ARUP

Job title		Cambridge North			**Job number** 267983
Document title		Odour Assessment			**File reference**
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Revision	**Date**	**Filename**	cambridge odour draft 1.docx		
Draft 1	12 Aug 2019	**Description**	First draft		
			Prepared by	Checked by	Approved by
		Name	Michael Bull		
		Signature			
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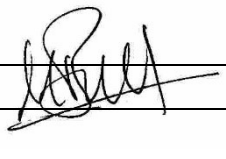
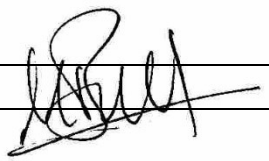
		Name	Michael Bull	Sam Bradley	Michael Bull
		Signature			
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Appendix A

Anglian Water Odour Emission Data

1 Introduction

Ove Arup and Partners Ltd has been commissioned by Brookgate Ltd to undertake an odour assessment relating to the proposed development of land near to Cambridge Water Recycling Centre (CWRC). Brookgate Ltd are proposing the development of land located at the end of Cowley Road, Cambridge This is a brownfield site of approximately 16 hectares mainly consisting of disused railway sidings. It is proposed to be a mixed use development of residential, office, student housing, hotel and retail uses.

The site is located to the south east of CWRC this is a large sewage works on a large site (most of which is not used for water treatment). Sewage treatment is an inherently odorous process and as a result, planners have to consider whether the development of land nearby would be suitable for uses that would be sensitive to odour. Where it is considered that the levels of odour would result in a sufficient impact on the amenity of the area, then planning could be refused.

The area has been the subject of several odour assessments carried out by various different parties. Those known to have been carried out are:

- An Anglian Water study dated 2012 to assess the odour impact of the existing works;
- An Anglian Water odour study dated March 2014 in connection with proposed changes to the operations and processes at CWRC;
- Various assessments carried out by CERC between 2012 and 2017 mainly in connection with planning applications near to CWRC;
- A previous study carried out by Arup in 2016 for Brookgate Ltd to assess the suitability of the same site for development purposes;
- An assessment carried out by Odournet in 2018; and
- This report.

These reports taken together, provide a comprehensive evidence base to assess the likely odour conditions on the proposed development site. This report therefore:

- Reviews the information in the previous assessments drawing out where these are consistent and highlighting differences in data and approach;
- Presents the results of an odour survey carried out in July 2019;
- Presents new odour modelling information based on the new survey and on emission data derived from all the surveys undertaken at the works;
- Provides an analysis of sensory assessment information using complaints analysis and sniff testing;
- Brings all the evidence together to provide conclusions on the likely odour environment on the proposed development site.

2 The Proposed Development and Surroundings

Brookgate Ltd is proposing a mixed use development on a site located at the end of Cowley Road, Cambridge. This is a brownfield site consisting of approximately 16 hectare of mostly disused railway sidings. It is proposed to be a mixed use development consisting mainly of residential, office, student housing, hotel and retail uses.

The site is located near to the CWRC operated by Anglian Water. There is also a Lafarge aggregate depot to the north of the site. The east of the site is bounded by the Cambridge to Ely railway line. To the west of the site and north of Cowley Road is an industrial / trading estate, to the west of the site and south of Cowley Road is a commercial office development. South of the site is the established residential area of East Chesterton. The site location is shown in Figure 1.

The main processes on CWRC that will result in odour conditions are:

- Inlet works – where sewage enters the works and undergoes preliminary treatment through screening and grit removal;
- Primary settlement – to remove the larger suspended solids from the incoming waste water;
- Activated sludge treatment – where the sewage is aerated and brought into contact with suspended biomass which uses dissolved organic material as a food source as hence removes it from the sewage;
- Secondary settlement – to remove solids from the treated sewage; and
- Sludge treatment – to stabilise and treat the sludge produced by the process (i.e. from primary and secondary settlement) using anaerobic digestion.

Cambridge WRC has been improved recently with an activated sludge plant replacing existing trickling filters located at the north and south east of the site. The trickling filters are still in place but are no longer used.

3 Background

Odour is a mix of volatile chemical compounds or a single compound that triggers a reaction in the olfactory organ, generally at very low concentrations. Any odour, whether considered to be pleasant or unpleasant, can result in a loss of amenity for occupiers of property if it is unwanted. If the odour is perceived sufficiently often above a threshold level, a statutory nuisance can be considered to exist. Odour can therefore be an important issue in planning when a proposal is made to locate sensitive uses close to an existing odorous process. The National Planning Policy Framework in paragraph 120 also notes that "planning decisions should ensure that new development is appropriate for its location" and "the potential sensitivity of the area or proposed development to adverse effects from pollution should be taken into account".

As noted in the Defra Code of Practice on Odour Nuisance from Sewage Treatment Works[1] odour can be characterised by four attributes:

- Concentration: the "amount" of odour present in a sample of air. It can be expressed in terms of parts per million, parts per billion or in mg/m^3 of air for a single odorous compound. More usually a mixture of compounds is present and the concentration of the mixture can be expressed in odour units per cubic metre. Odour concentration is measured in European odour units (ou_E/m^3). The odour concentration at the detection threshold is defined to be 1 ou_E/m^3. If an odour sample has been diluted in an olfactometer by a factor of 10,000 to reach the detection threshold, then the concentration of the original sample is 10,000 odour units;
- Intensity: is the magnitude (strength) of perception of an odour (from faint to strong). Intensity increases as concentration increases but the relationship is logarithmic rather than linear so increases or decreases in concentration of an odour do not always produce a corresponding proportional change in the odour strength as perceived by the human nose;
- Quality/Characteristics: this is a qualitative attribute which is expressed in terms of "descriptors", e.g. "fruity", "almond", "fishy". This can be of use when establishing an odour source from complainants' descriptions; and
- Hedonic tone: this is a judgement of the relative pleasantness or unpleasantness of an odour made by assessors in an odour panel. This provides a method to differentiate odours considered to be pleasant (e.g. bakeries) from those considered to be unpleasant (e.g. rotting fish).

The Defra Odour Guidance for Local Authorities[2] notes that 5 ou_E/m^3 would be a 'faint' odour whilst 10 ou_E/m^3 would be considered a 'distinct' odour. Generally, an average person would be able to recognise the source of an odour at about 3 ou_E/m^3 although this can depend on the relative offensiveness of the odour.

It should be noted that there is no statutory limit in England and Wales for ambient odour concentrations[1], whether set for individual chemical species or for mixtures. However, guideline limits and custom-and-practice standards have been

[1] Defra, Code of Practice on Odour Nuisance from Sewage Treatment Works, 2006
[2] Defra, Odour Guidance for Local Authorities, March 2010

used in some circumstances and there is some experience from other planning decisions.

The IPPC H4 Technical Guidance[3] (known as H4) gives odour criteria that 'indicate the likelihood of unacceptable odour pollution'. H4 proposes a range of criteria that depend on the relative offensiveness of the odour and are based on the 98th percentile of hourly mean odour concentrations. The 98th percentile of hourly means is determined by calculating the odour concentration for every hour of the year at a point, sorting these concentrations into ascending order and then taking the value where 98% of the hourly means have lower predicted concentrations (and therefore 2% of the hourly mean have higher concentrations than the 98th percentile). All odour concentrations reported in this report from this point onwards are based on the 98th percentile of hourly means unless otherwise stated.

For the more unpleasant odours such as processes involving decaying animal remains an odour criterion of 1.5 ou_E/m^3 as a 98th percentile of annual hourly mean concentrations is used. Moderately offensive odours (e.g. fat frying) have a criterion of 3 ou_E/m^3. Less unpleasant odours, for example from baking, have a less stringent standard of 6 ou_E/m^3.

In relation to sewage works, the H4 guidance suggests a level of 1.5 ou_E/m^3 as appropriate for odours from processes involving septic effluent or sludge. However, there is considerable ambiguity over the application of this value as most operations at sewage works do not include septic effluent or sludge, and there is no guidance on the acceptable odour levels originating from these other sources. Many also argue that the guidance is only applicable to processes regulated under the EPR Regulations by the Environment Agency and not for planning purposes. Almost all sewage works are not regulated by the EPR regulations and therefore the guidance does not apply in a formal manner.

3.1 Relevant Planning Appeals

Numerical odour criteria have been applied for planning purposes in the UK on numerous occasions. Such an approach appears to have been first applied at an appeal by Newbiggin-by-the-Sea v Northumbrian Water. The evidence presented to the inquiry details the results of research in Holland undertaken at over 200 sites to assess the relationship between odour and nuisance. The research concluded that a level of 5 ou_E/m^3 was an appropriate indicator of nuisance. It should be noted that this study was based on Dutch odour units that are twice the value of European units so therefore this standard is equivalent to 2.5 ou_E/m^3. However, the background to this study appears to be obscure and there is little information regarding the methods applied or the study sites.

Experience from other more recent planning appeals concerning residential development near sewage works suggest that levels of odour considered to be acceptable are below 5 ou_E/m^3 as a 98th percentile and on two recent occasions a level of 3 ou_E/m^3 has been accepted and most recently a level of 1.5 ou_E/m^3 was used and accepted. These include:

[3] Environment Agency H4 Odour Management, March 2011

- Land at Stoke Road, Leighton Linslade, APP/P0240/A/09/2110667, in this inquiry the Inspector considered that a level of 5 ou_E/m^3 "could be a risk of regular and unacceptable odour annoyance to such an extent that it would detract from the future resident's living conditions";
- Low Road, Cockermouth, Cumbria CA13 0XE, APP/G0908/A/11/2151737, the inspector concluded that "should odours fall within medium offensiveness, rather than low, (i.e. 3 ou_E/m^3) level modelled by the appellant indicates that it would not impinge on the appeal dwellings" (i.e. 3 ou_E/m^3 represented acceptable odour conditions).
- Land between Upthorpe Road and Hepworth Road, Stanton, APP/E3525/A/11/2162837, the inspector concluded that "I consider that a more appropriate threshold in this case is 3 - 5 ou_E/m^3, the level of the DEFRA guidance's "faint odour". He did note that this was for a small sewage works.
- Land at Ashley Road, Middleton, Leicestershire, APP/U2805/A/11/2162384. The Inspector concluded in this case "I believe that it is reasonable to take account of the 1.5 ou_E/m^3 contour map in determining odour impact. In my view areas subject to such concentrations are unlikely to provide a reasonable permanent living environment"

3.2 Other Relevant Guidance/Research

CIWEM has produced a Policy Position Statement[4] on odours which states that for a level of less than $3ou_E/m^3$, that "complaints are unlikely to occur and exposure below this level are unlikely to constitute significant pollution or significant detriment to amenity unless the locality is highly sensitive or the odour highly unpleasant in nature".

UK Water Industry Research (UKWIR)[5] published a study in 2001 that examined modelled odour concentrations and their relationship to complaints around sewage works. This was based on a review of the correlation between reported odour complaints and modelled odour impacts in relation to nine wastewater treatment works in the UK with ongoing odour complaints. The findings of this research indicated the following:

- At modelled exposures of below $5ou_E/m^3$, complaints are relatively rare, at only 3% of the total registered;
- At modelled exposures between 5-$10ou_E/m^3$, a significant proportion of total registered complaints occur; (38% of the total);
- The majority of complaints occur in areas of modelled exposure greater than $10ou_E/m^3$, 59% of the total.

There is some consistency within these sources but it must be recognised that all these studies are based on limited information. As noted in the H4 guidance, any assessment not only has to take into account the applicable standard but also the uncertainty inherent within the assessment.

[4] http://www.ciwem.org/policy-and-international/policy-position-statements/control-of-odour.aspx
[5] UKWIR Odour Control in Wastewater Treatment – A Technical Reference Document Report 01/ww/13/3, 2001.

The concept of an undeveloped buffer zone between an odorous process and sensitive receptors is well established particularly for Waste Water Treatment Works (WWTWs). Many water companies look for a 400m undeveloped zone around their works to allow odours to disperse. In the Defra Code of Practice on Odour Nuisance from Sewage Treatment Works it notes (p16):

> *"individual buffer zones can offer a practical means of preventing the exacerbation of existing problems and the occurrence of new ones".*

The code of practice also notes that a fixed distance for the buffer zone such as 400m is inappropriate and individual site circumstances should be taken into account. Anglian Water have taken such an approach when assessing odour risks around their sites developing their odour encroachment policy. This sets different distances based on the size and some operational features of the works[6].

3.3 IAQM Odour and Planning Guidance

The Institute of Air Quality Management (IAQM) has published guidance[7] for assessing odour impacts (on amenity) for planning purposes. This includes information on various assessment methods to be used to undertaken odour assessments for planning.

The guidance states that for assessing site suitability of proposed development land (e.g. residential) around an existing odour source, the odour effect can be assessed using predictive methods (which may be qualitative or modelling). Atmospheric dispersion modelling should use source terms that have been measured by Dynamic Dilution Olfactometry or if not available, use literature values.

The modelling will provide predicted concentrations (ou_E/m^3) as a 98th percentile of 1-hour means. The guidance recommends that in terms of comparing predicted concentrations with odour assessment criteria, practitioners should observe from the various scientific studies, case law and practical examples of the investigation of odour annoyance cases and then determine an appropriate criterion. This criterion could lie somewhere in the range of 1 to 10 ou_E/m^3 as a 98th percentile of hourly mean odour concentrations.

The guidance considers odour assessment approaches including dispersion modelling where it notes in Section 4.1 that "*Even when the model is a good representation of the real situation and the assumptions and input data are reasonable, the uncertainty for predictions from dispersion modelling can be considerable*". The guidance therefore recommends a "multi-tool" assessment approach – i.e. an assessment approach that uses at least two methods to assess the odour impacts.

[6] Anglian Water, Asset Encroachment Risk Assessment Methodology, 2019, https://www.anglianwater.co.uk/siteassets/developers/development-services/asset-encroachment-risk-assessment-methodology.pdf
[7] IAQM (2018) Guidance on the assessment of odour for planning.

Section 6 of the IAQM guidance provides advice on drawing conclusions from assessment results. It notes that:

"*the conclusion on the overall significance of likely odour effects will usually involve the practitioner drawing together the findings of several different odour assessment tools, each of which will have their own inherent strength and weakness and uncertainti*es";

It notes that this "weight of evidence" approach differs from normal assessment which or usually based on the results of one (usually dispersion modelling) assessment tool. The IAQM guidance advises the when coming to a conclusion regarding the odours impact, the right weight to the results provided by each tool needs to be given based on how well suited it is to the study scenario.

It particularly notes that for an existing activity or process, observations are possible regarding what is happening "on the ground" and that ***considerable weight*** should be placed on the findings of community based tools such as complaints analysis, community surveys and odour diaries. Dispersion modelling can be used as a supporting tool if this provides value to the study.

The IAQM guidance therefore strongly cautions on basing an assessment of an existing process only on the use of dispersion modelling and suggests that observations in the community should carry more weight.

4 Review of Previous Assessments

As noted earlier, there have been several previous assessments of the odour impacts from CWRC, this section reviews those assessments with particularly reference to:

- Input data used;
- Methodology applied;
- Predicted odour levels; and
- Conclusions.

4.1 Anglian Water Assessment 2012

This report[8] assesses the odour impacts of the existing works at the time, there has been a significant upgrade of the works since this this assessment was carried out and therefore the overall results are not representative of the current situation. At the time of the assessment, the sludge treatment processes were also not operational. However, this assessment does provide some emission on measured emission rates from parts of the process that are still operational.

The assessment partly uses measured odour emission rates taken from an odour assessment carried out by CERC in 2012 together with library values taken from the UKWIR report[5]. It is not explicitly stated which odour emission rates were measured but it does provide the odour emission rates used and compares these with the UKWIR emission rates. It has therefore been assumed that where the odours emission rates used differ from those in the UKWIR report, these are measured values.

There are values for:

Inlet works (reception, screen area and storm separation area): 36.4 $ou_E/m^2/s$

Primary settlement tanks: 2.3 $ou_E/m^2/s$

Activated sludge (C works): 2.3 $ou_E/m^2/s$ and

Final settlement tanks: 2.3 $ou_E/m^2/s$.

There are also values (2.3 $ou_E/m^2/s$) for the trickling filters and humus tanks which have since been removed. It is not reported if any seasonal variation was applied to the emissions data.

Given most of the values are the same, these have presumably been derived from measurement in one part of the works and the emission rates have been assumed to be the same for similar odour potential processes.

The report does provide a prediction for the odour concentrations around the site for the process as of 2012 – the predicted levels are shown in Figure 2. These

[8] https://www.cambridge.gov.uk/media/2700/cnfe-aap-io-anglian-water-odour-dispersion-modelling-report-2012.pdf, accessed August 2019

contours were derived using the AERMOD dispersion model and meteorological data from Cambridge collected between 2009 and 2011.

AERMOD is a well established dispersion model that has been widely used in the UK for odour assessment. It was developed on behalf of the United States Environmental Protection Agency (USEPA) and it is accepted as a suitable tool for assessment by the Environment Agency.

4.2 Anglian Water Assessment 2014

This report[9] examines the predicted changes in odour impacts because of the planned changes to the works that would involve decommissioning the percolating filter beds of Stream A and Stream B, along with the associated humus tanks and replacing these processes with a new activated sludge process (known as Stream D), comprising an activated sludge plant and final settlement tanks.

The existing activated sludge plant (known as Stream C) will remain operational in its current form. The preliminary treatment, primary settlement, tertiary treatment and sludge treat processes will not be changed. These changes have now been implemented at CWRC.

This assessment appears to have been based on similar odour emission data as the 2014 report although no emission rates are reported. It also appears to include the sludge treatment centre, this is discussed within the report as being operational although there is no explicit statement that it has been included. It is not reported if any seasonal variation has been applied to the emissions data.

The report details the expectation that the overall odour emission rates from the process will reduce as a result of removing the large area of trickling filters and humus tanks. Anecdotally, during site visits to CWRC, Anglian Water staff have reported that these trickling filters were considered to be quite odorous process at times.

The same dispersion model and meteorological data as used in 2012 were used for the assessment. The predicted odour concentrations are shown in Figure 3 which shows a reduction in odour concentrations compared with the 2012 assessment. This assessment appears to be Anglian Water's most recent assessment of the odour impact from CWRC for the existing processes at the site.

The predicted concentrations on the Chesterton sidings site are largely below 3 ou_E/m^3 with a very small area predicted to be above 3 ou_E/m^3 on the north west of the site.

[9] https://www.cambridge.gov.uk/media/2699/cnfe-aap-io-anglian-water-comparative-odour-potential-assessment-2014.pdf Accessed August 2019

4.3 CERC Assessments

Two further odour assessments of the site have been located on line, both carried out by CERC[10] [11]. Both are based on the same methods and input data and consequently can be treated as the same assessment (albeit examining different site locations).

Both assessments were carried out to assess the suitability of sites nearby for development, one examines Plots 1-21 on Cambridge Science Park and the other looking at air intakes on the Maurice Wilkes Site. The odour emission rates for the survey were based on a survey carried out by H+M Environmental in November 2015. This study was commissioned by Anglian Water. This data was also used in the Arup 2016 study (see Section 4.4 for full details). As the measurements were taken in November, the odour emission rates were multiplied by two before use in the model. The reports do not state if any seasonal variation was carried out. Given that it the winter emission rates were 50% lower, then the absence of seasonal variation would suggest this is a conservative assessment.

The assessment used the ADMS5 dispersion model, this a widely applied model used extensively in the UK and was developed by CERC. It is a similar model to AERMOD although would not be expected to produce identical results. Differences in the predictions between AERMOD and ADMS5 are indicative of some of the uncertainties associated with dispersion models.

Meteorological data was obtained from the Met Office Andrewsfield site for the years 2010 – 2014. This is an unusual choice of site given there are several other monitoring sites closer (Stansted, Bedford, Mildenhall and Cambridge Airport). While the choice of data will affect the detail of the distribution of odour contours it is not likely to make major changes in the predicted levels.

The predicted odour concentrations from these two assessments are shown in Figures 4 and 5. As for the previous Anglian Water assessment, the predicted concentrations on the Chesterton sidings site are largely below 3 ou_E/m^3 with a very small area predicted to be above 3 ou_E/m^3 on the north west of the site.

4.4 Arup 2016 Assessment

Arup carried out an odour assessment in 2016 on behalf of Brookgate Ltd. This used the same odour emission data as the CERC assessments and was provided by Anglian Water from a survey carried out by H+M Environmental. Anglian Water also provided details of the source sizes and operating conditions for input into the model. At Anglian Water's request, the AERMOD model was used for this assessment. The odour emission data used are summarised in Appendix A.

Anglian Water recommended that the emission data provide be multiplied by a factor of two to take into account the fact that it was collected during winter when

[10] CERC, Assessment of the impact from odour from Cambridge Water Recycling Centre on the Maurice Wilkes Site, St Johns Innovation Park, 26 January 2016

[11] CERC, Assessment of the impact of odour from Cambridge Water Recycling Centre on Plots 1 to 21, Cambridge Science Park

levels would be lower. Two scenarios were run, one using the corrected data and assuming the emission rates remained constant all year (a worse case given that it was known emission rates were lower in the winter). The second scenario examined reduced emission rates by 25% in the autumn and spring and 50% in the winter.

Meteorological data was obtained from the Cambridge Airport monitoring site for the years 2010-2014 with missing data taken from Mildenhall. The model was run for each year of data and the worst case result selected in accordance with the IAQM guidance.

The results predicted from the two scenarios are shown in Figures 6 and 7. These results are similar to the CERC assessments (as would be expected given they use similar input data, although the modelling approach is different). Assuming constant summer dour emission rates, a small part of the development site is predicted to have odour concentrations above 1.5 ou_E/m^3 but most of the site is predicted to be below this level. This is consistent with all the other previous assessments reported earlier.

4.5 Odournet 2018 Assessment

Odournet was commissioned by Cambridge City Council to undertake an odour impact assessment of CWRC with the intention of providing information to the Council on ongoing and future planning decisions. They report the scope of their study as:

i. To clarify the current CWRC configuration and operations;

ii. To undertake an odour survey and define odour emission estimates for each of the key elements of the treatment process at CWRC.

iii. To undertake odour dispersion modelling of CWRC under the current operational conditions and assess the extent of potential odour impact risk in the surrounding area.

Their study therefore includes a new odour survey to derive odour emission rates and odour modelling based on the new emission data. The sources included in the model and the odour emission data used are summarised in Appendix B. These are largely the same sources as used in previous assessments but with one significant new source identified, the vents from the gravity belt thickener stack. This was responsible for more than 25% of the odour emissions from the site.

Modelling was carried out using the AERMOD dispersion model and meteorological data for the years 2012-2016 taken from Cambridge Airport with missing data from Mildenhall. The report details that rural dispersion characteristics were selected as a model option. It has been assumed that the rural option mentioned applies to the processing of the meteorological data.

Odournet has applied a seasonal variation to the odour emission rates for processes involved with handling raw sewage, namely:

- Inlet works chambers, detritor and channels;

- Screenings plant and skips;
- Grit skips and dewatering plant;
- Works return channel;
- Distribution chambers;
- Primary settlement tanks; and
- Settled sewage distribution chambers.

The emission rates for these sources have been reduced by a factor of 5 during autumn and winter. Emission rates from other sources were assumed to be constant for the whole year.

For turbulent sources, a multiplier was applied to the emissions rate "*to reflect the elevation in emissions that occurs due to the increase in surface area exposed to the atmosphere*". The turbulence factors used are shown in Table 1.

Table 1 Turbulence Multipliers used by Odournet

Level of Turbulence	**Turbulence Multiplier**
Low	3
Medium	6
High	12
Very High	20

Odournet report that the application of these factors is based on their "*broader experience in the wastewater sector and the findings of research*". Neither these findings nor the research are detailed in the report. Note that the IAQM guidance states that when using library data "*to allow for external verification the full library of emission data should be publicly available*".

Turbulence factors have been applied to the sources detailed in Table 2, the report details the range of factors applied but not exactly how they have been applied and whether they were used to adjust the entire source.

Table 2 Turbulence factors applied to sources

Source	Factor applied
Inlet works, screens, detritor and channels	1-6
Storm weirs and tanks	1-6
Primary treatment distribution chambers	1-3
Primary settlement tanks (weirs)	1-3
Settled sewage distribution chamber	1-6
Secondary treatment distribution/mixing chamber	1-20
Secondary treatment outlet channels	1-20
Secondary digestion tank	1-6

Table 9 of their report provides a useful breakdown of the overall emission rates although these have been adjusted to reflect the frequency of occurrence of each source and are time weighted to reflect when some sources are not operational.

It is reported that the worst case year in 2013 (Although the results for all years are presented), the predicted odour levels for this year are shown in Figure 8. The predicted odours levels are considerably higher than any of the previous assessments, nearly all of the site is predicted to be above 1.5 ou_E/m^3 with portions of the site in the range 6->10 ou_E/m^3.

5 Odour Emission Rates

The previous studies have provided useful information on odour emission rates based on three previous surveys and a range of library data. To provide more information, a further survey was commissioned by Arup in June 2018, this survey was carried out in accordance with BS EN 13725.

5.1 July 2018 Odour Survey Results

Silsoe Odours undertook the survey on 4, 8, 9 and 15 July 2019. The survey was carried out with triplicate samples from 26 sources around the works. These sources were selected to provide a comprehensive assessment of emission rates and included sources where previous surveys had highlighted higher emission rates.

The reported emission rates from the survey are provided in Table 3 below:

Table 3 Odour Emission Rates Measured by Silsoe Odours July 2019

Sample source	Odour emission rate ($ou_E/m^2/s$) except where **bold** (ou_E/s)
Inlet Reception Chamber	39.55
Inlet Works Channel	30.39
Detritor	14.58
Return Liquor	14.70
Aerobic Zone C	0.19
Anoxic Zone C	0.67
AST Chamber C	1.72
Aeration lane 1, Zone D	1.21
Aeration Lane 2, Zone D	0.83
Anoxic Lane 2, Zone D	2.30
Anoxic Lane 1, Zone D	7.56
FST 1, D Works	0.48
FST 2, C Works	0.32
PST 6	2.79
PST Distribution Chamber 2	11.71
PST 5	5.68
PST Distribution Chamber 1	37.31

PST 3	4.82
PST 2	3.04
Settled Sewage Chamber	40.33
Secondary Digester 2	67.54
Secondary Digestor 1	6.54
Belt Thickener*	**16767**
Centrifuge	**29**
OCU 1	**75**
OCU 2	**914**

These results have been used "as received" in the updated modelling. However, a further review of the range of modelling data available has also been carried out to provide a view of the typical odour emission rates likely at the site. This is described in the following section.

5.2 Review of Odour Emission Data

The data collected in this survey has been compared with that reported in the previous H+M and Odournet assessments. This is shown in Table 4 below.

Table 4 Comparison of odour emission rates

Source description	H+M Survey November 2015	Odournet August 2017	Silsoe Odours July 2019	Input for this modelling study
Inlet works reception chamber	10.2	23	39.55	39.55
Inlet works screen area	8	23		14.6
Inlet works storm separation area	8	23		14.6
Inlet works channels to detritor	7.69	23	30.4	30.4
Detritor	7.69	23	14.6	14.6
Inlet works outlet channel	9	23	14.6	14.6

Returned Liquors channel	7	23	14.7	14.7
Inlet works mixing channel	14.13	23	14.6	14.6
Screenings skip	1	35		1
Grit skip	1.04	25		1
PSTs distribution chamber	6.5	23		6.5
Settled sewage collection chamber	5.82	8	40.3	40.3
Works main sewage pumping station	16.62			16.6
C works ASP distribution chamber	0.42	5		0.4
C works - ASP anoxic zone	0.42	0.2	0.19	0.3
C works - ASP aerobic zone	0.42	0.2	0.67	0.5
C works RAS pumping station	0.42			0.42
C works FSTs distribution chamber	0.42			0.42
D works ASP distribution chamber	12.47	5		12.5
D works - ASP anoxic zone	0.42	22	2.3-7.6	4.9
D works - ASP aerobic zone	0.42	0.2	0.83-1.21	1
D works FSTs distribution chamber	0.42	0.2		0.42
Secondary digesters unaerated	1.5	6	6,5	5.5
Secondary digesters aerated	4.2	0.6	67.5	67.5
Sludge cake storage skips	1.9	6		4

Sludge cake bays	20	6		12
Centrifuges	0.83			0.83
Drum thickeners	4.99			5
Digested sludge centrifuge	0.62			
Primary settlement tanks	8.3	1.1-3.9	2.79, 5.68, 4.82, 3.04	4.1
PSTs distribution chamber	7		11.7, 37.3	18.6
Storm tanks	0.17	8	Not in use	0.2
Settled sewage collection chamber	5.82	8		7
C works final settlement tanks	0.42		0.32	0.37
D works final settlement tanks	0.42		0.48	0.45
OCU Sludge Thickening Plant	25	1		25
OCU Sludge Thickening Plant	10	1		10
SAS Thickening belt vent		***250***		-
Raw sludge thickening building		***144***		
Raw sludge gravity belt thickener vents		***19023***	***16767***	***16767***

The raw sludge gravity belt thickener vent was not identified by Anglian Water in the first survey and is a significant source of odour. Emission rates from this source have been derived from the measured odour concentrations within the building and the estimated volumetric flow through the vents.

One of the secondary digester tanks was not operating during the Odournet survey, hence the low odour emission rate. The D works anoxic zone result from the Odournet survey appears to be high compared with the results from the other anoxic zones and Silsoe survey.

Emissions from the secondary digester tanks are very variable although in the Odournet survey these were not operational. High values can be observed when the tanks are aerated.

Comparing the two summer time surveys with the winter survey carried out by H+M suggests that emissions from processes associated with raw sewage are lower during the winter months but a factor of up to four.

The final column of the table shows the odour emission rates for all sources that were used in the revised modelling reported in Section 6. These have been derived from the Silsoe Odour survey and where sources were not measured, taken from other sources. The sources not measured in the Silsoe Odours survey are relatively small sources in comparison to the site's overall odour emission rate.

The total overall emission rates from the site can be calculated from the source areas and the emission rates. These are reported as follows:

Arup 2016: 47,158 ou_E/s (although then doubled to account for seasonal variation);

Odournet 2018: 72,843 ou_E/s (time weighted average emissions); and

This study: 82,517 ou_E/s (summer time emissions).

Although the data was derived from different surveys and there are inconsistencies between the odour emissions for each source between the surveys, arguably the overall emission rates for the site are relatively consistent between the three surveys after accounting for seasonal factors.

6 Odour modelling

6.1 Dispersion model

The odour modelling has been carried out using the AERMOD dispersion model, the same model used in the earlier Arup study and by both Anglian Water and Odournet.

Dispersion models require as input, details of the emissions sources, meteorological data, information regarding the local terrain and receptor locations. Details of the input data used are provided in the following sections.

6.1.1 Emission sources

The emission sources are the same as used in the previous assessment with the addition of the vent for the belt press thickener building. This vent is mounted a few metres up the side of the building and consequently does not discharge into in an unobstructed location. This was therefore modelled as a volume source with similar dimensions to the building.

Odour emission information used is detailed in Table 4. A map showing the location of the sources in provided in Figure 9.

Three runs were carried out,

- Scenario 1 - uses same seasonal variation as the previous study reducing the odour emission rates by 25% during autumn and spring and 50% in the winter.
- Scenario 2 - as was previously noted in the 2016 report, the application of seasonal variation factors is not an area where there is universal agreement on the approach and usually these are applied only to parts of the works handling raw sewage. A worse case run was therefore undertaken using summer emission rates for the whole year; and
- Scenario 3 – the final run has used the seasonal variation approach used by Odournet applied only to the sources involving raw sewage and the digestion tanks. The emission rates were reduced by 50% during autumn and winter This is considered to be a pessimistic approach, comparing the odour emission rates measured by H+M Environmental (i.e. in autumn/winter) some source reduced by 75%.

6.1.2 Meteorological data

The AERMOD model requires meteorological data and this was obtained from the Cambridge Airport monitoring site with missing data from Mildenhall for the years 2014-18.

The windrose derived from the meteorological data used in this study is shown in Figure 10. This shows the typical situation in the UK with predominant south westerly winds.

The data was processed using the AERMET process, the values used for the required inputs are shown below:

Surface roughness: 0.5m

Bowen ratio: 1.1875

Albedo: 0.24375

6.1.3 Receptor information

Two rectangular grids were used in the modelling, a coarse 250m spaced grid and a finer 50m grid on and around the development site.

6.2 Modelling approach

The AERMOD model was run using each year of meteorological data and the 98th percentile of hourly mean concentration predicted for each year These were examined and the results for the year 2014 identified as the worst case and are reported below.

6.3 Results of odour modelling

6.3.1 Scenario 1 – Seasonal variation as 2016 report

The predicted odour concentrations for this scenario are shown in Figure 11, these results show a similar distribution of odour contours as for the previous 2016 report. The predicted concentrations are slightly highly but most of the proposed development site is below 3ou$_E$/m, the level suggested in the Odournet report above which, odour annoyance may develop.

The predicted levels are considerably lower than those reported by Odournet, even though the overall summer odour emission rates are higher than the Odournet time weighted averages.

6.3.2 Scenario 2 – No seasonal variation

The predicted odour concentrations are shown in Figure 12. This scenario is a very pessimistic approach. The odour survey results show that odour emission rates decrease on parts of the site in the winter and there is common agreement between Arup and Odournet that emission rates from some sources will be lower in winter.

The results are very similar to Scenario 1 which indicates that the highest concentrations that contribution to the 98th percentile are found in summer months when emissions are at their peak.

6.3.3 Scenario 3 – Amended Seasonal Variation

This approach has reduced the odour emission rates only for sources associated with raw sewage or sludge handling during the autumn and winter. These sources have been reduced by a factor of two compared with the summer emission rates. The results are shown in Figure 13

The results show that the results are not sensitive to the assumptions made regarding seasonal variation which indicates that the highest concentrations are found in summer months,

6.4 Verification modelling

Given that there is a large discrepancy between the Odournet findings and this (and all other) study some verification modelling has been carried out to check the findings of this assessment. This has used a simple approach where one area source is used to represent all the emission sources from the site, no seasonal variation was applied. The emission rate was varied until a level was found that produced broadly similar predictions to the Odournet modelling, this was found to be equivalent to 150,000 ou_E/s.

The results are shown in Figure 15. These results are very similar to that predicted by the latest Arup modelling and suggest that the overall emission rate for the site would have to be over 150,000 ou_E/s to result in the same level of odour concentrations predicted by Odournet. This suggests that the Odournet approach is an extremely pessimistic approach, assuming around double the typical summer emissions from the site and is inconsistent with all other studies carried out at the site by Arup, Anglian Water and CERC.

7 Source Pathway Receptor Assessment

As noted earlier, it is now recommended in the IAQM guidance that a second assessment method is also used to assess the odour impacts of the site. Therefore, a second approach has been used following the Source, Receptor, Pathway (SPR) approach. Each of the main odour sources on site has been examined and their potential for odour generation and the type of odour likely to be released assessed and then how these odours may travel to the site of the proposed housing has been considered. Finally, a qualitative appraisal of the potential impacts from each source is determined by professional judgement. The assessment is detailed in Table 5. This approach was used in the previous Arup assessment and has been updated for this report.

Table 5 Source Receptor Pathway Assessment Outcome

Source	Source odour potential	Pathway effectiveness	Receptor	Potential impact
Inlet Works	Handling raw sewage with relatively high odour content Relatively short residence time in sewage system but some potential for septic conditions – some surveys have shown this to be a significant odour source with septic conditions.	Source located at the north east of the sewage works and is located more than 500m from the nearest part of the proposed development site. Parts of the site are more than 750m from this source. No obstruction or channelling of odour releases away from the site. Source is located north east of the receptors – wind from the north west is relatively infrequent Credible route for odour dispersion but sources are relatively distance from the receptors	Residential use – sensitive to odours.	Low-Moderate potential for odour impacts. Source has high odour potential but odours must travel several hundred metres to the proposed development.

Source	Source odour potential	Pathway effectiveness	Receptor	Potential impact
Primary Settlement Tanks	Treating screened raw sewage Total odour emission rates are high in some surveys. Continuous source	Located in the north east of the sewage works site, nearest source is more than 420m north west of the proposed development site. No obstruction or channelling of odour releases away from the site. Source is located north east of the receptors – wind from the north west is relatively infrequent Credible route for odour dispersion although sources are relatively distant from the proposed development site.	Residential use – sensitive to odours.	Low-Moderate potential for odour impacts.

Source	Source odour potential	Pathway effectiveness	Receptor	Potential impact
Activated Sludge Units - C Stream	Treating screened and settled raw sewage Highly aerated environment with little chance of septicity Low odour emission rate measured except under unusual operating conditions Continuous source	Located in the east of the site, the nearest source being approximately 200m north of the closest point on the proposed development site. Source is located north of the receptors – wind from the north has a frequency of approximately 7%. No obstruction or channelling of odour releases away from the site. Credible route for odour dispersion	Residential use – sensitive to odours.	Unlikely to result in significant odour impacts as a result of very low odour emission rate and highly aerated environment leading to less offensive odours.

Source	Source odour potential	Pathway effectiveness	Receptor	Potential impact
Activated Sludge Units - D Stream	Treating screened and settled raw sewage Highly aerated environment with little chance of septicity Low odour emission rate measured except under unusual operating conditions Continuous source	Located in the north east of the site, the nearest source being approximately 330m north of the closest point on the proposed development site. Source is located north of the receptors – wind from the north has a frequency of approximately 7%. No obstruction or channelling of odour releases away from the site. Credible route for odour dispersion but relatively distant from the source.	Residential use – sensitive to odours.	Unlikely to result in significant odour impacts as a result of very low odour emission rate and highly aerated environment leading to less offensive odours.

Source	Source odour potential	Pathway effectiveness	Receptor	Potential impact
Secondary Settlement Tanks	Process handles treated sewage with low organic content, potential for septicity is low. Continuous odour emission source. Measured emission rates are low	Located in the north east and east of the sewage works, C stream tanks are 170m from the proposed development at the nearest point, from the proposed development site. D Stream tanks are more than 300m north, north east of the proposed development at the nearest point. Source is located north, north east of the receptors – wind from the north, north east has a frequency of approximately 5%. No obstruction or channelling of odour releases away from the site. Credible route for odour dispersion	Residential use – sensitive to odours.	Unlikely to result in significant odour impacts as odour emission rates are low and there is a very low potential for septic conditions.

Source	Source odour potential	Pathway effectiveness	Receptor	Potential impact
Sludge Treatment	Processes highly organic material with a high potential for septicity. Processes are enclosed and fitted with odour control units one open vent. Odour concentrations within the building are high. Removal and handling of sludge could result in short term odour emissions Continuous and intermittent odour sources although continuous sources have very low emission rates	Process located in centre of site nearly 400m north west from the nearest point of the proposed development. No obstruction or channelling of odour releases away from the site. Source is located north west of the receptors – wind from the north, west has a frequency of approximately 3-4%. Credible route for odour dispersion	Residential use – sensitive to odours.	Moderate – source with high odour potential but located relatively distant from site and the frequency of winds is relatively low. Sludge handling outside of the processes could give rise to intermittent odour emissions at a higher level with potential for short term impacts.

The outcome of the assessment is consistent with the odour modelling demonstrating that, in typical operations, the likely potential for odour impacts on the proposed development site is low - moderate. The more offensive odours and odorous parts of the process are located on the western side of the works and are relatively distant from the proposed development site. Some intermittent operations on site do have the potential to result in higher odour levels offsite but these impacts will be short and likely to only affect the parts of the development site closest to the sewage works.

8 Observational Assessments

As noted in the IAQM guidance, for existing activities considerable weight should be given to observational assessment findings such as complaints analysis and sniff testing.

8.1 Complaints Analysis

The Odournet report details that there were five odour complaints since the works was upgraded in 2015 until September 2017, i.e. about 2 complaints a year. Where location information available, these complaints were received outside of the area where even the Odournet assessment would suggest complaints were likely.

Cambridge City Council was contacted for updated odour complaints information in August 2019, they reported one further formal complaint on the 24 April 2019 regarding regular bad odours and that that "the perceived odour on that day was the catalyst for the complaint to be made about alleged ongoing odour issues. The complaint log was updated in May 2019 to include two further alleged episodes of bad odour on 13th and 14th May". The location was noted as St John's Innovation Centre, Cowley Road. This is to the east of the site nearest the most odorous process associated with raw sewage.

The time of the odour detection was not noted, the weather conditions on the relevant days are reported to be as follows (although note that the date of the perceived odour may be different to the date it was reported):

24 April 2019: Force 5 – winds from SSE, S, SSW.

13 May 2019: Force 2 – winds from E; and

14 May 2019: Force 2 – winds from E and SE.

The works would therefore be a credible source of the odour for the reported odour in May. However, all the modelling assessments show that this area is subject to much higher odour concentrations that the proposed development site and that the concentrations are in the range 5->10 ou_E/m^3 where complaints are more likely. The assessments by Arup show that the modelled concentrations on the proposed development site are 5->10 times lower than those predicted at the site of these complaints.

8.2 Sniff testing

Sniff testing was carried out on three occasions around the site following the procedures detailed in Appendix 2 of the IAQM guidance. Sniff testing was carried out by staff with a known odour acuity. The sniff testing undertaken and observations were as follows:

3 June 2019 – 12-2pm , Wind speeds 13-15mph WSW. Observations taken at six location on the footpath along the River Cam north of the A14, see Figure 16.

No distinct sewage odour was detected at locations 1, 4 and 6. A sewage smell was detected at location 2, 3 and 5. However, media was being spread on fields west north west of the sniff test locations. The media had an animal slurry odour character which was observed at locations 2 and 3. The odour observed at location 5 had a different character, which could have been sewage from the STW but was not a clearly identifiable odour. This odour was noted for 37% of the time sampling.

23 August 2019, 1.45-3pm, wind speeds 6mph from south, south south westerly. Sniff testing was undertaken at five locations on or near to southern boundary of Milton Park, one location on corner of Cambridge Road on the turning into the aggregate plant, and one location on Cowley Road, see Figure 17.

No sewage odour was detected at any location with the exception of the location on Cowley Road where "Distinct" sewage odours were noted for 20% of the time of sampling. All odour modelling results suggest this location would be likely to experience odour levels that would affect amenity (i.e. above 5 ou_E/m^3).

5 September 2019, 11.10am-1.30pm, wind speeds 11-13 mph from north west/north north west. Sampling was carried out at three locations on Fen Road (points 1,2 and 3 on Figure 18) and three locations on Cowley Road within Cambridge Commercial Park (points 4,5 and 6 on Figure 18).

No distinct sewage odours were detected and any of the three sampling points on Fen Road, "Very Weak/Weak" odours described as burning rubber, exhaust and sewage were noted but as defined in the guidance, there was some doubt regarding their source. "Distinct" sewage odours were detected on Cowley Road at point 6, the closest location to the sewage works. Most of the modelling results suggest that this area would be likely to experience odour levels that could affect amenity (i.e. above 5 ou_E/m^3). No sewage odours were detected at point 5, midway along Cowley Road. Point 4 was near a waste disposal site and "Distinct" odours relating to rotting vegetables and possibly sewage were noted – however, these results were not conclusive given the waste transfer site odours which were a confounding factor.

The sniff testing observations are consistent with the results of the modelling studies with distinct sewage odours being detected in locations where all modelling studies expect concentrations to be at levels likely to affect amenity. However, in areas where all studies (with the exception of the Odournet study) predict odour levels to be below $3ou_E/m^3$, no distinct odours were noted.

While it is not possible to directly compare the results of odour modelling and sniff testing, sniff testing can provide some indication of how well a model is performing. Sniff testing is considered to be a robust assessment method, as detailed the in the IAQM guidance, "*Sniff tests also give an estimate of exposure; this is just expressed in a different way to modelling output*". It is important to note that strong or distinct sewage odours were not detected in any location where all the modelling studies (with the exception of the Odournet study) predict that odour concentrations are below 3 ou_E/m^3.

9 Discussion and Conclusions

Several odour studies have been carried out examining the odour environment around Cambridge WRC. These studies have included three on-site surveys and the use of library odour emission factors to inform dispersion modelling to predict odour concentrations around the site. These studies have been carried out to examine the impact of proposed changes at the works and to inform planning decisions for development near to CWRC. The studies have been carried out by four different parties and the odour surveys by three different laboratories.

These studies have been reviewed and the modelling results from each study compared. Nearly all of these studies result in similar predicted dour levels around the site the concentrations predicted on the proposed development site are in the range 1.5-3.0 ou_E/m^3 on the northern part of the site and less than 1.5 ou_E/m^3 on the southern part of the site. The results vary slightly depending on the assumptions made for seasonal variation of odour emissions but even assuming no variation, most of the development site has predicted odour levels below 3.0 ou_E/m^3 in the north of the site and below 1.5 ou_E/m^3 in the south of the site.

Although some of these studies have used the same source of odour emission data the modelling methods and assumptions used have been different. Other studies have used mainly library odour emission rate data from various sources and the predicted odour levels are at similar levels.

The most recent Arup modelling based on an entirely new odour survey remains largely consistent with these previous studies.

It is evident from comparison of the three odour surveys undertaken, that some processes were not operating in “normal” conditions at the time of the survey and as a result, had higher than expected odour emission rates.

The results from the Odournet study commissioned by Cambridge City Council predict much higher odour concentrations around the site – with levels of up to nearly 10 ou_E/m^3 being predicted on the proposed development site and several existing receptors in the area would be exposed to odour concentrations above 5-10 ou_E/m^3 – a level where complaints would be more likely to occur.

An analysis of odour complaints received suggest that since the works was upgraded 1-2 odour complaints are received a year. These complaints were either received from a location where all studies would predict that odour complaint was more likely or from locations relatively distant from the work where even the most pessimistic assessments so no predict odour concentrations to be at a level more complaints would be expected.

Sniff testing was carried out on three occasions, the results from the testing were largely consistent with the modelling assessments when distinct sewage odours were detected in areas that most of the modelling studies predict concentrations to be above 3 ou_E/m^3 (and usually above 5 ou_E/m^3). Conversely, distinct odours were not detected in locations where all the modelling studies (with the exception of the Odournet study) predict that concentrations are below 3 ou_E/m^3.

A qualitative Source Pathway Receptor assessment concludes that the proposed development site would have a Low to Moderate risk of adverse odour impacts. This is because the development site is more than 400-800m from the more odorous parts of CWRC meaning odours which allows for dispersion and hence dilution of the odours released.

Overall the range of evidence available from all the various reported modelling studies and this study indicate that odour levels on the proposed development site would be below the levels generally considered to have a low risk of adverse odour impacts. The only exception is the Odournet study which appears to have made some very pessimistic assumptions and the results can only be replicated by nearly doubling the measured odour emission rates on site.

The evidence from modelling studies in further supported by the evidence form the Source, Pathway, Receptor qualitative approach and the sensory assessments. Odour complaints are received at a frequency of once a year (and some are received in areas where all studies would suggest that there is a risk of adverse odour impacts) and the evidence from sniff testing is consistent with the modelling studies undertaken by Arup, Anglian Water and CERC.

Figures

Figure 1 Site Location

Figure 2 Predicted odour levels – Anglian Water 2012

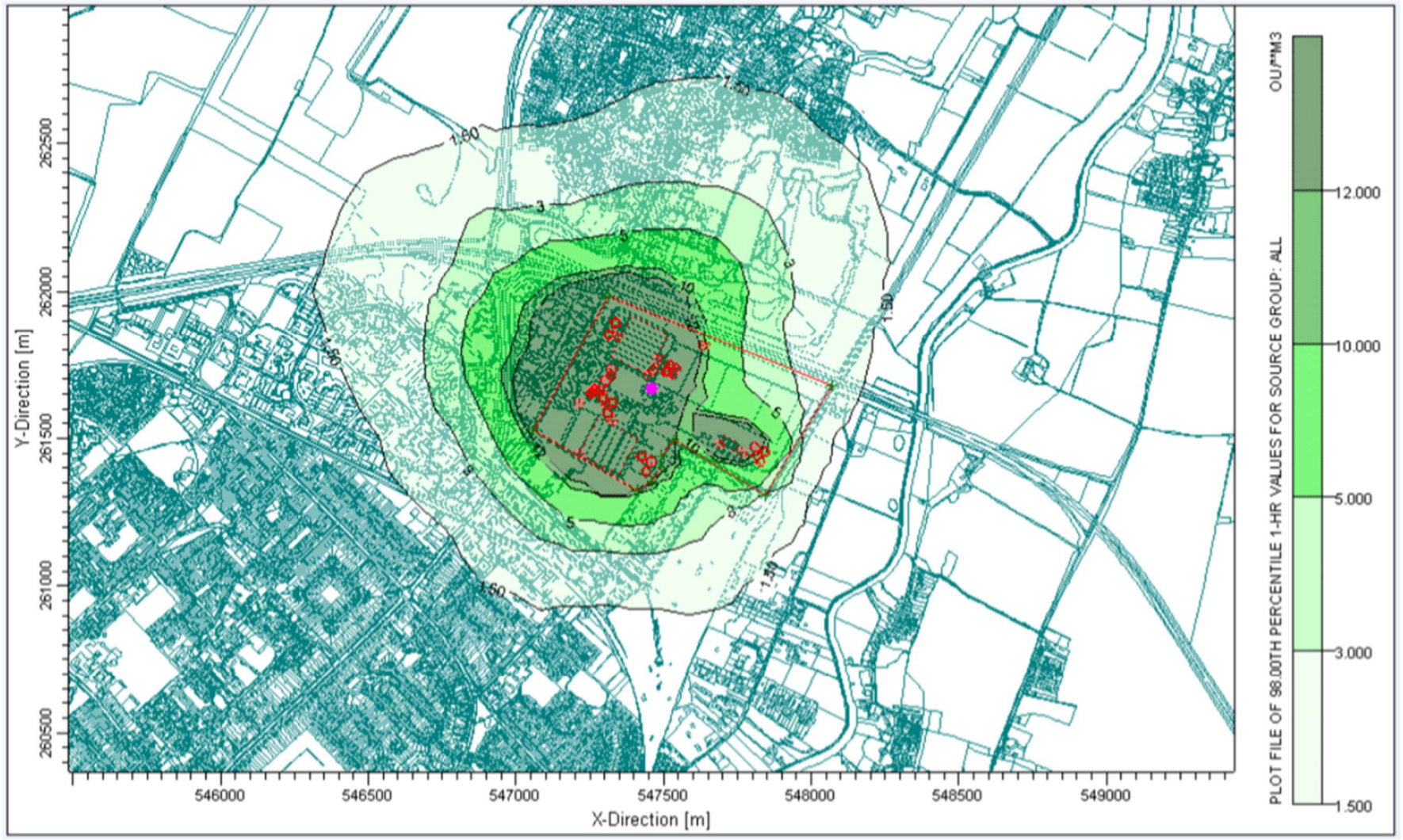

Figure 3 Predicted odour levels Anglian Water 2014

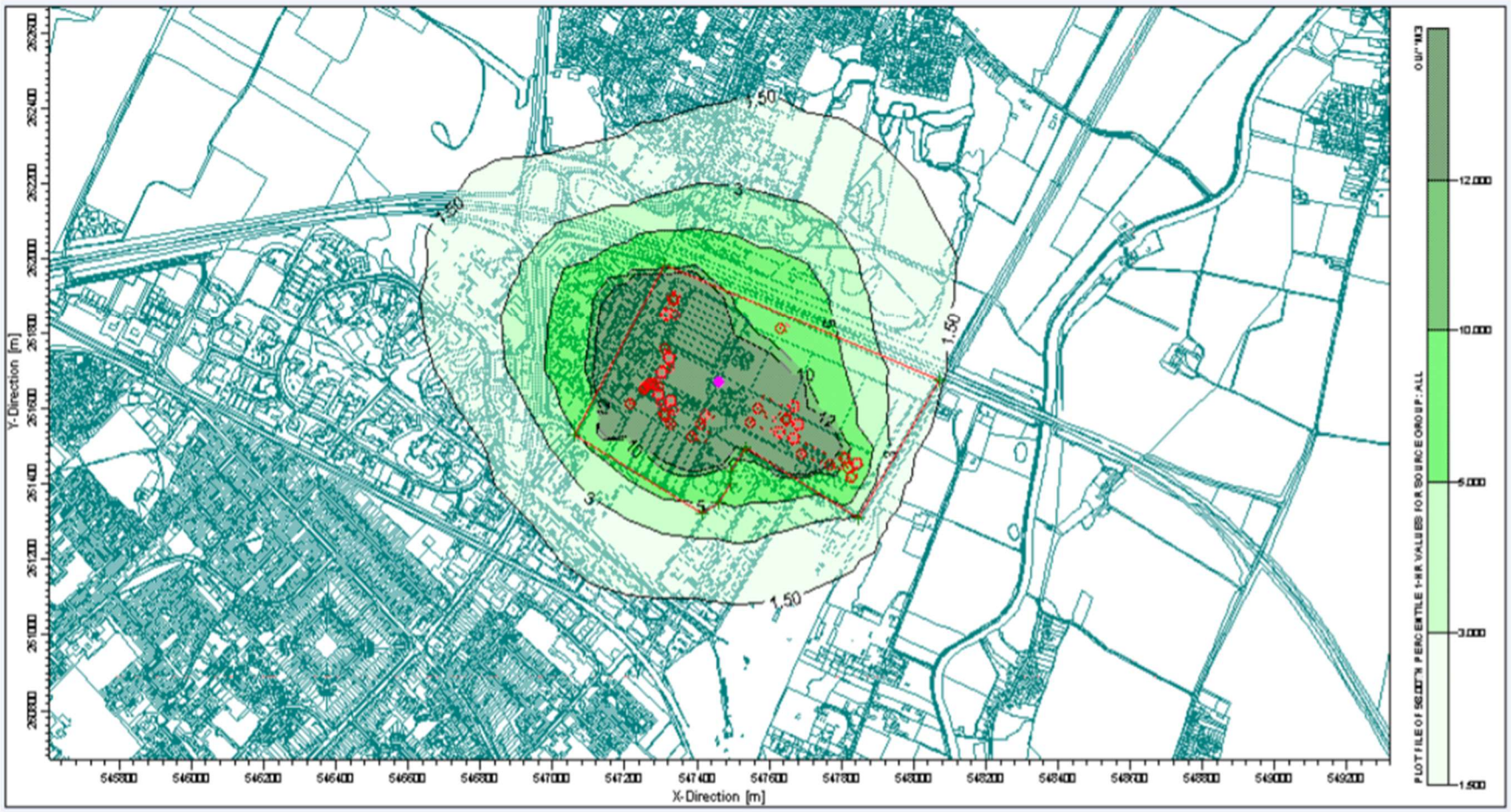

Figure 4 Predicted odour levels CERC 2016 assessment

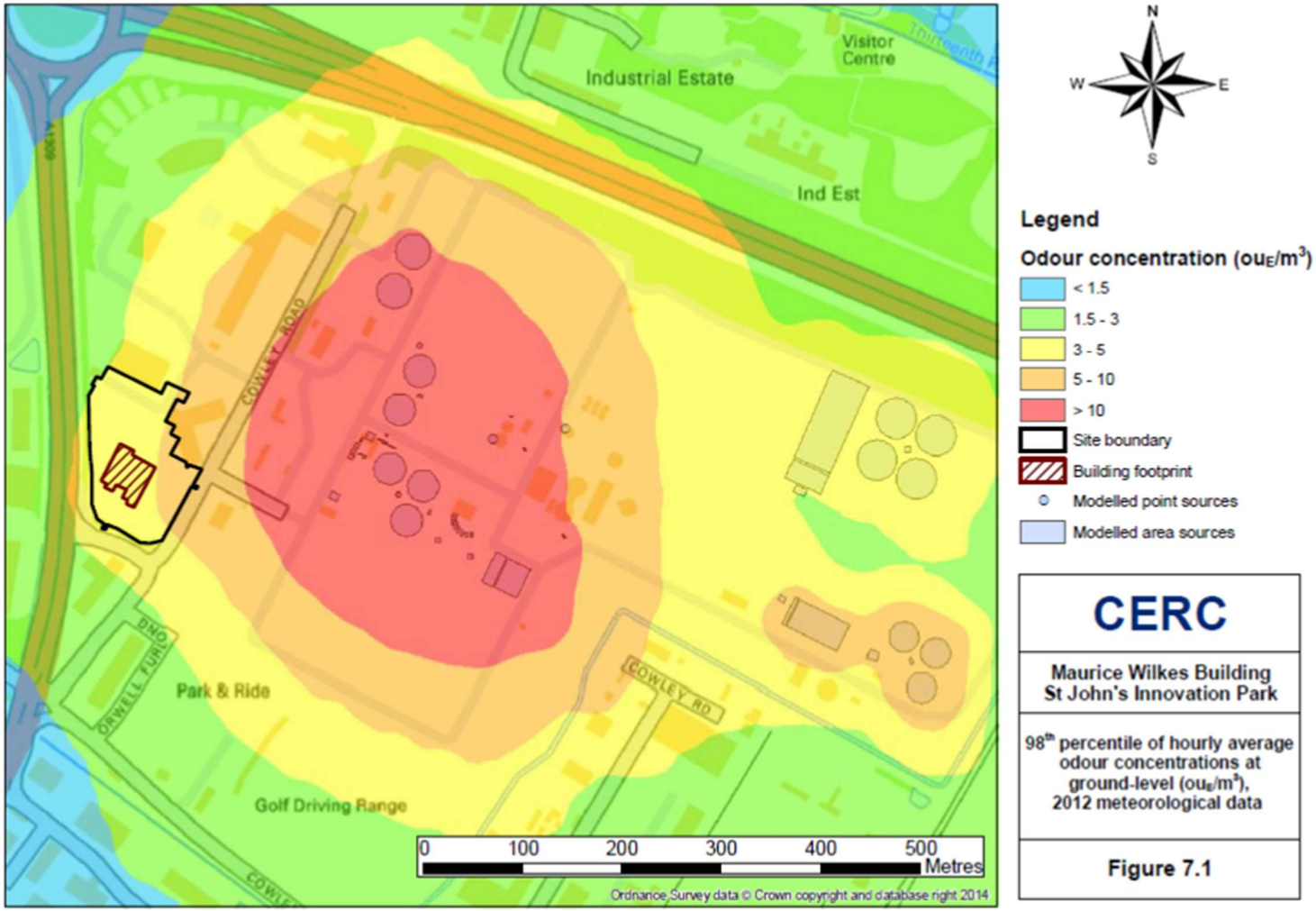

Figure 5 Predicted odour levels CERC 2017 report

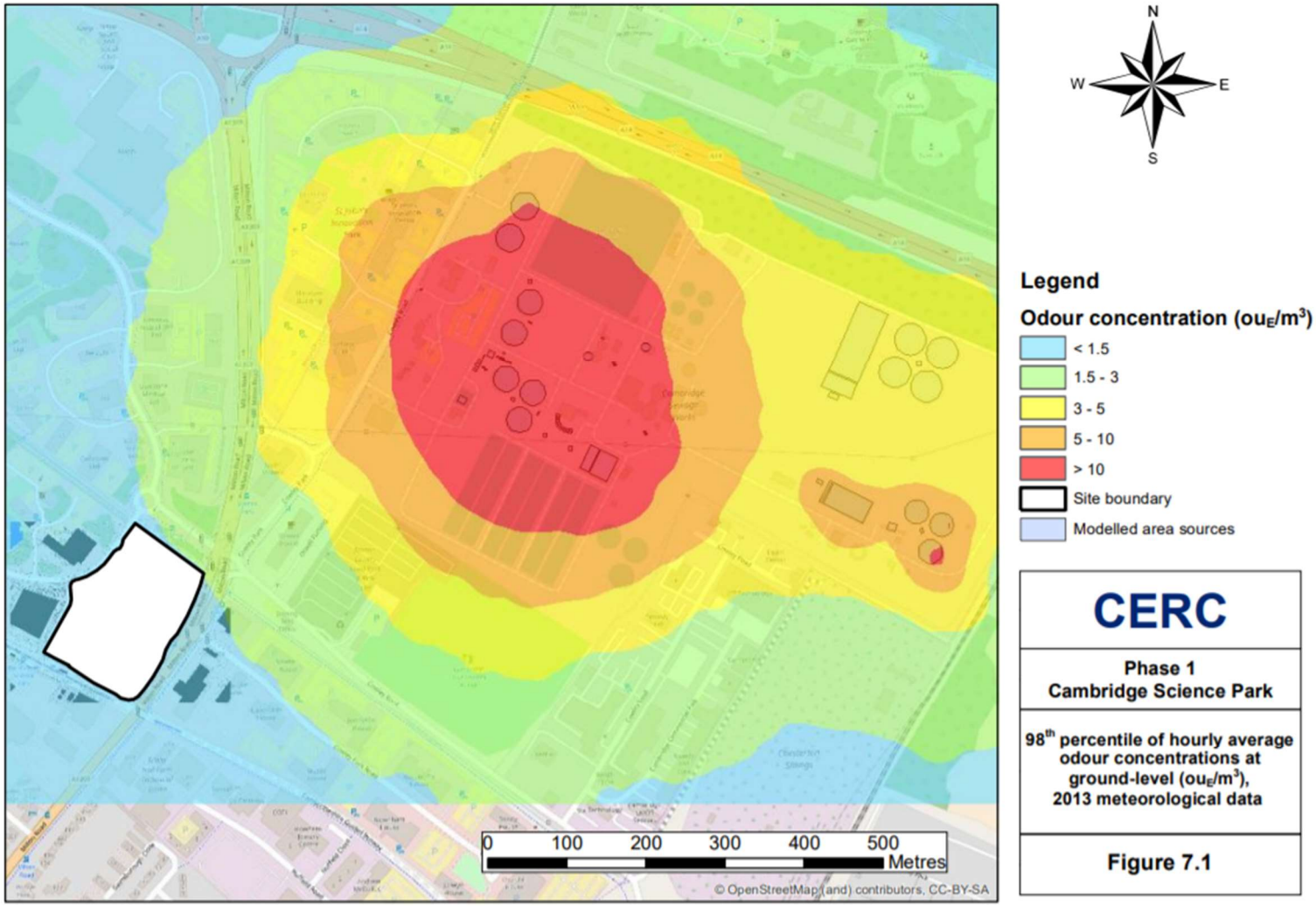

Figure 6 Predicted odour levels Arup 2016, no seasonal variation

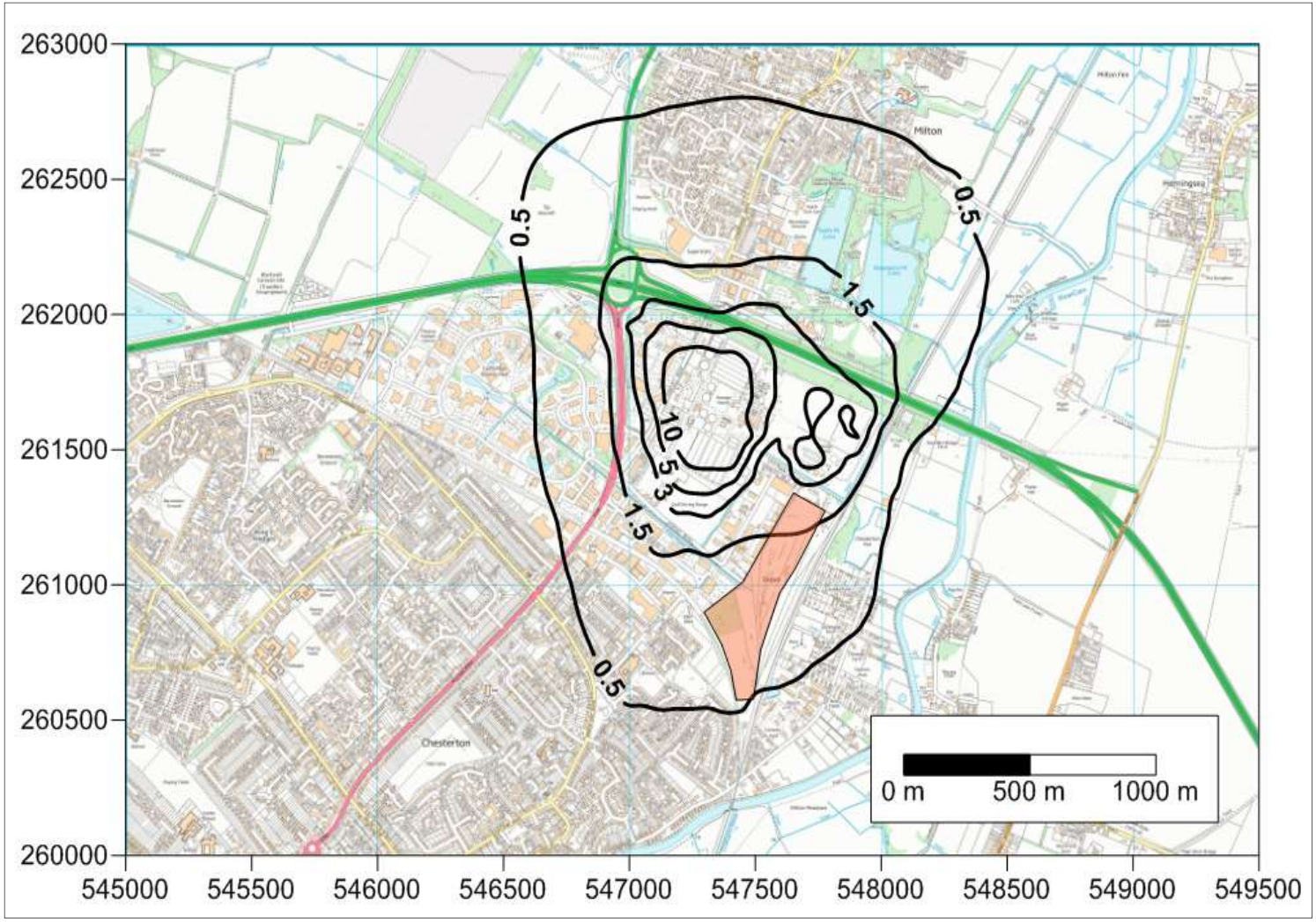

Figure 7 Predicted odour levels Arup 2016, with seasonal variation

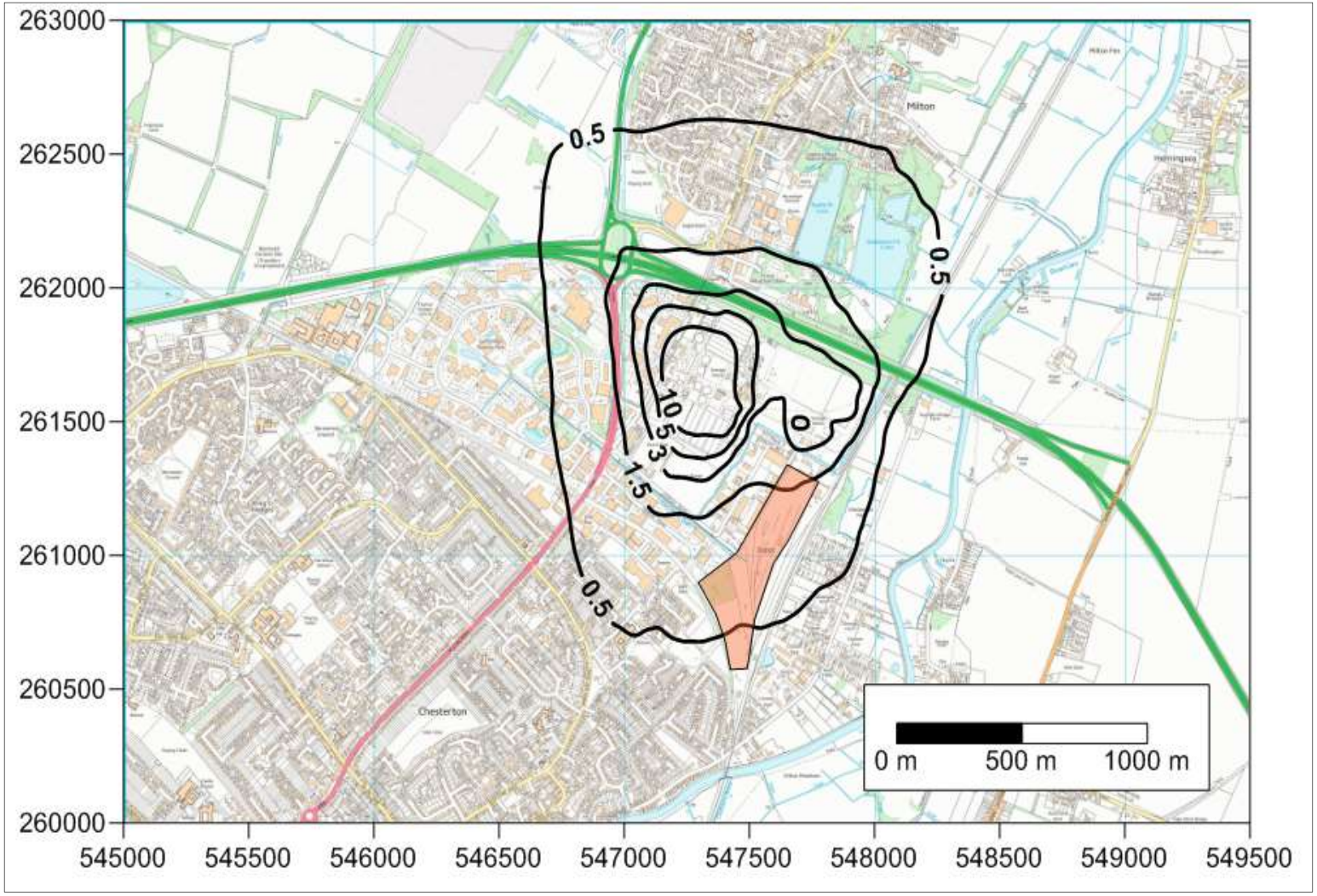

Figure 8 Predicted odour levels Odournet 2018

Figure 9 Location of sources and discrete receptors used in modelling

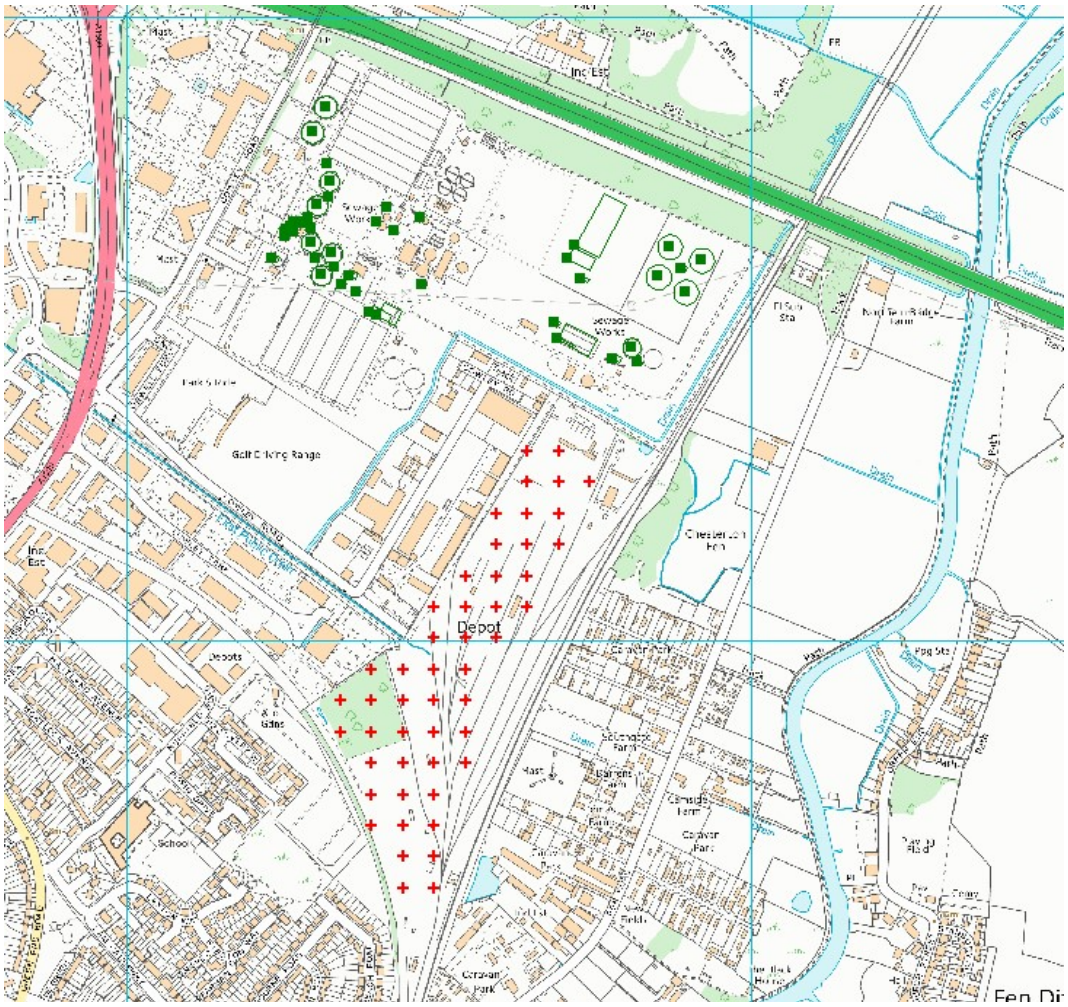

Figure 10 Wind rose for Cambridge 2014-2018

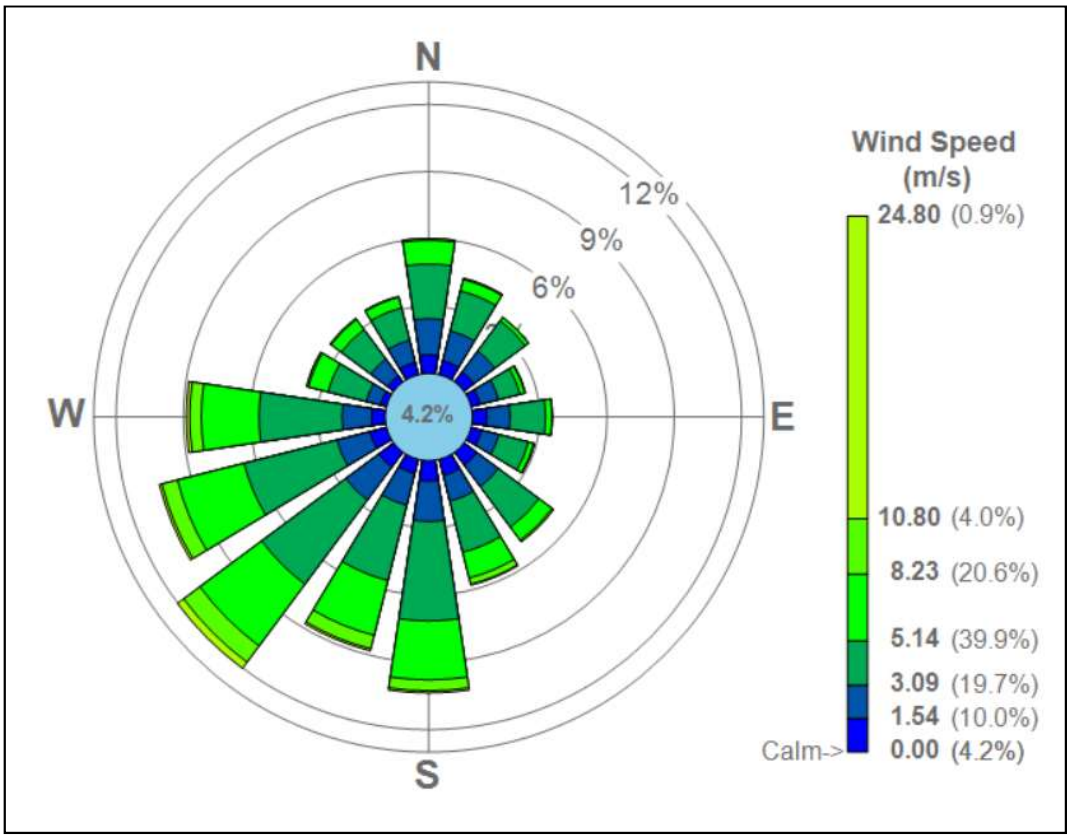

Figure 11 Predicted odour concentrations - Scenario 1

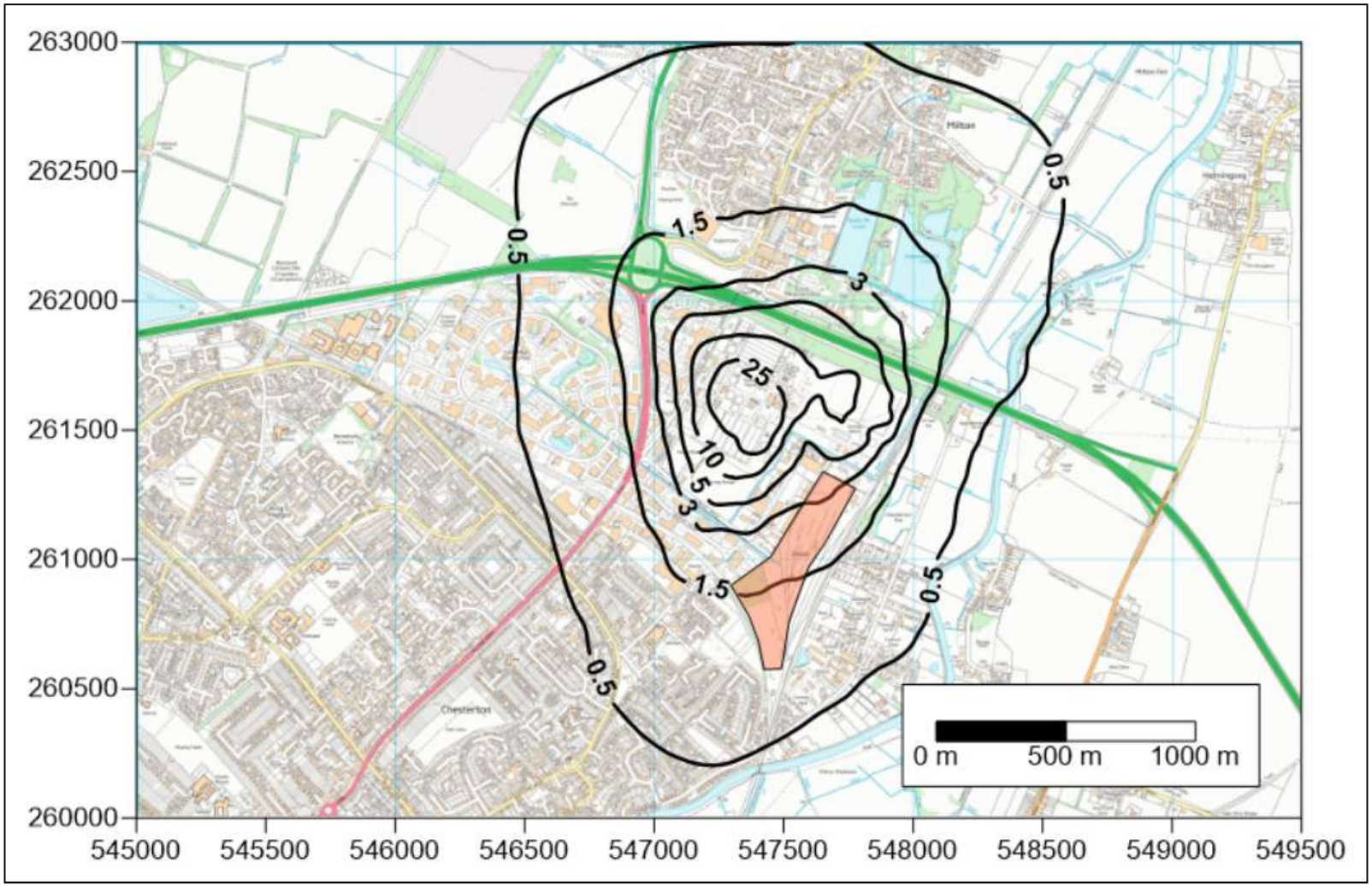

Figure 12 Predicted odour concentrations, Scenario 2

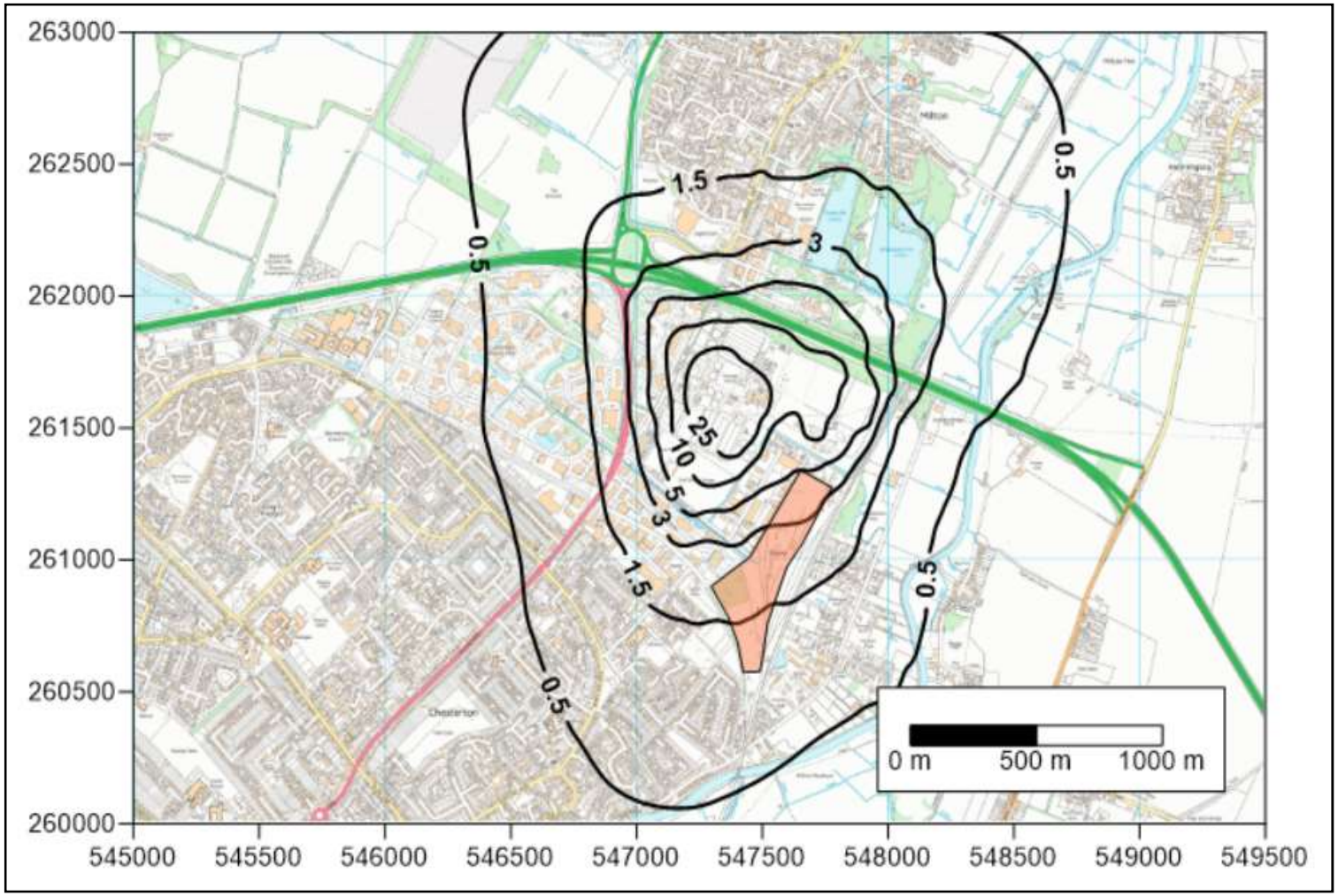

Figure 13 Predicted odour concentrations, Scenario 3

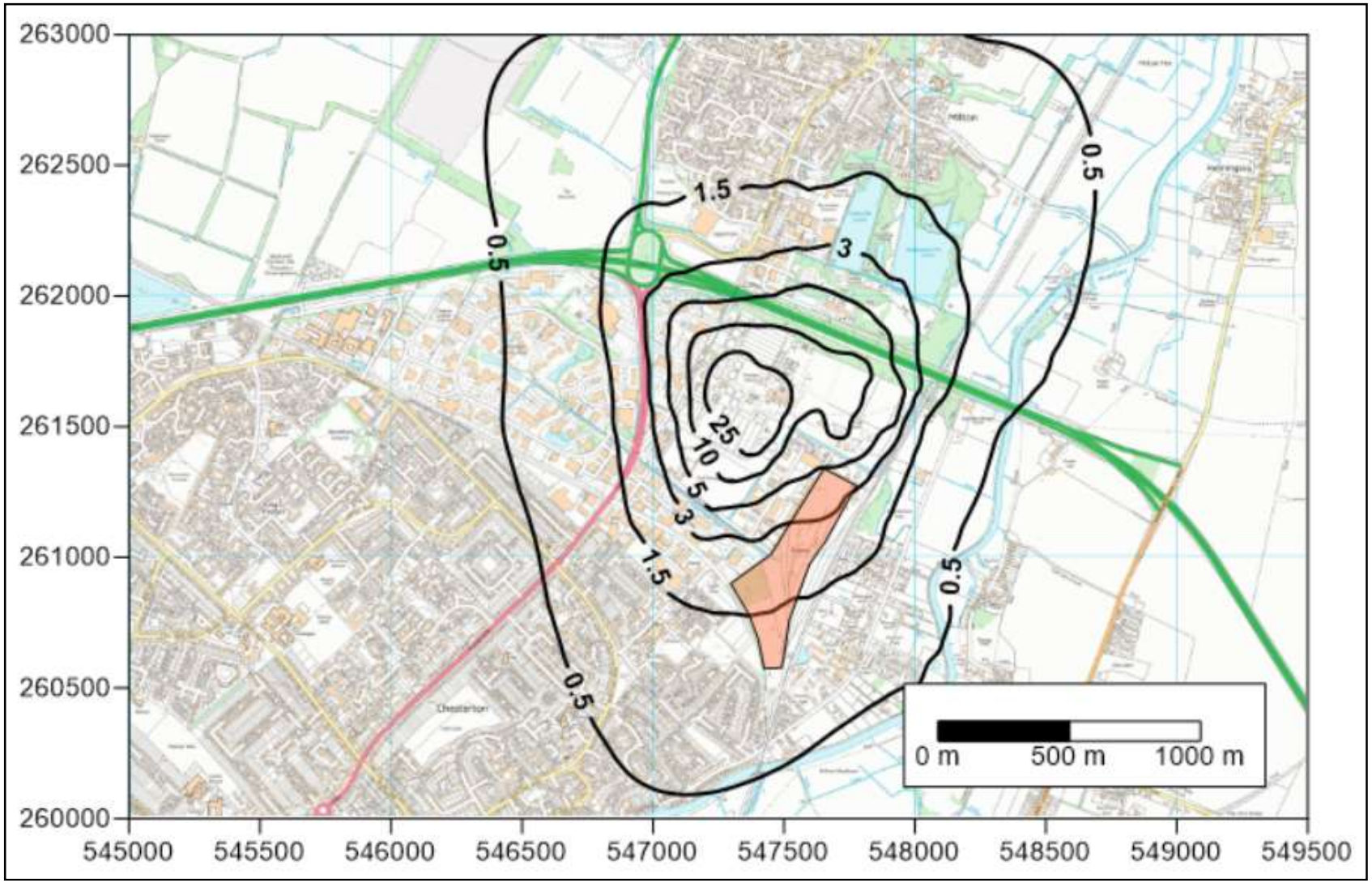

Figure 14 Simple verification modelling source and receptor layout

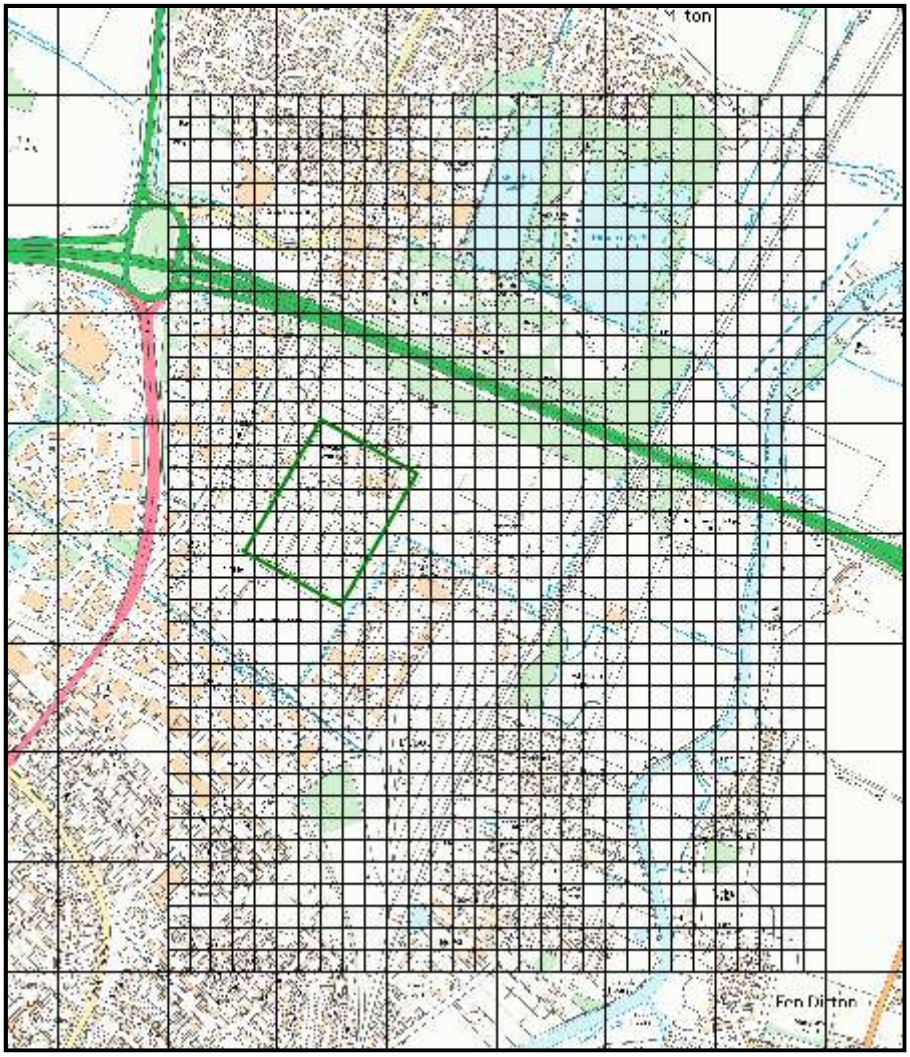

Figure 15 Predicted odour concentrations - Verification modelling 150,000 ou_E/s

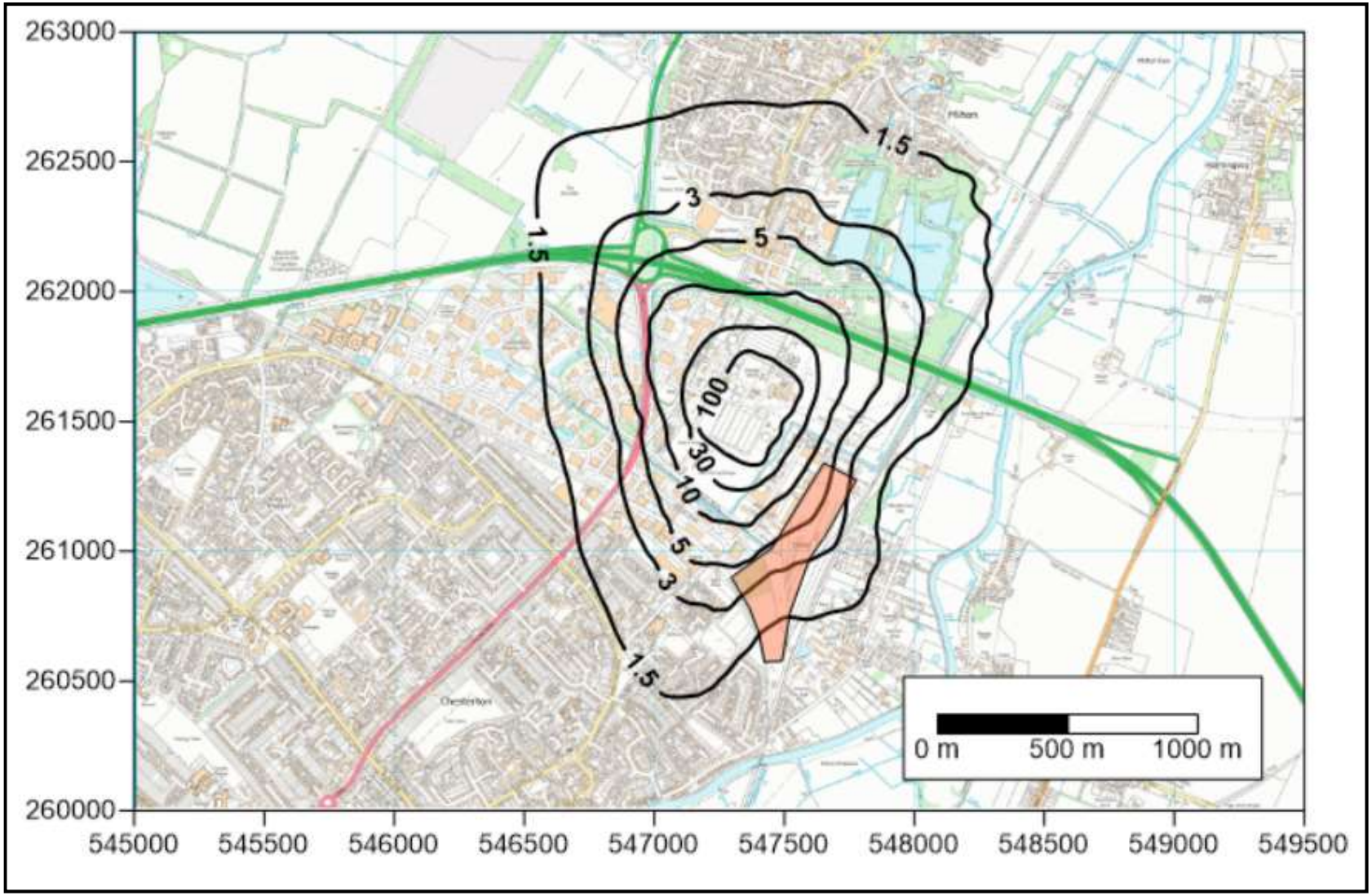

Figure 16 Sniff Test Locations 3 June 2019

Figure 17 Sniff Test Locations 23 August 2019

Figure 18 Sniff test locations 6 September 2019

Appendix A

Anglian Water Odour Emission Data

A1 Anglian Water Odour Emission Data

A1.1 Odour Sources

Anglian Water provided information on the sizes and locations of each of the odour sources on the site. Cambridge Water Recycling Centre has been subject to considerable improvement recently and several of the units on site are no longer used. The large trickling filter beds that exist are redundant and have been replaced by activated sludge units.

Annotated site aerial photos provided by Anglian Water are shown below in Figure A1 - Figure A6. The photos are annotated to mark each of the processes on site and details of these are provided in Table A1 and Table A2..

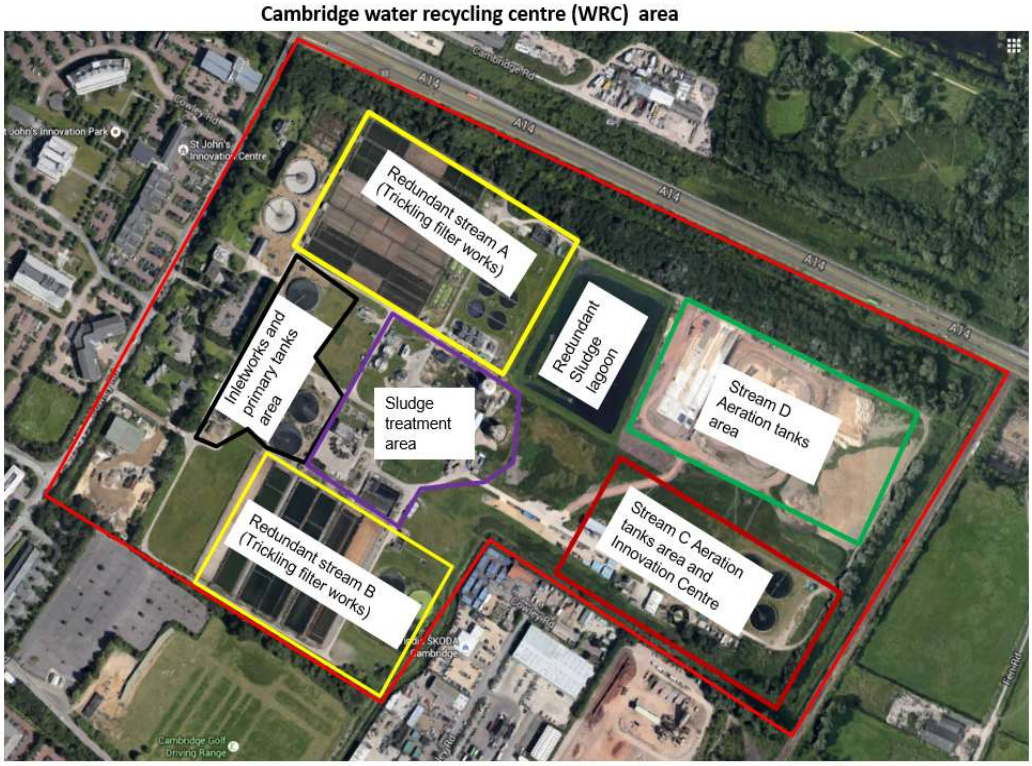

Figure A1 Aerial View of Cambridge WRC

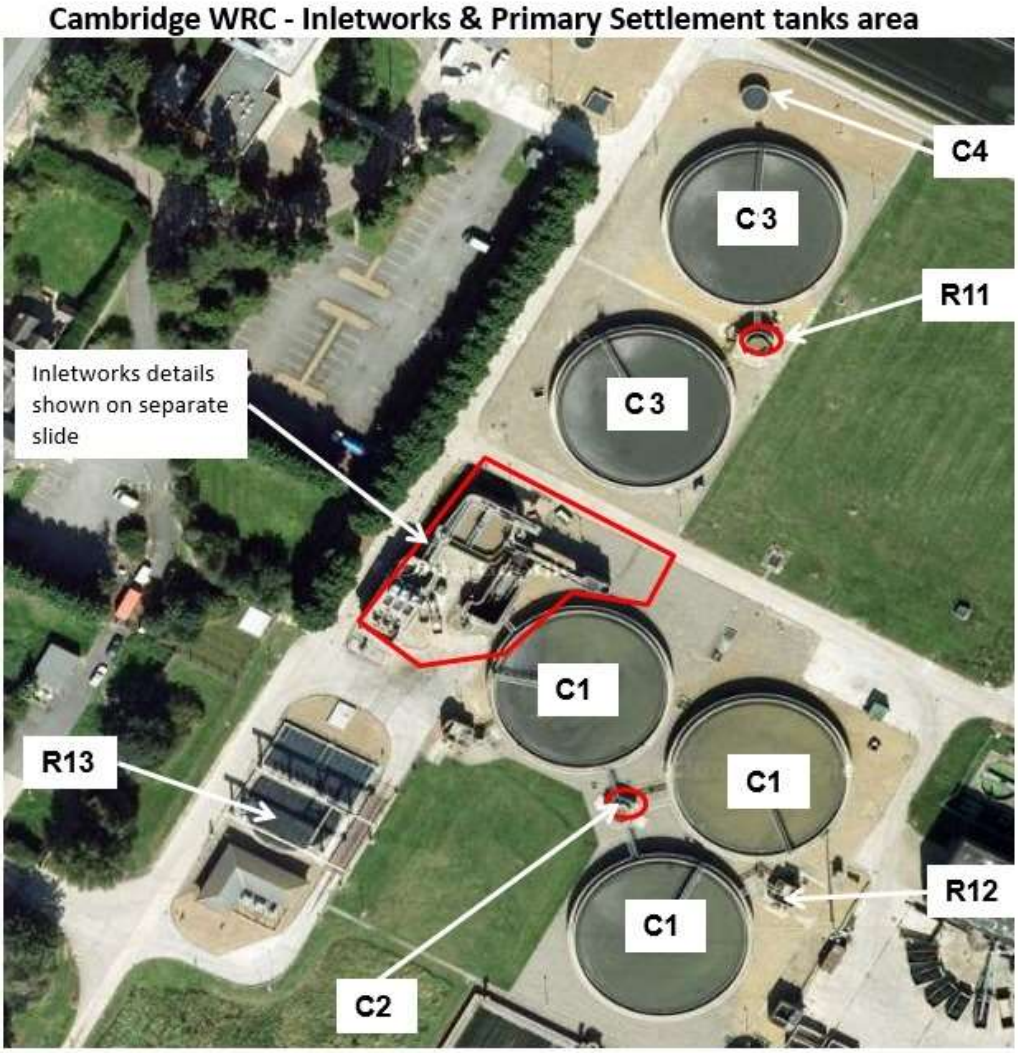

Figure A2 Inlet works and Primary Settlement Tanks

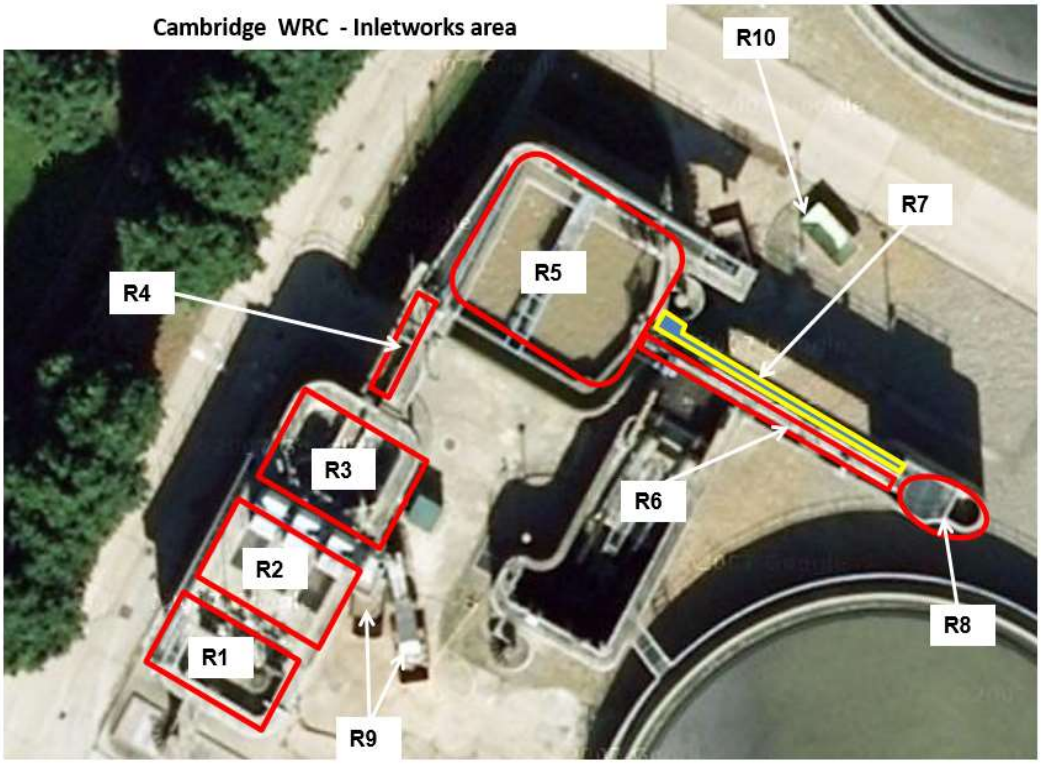

Figure A3 Detail of Inlet Works Area

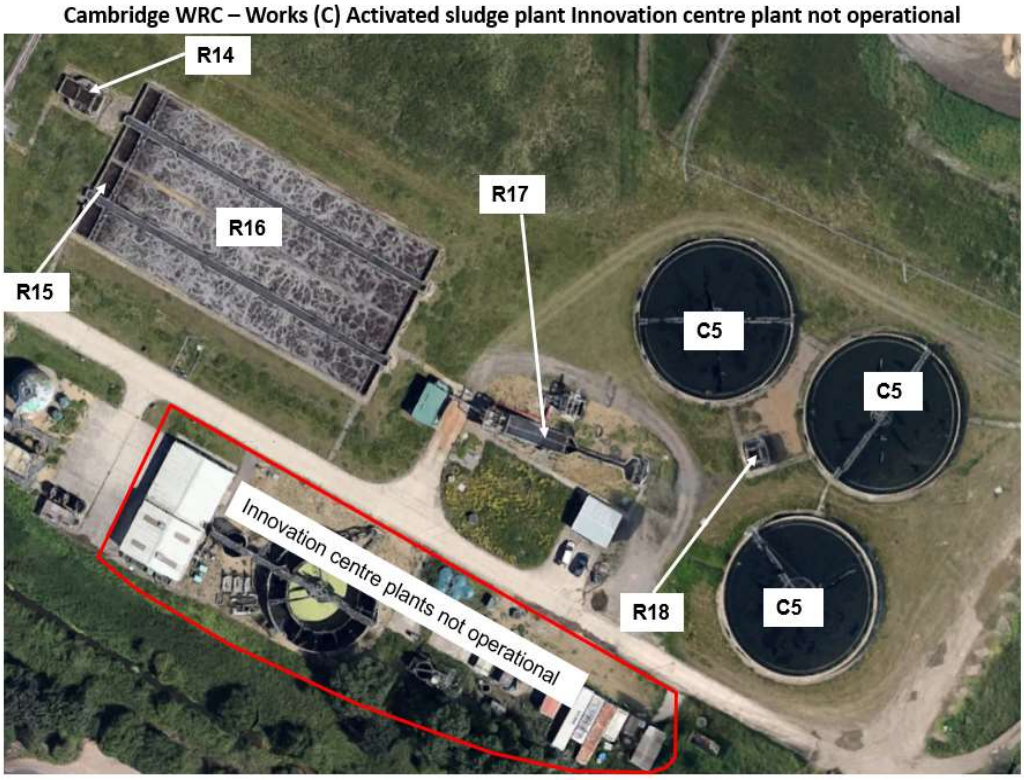

Figure A4 Activated Sludge Process

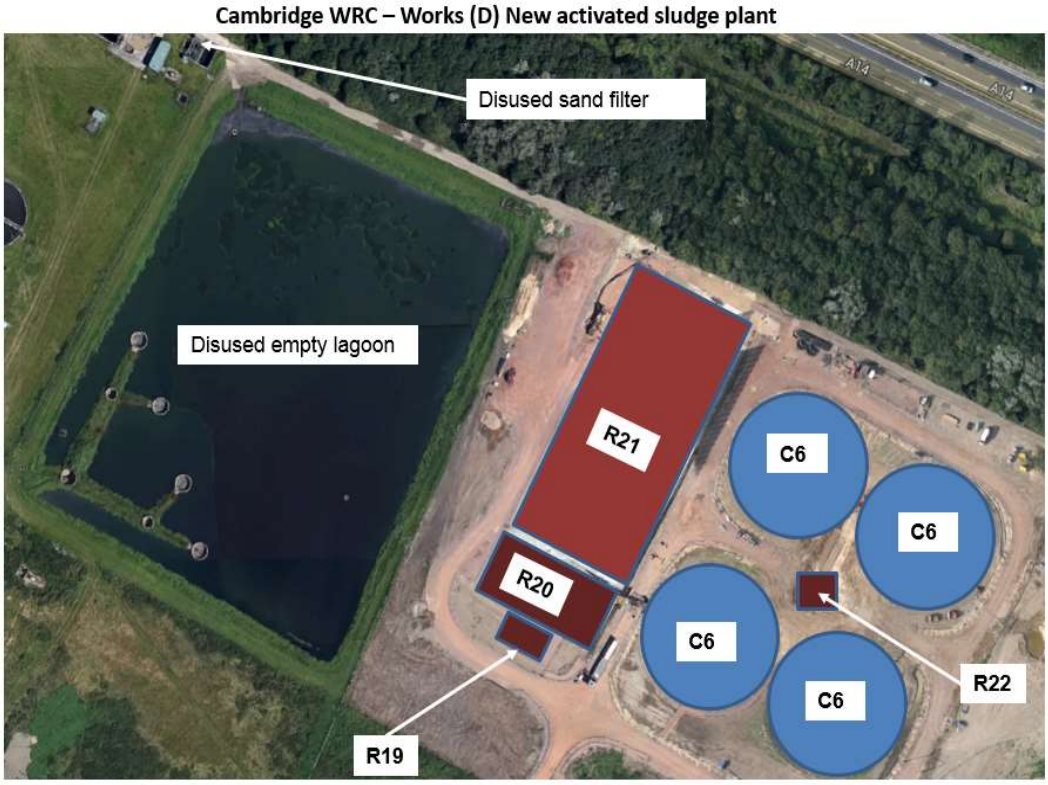

Figure A5 New Activated Sludge Area

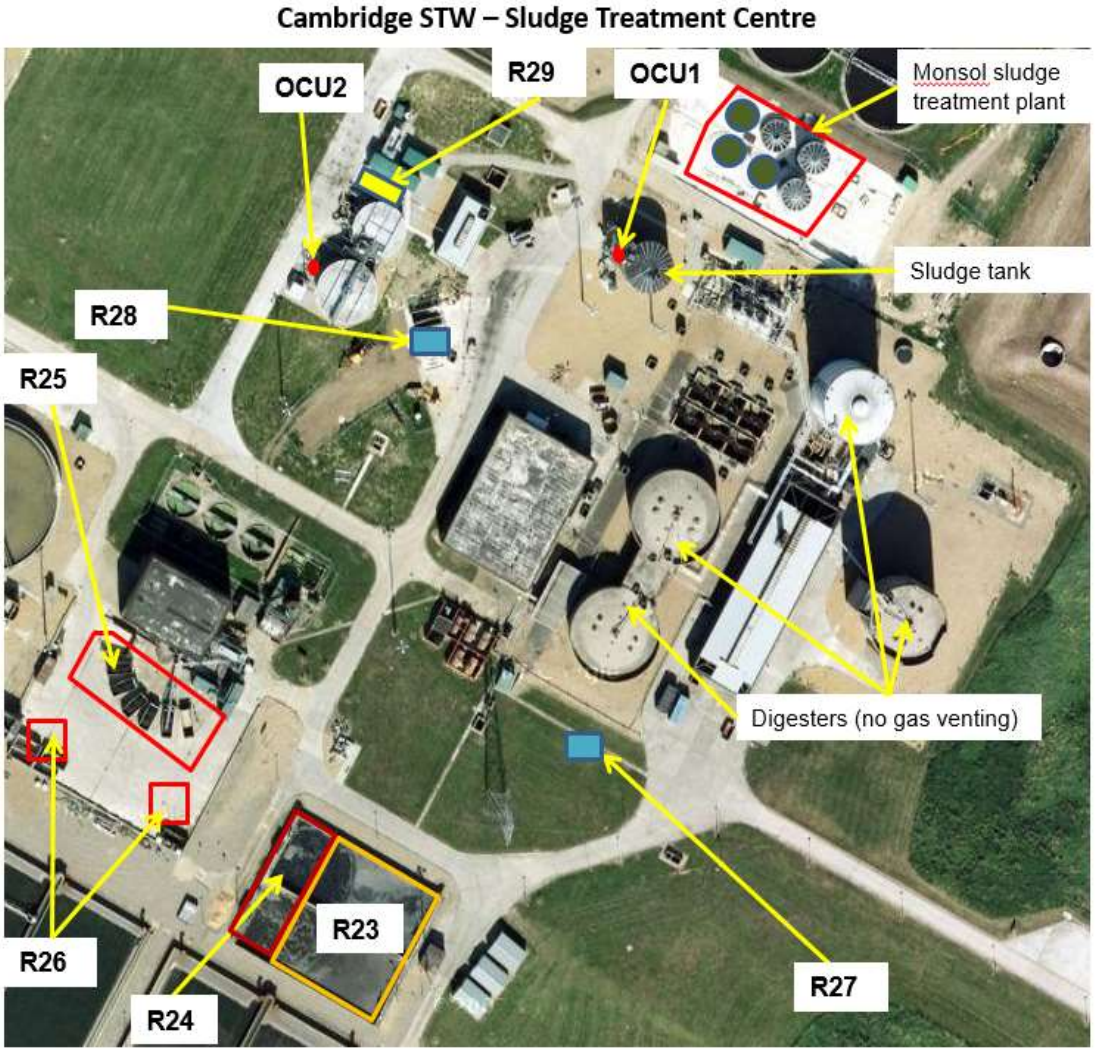

Figure A6 Sludge Treatment Centre

Table A1 Odour Sources at Cambridge WRC (Rectangular)

				m	m	m	m	m^2
number	**Rectangular odour sources**	**Shape**	**Number**	**length**	**width**	**Diameter**	**elevation**	**area**
R1	Inlet works reception chamber	rectangular	1	5	4	N/A	6	20.0
R2	Inlet works screen area	rectangular	1	5	4	N/A	6	20.0
R3	Inlet works storm separation area	rectangular	1	5	4	N/A	6	20.0
R4	Inlet works channels to detritor	rectangular	1	5	1	N/A	6	5.0
R5	Detritor	rectangular	1	8	8	N/A	6	64.0
R6	Inlet works outlet channel	rectangular	1	10	1	N/A	6	10.0
R7	Returned Liquors channel	rectangular	1	10	1.35	N/A	7	13.5
R8	Inlet works mixing channel	rectangular	1	4	1.5	N/A	6	6.0
R9	Screenings skip	rectangular	2	3	1.5	N/A	1.5	9.0
R10	Grit skip	rectangular	1	3	1.5	N/A	1.5	4.5
R11	PSTs distribution chamber	rectangular	1	4.8	2	N/A	4	9.6
R12	Settled sewage collection chamber	rectangular	1	5	2	N/A	3	0.0
R13	Works main sewage pumping station	rectangular	1	10	8	N/A	0.5	80.0
R14	C works ASP distribution chamber	rectangular	1	7	5	N/A	2	35.0
R15	C works - ASP anoxic zone	rectangular	1	30	4	N/A	2	120.0
R16	C works - ASP aerobic zone	rectangular	1	56	30	N/A	2	1680.0
R17	C works RAS pumping station	rectangular	1	10	9.6	N/A	2.5	96.0
R18	C works FSTs distribution chamber	rectangular	1	6	3	N/A	1.5	18.0
R19	D works ASP distribution chamber	rectangular	1	12	6.5	N/A	7	78.0
R20	D works - ASP anoxic zone	rectangular	1	40	20	N/A	6	800.0
R21	D works - ASP aerobic zone	rectangular	1	95	40	N/A	6	3800.0
R22	D works FSTs distribution chamber	rectangular	1	6	6	N/A	5	36.0
R23	Secondary digesters unaerated	rectangular	1	32	25	N/A	2	800.0
R24	Secondary digesters aerated	rectangular	1	32	12	N/A	2	384.0
R25	Sludge cake storage skips	rectangular	9	5	2.5	N/A	2	112.5
R26	Sludge cake bays	rectangular	2	5	5	N/A	1.5	50.0
R27	Centrifuges	rectangular	2	3	1.5	N/A	3	9.0

R28	Drum thickeners	rectangular	2	3	1.5	N/A	3	9.0
R29	Digested sludge centrifuge	rectangular	1	3	1	N/A	3	3.0

Table A2 Odour Sources at Cambridge WRC (Circular)

				m	m	m	m	m^2
Number	**Circular odour sources**	**Shape**	**Number**	**length**	**width**	**Diameter**	**elevation**	**area**
C1	Primary settlement tanks	Circular	5	N/A	N/A	32	4	4019.2
C2	PSTs distribution chamber	Circular	2	N/A	N/A	4.8	4	36.2
C3	Storm tanks	Circular	2	N/A	N/A	35	1.5	1923.3
C4	Settled sewage collection chamber	Circular	2	N/A	N/A	5	3	39.3
C5	C works final settlement tanks	Circular	1	N/A	N/A	30	1	706.5
C6	D works final settlement tanks	Circular	4	N/A	N/A	40	4	5024.0

Table A3 Odour Sources at Cambridge WRC (Odour Control Units)

number	Odour control units	outlet Shape	Number	lenghth	width	Diameter	elevation	area
OCU1	Serving sludge thickening plant	circular	1	N/A	N/A	0.16	6	0.02
OCU2	Serving sludge thickening plant	circular	1	N/A	N/A	0.16	6	0.02

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