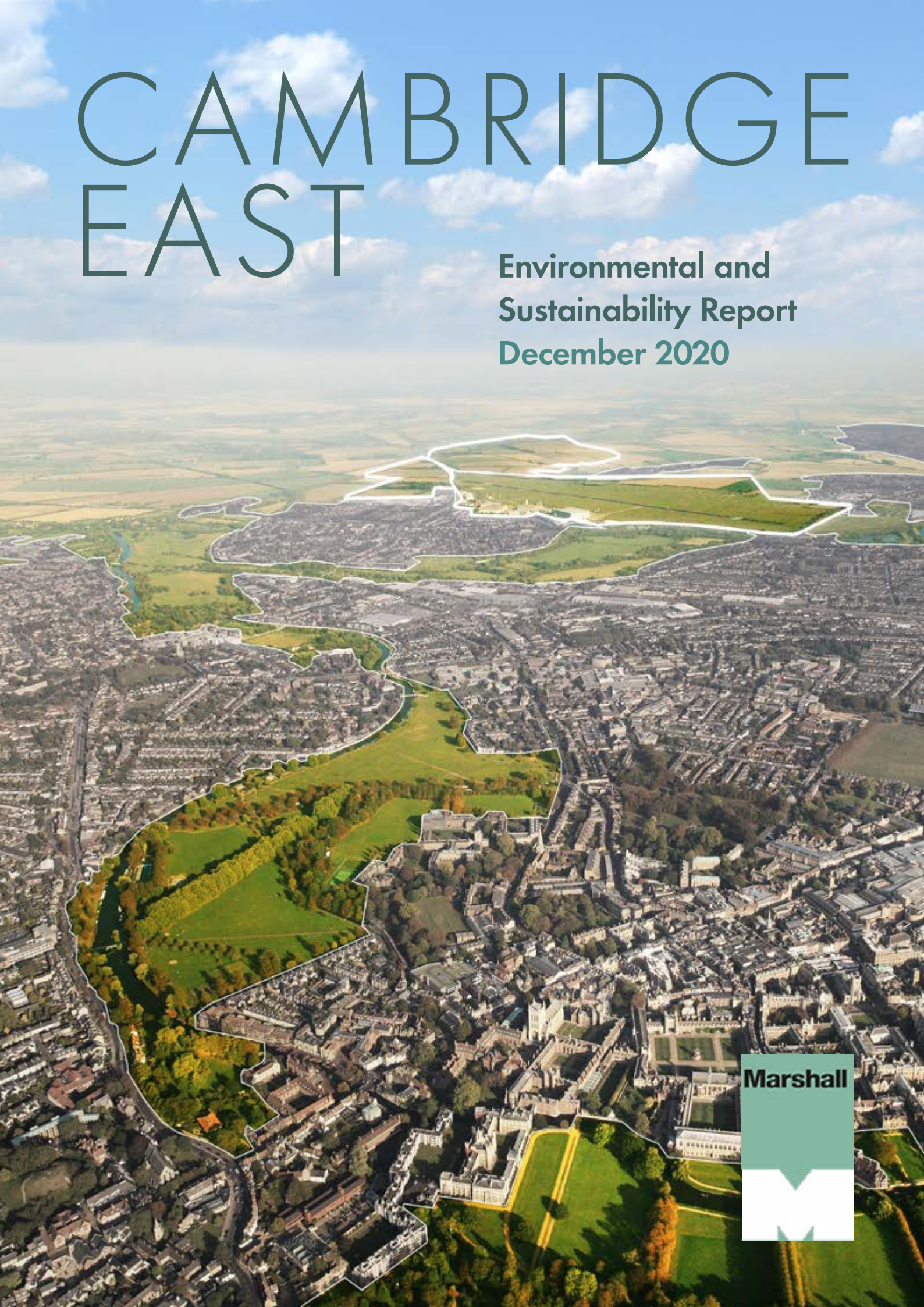
CAMBRIDGE EAST

Environmental and Sustainability Report

December 2020

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Document Status and Review Schedule

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Executive Summary

Logika Consultants have been appointed by Marshall Group Properties Limited to provide advice to help maximise the environmental and sustainability opportunities associated with development of Cambridge East, a uniquely located and aspirational potential development site. This work is also supported by HOK who have undertaken an integrated sustainability assessment.

Cambridge East lies to the east of Cambridge and currently comprises Cambridge Airport and surrounding arable farmland. Cambridge City Council and South Cambridgeshire District Council are jointly preparing the Greater Cambridge Local Plan which will set out the future land use and planning policies for Greater Cambridge over the next 20 years, for which Marshall are putting forward the site of Cambridge East as part of the Local Plan 'call for sites'.

Marshall has a long and proud history within Cambridge, and their ethos and approach for Cambridge East centres around providing an environmentally sustainable legacy for future generations of Cambridge. The emerging proposals go beyond best practice and raise the bar with regards to the environmental and sustainability benefits that development can provide. Four Scenarios (A, B, C, and D) have been developed and tested against prescribed and wide-ranging Requirements and Ambitions.

A high-level assessment of the existing baseline conditions has been undertaken to ensure that the Scenario proposals are founded on good science. The aspects considered include biodiversity, flood risk and drainage, geology and hydrogeology, land contamination, landscape and views, air quality, and connectivity and accessibility.

Cambridgeshire's Big Themes have been intrinsic to the evolution of the Scenarios, which have also been shaped by national and regional policy documents, alongside emerging environmental guidance and best practice. Over and above this, Marshall have placed the environment and sustainability at the heart of all decision making.

The work undertaken has established that development of this scale can have significant benefits in comparison to locating development over a series of smaller discrete sites. The benefit of scale at Cambridge East provides:

- A single integrated public transport and active travel solution to reduce carbon emissions and ensure local air quality improves;
- A single strategy to meet both Biodiversity Net Gain and carbon sequestration, providing significant large-scale opportunities for major local environmental gains; and
- The scale and investment make developing and incorporating innovative approaches more feasible, such as sustainable water management for the wider area.

Whilst it is important to recognise that Scenario C is not the best performer against every environmental requirement and ambition set, it is considered that this Scenario overall delivers the best environmental and sustainability outcomes. This is due to the following:

- Potential for increased off-site local biodiversity enhancement/creation for Biodiversity Net Gain and carbon offsetting;
- Increased likelihood that Teversham Fen can be reinstated, and the greatest opportunity to recharge the depleted local groundwater reserves;
- Opportunity to create a more significant 'green link', potentially extending to the Wicken Fen Vision;
- More opportunity to utilise larger areas of communal space for environmental benefit e.g. SuDS;
- Includes the Cambridge Autonomous Metro (CAM), a highly sustainable public transport intervention (alongside Scenarios B and D);
- Achieves Net Zero carbon, and also results in lower carbon emissions per user (than A and alongside Scenarios B and D);
- Provides greater jobs, both at construction and once occupied, which will include more entry level and apprentice jobs; and
- Greater number of affordable homes provided.

Through considering the environment and sustainability at the outset, Cambridge East provides a highly successful scheme, which will provide a legacy development with widespread and wide reaching environmental and sustainability benefits.

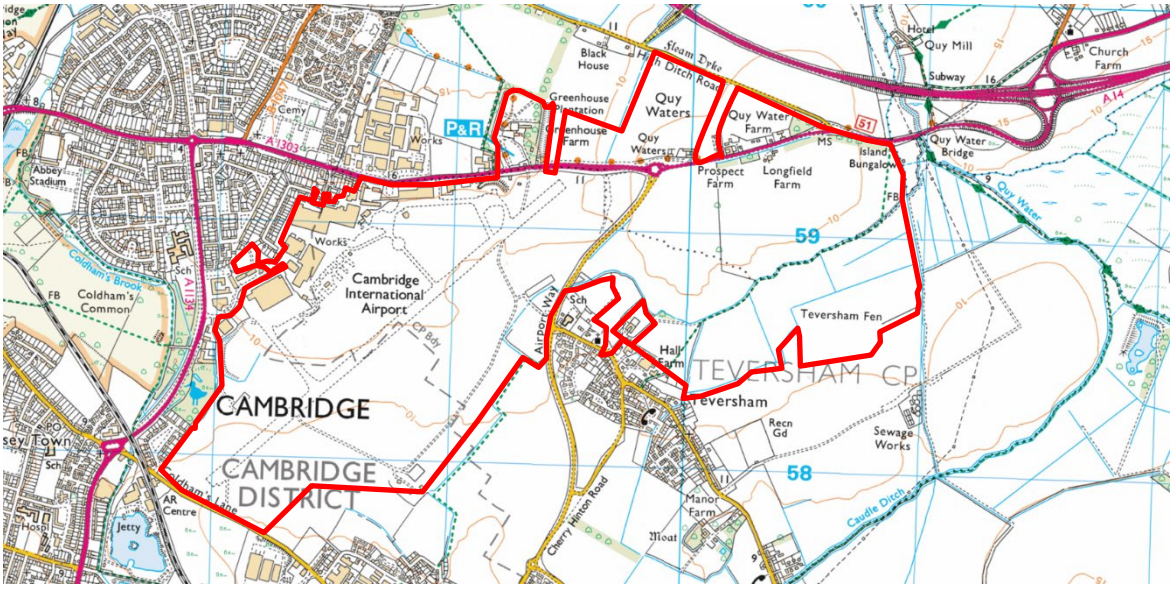
1 Introduction

1.1 Cambridge City Council and South Cambridgeshire District Council are currently preparing the Greater Cambridge Local Plan which will set out the future land use and planning policies for Greater Cambridge over the next 20 years. They have issued a 'call for sites' whereby sites can be put forward to be considered for allocation for development within the Local Plan.

1.2 Marshall Group Properties Limited (hereafter referred to as Marshall) are putting forward the site of Cambridge East and this document sets out the environmental and sustainability issues which make up part of the evidence that supports their allocation proposal. Marshall are proud of their history and role in Cambridge and aim through this site to contribute to the city's future social and economic success.

1.3 Cambridge East (hereafter referred to as 'the site') comprises circa 300ha of land which lies on the eastern fringe of the City of Cambridge. The site includes Cambridge Airport and adjoining land, designated as Green Belt, to the east.

Figure 1: Site Location Plan



Source: bing.com/maps

1.4 Cambridge East is a location that can accommodate the scale of growth needed to meet the ambitious economic growth targets of Cambridge, whilst simultaneously contributing to meeting the housing needs of local people and enhancing the sustainability and environmental principles which are intrinsic to Cambridge's vision.

1.5 As part of Marshall's work to support the 'call for sites', four different Scenarios have been developed and tested. These are illustrated and summarised below and set out in more detail in the 'Masterplan Frameworks Options Study', which has been submitted as part of a suite of evidence base documents alongside this report.

Figure 2: Scheme Scenarios

	A	B	C	D
Number of homes	9,500	9,500	12,000	12,000
NIA (sqf)				
Commercial (office, research, makerspace)	540,000	5,450,000	6,100,000	6,100,000
Retail	70,000	100,000	150,000	150,000
Leisure (entertainment, cultural, sports)	20,000	226,656	415,761	279,120
Hotel	-	155,000	193,750	193,750

- **Scenario A** – A scheme covering the Safeguarded Airport land which is compliant with the adopted Cambridge East Area Action Plan. This scheme includes high quality public transport (HQPT[1]) links as envisaged in the AAP, a relocated P&R[2] and dedicated transit corridor through the site. It does not require a dedicated off-site mass transit link connecting to Cambridge Station. It includes delivery of a Country Park to the east of Airport Way;

- **Scenario B** – A scheme covering the Safeguarded Airport land but which achieves a greater mix of uses than is envisaged in the AAP, including a significant increase in the provision of commercial development to enable and capitalise on the delivery of a research hub. This scheme is supported by comparable on-site transport infrastructure as Scenario A (including relocated P&R and dedicated on segregated transit corridor), but with a dedicated off-site mass rapid transit link[3] connecting to Cambridge Station with further connections to Cambridge North;

- **Scenario C** – A scheme covering the Safeguarded Airport land and additional Green Belt land to the east of Airport Way, which enables the delivery of a significantly greater quantum of development than Scenarios A or B, including a greater mix of uses, notably more residential units, and a greater scale of commercial development. This scheme is supported by comparable on-site transport infrastructure as Scenario A (including relocated P&R and segregated transit corridor), but with a dedicated off-site mass rapid transit link connecting to Cambridge Station with further connections to Cambridge North. It also provides a Green Infrastructure network which extends beyond the redline of the site to the east; and

[1] High Quality Public Transport (HQPT) - surface, bus based rapid transit solutions which will operate in existing street corridors and will be supported by priority measures and alongside design features to reduce delays caused by passengers boarding or leaving buses, or purchasing fares.

[2] Park & Ride

[3] Mass rapid transit link – fully segregated high capacity transit solutions with the potential to be part of the CAM.

- **Scenario D** – A scheme which achieves the same amount of development as Scenario C but covering the Safeguarded Airport land only. This scheme is supported by comparable on-site transport infrastructure as Scenario A (including relocated P&R and segregated transit corridor), but with a dedicated off-site mass rapid transit link connecting to Cambridge Station with further connections to Cambridge North. It is being tested to examine the potential to densify Option B.

1.6 The role of the environmental and sustainability work has been twofold:

- To ensure that the environmental and sustainability performance of each Scenario is optimised as far as is possible; and
- To identify the environmental and sustainability performance differences that occur as a result of the varying characteristics of each Scenario.

1.7 The work presented in this document is underpinned by factual and scientific data, thereby ensuring that the optimal environmental and sustainability performance can be accurately assessed and realised for each of the Scenarios. It should be acknowledged though that the work undertaken is still at a high level and that this is as would be expected given the point in the development cycle that the proposals have reached.

1.8 The current baseline environmental context of the site and surrounding area is outlined in Chapter 2. Chapter 3 outlines the policy documents which relate to Cambridge and the wider area, drawing out the specific environmental objectives and requirements which any future scheme needs to incorporate. As a result of Marshall's commitment to development of a highly sustainable nature, the commitments go above and beyond those expected in local and national planning policy. Marshall aspire to the Cambridge East development being seen as a beacon for sustainable best practice, leading the way in meeting and exemplifying the Councils' ambitions for the highest quality of sustainability, place making, low carbon impact, and quality of life.

1.9 Drawing on the policy, legislation and local objectives outlined in Chapter 3, Marshall's ambitions and requirements for the development, and the associated design principles that have supported the evolution of the Scenarios, are set out within Chapter 4. The specific environmental opportunities are discussed in depth in Chapter 5. Chapter 6 draws together all four development Scenarios, succinctly summarising the overarching environmental and sustainability concepts and highlighting the differentiations between the respective Scenarios in terms of their relative environmental and sustainability performance considered against the requirements and ambitions outlined in Chapter 4.

2 Current Environmental Context

Current Land Use

2.1 The site of Cambridge East comprises approximately 310ha of land currently utilised as Cambridge Airport (176ha), with adjoining land held by Marshall (approximately 98ha), and also by Cambridgeshire County Council (approximately 36ha) lying to the Airport's immediate east. The site of Cambridge East lies on the fringe, and to the east, of the City of Cambridge itself. The south, west and northern boundaries of the Airport border existing communities, whereas, in contrast, the surrounds of the eastern section of the site that lies to the east of Airport Way, comprise farmland, villages and fenland.

Biodiversity

2.2 The area west of Airport Way comprises entirely of the Airport site itself and therefore supports both development and mown grassland managed intensively to avoid aircraft bird strike. A small ordinary watercourse is currently present through the central and eastern parts of the site. East of Airport Way the site is dominated by farmland currently in arable production, with hedgerows forming field boundaries.

2.3 The remnants of Teversham Fen also occur in this area. Currently this 'Fen' supports only a dry reedbed and is in a particularly degraded ecological state.

2.4 There are several statutory Sites of Special Scientific Interest (SSSI) in the vicinity of Cambridge East. These comprise:

- Little Wilbraham Fen, located approximately 250m to the east. The Fen measures approximately 62ha. Natural England classify the condition of the fen meadow and reedbed as unfavourable/declining (6.96ha), lowland neutral grassland as unfavourable recovering (36.78), and the lowland fen, marsh, and swamp as favourable (18.24ha). Little Wilbraham River County Wildlife Site (CWS) is also present adjacent to Little Wilbraham Fen;
- Fulbourn Fen, located approximately 3km to the southeast. The Fen measures approximately 27.34ha. Natural England classify the condition of the dry grassland as favourable (6.27ha), the wet woodland as unfavourable recovering (15.85ha), and fen meadow as unfavourable recovering (5.22ha); and

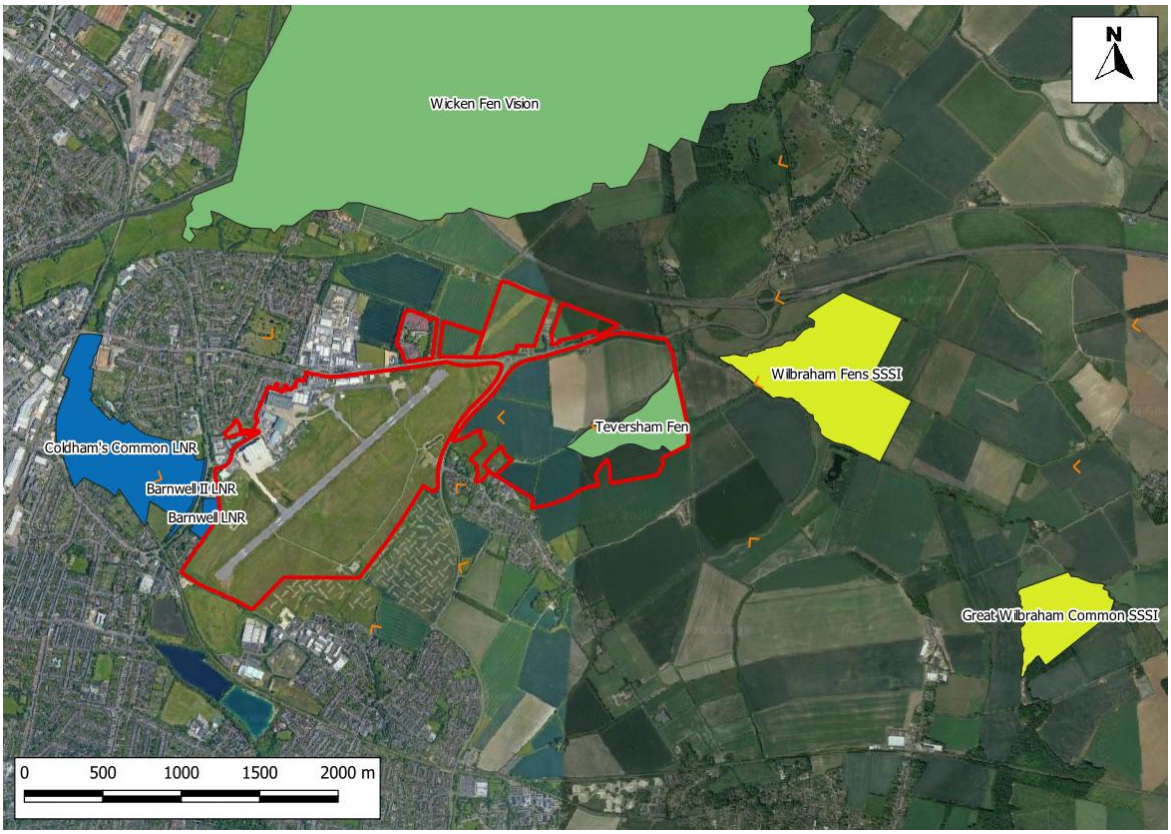
- Great Wilbraham Common, located approximately 2.3km to the southeast. The common measures 23.51ha. Natural England classify the condition of the common (dry grassland) as favourable.

2.5 In addition, the Fenland Special Area of Conservation (SAC) lies approximately 10km to the northeast of Cambridge East. This SAC of 619ha, comprises three separate sites, Chippenham Fen and Snailwell Poor's Fen SSSI, Wicken Fen SSSI and Woodwalton Fen SSSI.

2.6 Other sites of importance for biodiversity that lie within the vicinity of Cambridge East include:

- Barnwell Local Nature Reserve which borders the western edge of Cambridge Airport, located to the east and west of Barnwell Road. The Eastern part of the Nature Reserve measures 2.61ha, and the Western part measures 3.75ha. Habitats comprise grassland, scrub, Coldham's Brook, and a pond.
- Coldham's Common Local Nature Reserve is located approximately 200m to the west of the site, immediately adjacent to Barnwell Local Nature Reserve. The Nature Reserve measures 49.28ha. The common comprises a variety of habitats including particularly unimproved grassland.

Figure 3: Ecological Sites



Flood Risk and Drainage

2.7 Based on natural topography, surface water runoff from the site is currently split into two drainage catchments. The eastern half of the site discharges to the east into Quy Water Catchment, and the western part of the site discharges to the west into Cherry Hinton Brook/Coldham's Brook Catchment. These two watercourses discharge into the River Cam.

2.8 The site mainly lies within Flood Zone 1 and therefore is at a low risk of fluvial flooding. Teversham Fen and the surrounding arable fields in the southeast lie within Flood Zones 2 and 3 indicating a medium to high risk of fluvial flooding. There is an unmodelled ordinary watercourse/ditch present through the central and eastern parts of the site, however as this is the head of the watercourse it should not pose a major flood risk. This is confirmed through the pluvial (surface water) flood maps, which only indicate the potential for nominal ponding adjacent to the ditch.

Geology and Hydrogeology

2.9 The British Geological Society mapping identifies that the geology at the site generally comprises West Melbury Marly Chalk Formation (calcareous sedimentary rock) which outcrops across the majority of the site, with Gault Formation below. Some small superficial areas of River Terrace Deposits (comprising sand and gravel) are present in the north of the site, and Peat is present in the vicinity of Teversham Fen in the east (overlying River Terrace Gravels).

2.10 Marshall have undertaken historic borehole investigations at the site to a maximum depth of approximately 20m. These results show that below the topsoil, the geology comprises stiff, closely fissured light grey, slightly sandy Clay, with occasional partings of silt and sand (Lower Chalk). Below this Gault Clay is present.

2.11 The West Melbury Marly Chalk is classified as a Principal aquifer, and the River Terrace Deposits as a Secondary A Aquifer. Peat is classified as unproductive strata. The site does not lie within a Source Protection Zone.

Land Contamination

2.12 A high-level contaminated land assessment[4] has been undertaken for the site by Mott MacDonald (please see the Executive Summary in Appendix 1). This concludes that the majority of the site is classified as a lower risk, whilst hotspots of contamination are likely within the Airfield, and Newmarket Road Park and Ride.

2.13 The types of contaminants that are likely in these hotspots comprise hydrocarbons from fuel storage, solvents from aircraft maintenance and metals from paints. These are all common contaminants

[4] Mott MacDonald, November 2020. *Cambridge East Contaminated Land RAG Assessment*

associated with airfields and general industry, and remediation methods are well known and proven for these contaminants.

2.14 Marshall is undertaking ongoing investigations and monitoring with regards to the PFAS and PFOS identified in groundwater in the vicinity of the fire training grounds, alongside discussions with the Environment Agency and Cambridge City Council. Workable remediation options have been identified and agreed with all parties, which are currently being undertaken.

2.15 Given the Assessment has concluded that contamination issues should not preclude the opportunity to develop the site, and also they need not influence the development design (at least at this stage), contamination is considered no further in the Report. It is however, recognised that more detailed work will be needed later in the development cycle.

Air Quality

2.16 The site lies within South Cambridgeshire District Council (SCDC) and Cambridge City Council (CCC), which have both declared Air Quality Management Areas (AQMAs) within the vicinity of the site. The main air pollutants of concern relate to road traffic emissions, including nitrogen dioxide (NO2) and fine particulate matter (PM10 and PM2.5).

2.17 SCDC declared an AQMA in 2007 along the A14 between Bar Hill and Milton, located approximately 3km northwest of the site. Exceedances occurred in the annual mean NO2 objective, and the 24-hour mean PM10 objective.

2.18 In 2005 CCC declared an AQMA owing to exceedances of the annual mean NO2 air quality objective in Cambridge city centre, and along the main radial routes into the city. The closest point of the AQMA is approximately 2km from the site.

2.19 The UK Pollutant Release and Transfer Register (Defra, 2017b) does not identify any significant industrial or waste management sources within Cambridge which are likely to affect baseline air quality at the site.

Landscape and Views

2.20 The site is not located in a conservation area and lies outside of the historic core in the Eastern Transition Lands (as identified in the Cambridge Landscape Character Assessment). The eastern part of the site is currently located on land designated as Green Belt. A Height Study has been undertaken by Montagu Evans LLP[5], which already has, and will continue to, influence development design evolution.

2.21 Features identified as being important include the setting of Teversham and Fen Ditton Conservation Areas, and listed buildings in the immediate vicinity such as the Church of All Saints in Teversham,

[5] Montagu Evans LLP, 2020, Cambridge Airport Heights Study

and the Parish Church of St Mary in Stow cum Quy. On the site itself there is also a listed Airport Control and Office building.

2.22 There are large hangers currently present on the existing Airfield. These are light in colour, and therefore prominent in distant views. The Cambridge Landscape Character Assessment and Cambridge Inner Green Belt Study identifies these hangers as visually detracting, forming a negative edge to Cambridge City.

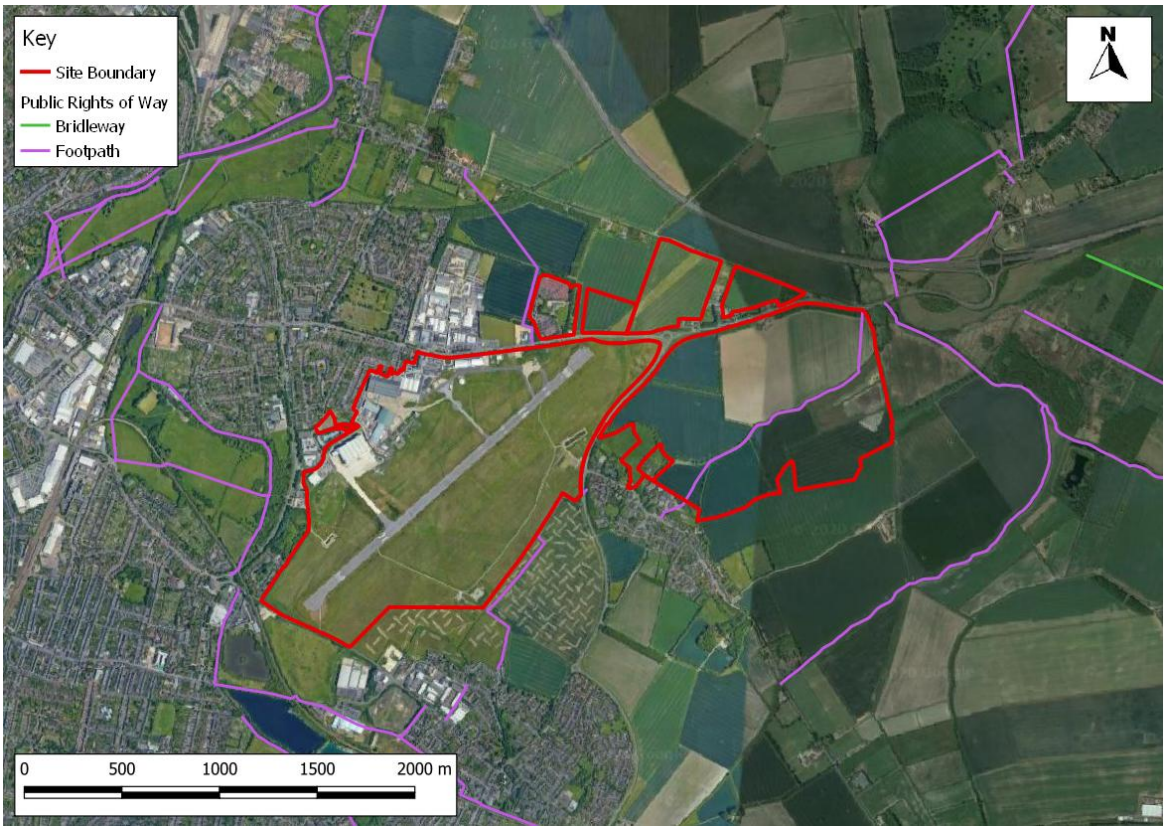
2.23 There are two consented schemes in the vicinity, Land North of Newmarket Road (currently under construction) located to the north, and Land North of Cherry Hinton (due to be granted planning permission imminently) located to the south. 17 view locations have currently been considered, please refer to the Height Study for further details.

Connectivity and Accessibility

2.24 There is no public access on the Airfield and because of this the Airport itself acts as an impermeable barrier stopping movement both east-west, and north-south, within the local area, and particularly between Coldham's Common to the west and areas of countryside to the east. A public footpath is present through the eastern section of the site that lies to the east of Airport Way, which connects Teversham to the A1303. This footpath comprises an earth track through the existing fields and an unmade road.

2.25 Two public footpaths are present to the east of the site, emanating from the A1303. One footpath travels north across the A14. The second footpath travels south beside Little Wilbraham Fen and towards Great Wilbraham Common. There is currently no direct footpath connection from the site to these off-site Fens without walking beside a busy 'A' road.

Figure 4: Local Footpaths



3 Drivers for Sustainable Development

3.1 Marshall appreciates that with Cambridge East, there is an opportunity to design a development that sets the benchmark for sustainability, and it is their ambition to realise this. Truly sustainable development is not only a requirement of emerging planning policy, Marshall recognises that it needs to be the hallmark of all great development and a fundamental requirement for future occupiers and investors. The approach to development of the proposed Cambridge East Scenarios has therefore embedded environmental design at each of their hearts, led by stretching ambitions for sustainable development set by Marshall. A leading team of experts has been appointed with a specific remit for the environment and sustainability, however the design team as a whole also has a collective responsibility for achieving these ambitions.

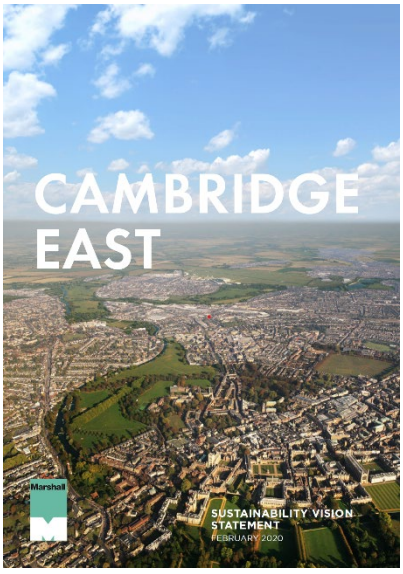
3.2 This approach has created proposals which would set a new benchmark for sustainable development in Cambridge and lead the way in demonstrating how the objectives of the planning authorities can be delivered through development which enhances the environment and provides healthy places for people to live and work within.

3.3 This Chapter sets out the main drivers which have helped steer the sustainability values of Cambridge East and which have in particular informed the Requirements and Ambitions (and the associated Design Principles) that Marshall have set for the scheme and which are detailed in Chapter 4.

Cambridge East Sustainability Vision

3.4 Marshall's Cambridge East Sustainability Vision[6] (February 2020) commits to the proposals being highly sustainable. In this document, which has been submitted to the planning authorities, Marshall sets out its vision for how Cambridge East will meet the following:

- Net Zero Operational and Embodied Carbon;
- Sustainable Water Cycle;
- Sustainable Land-use and Biodiversity;
- Good Health and Wellbeing; and
- Sustainable Communities and Social Value.



[6] Marshall, February 2020. *Cambridge East Sustainability Vision Statement*

3.5 The Sustainability Vision has been vital in shaping development of the Scenarios. The document will continue to act as an important baseline to ensure that the project keeps moving forward in its determination of achieving highly sustainable development.

Policy and Legislation

3.6 There are other key drivers that Marshall has taken into account as the Scenarios are developed, such as ensuring all legislative and policy drivers are met. These include (but are not limited to) the following:

- Net Zero emissions law, targeted by 2050;
- Wildlife and Countryside Act (1981);
- Environmental Protection Act (1990);
- Natural Environment and Rural Communities (NERC) Act (2006);
- Climate Change Act (2008;)
- The Water Environment (Water Framework Directive) Regs (2017);
- Environment Bill draft (2020);
- National Planning Policy Framework (2019);
- Air Quality Standards Regulations (2010);
- Professional Practice Guidance on Planning & Noise: New Residential Development (2017);
- East Cambridgeshire Core Strategy Development Plan Document, Policy EN 4 (2009);
- Cambridge City Local Plan (2018);
- East Cambridgeshire Local Plan (2015);
- Climate Change Strategy (2016-2021);
- Carbon Management Plan (2016-2021);
- South Cambridgeshire Local Plan (2018); and
- Greater Cambridge SPD (2020).

The Role of Nature in a UK Nationally Determined Contribution

3.7 The World Wildlife Fund (WWF) and the Royal Society for the Protection of Birds (RSPB) have jointly published a document[7] to highlight the role that nature can play in reducing carbon emissions. They recommend (of those which are most relevant):

- Targets should include protecting existing carbon stocks, in particular native woodland, peatland, and permanent grassland to avoid further emissions;
- Carbon sinks should be enhanced through improved management, restoration, and the creation of a broad range of native habitats. Native woodland expansion (avoiding planting on semi-natural grassland) and rewetting peatlands should be encouraged. Benefits can also be afforded through hedgerow and orchard enlargement; and
- Nature based solutions should be prioritised, which will also provide biodiversity and socio-economic benefits.

3.8 The aspects above will be intrinsic to ensuring that Cambridge East strives for and sets best practice through design.

Local Plan Evidence Base

3.9 The Greater Cambridge authorities have published a series of Spatial Options Assessment documents[8] as part of an evidence base to support development of the Local Plan. These documents include the Green Infrastructure Opportunity Mapping, Integrated Water Management Study, and Sustainability Appraisal. Whilst developing the evidence base, this initial stage has tested growth and spatial options for the Local Plan.

3.10 The documents set out eight spatial options for the location of potential future development, which have been investigated in terms of the opportunities they each provide. Cambridge East is mostly considered as Option 2, but Options 1 and 3 are also relevant. The work identifies that Options 1 and 2 by themselves would not be sufficient to meet the scale of need for which the new Plan needs to provide identified. The options considered include:

- Option 1: Densification of existing urban areas;

[7] The Role of Nature in a UK NDC, 2020
[8] Greater Cambridgeshire Local Plan Spatial Options Assessment, 2020

- Option 2: Edge of Cambridge – Outside Green Belt;
- Option 3: Edge of Cambridge – Green Belt; and
- Other Options to disperse growth away from the City.

3.11 Within the Green Infrastructure Opportunity Mapping evidence and the associated Baseline Report seven themes are identified which include:

- Landscape, cultural heritage, and sense of place;
- Biodiversity and geodiversity;
- The water environment;
- Access and connectivity;
- Recreation and play;
- Carbon sequestration; and
- Agriculture and community food growing.

3.12 A review of the evidence produced and, in particular, the Opportunity Mapping for the area of Cambridge East and its surrounds, shows that there is significant potential to integrate green infrastructure and realise the ambitions of many of these seven themes. Specifically, this includes integrating active travel into any development and extending Barnwell East Nature Reserve. It is also noted that risks to internationally important ecology sites need to be considered and addressed.

3.13 In addition to these themes, the cross-cutting aspects of climate change, health and wellbeing, and social inclusion are considered. The need for existing or new Green Infrastructure to provide multiple benefits based on the above themes is noted as being important.

3.14 A Sustainability Appraisal is also a key piece of the evidence published. Although it is acknowledged that much of the assessment is at a high level because it is not based on a specific development design proposal, useful points are made with regard the opportunities that could occur and constraints that exist from development of Cambridge East. These are outlined below:

- Given the scale of the site there are opportunities for large scale green infrastructure interventions;
- Recreational pressure to important ecological sites will need to be managed;
- Development could enhance landscape character and distinctiveness of the Airport site, although views in and out of city could be affected;

- Water recycling and new blue-green infrastructure may be easier to implement across larger sites, such as Cambridge Airport;
- There is much opportunity to manage flood risk through SuDS and to reuse rainwater that falls on the site; and
- Development at Cambridge Airport would be in close proximity to an Air Quality Management Area.

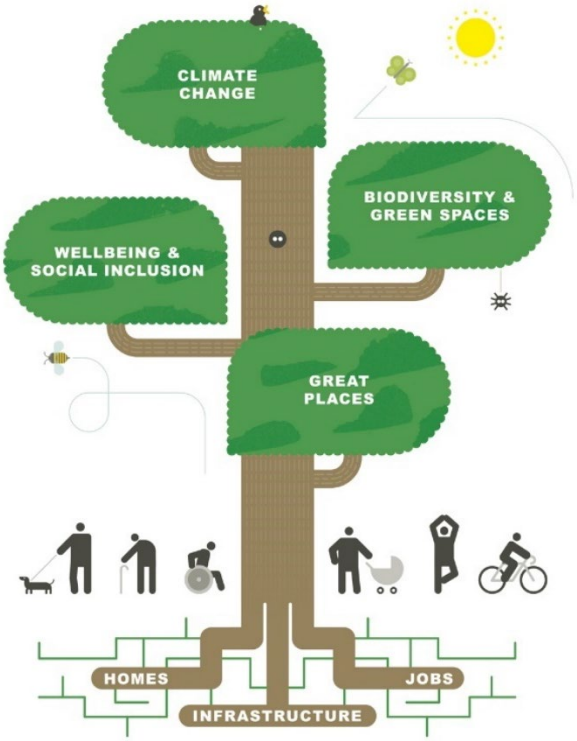
3.15 Much of the evidence produced resonates with what Marshall has identified and believes, and therefore has been a key driver in developing the Requirements and Ambitions outlined in the next Chapter.

The Big Themes

3.16 As noted, the new Local Plan will set out the future land use and planning policies for Greater Cambridge, which will cover the next 20 years and demand sustainable development. To reach this goal, Greater Cambridge have developed and adopted four 'Big Thames'[9] to guide preparation and implementation of the joint Local Plan.

3.17 There are four critical objectives which place significant emphasis on development being highly sustainable. These comprise:

- Climate Change (including Net Zero Carbon);
- Biodiversity and green space (sustainable water use, land use, biodiversity, and connectivity);
- Wellbeing and social inclusion (good health and wellbeing); and
- Great places (sustainable communities and social value).



3.18 Marshall has been strongly influenced by the 'Big Themes' set by the authorities for the future of Cambridge. It is challenging but heartening that the Councils and Marshall share the same imperatives for the future.

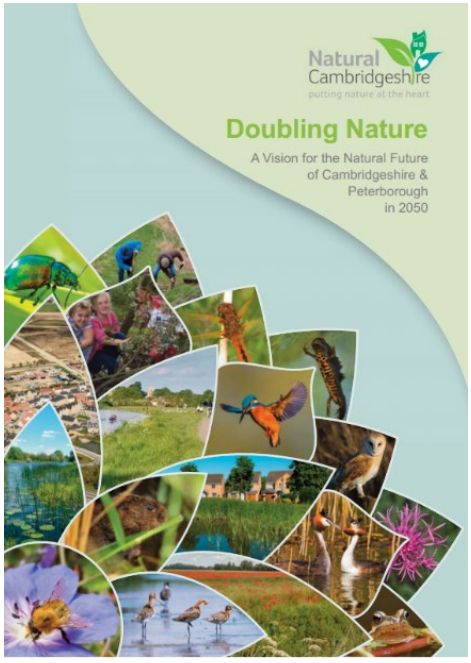
[9] Greater Cambridge Big Themes

3.19 Sitting underneath these 'Big Themes' are a set of associated key issues, and importantly what has to be done to help address the outlined objectives. Marshall recognises that any development of the scale and significance of a strategic site such as Cambridge East must lead the way in showing how the objectives can be met. Any solution, of course, must be specific to its site and to the circumstances of Cambridge.

Doubling Nature

3.20 Natural Cambridgeshire are a local partnership comprising leaders from business, local authorities, the health sector, farming wildlife and environmental organisations. They have set out a vision for the future of Cambridgeshire and Peterborough of Doubling Nature[10] by 2050. This aims to double the area of rich wildlife habitats and greenspace from 8.5% to 17%.

3.21 The drivers for setting out this vision emanate from Cambridgeshire being the driest part of the country with limited water resources, to ensure a sustainable future for the Fens, and to plan sustainably for the anticipated growth resulting from the government's designation of Cambridge within the identified 'Growth Arc'. Placing Nature at the heart of decision making will therefore aim to safeguard quality of life and wellbeing. Important elements which Natural Cambridgeshire state will facilitate the vision include:



- Enhancing existing areas (specifically Wicken Fen and the Great Fen) and creating new habitats;
- Increasing tree cover and woodland networks – Cambridgeshire is thought to be the least wooded County in England; and
- Securing access to high quality natural green space within 300m of everyone's home.

3.22 Supporting the delivery of this Vision has been a particular driver for Marshall's environmental and sustainability ambitions.

Wicken Fen Vision

3.23 Wicken Fen is located approximately 11km to the northeast of the site, and is designated a SSSI, Ramsar site and Fenland SAC. The Wicken Fen Vision[11] is a 100 year plan launched in 1999, to

[10] Natural Cambridgeshire Doubling Nature

[11] Wicken Fen Vision booklet, 2018

create 53km^2 of diverse landscape for wildlife and people. The ambition is centred around four key themes comprising:

- **Habitats and wildlife –** to extend Wicken Fen nature reserve and restore natural processes, carefully manage water and grazing regimes, and allow sustainable land management;
- **People** – to inspire and connect people with nature, conservation, and the landscape, whilst protecting the landscape;
- **Learning** – continually monitor progress, share understanding, contribute to research on climate change and ecosystem services, and inform decision makers; and
- **Sustainable economy** – stimulate a thriving local economy, which is sympathetic to the wildlife and landscape.

3.24 Currently 446ha of land has been purchased, 48km of public access has been created/improved, two bridges have been constructed, a cycle hire facility has been opened, and a 'back to basics' campsite has been established. With regards to wildlife, over 5000 wintering waterfowl are using the new habitat, including six cranes. Konik ponies are also now grazing in the area. Much more however, is still planned to be undertaken.

Cambridge Fens Nature Network Strategy

3.25 Cambridge Past, Present and Future (CPPF) and Beds, Cambs and Northants Wildlife Trust (BCNWT) are jointly preparing their Cambridge Fens Nature Network Strategy, which is currently in draft format. Within the document the most important sites, or core sites as they refer to them as, are identified, these being Little Wilbraham Fen, Great Wilbraham Common, Fulbourn Fen and Little Wilbraham River.

3.26 The drivers for developing this strategy result from the sites' suffering from being too dry due to depressed groundwater levels/abstraction pressures, the currently limited sizes of the respective sites, and dogs off leads frightening local wildlife which leads to a reduction in breeding.

3.27 The objectives of the Strategy are both short and long term, which comprise:

- **Short term** – enhanced management of all sites and provision of buffer areas, establishing a nature friendly farming group to promote key species conservation, and explore opportunities with landowners for the creation of larger Fen areas; and

- **Long term** – increase semi-natural habitat coverage from 155ha to 300ha, including more species rich grassland, Fen, and other wetland habitat. This will include creating at least one new core area of 100ha, and two further new areas of 40ha. Also establishing a network of habitats along Little Wilbraham River and New Cut to create corridors between the three existing core sites.

3.28 As set out above, the existing habitats are very sensitive to the presence of people and dogs. As part of the strategic green infrastructure network it is considered that there is a resulting need to create new strategic accessible greenspaces including dedicated dog walking spaces, and a wider range of circular walking routes around Fulbourn (and to a lesser extent the Wilbrahams and Teversham), to reduce recreational pressures at Fulbourn Fen and Little Wilbraham Fen.

Consultation

3.29 Marshall's work has been informed by consultation with the Beds, Cambs and Northants Wildlife Trust (BCNWT), National Trust (NT) and Cambridge Past, Present and Future (CPPF). This consultation has included both presentations and a workshop at which the consultees were given the opportunity to consider and present what they felt were the key issues and opportunities that arise from development at Cambridge East. Their respective responses which also draw upon the principles of the documents referenced above, were documented in a letter to Marshall from the consultees, a copy of which is found in Appendix 2. In summary the key issues and opportunities are summarised as such:

- Visitor pressure on Little Wilbraham Fen SSSI should be managed by diverting people to other green spaces, discouraging access to sensitive areas, active visitor management, and expanding or buffering the SSSI;
- A new Country Park is needed to the north of the A14, to divert visitor activity from Little Wilbraham Fen and to act as a southern gateway to the area of the Wicken Fen Vision;
- A green corridor should be developed which provides connectivity from Coldham's Common to the Cambridge Fens for both people and wildlife. The corridor should also provide high quality, wildlife rich, accessible spaces close to where people live;
- The priority for Biodiversity Net Gain should be to expand and buffer Little Wilbraham Fen; and
- Green infrastructure including nature should be integrated within the development.

3.30 Furthermore, the National Trust has indicated that they are keen to explore the potential for aspects of the green infrastructure strategy for Cambridge East, including particularly the green corridor initiative (which is explained in Chapter 5) to be one of 20 pilot projects in the UK, thereby providing an exemplar case study of how to connect cities to the countryside.

3.31 Consultation has confirmed that there is a clear long-term vision for Cambridge and its connection to the surrounding countryside as is outlined in the Strategies discussed earlier in this Chapter. By setting a clear vision for the future, it is hoped that as development occurs these aspects will be at the heart of proposals, with each site playing its part to reach the ultimate goal.

3.32 BCNWT, NT and CPPF acknowledge that achieving all of these ambitions at Cambridge East would likely require additional capital and resource to that provided by Marshall as part of their proposals. Marshall recognises that Cambridge East can create the necessary bridge between the city and surrounding nature. Marshall fully supports the wider visions for Cambridge and want to ensure that what is created through Cambridge East can lead and be built upon, for example, to enable and help support the sustainable development of other schemes within the local area. This can be seen in the proposals detailed later.

4 Approach

4.1 Informed by the background set out in Chapters 2 & 3, Environmental and Sustainability Requirements and Ambitions for Cambridge East have been developed. The Requirements and Ambitions have also importantly informed periodic testing of the environmental and sustainability performance of the Scenarios, with a final assessment being documented in Chapter 6 of this Report.

4.2 The Requirements and Ambitions have also been used to develop specific Environmental and Sustainability Design Principles. These Principles have been used as important design drivers to ensure that the evolution of the Scenarios has occurred in a way that would, as far as is possible, achieve the Requirements and Ambitions. Furthermore, the Design Principles have been used to optimise environmental and sustainability performance. In evolving the Scenarios, achievement of the environmental and sustainability principals has been considered to be every bit as important as the meeting of requirements of any other design element including, for example, the layout of the buildings or design of the transport infrastructure.

4.3 The full Requirements, Ambitions, and Design Principles table is included in Appendix 3, please see a summary version provided below as Table 1.

Table 1: Requirements, Ambitions and Design Principles

Environmental Aspect	Topic	Type of measure	Design Principles
All	Where relevant	Requirement	Adherence to legislation
Air Quality	Air Quality Management Area (AQMA)	Requirement	No deterioration of air quality within AQMA
Air Quality	Air quality neutral	Ambition	For area affected by our proposals achieve air quality neutral or better
Air Quality	Air pollution exposure for residents	Ambition	Lowest exposure possible for new and existing residents to air pollution
Biodiversity	Biodiversity Net Gain	Requirement	Achieve Biodiversity Net Gain of at least 10% with an ambition of 20%
Biodiversity	Priority habitats and species	Requirement	Avoid, minimise, mitigate harm, or at least compensate and if possible, enhance
Biodiversity	Regional and locally designated sites of biodiversity value	Requirement	Avoid, minimise, mitigate harm, and enhance where possible
Biodiversity	Local green and natural spaces	Ambition	Delivery of new, or contribute to enhancement of green and natural spaces particularly those that meet wider external strategic ambitions
Carbon and Climate Change	Zero Carbon Hierarchy	Requirement	Maximise energy efficiency; and incorporate renewable or low carbon sources on-site as far as practicable
Carbon and Climate Change	Renewables on-site	Requirement	Install renewable and low carbon energy generation sources to either fully or partially displace the use of fossil fuels. They need to be located on-site or close to the energy users.

Environmental Aspect	Topic	Type of measure	Design Principles
Carbon and Climate Change	Renewables on-site	Requirement	For new dwellings and new non-residential buildings of 1,000m^2 or more, to reduce carbon emissions by a minimum of 10% (against Building Regulations baseline) through the use of on-site renewable energy and low carbon technologies
Carbon and Climate Change	Future adaptation	Requirement	Promote sustainable forms of transport including with excellent active travel and public transport links
Carbon and Climate Change	Future adaptation/Overcooing	Requirement	Use layout, building orientation, design, and materials to ensure properties are not susceptible to overheating and include open space and vegetation for shading and cooling
Carbon and Climate Change	Carbon emissions	Requirement	Reduce the need for energy in the building's design
Carbon and Climate Change	Overheating	Requirement	Use optimum orientation for buildings and streets to reduce solar gain in summer and catch breezes
Carbon and Climate Change	Operational energy use (domestic and non-domestic)	Ambition	Use form, fabric, and landscape to optimise ambient lighting, heating, cooling, and ventilation
Carbon and Climate Change	Embodied carbon emissions (domestic and non-domestic)	Ambition	Maximise on-site renewable energy
Carbon and Climate Change	Offsetting scheme for operational carbon	Ambition	Offset the remaining 25% of operational carbon emissions by offsite renewable generation (Wind Farms) and/or carbon sequestration schemes such as carbon forestry, grassland and fenland restoration.
Carbon and Climate Change	Offsetting scheme for embodied carbon	Ambition	Adopt one or more of a combination of carbon offsetting schemes(Carbon Forestry, Fenland Restoration, Wind farms, Grassland, Carbon Credits), with a priority on local carbon sequestration, to minimise overall embodied carbon emissions by up to 70% (for domestic buildings) and 54% (for non-domestic buildings) against the benchmarks used by RIBA 2030 Challenge.
Green Infrastructure	Recreation and Amenity	Requirement	Incorporate appropriate range and quantity of sport and recreation facilities, including play space and allotments.
Green Infrastructure	Landscape Character	Ambition	Complement local landscape character particularly in relation to historic Cambridge/Cambridge landscape
Green Infrastructure	Provision of open space	Ambition	Maximise the % of total open space that also has an ecosystem function per resident
Green Infrastructure	Multifunctionality of greenspace	Ambition	Increase the level of multifunctionality for greenspace created/enhanced albeit without compromising the quality of its primary purpose
Green Infrastructure	Connectivity	Ambition	Connect, though accessible greenspace, Coldham's Common to the Countryside and beyond
Townscape	Tall buildings and views	Requirement	Ensure the appropriateness of location, setting and context of tall buildings when considered against area's character and sensitive viewpoints
Noise	Acoustics - external spaces	Ambition	Provide access both for new residents and other users of the development to a variety of tranquil public amenity areas
Water Management	Flood Risk	Requirement	Ensure that there is no increase in flood risk including out with the development area
Water Management	Sustainable Drainage	Requirement	Maximise the use of Sustainable Drainage Systems and seek to create the most water efficient development possible
Water Management	Sustainable Drainage	Ambition	Maximise areas of permeable surfaces to reduce flood risk

Environmental Aspect	Topic	Type of measure	Design Principles
Water Management	Heavily modified waterbodies	Ambition	Maximise the opportunity to de-culvert watercourses should such exist
Water Management	Water pollution control	Ambition	Maximise the quantum of surface water runoff cleaned by natural systems
Water Management	Rainwater use	Ambition	Ensure that rainwater and greywater are reutilised to thereby create the most sustainable water cycle

5 Proposal

5.1 This Chapter focuses on describing the proposals and opportunities, across a range of environmental and sustainability aspects, that have been identified thus far. It should be noted that there are many environmental and sustainability proposals that are consistent throughout the Scenarios but there are also some key differences, which reflect inherent characteristics of the Scenarios.

5.2 In this Chapter the 'maximum extent' of the proposals and opportunities are detailed with no specific consideration of whether they can be accommodated in any particular Scenario. This consideration is made in Chapter 6 where the specific differences between the Scenarios in terms of achieving this 'maximum extent' are outlined, and the environmental and sustainability performances of each is evaluated, including with specific reference to the Environmental Requirements and Ambitions set out in Chapter 4.

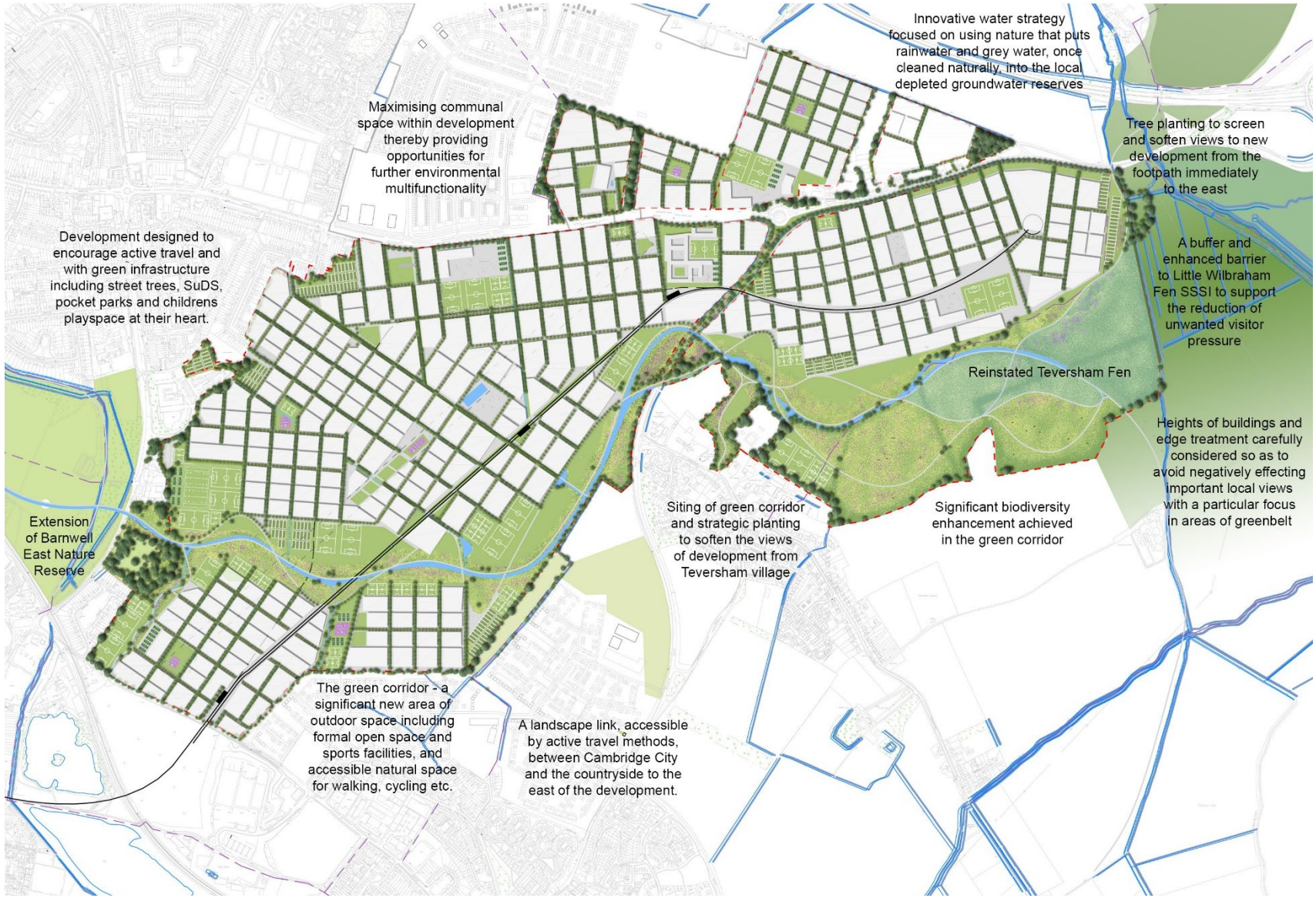
5.3 Multi-functionality has been sought as far as is possible in the proposals. It is one of the major benefits of green infrastructure that, if designed well, multiple benefits (for example both biodiversity and recreation) can be realised. However, there will always be a primary function identified, and seeking to achieve multi-functionality should not impact the ability for this primary function to be achieved to its highest potential.

5.4 It is important to note that the proposals are, for the most part at this stage, opportunities rather than being absolute fixes. However, even if all are not achieved through the development proposals, it is hoped that they have illustrated a way forward and that those opportunities that are not required as a result of these proposals might, in the future, be taken forward by others.

5.5 In reality some options lend themselves to be taken forward as part of a wider joint Local Plan initiative, rather than at a site-specific scale. This is because the ambitions of much of what is proposed could be better achieved collectively and part of wider Strategies that could unlock for example increased funding, that could come from the range of development which is set to occur in Greater Cambridge. Where a particular opportunity such as this has been identified, it has been specifically referenced later in this Chapter.

5.6 The following annotated plan illustrates the key environmental and sustainability proposals that are being proposed. The following sections within this Chapter describe in more detail the proposals using other graphics where it is beneficial.

Figure 5: Green Infrastructure Site Plan



Connected Landscape of Cambridge Quality

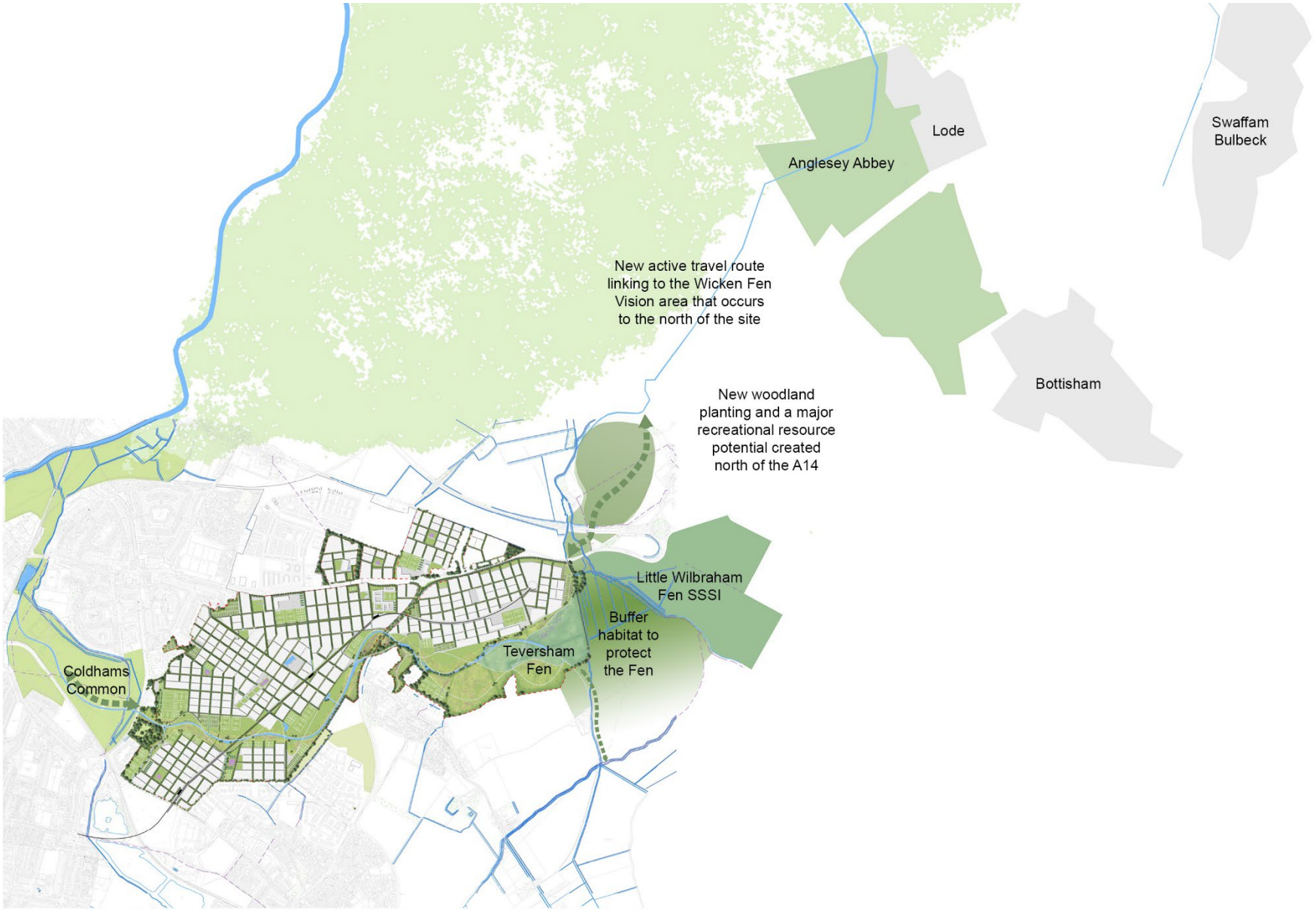
5.7 The existing and historic landscape of both the site and the wider Cambridge area have been influential in establishing the vision for Cambridge East. Cambridge has a wealth of picturesque semi-natural accessible open space, often still managed in traditional ways, and this is reflected in the approach taken to the early design of the large areas of open space that are to be created as a result of the development. Areas such as The Backs and Coldham's Common (which lies almost immediately adjacent to the site), where large swathes of mainly grassland can be accessed by all, and which is managed by low intensity grazing or mowing, have inspired the proposals for a green corridor.

5.8 The green corridor will not, however, replicate these areas but will rather resonate with their character whilst also seeking to perform specific primary functions, for example providing opportunities for formal or informal recreation, enhanced biodiversity or the sustainable management of water. This will require the creation of particular zones each serving a particular primary function. Of course, secondary benefits will also be sought in these zones but not to the detriment of achieving the primary function ambitions.

5.9 In addition, the location of the site provides significant access opportunities that will benefit both future residents and users of the site, and existing Cambridge residents. Development of Cambridge East would unlock the missing jigsaw piece that allows connectivity, through areas of green space and in particular the green corridor, from central Cambridge via Coldham's Common and onwards to the countryside located further east and northeast, including potentially, depending on the specific Scenario, to the southern fringe of the Wicken Fen Vision. Currently such connectivity is unachievable because the Airport itself acts as an impermeable feature in the landscape. This will never change given the stringent Airport safety and security requirements, unless development is authorised to proceed.

5.10 Different types of experience will be offered throughout this route from surfaced footpaths and cycleways to unsurfaced trails thereby giving users the opportunity for varied recreational experiences but also ensuring that there is a focus on ensuring accessibility for all. In all Cambridge East could unlock the opportunity for a near continuous walk within semi-natural landscapes that, if the Wicken Fen Vision is to be realised, could extend many miles. This is illustrated further on Figure 6.

Figure 6: Connectivity



Siting Development Appropriately

5.11 Marshall recognise that the development itself needs to be sensitively designed to ensure that it sits appropriately within the existing landscape, particularly including parts which lie within existing Green Belt land.

5.12 In addition, there are a few (albeit not many given the local topography is generally very flat), sensitive viewpoints including the village of Teversham and the footpath to the east of the site, from which proposed development might be seen. The design of the Scenarios already responds sensitively to these issues, albeit they are mostly elements which will be dealt with at a more detailed design stage.

5.13 Interventions currently proposed by Marshall include:

- Responding to the consented development at Land North of Newmarket Road and Land North of Cherry Hinton, albeit when the latter development is constructed it will screen the majority of Cambridge East from this location;
- A reduction in scale and density of development along the northern and southern boundaries of the Green Belt land in the east, and along Airport Way through the centre of the site;
- Location of the green corridor through the southern and eastern parts of the site to act as a buffer to development when viewed from Teversham to the south;
- Tree planting within the green corridor and along development edges, to screen and soften views from sensitive receptors to the east and south; and
- The use of natural coloured materials on buildings and buildings on smaller footprints, particularly those which are tallest and largest, to enhance existing distant views. These currently comprise large airport hangars in light coloured materials. This would improve the existing visual intrusion of these buildings.

Enhanced Biodiversity

5.14 Increasing biodiversity is a vital part of the Cambridge East proposals. Marshall commit to meeting the likely Biodiversity Net Gain policy target of at least 10% and have an ambition to go further seeking to achieve a target of 20%. In addition, there is the opportunity to contribute to the ambitions of the Wicken Fen Vision, the draft Cambridge Fens Nature Network Strategy, and the Cambridgeshire Doubling Nature Vision. The green corridor will be instrumental in this and proposals are for a corridor that provides wildlife connectivity from Coldham's Common in the west, to the countryside in the east.

5.15 Careful consideration has already been paid to the composition of the green corridor and the habitats it will support. As a broad principle the prime focus of the eastern part of the corridor, this being the

area that currently lies to the east of Airport Way, will be on creating areas of very high biodiversity value. In addition, throughout the length of the corridor, to the south of the proposed watercourse (see later), the area will support grasslands managed by low intensity grazing or as hay meadows. This management will ensure that they also develop to provide a great resource for biodiversity. The main purpose of the areas to the west of Airport Way, and to the north of the proposed watercourse, will be to accommodate both formal and informal recreational activities but even here effort will be made to incorporate features, including hedgerows and mature trees that benefit biodiversity.

5.16 One of the many advantages of creating an area of high biodiversity value in the eastern part of the green corridor is that it will act as a buffer to the important, yet highly sensitive fenland sites, including particularly Little Wilbraham Fen, that lie close-by. This buffer has the potential to extend the area that might be utilised by important species that inhabit the fens, but also importantly will give people a place to experience nature but in a setting that is less sensitive than the fens to human pressure.

5.17 It is anticipated that the following habitats will be supported within the green corridor:

- Extensive areas of species rich grassland, both wet and dry depending on the local conditions, will predominate;
- Aspiration to create a small watercourse following natural topography, which will meander through the green corridor;

- Occasional ponds and reedbeds, often with sustainable drainage and improving water quality functions;
- Although the landscape will be mostly open, in keeping with historic Cambridge city landscapes, occasional mature trees will occur both individually and in small groups. They will also be used to help screen the development from sensitive views; and
- Hedgerows will occur infrequently but may be used to demarcate boundaries or to create 'fields' to help facilitate the ability for grazing in certain areas.

5.18 In addition, there is the opportunity to utilise part of the Green Corridor to extend Barnwell East Nature Reserve which immediately abuts the western edge of the airfield. This Reserve currently comprises a mosaic of trees, scrub and ponds, and there is the potential to extend, and perhaps even double its existing 2.61ha, by creating similar habitats and by funding its management in perpetuity. This could significantly enhance its biodiversity value and reinforce its importance as a local wildlife site.

5.19 A significant opportunity exists to reinstate Teversham Fen from its current degraded state. This would provide a major biodiversity benefit and is a key strand of the draft Cambridge Fens Nature Network Strategy providing both new additional fenland habitat and a buffer to the highly sensitive Little Wilbraham Fen. It would also be a key part of the sustainable water management strategy as is explained later in the Chapter.

5.20 To achieve the high levels of Biodiversity Net Gain, depending on the final footprint of the development and therefore the specific Scenario, there will likely be a need to utilise land outside of the development boundary. The ambition would be to try to achieve this in areas as local to the development as is possible, potentially including land to the east and/or northeast. Marshall is currently in discussion with owners of landholdings in this area and is actively seeking to secure Option Agreements and an interest in the land in order to utilise these areas for environmental purposes, in particular Biodiversity Net Gain. This could either be secured directly as part of Cambridge East or by the Councils, supported by developer contributions and a clear biodiversity spatial strategy in the new Joint Local Plan.

5.21 A 'suite' of opportunities, which can form the basis of a long term, potentially shared strategy, have been identified. These opportunities, which also seek to meet the ambitions of other nature conservation ambitions including the Wicken Fen Vision, the Nature Network Strategy and the Doubling Nature Vision, have been carefully considered so as to provide some or all of:

- Additional buffering to Little Wilbraham Fen, including enhancing areas of land that lie between the development and green corridor for biodiversity, and the Fen itself. Consideration would be paid to the creation of new habitat including fen, wet woodland, and wet and dry grassland;

- Connectivity to the area of Wicken Fen Vision through the creation of a surfaced route that could be utilised by active travel users and wheelchair users;
- A new natural resource for people to enjoy in the area north of the A14. This would likely be new woodland which would have the added benefit of providing carbon sequestration (see later in the Chapter for further details); and
- A robust boundary between the development and Little Wilbraham Fen thereby restricting the opportunity for increased visitor pressure.

5.22 These opportunities are shown and described in more detail on Figure 5 that can be found earlier in this report.

A Place to Enjoy

5.23 Meeting the open space requirements for the development would be achieved by siting uses both within the area of development itself and within the green corridor. Parts of the green corridor will be dedicated to the provision of space to support formal and informal recreation, sports, and space for play. Careful consideration has already been paid to the location of the more formal uses within the green corridor, these being sports facilities and allotments. Broadly speaking, the proposal is to generally locate these uses west of Airport Way and north of the aspirational watercourse.

5.24 The vast majority of the green corridor to the east of Airport Way, and to its west but only south of the aspirational watercourse, will support informal recreational uses. These areas will be more natural, and they will be managed to achieve high biodiversity potential. They will however, except when management dictates, have an open access policy so they can be enjoyed by anybody and will provide a recreational resource more sanitised, but generally akin to that found in the countryside.

There will be diversity in the habitats that occur, offering walks and cycles through a flattish and diverse landscape.

5.25 They will act as Suitable Alternative Natural Greenspace (SANGs), taking pressure off more sensitive important biodiversity sites that occur nearby. The ambition will be to re-instate Teversham within this area, and that unrestricted public access will be allowed. This will provide new residents and those that already live in the local area, the opportunity to visit a fenland that is less sensitive than the likes of Little Wilbraham Fen SSSI and other important protected sites nearby.

A Built Environment for People

5.26 The developed areas will provide opportunities for wildlife, and will provide other environmental benefits too, but the primary purpose of green infrastructure here will be to create an enhanced environment for the people that occupy the development.

5.27 Very low traffic neighbourhoods will ensure greater opportunities for safe active travel, and segregated routes to accommodate this will be a key characteristic of the development. Where streets might normally be proposed in developments of this type usually, there will be car free streets and dedicated active travel corridors, that also include significant levels of planting and where needed sustainable drainage features.

5.28 Vegetation will also be used as a way of separating pedestrians and cyclists from the limited traffic that will use the site and as a way of waymarking through the development from one greenspace to another, or perhaps to areas that are visited more frequently such as schools and shops. Vegetation and other forms of landscaping will also be used to create areas of tranquillity even within the most densely developed areas.

5.29 Cambridge, like most places, is becoming hotter and there will be an emphasis on providing spaces that are cooler. This will be achieved through the planting of street trees, but also through the creation of areas of shade in the parks and other communal spaces that will occur.

5.30 There will be an emphasis on providing areas for both formal and informal recreation. As the development will support such low levels of traffic, these will not be confined to dedicated playgrounds, perhaps also occurring within ‘home zones’ and active travel corridors for example.

5.31 Where possible communal spaces associated with apartment blocks will incorporate high quality green infrastructure. In Scenarios where the ratio of apartments to houses is higher but also importantly where density per hectare is lower, more space will be dedicated to the provision of communal open space compared to gardens. It is harder to incorporate and guarantee in perpetuity, that gardens provide a high level of environmental and sustainability quality, and therefore having more communal areas will provide additional environmental and sustainability benefits. For example, incorporating sustainable drainage or high biodiversity features into communal space is simple and easy to manage as part of a normal communal space management regime. However, incorporating such features into gardens is more difficult because, of course, the owners of those houses want to be able to dictate how their garden looks.

An Innovative Approach to Water Management

5.32 Marshall is taking a holistic approach to the site-wide water cycle, which is intrinsic to design development. This will not only improve the sustainability values of the site, but also benefit the wider environment within which the site lies.

5.33 It is appreciated that the innovative approach to water management set out here needs to be grounded on good science. To this end a Water Balance Study has been undertaken by the consultants Arup, and this informs the proposals presented here. This has allowed them to be developed with some level of certainty with regard their likely success.

5.34 As set out above, Marshall's aspiration is to reinstate Teversham Fen as part of the green corridor. In assessing the potential to do this, a series of water balance calculations have been undertaken which consider the annual inflows from rainwater, losses through evapotranspiration, and site balance (comprising infiltration and runoff).

5.35 Preliminary calculations show that the Scenario(s) with the following provide the greatest potential to facilitate re-creation of fenland:

- The highest quantum of impermeable surfaces, allowing capture and redirection of runoff;
- The highest levels of greywater recycling from the proposed development, which increases the potential inflows over and above the existing situation; and

- Where development is located closest to Teversham Fen, thereby maximising the ability to drain runoff to the re-created fen by gravity, rather than relying on pumping which is considered less sustainable.

5.36 The ability to harness grey water would provide a continuous water feed, which would not be dependent on seasonal fluctuations. It is currently estimated that 20% of the required flows in the Scenarios with the higher quantum of development, could be harnessed in this manner. By using this innovative method, the development 'creates' additional water (over and above the rainwater falling on the site), which would benefit water balance in the adjacent environment.

5.37 SuDS would be incorporated within the scheme to ensure that the water discharged to the receiving aquifers and reinstated fen is of sufficient quality. Permeable paving, swales, balancing ponds, reed beds, and filter strips would be considered. SuDS would be designed in accordance with best practice, taking a quantified approach to the identification of potential pollutants, and the measures required to control that risk.

5.38 Due to the historic uses at the site, namely the airport and arable farmland, it is very likely that the current soil is compacted, with land drains potentially present. This encourages runoff and reduces infiltration to the ground beneath. Improving soils will be of paramount importance to the reinstatement of the fen, the wider green corridor and also within areas of greenspace in the developed areas, with porous soils capable of holding greater capacity of rainwater, leading to increased infiltration and reduced overland runoff. This will also provide increased carbon sequestration benefits (see later).

5.39 If the scheme harnesses natural infiltration, the aquifer beneath could be improved, benefiting the wider water cycle in a water-scare area. Increasing discharge to the existing aquifer would require a refocus away from traditional forms of rainwater harvesting which are often expected of development schemes. As the design progresses, discussions would be undertaken with the Cambridge authorities and the Environment Agency to facilitate a holistic approach to water discharge, specifically to discharge to, and abstract from, the aquifer beneath. In this scenario the aquifer itself would comprise the 'rainwater harvesting' feature in its most natural form, reconnecting the development to the land it sits within. This solution is considered likely to be more carbon efficient than traditional rainwater harvesting given that there will almost certainly be less infrastructure required (albeit this does need further consideration) and certainly it will represent a more 'natural' solution.

5.40 Whilst this approach could benefit wider groundwater levels in the area, any direct benefit to the adjacent Fens would be dependent upon the flow of groundwater. Further investigation of the groundwater regime would be required at a later stage, however in previous investigations groundwater within the Chalk was predominantly noted to flow towards the north (with some local variations).

5.41 The development at Cambridge East will also aspire to create a watercourse in the west, following natural topography. This feature would act as sustainable conveyance, capturing on-site surface water runoff and providing additional habitat of value for biodiversity.

Achieving Net Zero Carbon and Limiting Emissions

Energy

5.42 As set out in the Sustainability Vision for Cambridge East, Marshall will target achieving Net Zero[12] operational and embodied carbon emissions for the built environment by and beyond 2030. Alongside meeting the Royal Institute of British Architects (RIBA) Sustainable Outcomes and RIBA 2030 Challenge, this aligns with Greater Cambridge's Big Themes of Climate Change.

5.43 It is however recognised that residual carbon emissions are still expected, for which a robust offsetting strategy is being developed (as set out in the Sequestrating Carbon section below). Through these measures Net Zero will be achieved, allowing Marshall to achieve their ambition of creating a sustainable development which combines the highest standards of modern living and working.

[12] In this instance Net Zero Carbon is defined as achieving an overall absolute balance between emissions produced and emissions taken out of the atmosphere

5.44 Marshall have established the key Net Zero design principles for Cambridge East. These comprise a fabric first approach, regenerative engineering integration, room controls, low embodied construction, and maximisation of on-site renewables. Albeit design is at a very early stage, the Scenarios have been developed with these aspects in mind and have taken into consideration the opportunities outlined below. Please see Appendix 4 for further details.

- **Layout: grid orientation and spacing** – Maximising solar exposure to reduce energy demand of each building. This reduces the need to rely on lighting systems, and thereby associated energy demand. The benefits are more evident in situations where the distance between buildings is sufficient to allow sun penetration, and the buildings are lower to allow low sun to enter buildings on all floors;
- **Massing** – Providing a passive building form to minimise energy consumption;
- **Daylighting** – Optimum orientation of buildings, which are spaced appropriately and provided with glazing ratios to maximise daylight;
- **Natural ventilation** – Orientating buildings to incentivise the airflow reaching the building façade and provide natural ventilation. The prevailing wind in Cambridge emanates from west and southwest;
- **Renewable energy** – Photovoltaic panels to be installed on available roof spaces in addition to ground source heat pumps, to offset the local annual energy demand. This will assist in achieving Net Zero operational carbon emissions. Technology is evolving quickly in this area, and therefore options will be further explored during the design process. Also note that the UK power grid is set to become ever greener with significant investment including particularly in offshore wind. During detailed design, consideration will therefore be paid to getting right the appropriate balance between on-site and off-site renewable energy use;
- **A framework energy strategy** – In addition to the above a framework energy strategy will be developed with the energy provision for the scheme reviewed and amended, which will involve consideration of emerging low or zero-emissions technologies. As advanced technologies become available, the latest and lowest emission technologies will be employed wherever practical throughout subsequent phases of the development. This will ensure that the development is able to take advantage of the opportunities that new technologies can bring; and
- **Offsetting carbon emissions** – Offsetting will be required for annual operational energy carbon emissions, to ensure that the site meets Net Zero targets. Innovative schemes are being considered with Marshall having a strong preference for local schemes, please refer to the Sequestrating Carbon section below for further details.

5.45 All this should support the design of the non-residential buildings being in accordance with BREEAM and Energy Performance requirements. The development will achieve a BREEAM 'Excellent' status and aspire to BREEAM 'Outstanding'.

Transport

5.46 The Strategic Options Assessment work recently published by the Greater Cambridge Shared Planning Service provides an evidence base for the emerging Local Plan and has sought to appraise and compare the Strategic Spatial Options within the emerging Local Plan across several disciplines. The work has drawn conclusions on a number of relevant matters, and these are summarised below:

- The Transport Evidence Report makes a compelling case for density in development and that city or edge of city growth is more sustainable than dispersed development because it has less transport impact due to access to existing jobs, services, and facilities;
- Even without mitigation (the basis for all tests undertaken), the Spatial Options that include Cambridge East or relate to City densification or edge of City development have the highest non-car mode share, lowest distance and time travelled and delay, as well as the best carbon outcomes; and
- The Zero Carbon study is clear that the carbon emissions from transport are the biggest challenge (following Zero Carbon policies applied to construction and energy consumption) and must therefore be addressed through location and the sustainable distribution of growth. Distribution options focus on Cambridge to achieve the most sustainable outcomes.

5.47 Understanding that set out above, Marshall have developed a transport strategy that seeks to generate as close to zero emissions as is possible, significantly reducing carbon emissions from the development's road traffic, and thus also maximising benefits to local air quality and reducing the extent to which the public are exposed to poor quality air.

5.48 Stantec have prepared a Transport Appraisal and Emerging Transport Strategy[13] for Cambridge East. The strategy backed by Marshall seeks to reduce car dependency and a trip budget will be put in place to ensure that maximum levels of trips are known and understood. Cambridge East is uniquely placed to reduce car dependency through its sustainable location, and scale of development which can provide local accessibility to facilities, services, and employment. The design approach also aims to remove the convenience of using a car for everyday short trips and replace this with a network of movement corridors for less impactful modes of transport.

5.49 Marshall have embedded this ethos at Cambridge East through the concept of Low Traffic Neighbourhoods whereby any car parking is located away from residential units and a network of safe streets for people are created with clear legible routes to more strategic movement corridors

[13] Stantec, 2020. Cambridge East Transport Appraisal and Emerging Transport Strategy

which link each neighbourhood. Shared mobility is designed for and embraced through the use of Mobility Hubs throughout the scheme. These provide a community focal point and access to shared private transport services and public transport more generally.

5.50 Marshall's ambition to provide a cleaner and healthier environment to benefit new and existing residents of Cambridge will be supported by an Ultra-Low Emissions Strategy (U-LES) for the site. The U-LES will go beyond the good design and best practice measures that will be incorporated into the scheme. It will provide an ongoing focus on a number of priority measures and actions that will be considered, both strategically in relation to the scheme as a whole, and for each individual phase of the development.

5.51 Parking will be accommodated in hubs on the fringes of the neighbourhood areas only, where as part of the UK's transition to non-petrol and diesel vehicles, only non-fossil fuelled vehicles will be allowed to park there. Similarly, only non-fossil fuelled vehicles will be permitted within the developed areas themselves and even then, only for drop off and pick up, and other necessary and permitted activities.

5.52 The scheme will consider electric vehicle charging infrastructure to ensure the provision supports the electric vehicles on site. The active and passive provision for electric vehicle charging infrastructure will be examined in detail during each phase of the development and will include consideration of both steady charge and rapid charge points.

5.53 A low car ownership model is proposed, accompanied by car club parking spaces within the development. These car club spaces will be for zero emission capable vehicles to allow all occupiers access to the shared use of pay-as-you-go vehicles, and thus reducing the need for private vehicles.

5.54 In producing a U-LES for each phase of the development, measures will be proposed to minimise private delivery trips. Local hubs will be provided that act as delivery and consolidation centres and consideration will be given to the benefits of providing parcel lockers or collection points to avoid failed deliveries and the need for additional visits. Focus will be given to zero emission last mile deliveries.

5.55 Cycling will be encouraged as a mode of transport to and from the development, and safe active travel routes will be a feature of both the developed areas and the green corridor. In addition, secure, weather protected cycle parking bays will be provided within the development. The potential for bicycle hire docking stations near to the development entrances to

promote cycling for occupants with no bicycle of their own is also intended. Travel behaviour would be quantified through development-wide surveys and compared to published targets.

Air Quality Design Interventions

5.56 As has already been illustrated, investing in cleaner air and doing as much as it can to tackle local air pollution are priorities for Marshall in the context of bringing forward this scheme. As proposed above, Marshall will ensure that emissions from the operation of the development will be reduced as far as practicable, but in the event that it can be demonstrated that emissions cannot be further reduced specific design interventions will be proposed that would provide the equivalent air quality benefits within the environs of the development.

5.57 The Marshall team has already considered much of the following and will continue to incorporate similar good design and best practice measures to reduce emissions from construction, road traffic and energy provision. For example, green infrastructure, such as the planting of trees and bushes, as appropriate, will be used to provide a barrier to, and separation from, pollution sources. Furthermore, the design will seek to ensure that the most sensitive uses (residential/school/medical) are the furthest from sources of pollution.

Sequestrating Carbon

5.58 As has been demonstrated, Marshall wants to ensure that the development is designed and constructed so as to generate as close to Net Zero Carbon emissions as is possible. This is covered in the section entitled 'Limiting Emissions and achieving Net Zero' earlier in this Chapter. However, it is recognised that even given the high standards of carbon efficiency being sought, it is inevitable that there will be residual emissions and embodied carbon that will need offsetting if Net Zero is to be achieved.

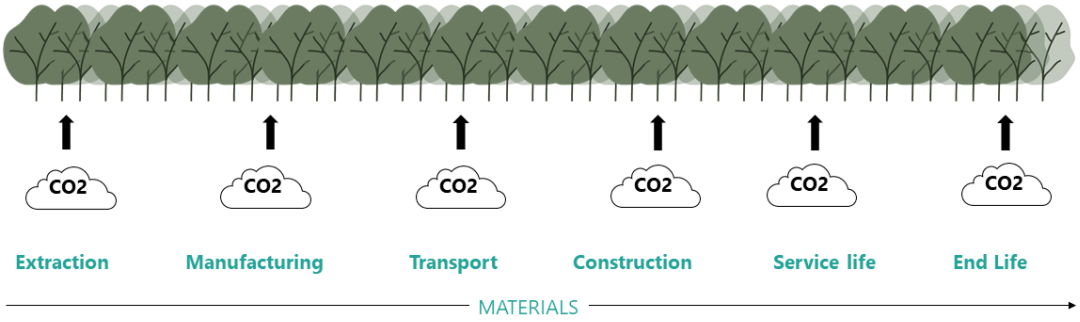
5.59 Offsetting could be achieved simply by buying the appropriate number of 'carbon credits' via one of many commercial carbon offsetting schemes that currently exist. Such schemes fund projects including those that seek to sequester carbon[14] through, for example, mass tree planting or soil improvement. This can occur anywhere in the world although sometimes it is possible to specify whether the offsetting should be UK focussed.

5.60 Marshall however has an ambition to localise the benefits that Cambridge East can bring and therefore the priority is to seek opportunities to offset carbon, particularly that from construction, which is embodied, in Cambridgeshire, and if not there, at least within East Anglia.

[14] Carbon sequestration is a process that captures and stores atmospheric carbon dioxide thereby providing a method of reducing the amount of carbon dioxide in the atmosphere.

5.61 Furthermore, Marshall is proposing to offset embodied carbon emissions considering a lifespan of the development of 100 years so that all the following points of lifecycle shown on Figure 7 are included.

Figure 7: Carbon Lifecycle Stages



5.62 Although acknowledged that the work undertaken thus far is at an early stage, consideration has been paid to the types of carbon sequestration activities which could occur within Cambridgeshire, the land required for habitat enhancement and creation, the associated cost of these, and whether they also bring multiple other benefits, for example, biodiversity enhancement to achieve Biodiversity Net Gain requirements and recreation opportunities.

5.63 The following proposals are all under consideration as carbon sequestration opportunities. Some can be realised within the development footprint itself including particularly within the green corridor. Others might be achieved adjacent to the site or even further away, albeit as stated earlier the focus would be on ensuring that this is within Cambridgeshire or East Anglia.

5.64 As with many of the proposals in this document the following should not be seen as fixes but rather as opportunities that will be further considered upon allocation of the site. It is likely that not all will be required for Cambridge East, and some can probably only be delivered with the support of other organisations. That is why this opportunity might be better being taken forward as a wider Joint Local Plan initiative. All also have the opportunity to help support the achievement of wider environmental ambitions, including, for example, to restore degraded Fen, double Cambridgeshire's nature resource, increase significantly the quantity of the County's tree cover, or to make Cambridge a Net Zero Carbon city.

5.65 It should also be noted that not all the opportunities noted are currently recognised as Net Zero offsetting opportunities for development and therefore offsetting 'credits' claimed against them. For example, the benefits of halting the deterioration of fenland and grassland (for example from agricultural practices) and specifically the cumulative emissions reductions associated with this are currently not recognised when trying to claim as carbon offsetting. This is due to the presumption that deterioration will not continue in perpetuity (i.e. it will not all disappear), because maintaining

peat is such an important carbon initiative for the UK. This approach will therefore need to be agreed with relevant bodies before it can count against carbon offsets:

- **Teversham Fen:** The primary driver for the re-instatement of Teversham Fen is for biodiversity enhancement albeit there could be some carbon sequestration benefit that develops over many years. This is as a result of peat, which is a fabulous medium for capturing carbon because it supports an accumulation of partially decayed biomass that would otherwise decay completely and release carbon into the atmosphere, accumulating very slowly. This would not be a primary carbon sequestration initiative therefore, rather being an additional benefit of Teversham Fen restoration;

- **A buffer to Little Wilbraham Fen:** A key focus of the Nature Network Strategy is to create a buffer to Little Wilbraham Fen, with the area between the proposed development and the Fen itself being seen as a particularly important location. This is an area under consideration by Marshall for enhancement to help meet Biodiversity Net Gain requirements. Because of the habitats that are proposed here there could be some potential to achieve a level of carbon sequestration benefit, although as with the re-instatement of Teversham Fen, the primary driver here would be enhancing biodiversity with carbon sequestration being a secondary aim;

- **Other fen enhancement:** Restoration and enhancement of degraded fen is a key regional ambition and there are several projects, including the Great Fen Project and Wicken Fen Vision, that are focussed on achieving this. The primary driver of these is to restore the East Anglian historic landscapes and to provide biodiversity enhancement. However, particularly where reversing the loss of fen to agricultural land can be achieved, and where there still remain good depths of peat (which is not the case at Teversham Fen), there is an opportunity for significant levels of carbon sequestration;

- **Woodland:** Given the scale of the proposals there is the potential for major new woodland creation that seeks to support the offsetting of carbon from the development and to achieve major new Biodiversity Net Gain. Tree planting on areas of land to the north of the A14 would help to provide a link from the development's green corridor to the area of the Wicken Fen Vision. It would also provide an opportunity, likely with support from others, to create a new 'green' destination for the residents of Cambridge and beyond. There is also the opportunity for additional tree planting to achieve carbon sequestration benefits, in other parts of Cambridgeshire and East Anglia;

- **Grassland**: Grasses are excellent at sequestering carbon, through photosynthesis and storage within their roots, which is transferred to the soil through decomposition. Grassland will predominate throughout the green corridor albeit on the airfield much already occurs. Therefore, although the quality of the grassland and its potential for sequestrating carbon will improve, particularly as soil becomes less compacted and a more diverse range of grassland species begin to occur, this is not seen as a major offsetting opportunity. It is likely however, to offer some carbon sequestration benefit over what is there already; and

- **Soils:** Soil holds four times the amount of carbon stored in the atmosphere, and therefore is hugely important when considering and maximising sequestration of carbon, particularly when alongside habitat creation. Soil organic carbon has a direct correlation to the levels of soil organic material it supports, which improves soil quality through increased retention of water and nutrients. This improves soil structure and reduces erosion, which improves groundwater and surface water quality, and reduces flood risk, thereby providing significant multi-functionality. Local Plan evidence has identified that the soils that occur at Cambridge Airport store some of the highest levels of carbon of any soils within the local area. Emphasis will therefore be on ensuring that development, as far as is possible, does not cause them to degrade, and in fact in areas such as the green corridor, the ambition will be to seek to improve their carbon sequestration potential. This might be achieved because of the low intervention management that is proposed including grazing, which specifically will help to ensure high levels of organic matter are returned to the soils and that will also help to ensure soils do not become compacted. There is also the opportunity, and one that is likely to become more common in the future, to support soil improvement programmes whether as part of wider biodiversity enhancement opportunities or even for land in agricultural production.

Social Equality

5.66 Cambridge East can be an economically sustainable place in its own right and can contribute to the sustainable growth of Cambridge. The development of the proposal to date has been underpinned by the four big themes of the Greater Cambridge Local Plan as well as the need to provide the jobs, homes and infrastructure to deliver sustainable growth (sub themes of the Greater Cambridge Local Plan).

5.67 Cambridge has achieved significant economic growth and is a globally recognised centre for research and development, but this success has not always benefited everyone equally. It has relatively high economic activity and low unemployment but is the most unequal city in the UK in term of income distribution.

5.68 To the extent to which unemployment and deprivation exists in the city, it is concentrated in the east and is largely driven by lack of skills, training and employment opportunities for vocational jobs, and low pay.

5.69 Cambridge East provides an opportunity to provide employment space accommodating a range of jobs and opportunities, as well as the transport infrastructure to unlock growth in the area. This will be matched by the significant quantum and range of homes for local people.

Providing Local Jobs

5.70 Marshall has a legacy of investing in training and skills and has been training apprentices since 1920. It also runs professional qualification programmes for experienced workers, providing training opportunities and practical qualifications (from Level 1 to 4) for those who are looking to expand their skills and expertise.

5.71 Cambridge East provides an opportunity to galvanise this expertise in training and apprenticeships, and Marshall is committed to ensuring that the benefits of the scheme are maximised in the local area – the Skills Charter[15] sets out Marshall's initial approach to address the challenges in the east of Cambridge.

5.72 The scale and ambition of Cambridge East (up to 38,000 jobs) will allow for a comprehensive effort to address barriers to training and employment. This can be maximised both through the design of the buildings – and therefore the types of occupiers who would be attracted to locate at the site, and through the interventions and support available to businesses to encourage investment in skills and training. Design of the schemes will include opportunities for flexible working to accommodate those who do not want to work at home, but do not want to commute every day. The University College, the retail and leisure offer and the cultural offer will also provide a range of opportunities, including for those with lower skills.

5.73 While unemployment is relatively low in Cambridge, it is still important to provide entry level jobs and ensure that barriers to entry are reduced wherever possible. The Skills Charter sets out a number of ways which this may be achieved. It is anticipated that there would be approximately 1,300 entry level jobs – this is more opportunities than there were unemployed claimants in East Cambridge at the end of 2019 (650 residents) and a significant proportion of unemployed claimants in October 2020 (1,755 residents) which is heightened as a result of the effect of Covid-19.

[15] Quod, 2020. Strategic Case Cambridge East – please refer to this document for further information

5.74 The construction of Cambridge East will also provide a long and relatively consistent pipeline of construction work. Construction is one of a small number of large sectors in Cambridge that needs lots of workers with mid-level skills (another is ICT). This means it provides a route from both academic and vocational training into relatively well-paid jobs.

5.75 The duration and consistency means that it will be easier to align recruitment and training of local people with the needs of the project – local residents would be able to find work at an entry level (or indeed any level) and then train to acquire new skills and be promoted. Investment in skills and jobs is one way the city can grow and become a more equal place to live and work. The Skills Charter set out Marshall's initial approach to developing a pipeline of skills to facilitate the building of Cambridge East and a pipeline of schemes across Greater Cambridge.

Homes for Local People

5.76 Cambridge East could provide up to 12,000 homes. The mix of housing options have been developed to meet the needs of the local population – including student accommodation and purpose built to rent (B2R) options for those working or studying at the university or in shorter term roles at the research hub or with businesses. There are also a range of affordable flats and houses to meet the needs of those on lower incomes. The range of units has also been developed with the view of the middle earners who may not qualify for affordable housing options but nonetheless require high quality but affordable options.

Sustainable Management in Perpetuity

5.77 The need for sustainable management of the green spaces that occur within the green corridor has been a key consideration in coming up with the proposals outlined in this document. The ambition is to create spaces that only require low-level management intervention, and that any management which is required is based on historic land management practices.

5.78 Planting design will therefore seek to ensure that, for the most part, species used require limited and hopefully, at least after establishment, no watering. Where landscape planting, particularly in the areas of development, does require regular watering, the ambition will be to use harvested rainwater and/or greywater taken from development uses. Of course, the emphasis will be on using no water from mains supply.

5.79 The semi-natural spaces that are proposed to occur within the green corridor will primarily be managed either as grazed pasture or as meadows cut during the summer for hay. These are low intervention and highly sustainable forms of management both environmentally and financially, plus also totally in keeping with the landscape character of Cambridge.

6 How the Scenarios Differ

6.1 Cambridge East is strategically placed to deliver highly sustainable development within Greater Cambridge. Marshall will ensure that provision of homes and jobs in this location is undertaken in a way that is a befitting legacy to the Marshall family and its longstanding relationship to the city of Cambridge. The scheme will go beyond best practice in many cases, providing an innovative development which will ensure climate change is intrinsic through design. Cambridge East will be a new mixed-use Net Zero carbon community where people will have the ability to meet most of their daily needs within a short walk from home, and development is structured around safe cycling and local transport options.

6.2 Strategically there is environmental and sustainability advantage in developing on a large highly suitable site such as Cambridge East when compared to developing a series of discrete, smaller areas of land. For example:

- A single location allows for investment in a sole integrated public transport and active travel solution, a significant benefit when seeking to reduce carbon emissions and ensure local air quality improves;
- Developing a single site allows for a more coordinated and consolidated response to issues such as Biodiversity Net Gain and carbon sequestration through habitat enhancement. For Cambridge East this will focus on very local benefits both on-site in the green corridor, and for the most part in areas immediately adjacent; and
- The scale of the site and therefore the level of investment involved makes developing innovative approaches to deliver high levels of sustainability performance possible. For example, the proposals at Cambridge East are seeking to recharge the locally depleted groundwater reserves though the employment of a highly sustainable water management regime, something which is very unlikely to be achieved in smaller more piecemeal development.

6.3 However, because of their different characteristics, the four development Scenarios which have been developed by Marshall inevitably perform differently in terms of their environmental and sustainability performance.

6.4 The table below shows this differentiation between the four Scenarios. The differentiations draw upon the environmental and sustainability requirements, ambitions, and design principles, outlined in Chapter 4, and focus on the specific elements which have influenced development of the Scenario framework. The table does not list every design principle as often these are intrinsically linked, however ensures that they are all covered and considered under a broader heading.

Table 2: Differentiation of Scenarios

Theme	Overview of performance against Requirements and Ambitions Set
Connectivity	**Connecting the City to the Countryside, and to the Wicken Fen Vision beyond** In all Scenarios the green corridor would provide the potential to, via active travel means, travel almost entirely using greenspace, from Coldham's Common and other green spaces in central Cambridge, to areas of countryside east of the city. The key differentiator is that in all Scenarios except for C, the likelihood is that enhancements would be made to the footpath up to only where it crosses Newmarket Road but that this would be the extent of off-site additional access provision. Here it would link with the existing footpath network. In Scenario C, because there would likely be a need to provide an offsite resource for Biodiversity Net Gain and the emphasis would be to provide it in the area immediately east of the site, there is the potential to create an enhanced active travel link, including a more direct route from Airport Way to the underpass of the A14, and then north of the A14, towards the area of the Wicken Fen Vision.
Views	**Tall Buildings and Views** All Scenarios will be designed ensuring they are appropriate to the location within which they sit. Consideration will be given to setting and context of tall buildings when considered against the area's character. Due to the lower density of development proposed and less tall buildings, Scenario A would have least impact on surrounding views. The existing schemes proposed in the vicinity (Land North of Cherry Hinton and Land North of Newmarket Road) would provide additional screening.

	Scenario B would be less impactful than Scenario C, as it does not build upon Green Belt land. However, through provision of the green corridor buffer to Teversham, planting of trees, and designing sympathetically to the surrounding landscape, the impact of Scenarios B and C can be reduced and designed accordingly, taking all locally important views into account. This can be achieved through a reduction in scale and density in sensitive areas in the east and south, and through consideration of built form and natural coloured materials on buildings. The latter could in all Scenarios reduce the visual impact of the existing aircraft hangers which can be seen at distance due to the large existing forms and light colours. Due to the density and restriction of land take, Scenario D requires taller buildings to enable design which may be visually intrusive to local views.
Biodiversity	**Biodiversity Net Gain** Calculations estimate that achieving Biodiversity Net Gain of at least 20%, could likely be accommodated in the site itself for Scenarios A, B & D. Because of the extra land required for development, which is generally of poor value for biodiversity being currently in arable use, Scenario C would almost certainly require further Biodiversity Net Gain to be achieved outside of the site. Although much depends on the exact nature of the type of Biodiversity Net Gain opportunity taken, it is likely to mean the need for large scale off-site habitat enhancement or creation. The focus would be to achieve this locally and there are significant opportunities to support the ambitions of other biodiversity strategies. **Priority Habitats and Species** Scenario C affords the best opportunity to support the reinstatement of Teversham Fen because it has the most potential for capturing and redirecting surface water runoff. Scenarios C and D would generate the most greywater, however Scenario C places development nearest to the Fen thereby giving the best opportunity to utilise greywater from the development without any need for pumping.

	Protected Sites and Species All Scenarios support the extension of Barnwell East Nature Reserve. Furthermore the creation of the green corridor, including particularly the reinstatement of Teversham Fen which is most likely to occur in Scenario C, and the strengthening of the boundary between the development and land to the west of Little Wilbraham Fen, will all help to provide a buffer to the Fen itself. However, as a result of the likely need to achieve Biodiversity Net Gain outside of the site, Scenario C provides the opportunity to create an increased and enhanced buffer in land that lies between the development and the Fen. This is very unlikely to occur in any other Scenario as no off-site Biodiversity Net Gain is likely to be required and the carbon sequestration potential of enhancing this area is considered to be generally quite low.
Greenspace	**Multifunctionality of greenspace** In all Scenarios the Green Infrastructure provided will complement the local landscape character, particularly in relation to the Fens, incorporate sport and recreation facilities, space for play, provide air quality enhancements through design, incorporate noise attenuation features to ensure tranquillity, and SuDS. Open spaces will support art and culture; and provide opportunities for food growing. Communal space can provide a higher environmental quality when being compared to gardens as, because it is not in private ownership, and therefore there is greater control and flexibility over the purposes it can serve. Scenario C performs best in this area because it has a greater development footprint, with 11% of land (14ha in total) that is assigned as being for apartments being proposed for to be utilised for communal space. For Scenario B it is 9% (7ha overall), and for Scenarios A (9ha overall) & D the number is 8% (7ha overall). Due to the higher % of communal space, it is therefore considered that Scenario C performs mildly better than the other Scenarios.

Water Management	**Flood Risk** As the majority of the site lies within Flood Zone 1, with Teversham Fen and adjacent arable fields in the east located in Flood Zones 2 and 3, development in all Scenarios would be at a low risk of flooding (i.e. located in Flood Zone 1), and flood risk would not increase elsewhere. **Sustainable drainage and pollution control** SuDS would be incorporated within all Scenarios to ensure that rainwater falling on the site is management post-development. More rainwater could be harvested within Scenario C, as this provides the greatest quantum of development, and thereby impermeable surfaces from which to collect rainwater. Of course, though because of more development Scenario C (and Scenario D) would utilise the most water too. The incorporated SuDS would ensure that the quality of water is acceptable prior to discharge, be that to groundwater or to an on-site watercourse. **Groundwater** Scenario C provides the greatest opportunity to increase groundwater levels in a water-scarce area. Through capturing harvested greywater and rainwater, Scenario C presents a unique opportunity to treat and subsequently recharge the aquifer beneath to the benefit of the wider environment.
Net Zero Carbon	**Fabric First Passive Design** All scenarios benefit from rotating the grid to maximise sun penetration with this being more evident where the distance between buildings is greater and the buildings are lower, thereby allowing low sun to enter buildings on all floors. Natural ventilation is also easier to achieve in low rise and less dense schemes. Therefore, daylight access and natural ventilation will be better in neighbourhoods with lower density such as in Scenario A and in those zones within Scenarios B & C that support low/medium density.

Energy Demand and Renewables

All Scenarios will incorporate efficient and well-integrated mechanical and electrical systems within the domestic and non-domestic buildings to ensure energy demand for the buildings are reduced to the levels of the RIBA 2030 challenge operational energy use targets. The buildings will be fully electric with no fossil fuels used on site, and will integrate the latest technologies of LED lighting, thermal heat recovery, air source heat pumps, and user centred lifestyle smart phone control apps.

All Scenarios would include significant on-site renewable energy source including ground source heat-pumps. Photovoltaic panels will also be installed including particularly on roofs but also potentially in other areas at ground level where space permits. More photovoltaic panels can be provided per occupant on low rise housing than on apartments, as there is obviously a greater overall roof area. This said, Scenario A, because it comprises a greater proportion of housing, and Scenario C which provides more communal space, have the most significant potential to use on-site solar energy to meet the developments energy demand.

Achieving Net Zero Carbon

All Scenarios can be designed to achieve Net Zero Operational and Embodied Carbon, incorporating buildings with passive design principles and offsetting schemes for operational and embodied carbon (see Appendix 4 – section 1, 3 and 4).

Scenario C will have better operational and embodied carbon emissions per head of occupants (residents, daily commuters on-site) than Scenario A which will have fewer occupants, and is broadly similar to Scenarios B and D. The whole life cycle carbon emission per head of occupants obtained for Scenario C is 17% less than Scenario A which, based on the results from the early Net Zero carbon target models, results to be the worst-case Scenario. Due to increased density and 24/7 land uses, Scenario C due to its scale and significant amount of 24/7 complementary amenities would support the creation of a large-scale district heating systems using large heat pump arrays, lowering operational emissions of not only Cambridge East but the local communities (see Appendix 4 – section 2).

	Sequestrating Carbon All Scenarios have the opportunity to consider the sequestration of carbon in habitats locally or at least regionally, and as a result of this, to achieve other environmental benefits, for example to create areas of higher biodiversity value. Because of its additional scale which will result in higher levels of embodied carbon requiring offsetting, and that it will almost certainly need to seek to achieve additional Biodiversity Net Gain offsite, Scenario C presents the greatest opportunity, however. For the other Scenarios, a similar approach could be taken, but the level of habitat creation/restoration that could be achieved would be less. Carbon offsetting in this way could of course be from a provider whose focus is on gaining local benefits, including possibly schemes that have developed to support development more generally that occurs locally, or could potentially be undertaken by Marshall as a Cambridge East only initiative.
Air Quality	**Air Quality and Pollution Exposure** The scheme will be designed so it has the potential to be air quality neutral or better, with strategies to reduce emissions to air from key sources including energy provision and road transport. Overall energy demand for the development will be minimised. For all Scenarios road transport will be potentially managed via the implementation of a trip budget approach. As set out within the Net Zero Carbon section above, renewable energies would be harnessed which would reduce emissions of local air pollutants and carbon dioxide. The latest and lowest emission technologies will be employed wherever practical throughout the respective phases of the development. Scenario A does not result in the most sustainable outcomes when compared to Scenarios B, C and D. If the jobs were relocated elsewhere (Scenario A) there would be an increase in car trips and kilometres travelled by cars. This clearly demonstrates the value of allocating and concentrating jobs in a single locality where critical mass affords better public transport viability and the control of how people access jobs, i.e. limited on-site car parking, with lower car trips and vehicle km. Scenario A is not of sufficient scale to support longer term, large scale solutions such as CAM or other mass transit schemes.

	Scenario C results in the lowest overall car work trips, lowest car km and highest public transport trips and km travelled when considering all journeys across the Cambridge and South Cambridgeshire area. Accommodating additional jobs in Scenario C at Cambridge East delivers benefits that distributing additional jobs across the wider area does not. Scenario C and D can provide significantly more contribution towards the public sector led public transport solutions.
Social Inequality	**Operational and Entry Level Jobs** Scenario C would accommodate 38,000 jobs, of which approximately 1,300 would be entry level jobs and 5,700 would be for people with Qualifications of Trade Apprenticeships, NVQ2 and below. Scenario A and B would result in fewer jobs on-site, and fewer entry level jobs and opportunities that require lower qualification levels: • Scenario A would result in only 170 entry level jobs and 630 jobs for people with Trade Apprenticeships, NVQ2 and below onsite: and • Scenario B would result in 920 entry level jobs and 4,100 jobs for people with Trade Apprenticeships, NVQ2 and below onsite. This is lower than Scenario C but still a significant quantum of jobs in the context of the population of East Cambridge. There are also economies of scale and efficiencies associated with providing skills and training interventions that mean the impact of Cambridge East will grow disproportionately with scale – the more job opportunities, businesses and vacancies, the easier it is to maximise the skills and training opportunities. Therefore, Scenario C maximises the opportunities for training and upskilling. **Construction Jobs** The precise number of jobs will depend on the method of construction for different elements and things like off-site manufacturing can reduce the number of workers on-site. However, the scale of development is such that even in the smallest scheme (Scenario A), there would be an average of between 700 and 1,000 workers on-site over a 35-year period.

	The largest need for workers would be from Scenario C with between 1,500 and 2,200 over just under 30 years. The figures for Scenario B and D are similar (1,400 to 2,000 over 31 years and 1,300 to 1,900 over 34 years). **Providing Homes for Local People** Scenario A and B result in 9,500 homes while Scenario C and D accommodate 12,000 homes. There is variation in the Scenario around the mix of units provided due to the constraints of the space - Scenario C has the highest quantum of houses (4,140 houses as opposed to flats) and the highest number of affordable homes (3,840 homes). Scenario C and D include the most private rented sector (PRS) homes which would suit the needs of a younger workforce who demand more flexibility and/or working households with lower incomes.

7 Conclusion

7.1 The proposals outlined in this Report demonstrate that the site of Cambridge East can support highly sustainable development. Development of this scale when compared to delivering the same quantum but over a series of smaller discrete sites has a number of distinct advantages most specifically these being the following:

- A single integrated public transport and active travel solution can be developed having a significant benefit in reducing carbon emissions and ensuring local air quality improves;
- A single strategy can be employed to meet both Biodiversity Net Gain and carbon sequestration needs and because of the large-scale requirements of these, significant opportunities exist for major environmental gains to be made; and
- The scale of the site and level of investment involved makes developing innovative approaches to sustainable management more feasible, for example those related to water.

7.2 In addition, in this Report it has been demonstrated that each of the Scenarios developed have many similar environmental and sustainability attributes but also some significant differences.

7.3 On balance, although it is important to recognise that it is not the best performer against every environmental requirement and ambition set, it is considered that Scenario C, overall, delivers the best environmental and sustainability outcome. This is because:

- It has more opportunity for off-site biodiversity enhancement including as a result of needing to provide more Biodiversity Net Gain and because there is more requirement for carbon offsetting which could be achieved locally through habitat enhancement/creation for carbon sequestration purposes;
- It is more likely that Teversham Fen can be reinstated, and linked to this it provides the greatest opportunity to recharge the depleted local groundwater reserves;
- It provides an opportunity to create a more significant ‘green link’, potentially extending as far as the Wicken Fen Vision;
- More opportunity to utilise larger areas of communal space for environmental benefit e.g. SuDS;
- It is one of three Scenarios that would include the CAM, a highly sustainable public transport intervention (alongside Scenarios B and D);
- Although all Scenarios can achieve Net Zero carbon as a result of efficient construction and design, and also through offsetting residual emissions including through local sequestration,

Scenario C (alongside Scenarios B and D) will result in lower carbon emissions per user (e.g. residents, daily commuters etc.);

- It provides greater jobs, both at construction and once occupied, and these will include more entry level and apprentice jobs; and
- There will be more affordable homes provided.

7.4 As a result, there is also significant potential to support the achievement of other local environmental enhancement strategies. This has been a key driver in the development of the environmental and sustainability strategy for Cambridge East thus far, no matter what the Scenario. Through embedding these aspirations at the core, Marshalls will ensure that their proposed legacy will have widespread and wide reaching environmental and sustainability benefits.

8 Appendices

A1 Contaminated Land RAG Assessment – Executive Summary

Executive Summary

Marshall Group Properties are proposing to put forward the site of Cambridge Airport, and potentially an area of greenbelt that lies to its east (herein referred to as the Site), for allocation for development in the emerging Greater Cambridge Local Plan. Proposed future uses for the site include residential, commercial, sports and potentially a transport hub. Mott MacDonald has been commissioned to complete an assessment to determine whether the Site could support the uses proposed, in terms of risks from contaminated land.

The overall objective of this report is to assess the potential contamination risks across the site using existing information and historical mapping. This will be used to inform a RAG (Red, Amber, Green) assessment of contamination risks.

The RAG assessment split the site into six areas (Plots A to F) dependant on land use. The overall RAG assessments for each Plot have been summarised in Appendix A (A.6) and in the table below. The assessment has concluded that, whilst hotspots of contamination are likely within Plots A and B, the majority of the Site can be classified as 'green', lower risk, in terms of land contamination. The lower risk areas are not anticipated to pose a risk to future development.

Summary of risk areas in terms of total site area

Plot	Area (ha)	Area designated 'Red'		Area designated 'Amber'		Area designated 'Green'	
		(ha)	% plot area	(ha)	% plot area	(ha)	% plot area
A	472.4	14.8	3.1%	67.9	14.4%	389.7	82.5%
B	18.8	0.0	0%	18.8	100%	0.0	0%
C	12.9	0.0	0%	0.0	0%	12.9	100%
D	39.4	0.0	0%	0.0	0%	39.4	100%
E	15.1	0.0	0%	0.0	0%	15.1	100%
F	289.5	0.0	0%	0.0	0%	289.5	100%
Total in safeguarded plots (A, B and C)	504.1	14.8	2.9%	86.7	17.2%	402.6	79.9%
Total in green belt plots (D, E and F)	344.0	0.0	0%	0.0	0%	344.0	100%

The types of contaminants that are likely to be encountered in the amber and red areas comprise hydrocarbons from fuel storage, solvents from aircraft maintenance and metals from paints. These are all common contaminants associated with airfields and general industry, and remediation methods are well known and proven for these contaminants. The examples within Section 5 of this report summarise likely contaminants and remediation or mitigation measures that have enabled development on similar sites in terms of land use and environmental setting. This confirms that, if encountered, the risks can be effectively mitigated to support development in all areas of the site.

In conclusion, there are no known contaminants that have been uncovered from this review that would prevent the site being developed.

A2 Consultation Responses

Richard Oakley
Director
No. 6 Developments
6 Church Lane,
Sharnbrook,
Bedford, MK44 1HR

10/11/2020

Dear Richard

Green Infrastructure & East Cambridge Development Plans

We are grateful to Marshalls for engaging with us at an early stage of planning for the redevelopment of Cambridge Airport in relation to green infrastructure.

This is a major scheme that will transform the eastern edge of Cambridge and will require the protection, enhancement and creation of a significant amount of green infrastructure. Marshalls' relationship with Cambridge has benefitted the company and the city for over 100 years. Through the redevelopment of the airport Marshalls have an opportunity to leave a wonderful legacy for future generations by providing high quality, wildlife rich, accessible spaces close to where people live.

We hope that by engaging with you, and the local planning authority, we can encourage proposals to come forward that will seize this opportunity and avoid harm to biodiversity and heritage.

From the discussions that we have had, we have been able to explain our own visions for Wicken Fen/Cambridge Nature Network and how the Cambridge Airport development could help to achieve these. There are some key points on which all three NGOs agree and which we would like to communicate to you clearly at this stage:

1. Impacts on Little Wilbraham SSSI

This is a very sensitive site that is likely to be harmed by visitor pressure arising from proximity to the development. Visitor management solutions will need to be found in order to avoid or mitigate this harm. Our view is that this will require a mixture of diverting people to other green spaces, discouraging access to sensitive areas, active visitor management and expanding or buffering the SSSI.

2. Need for a new "country park"

Nearby countryside recreation facilities are already full at peak times and visitor pressure is increasing the costs of maintaining the natural and built heritage of these site. This includes Anglesey Abbey, Wicken Fen, Milton Country Park and Wandlebury Country Park. A major development of the scale proposed for eastern Cambridge will result in damage to these sites from visitor pressure. A new wildlife-rich "country park" will be required to meet the recreational needs of new residents and avoid harm to existing sites - and it would also deliver significant biodiversity net gain and health outcomes. We believe that the best location for this would be on the northern side of the A14 in order to divert people from the sensitive SSSI and where it can also act as a southern gateway to the Wicken Fen vision area. If necessary, it could also grow to serve other communities if, in future, the population of Cambridge continues to rise.

3. Green Corridor Opportunity

We strongly support the concept of a significant green corridor linking from Coldham's Common to the Cambridge Fens – this would provide ecological connectivity to the north of the A14 and to the east towards the Wilbrahams. It would connect to the Cambridge Nature Network/ Wicken Fen Vision and the National Trust would be delighted if this could be one of the 20 green corridors that they have committed to create across the UK. The purpose of these green corridors is to provide high quality, wildlife rich, accessible spaces close to where people live.

Such a corridor would enable the movement of wildlife into and out of the city and provide easy access on foot or cycle. It would also be consistent with the historic built form of Cambridge, with fingers of countryside extending into the city.

This corridor would need to serve a variety of different user, ecological and landscape needs and we would recommend a zoning approach in order to maximise the benefits and minimise some of the conflicts.

4. Priority for Biodiversity Net Gain

We feel that the priority for Biodiversity Net Gain should be to expand/buffer Little Wilbraham Fen SSSI. As well as achieving the best gain, this also has the potential to mitigate some of the impacts of the development.

5. Integrating green infrastructure and the built environment

We strongly support the principle of integrating nature and buildings within the development, to achieve a development with 'nature at its heart' running through the whole tone and design of the development. Rather than a cliff edge of built infrastructure and then space for recreation and then space for nature. This would also have significant mental wellbeing benefits for the residents as well as potential commercial benefit for the development.

6. More resources will be needed

There is an opportunity to provide a significant amount of new green infrastructure that can boost nature, meet the recreational needs of future generations and create a legacy for the city. We doubt that this can be achieved solely through developer contributions and therefore additional funding will be needed to fully realise the ambition. We would encourage you to explore opportunities for the development to lever in additional funding from the public, private or charitable sectors in order to achieve the best possible outcome.

We have, and wish to continue, engaging with you on a 'without prejudice' basis and, where appropriate, we are willing to provide our knowledge and expertise of green space management to help ensure that the best proposals come forward.

We look forward to seeing the latest proposals in due course.

Yours sincerely

James Littlewood, CEO, Cambridge Past, Present & Future
Paul Forecast, Regional Director, National Trust
Martin Baker, Conservation Manager, Wildlife Trust BCN

A3 Ambitions, Requirements and Design Principles Table

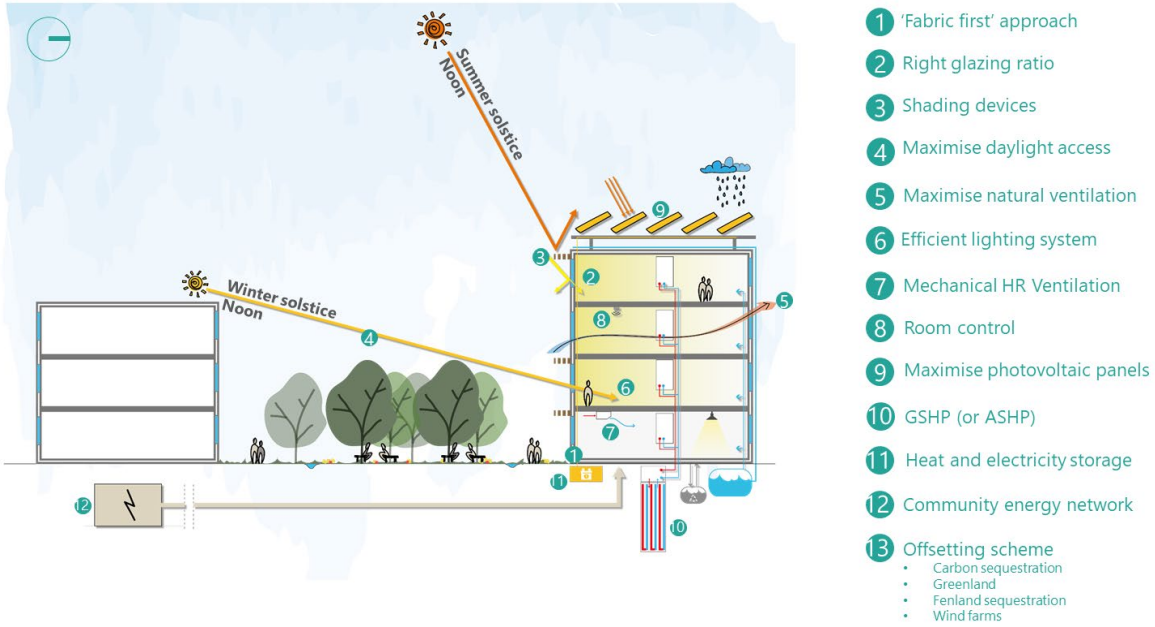
Environmental Aspect	Topic	Type of measure	Design Principles	Influenced Framework
All	Where relevant	Requirement	Adherence to legislation	Y
Air Quality	Limit values/Air Quality Objectives	Requirement	Adherence to legislation	L
Air Quality	Air Quality Management Area (AQMA)	Requirement	No deterioration of air quality within AQMA	Y
Air Quality	Air quality neutral	Ambition	For area affected by our proposals achieve air quality neutral or better	Y
Air Quality	Air pollution exposure for residents	Ambition	Lowest exposure possible for new and existing residents to air pollution	Y
Biodiversity	Species protected by legislation	Requirement	Adherence to legislation	L
Biodiversity	Biodiversity Net Gain	Requirement	Achieve Biodiversity Net Gain of at least 10% with an ambition of 20%	Y
Biodiversity	Priority habitats and species	Requirement	Avoid, minimise, mitigate harm, or at least compensate and if possible enhance	Y
Biodiversity	International and nationally protected sites of biodiversity value	Requirement	Adherence to legislation	L
Biodiversity	Regional and locally designated sites of biodiversity value	Requirement	Avoid, minimise, mitigate harm, and enhance where possible	Y
Biodiversity	Urban Greening Factor	Ambition	Achieve UGF score of at least 0.4	N
Biodiversity	Local green and natural spaces	Ambition	Delivery of new, or contribute to enhancement of green and natural spaces particularly those that meet wider external strategic ambitions	Y
Carbon and Climate Change	Net-zero target	Requirement	Reduce GHG emissions	N
Carbon and Climate Change	Zero Carbon Hierarchy	Requirement	Maximise energy efficiency; and incorporate renewable or low carbon sources on-site as far as practicable	Y
Carbon and Climate Change	Renewables on-site	Requirement	Install renewable and low carbon energy generation sources to either fully or partially displace the use of fossil fuels. They need to be located on-site or close to the energy users.	Y
Carbon and Climate Change	Renewables on-site	Requirement	For new dwellings and new non-residential buildings of 1,000m2 or more, to reduce carbon emissions by a minimum of 10% (against Building Regulations baseline) through the use of on-site renewable energy and low carbon technologies	Y
Carbon and Climate Change	Future adaptation	Requirement	Build in high levels of energy efficiency for buildings	N
Carbon and Climate Change	Future adaptation	Requirement	Promote sustainable forms of transport including with excellent active travel and public transport links	Y
Carbon and Climate Change	Future adaptation/Overheating	Requirement	Use layout, building orientation, design, and materials to ensure properties are not susceptible to overheating and include open space and vegetation for shading and cooling	Y
Carbon and Climate Change	Carbon emissions	Requirement	Reduce the need for energy in the building's design	Y
Carbon and Climate Change	Community energy network	Requirement	New buildings to be compatible with district heat networks	N
Carbon and Climate Change	Overheating	Requirement	Use optimum orientation for buildings and streets to reduce solar gain in summer and catch breezes	Y
Carbon and Climate Change	Overheating	Requirement	Provide glazing systems to reduce solar heat gain	N
Carbon and Climate Change	Overheating	Requirement	Provide shading device to block summer sunrays and materials to prevent penetration of heat, including use of cool building materials and green roofs and walls	N
Carbon and Climate Change	Overheating	Requirement	Increase absorption of heat through thermal storage or mass in hot period	N
Carbon and Climate Change	Overheating	Requirement	Increase natural ventilation to remove heat using fresh air	N
Carbon and Climate Change	Sustainable and healthy materials	Requirement	Use healthy and low embodied carbon materials	N
Carbon and Climate Change	Carbon emissions	Ambition	Reduce emissions from operation	N
Carbon and Climate Change	Operational energy emissions	Ambition	Delivery of energy efficiency measures	N
Carbon and Climate Change	Operational energy emissions	Ambition	Design sustainable construction	N
Carbon and Climate Change	Operational energy use (domestic and non-domestic)	Ambition	Apply following design principles to minimise the energy demand by up to 75% against the benchmarks used by the RIBA 2030 Challenge:	-
Carbon and Climate Change	Operational energy use (domestic and non-domestic)	Ambition	Use form, fabric and landscape to optimise ambient lighting, heating, cooling and ventilation	Y
Carbon and Climate Change	Operational energy use (domestic and non-domestic)	Ambition	Use efficient and well-integrated mechanical and electrical systems and user-friendly control	N
Carbon and Climate Change	Operational energy use (domestic and non-domestic)	Ambition	Incorporate low carbon heating including eliminating new connections to the gas grid and/or use of fossil fuel boilers	N
Carbon and Climate Change	Embodied carbon emissions (domestic and non-domestic)	Ambition	Maximise on-site renewable energy	Y
Carbon and Climate Change	Embodied carbon emissions (domestic and non-domestic)	Ambition	Use of low carbon materials and recycled content	N
Carbon and Climate Change	Embodied carbon emissions (domestic and non-domestic)	Ambition	Design for disassembly and future reuse, i.e. the ‘circular economy’	N
Carbon and Climate Change	Embodied carbon emissions (domestic and non-domestic)	Ambition	Design long term durable and flexible buildings	N
Carbon and Climate Change	Embodied carbon emissions (domestic and non-domestic)	Ambition	Prioritise the use local supply chain for the build where possible	N
Carbon and Climate Change	Embodied carbon emissions (domestic and non-domestic)	Ambition	Use efficient methods of fabrication	N
Carbon and Climate Change	Offsetting scheme for operational carbon	Ambition	Offset the remaining 25% of operational carbon emissions by offsite renewable generation (Wind Farms) and/or carbon sequestration schemes such as carbon forestry, grassland and fenland restoration.	Y
Carbon and Climate Change	Offsetting scheme for embodied carbon	Ambition	Adopt one or more of a combination of carbon offsetting schemes(Carbon Forestry, Fenland Restoration, Wind farms, Grassland, Carbon Credits), with a priority on local carbon sequestration, to minimise overall embodied carbon emissions by up to 70% (for domestic buildings) and 54% (for non-domestic buildings) against the benchmarks used by RIBA 2030 Challenge.	Y
Green Infrastructure	Recreation and Amenity	Requirement	Incorporate appropriate range and quantity of sport and recreation facilities, including play space and allotments.	Y
Green Infrastructure	Landscape Character	Ambition	Complement local landscape character particularly in relation to historic Cambridge/Cambridge landscape	Y
Green Infrastructure	Provision of open space	Ambition	Maximise the % of total open space that also has an ecosystem function per resident	Y

Green Infrastructure	Multifunctionality of greenspace	Ambition	Increase the level of multifunctionality for greenspace created/enhanced albeit without compromising the quality of its primary purpose	Y
Green Infrastructure	Connectivity	Ambition	Connect, though accessible greenspace, Coldhams Common to the Countryside and beyond	Y
Historic Environment	Sites and buildings of historic value	Requirement	Ensure valued historic assets can themselves be conserved and enhanced, and their character enhanced/maintained	N
Historic Environment	Archaeology	Requirement	Ensure the appropriate conservation of archaeology	N
Land Contamination	Land contamination	Requirement	Avoid significant harm to receptors including people, wildlife and water bodies	L
Light Pollution	Light pollution	Requirement	Reduce light pollution for people and wildlife, and maximise energy efficiency	N
Townscape	Tall buildings and views	Requirement	Ensure the appropriateness of location, setting and context of tall buildings when considered against area's character and sensitive viewpoints	Y
Natural Capital	Natural Capital	Ambition	Seek to maximise the ecosystem services functions of the site and thereby contributing significantly to local natural capital	N
Noise	Acoustics - internal spaces	Requirement	Ensure that internal noise levels meet appropriate guidelines	N
Noise	Acoustics - external spaces	Ambition	Provide access both for new residents and other users of the development to a variety of tranquil public amenity areas	Y
Waste Management	Waste management	Requirement	Minimise the amount of construction waste through recycling etc.	N
Waste Management	Waste management	Requirement	Maximise the reuse and recycling of materials	N
Waste Management	Waste management	Ambition	Provide facilities within the new development to optimise the opportunity for reusing and recycling waste	N
Water Management	Flood Risk	Requirement	Ensure that there is no increase in flood risk including out with the development area	Y
Water Management	Sustainable Drainage	Requirement	Maximise the use of Sustainable Drainage Systems and seek to create the most water efficient development possible	Y
Water Management	Surface and ground water	Requirement	Ensure no deterioration in surface and ground water quality, and improve where possible	L
Water Management	Sustainable Drainage	Ambition	Maximise areas of permeable surfaces to reduce flood risk	Y
Water Management	Heavily modified waterbodies	Ambition	Maximise the opportunity to deculvert watercourses should such exist	Y
Water Management	Water pollution control	Ambition	Maximise the quantum of surface water runoff cleaned by natural systems	Y
Water Management	Rainwater use	Ambition	Ensure that rainwater and greywater are reutilised to thereby create the most sustainable water cycle	Y
Water Management	Water consumption (domestic)	Requirement	Reduce water demand for domestic and non-domestic uses on the site including for the areas of greenspace	N
Water Use	Potable water use (domestic and non-domestic)	Ambition	Minimise potable water consumption by optimising building systems	N
Water Use	Potable water use (domestic and non-domestic)	Ambition	Maximise recycle and re-use water on-site	N

A4 Net Zero Carbon Assessment

1. This Appendix provides further technical background prepared by HOK with regards to Net Zero Carbon. The Figure below highlights the intended strategy for building design.

Figure A2.1 Net Zero Operational Strategy for Scenario C



2. Early net zero carbon target models have been generated to evaluate the amount of operational and carbon emitted from all four Scenarios, based on the data developed to date. These models have been used to do an early provision of the cost and size of offsetting schemes and to identify those that would better accommodate the wider Sustainability Vision for Cambridge East. These models are built based solely on the targets set in the RIBA 2030 Challenge and have been applied to all four Scenarios[16]:

[16] The impact of utilities and public realm infrastructure required for each developed area in Cambridge East have not been included in the models.

The carbon emissions for transport are not included in the calculation.

The number of occupants for each scenario includes the residents of Cambridge East, the daily commuters on-site. This data does not consider external daily visitors.

Whole Life Carbon Emissions of Buildings	Scenario A	Scenario B	Scenario C	Scenario D
RIBA 2030 challenge Operational Energy Target (MWh/y)	47,300	70,898.11	95,602.52	90,314.28
2030 Operational Carbon Average kgCO2/m2	3.82	5.20	5.59	5.33
RIBA 2030 Challenge Embodied Carbon Emissions (TCO2)	433,656.42	687,238.94	933,740.64	886,985.88
2030 Embodied Carbon Average kgCO2/m2	194.73	279.92	303.12	290.64
Whole Life Carbon Emissions Outcome				
RIBA 2030 Challenge Operational Carbon Emissions 60 years (TCO2)	510,830.57	765,699.55	1,032,496.40	975,394.19
Total Whole Life Carbon Emissions (TCO2)	**944,496**	**1,452,938**	**1,966,237**	**1,862,380**
Total whole life Carbon Emissions (kgCO2/m2)	**424.12**	**591.80**	**638.31**	**610.24**
Total Whole Life Carbon Emissions (tCO2 per person)	**38.02**	**31.08**	**31.43**	**30.01**

Table notes:

i. For operational carbon, the calculation considers that both domestic and non-domestic buildings are designed to minimise the residual energy demand by up to 75% against the benchmarks used by the RIBA 2030 Challenge. Renewables on-site are included in the design. The benchmarks used for the operational carbon emissions are from Ofgem (for domestic) and CIBSE TM 46 (for non-domestic)

ii. The remaining 25% of energy demand during operation will be offset with offsetting schemes.

iii. For embodied carbon, the calculation considers that both domestic and non-domestic buildings are designed to minimise the overall embodied carbon emissions up to 70% (for domestic buildings) and 54% (for non-domestic buildings) against the benchmarks used by RIBA 2030 Challenge. The benchmarks used for the embodied carbon emissions are from M4i

3. The results indicate that to offset the carbon emitted yearly during operation, the equivalent of between 4 and 8 offshore wind generators (11,500 MWh/y per generator) will be required. In practice, the operational carbon emissions can be offset with one or a combination of different schemes, including habitat creation and enhancement or through the purchase of credits from a commercial provider. This calculation is based on Vattenfall Kentish Flats Wind Farm 173,000 MWh/year from a total of 15 turbines 11,500 MWh/year/turbine.

Whole Life Carbon Emissions of Buildings	Scenario A	Scenario B	Scenario C	Scenario D
Operational Carbon Offsetting				
Number of Offshore wind generators (11,500 MWh/y per generator) note 1	4	6	8	8

4. The results of the models for the Cambridge East framework have been also used to produce an estimate for costs and areas required to offset exclusively embodied carbon emissions. The estimated data are referring to a period of 100 years that would be needed to offset the residual carbon emitted from the extraction of materials to their end of life. The offsetting schemes for embodied carbon sequestration that have been explored and analysed are Grassland, Woodland and Fenland:

- Grassland: The calculation for this scheme is based on a series of assumptions due to many differences existing between grassland types and management prescription and is also referring to the type of grassland that has the highest sequestration rate. Overall, by assuming the best-case scenario where all the embodied carbon would be offset by using grassland, the total cost and the area required within an offset period of 100 years will likely be the highest among the options. Furthermore, the credits from grassland are still to be recognised by official bodies. The advantage of integrating local grassland in the wider scheme for carbon sequestration is that it has a high biodiversity value, and it contributes to restore the natural habitat.

- Woodland: Non-thinned mixed broadleaf woodland is the highest carbon yielding woodland type as well as being the most character appropriate for Cambridge area. The cost of the scheme and the area required for offsetting all the emitted embodied carbon within a period of 100 years will potentially be higher than fenland but still lower than grassland. Carbon credits form woodland are the only verified credits that can be used in net zero reporting. The other advantage of a mixed broadleaf scheme is that it can be tailored for almost any type of soil and will offer potential Biodiversity Net Gain.

- Fenland: Restoring fenland for carbon sequestration will potentially be the most cost-effective option and will require less area than the other schemes for the same amount of carbon sequestered by the other options. It also has the advantage of constantly sequester carbon, although it will happen with an inconsistent rate. However, as for the case of grassland, net cumulative emissions reductions still cannot be recorded as credits. The Peatland Code (PC) illustrates a process by which credits from peatland and fenland restoration can be verified. Although, PC has not yet received its ISO14065 audit status, it is expected to achieve these recognitions in a few years' time. Furthermore, fenland does not provide the opportunity to sequester in association with a mixed broadleaf woodland scheme as planting trees does not necessarily restore peat and in some cases could reduce it.