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ELY MASTER PLAN

INFRASTRUCTURE AND CONSTRAINTS ASSESSMENT

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C O N T E N T S

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1. INTRODUCTION

As part of the process of developing a master plan to guide the future development of Ely, a review has been undertaken of all the physical, planning and infrastructure constraints that may limit the potential for development, or the potential of individual sites.

This report summarises the results of this review, dealing with each of the major issues in turn. Finally this report includes a outline of the constraints identified and how they affect individual sites.

2. HERITAGE ISSUES

2.1 Introduction

This discussion of Heritage issues has been developed by desk-based research supplemented by personal knowledge and site visits. The consultants have also discussed the heritage resources, opportunities and constraints with Cambridgeshire Archaeology of Cambridgeshire County Council.

The Cathedral City of Ely is on a locally prominent hill rising above the Cambridgeshire Fenland. The hills geology and topography have been of fundamental importance for the placement and growth of the City. The complicated relationship between the geology and human activity has been published in considerable detail elsewhere, and a serviceable succinct potted history is incorporated in a study of 2001 (*Ely Environmental Capacity Study*; LDA, 2001) – this need not be repeated here. However, it will be useful to review the most salient points in chronological sequence as a means of explaining how the remains of 2500 years of inhabitation has created both constraints and opportunities for modern Ely.

The following discussion is a very strategic level review based largely upon professional judgement and making some use of the extremely large volume of detailed archaeological and historic records that exist within the study area. The principal areas of heritage remains are shown on the Heritage Map. No attempt has been made to plot all of the hundreds of monuments, events and buildings contained within the Cambridgeshire Historic Environment Record, although a digital version of the HER has been perused. However, this synthesis has been discussed with the archaeologists in Cambridgeshire County Council.

2.2 Palaeontology and Fossils

The chronologically earliest site is not archaeological but palaeontological – this is the SSSI site of Roslyn or Roswell Pits northeast of the city, where extraction of the Jurassic Kimmeridge Clays has exposed a remarkable series of fossils. These include a wide variety of ammonites, belemnites, bivalves, fish and even a near complete specimen of a *Pliosaurus*. The pits were worked to provide materials for embankments throughout the 19th and into the 20th centuries. Statutory protection makes this a constraint against development in this vicinity.

2.3 Earlier Prehistory – Mesolithic (6-7000 BC) to Roman Periods (AD 400)

The earlier archaeological history of Ely is not very well illustrated by sites in the immediate locality. This is because the landscape that existed prior to about 500 years ago hardly exists today. The Fens were then a wet fenland and the general ground level – insomuch as the boggy fen had a ground surface – was several meters or more higher than today. This Fen was formed by alternate flooding of the lowest lying areas by freshwater and seawater, leading to deposits of silts and clays, and extensive peats. The draining of the Fens that began in the 17th century led to the desiccation of the extensive peat deposits which have since compressed into he rich fenland soils, but leaving much of the artefactual traces of earlier occupation of fen areas jumbled together. The most important and valuable earlier prehistoric archaeological sites are generally to be found on fen-edge locations where higher land bordered the previous fens. Such earlier sites would be very important and hence should where possible be avoided by development plans. The lower slopes of the hill of Ely generally exhibit this potential and where this is proximate to the modern city should be considered a constraint to be avoided if possible. An example of this would be the westwards slopes of the hill to the west of the A10 by-pass.

Prehistoric (Neolithic, Bronze Age and Iron Age) settlement traces in Ely are known through chance finds and scattered traces found during developments, for example the new housing estates just inside the A10 by-pass to the west of Ely city centre. Another area is to the north off of the Prickwillow road.

Roman remains are known from the same areas – peripheral to the present city. In addition, a Roman road is believed to run north-south towards Littleport, and is likely to pass west of the centre.

Throughout these periods occupation of the hill of Ely was probably always quite scattered and rural in character – there are no convincing suggestions of large-scale settlements.

2.4 Saxon Ely

This period – circa ASD400 to AD1066 – was when the development of the Fens reached the maximum. Ely hill was an island surrounded by dense impenetrable meres. It is said that the large numbers of eels gave the hill its name. There are several known foci for Saxon settlements, which are denser in character than previous habitation traces. The best-known settlement was in the same area as the earlier habitations – alongside the A10 by-pass west of the city centre – where the settlement is known to extend for several hundred metres in length and span the Anglo-Saxon period. Another settlement is known from documentary sources at a place called Cratendune about 1 mile north of the city centre, where a church was established circa AD607. This settlement failed to flourish and in AD673 the princess Etheldreda established a focal point on the hill nearer to the river and established a monastery. This was somewhere very near to, or under, the present Cathedral. Traces of Saxon settlement are known in the vicinity of the Cathedral and the Cathedral Green, as well as downhill to the east between Broad Street and the river. Saxon Ely was perhaps a more dispersed settlement with several 'centres' rather than a single focal point.

2.5 Medieval Ely

By 1071 William the Conqueror was building a motte-and-bailey castle in Ely (still visible in the Cherry Hill Park south of the Cathedral).

A local hero was Hereward the Wake, also known as Hereward the Outlaw or Hereward the Exile, was an 11th Century leader in the resistance to the Norman Conquest, with a power-base around the Isle of Ely and the surrounding Fens.

A few years later in 1083 the construction of the present Cathedral, replacing the earlier Saxon monastery, was begun by the first Norman Abbot Simeon. The monastery was raised to a Bishopric in 1109, with the Abbot becoming the Bishop and the Prior the head of the monastery. The Bishop established his 'palace' immediately west of the Cathedral. Only a century later St Mary's Church was begun some 100 metres west, at the west end of the Cathedral Green. Approximately contemporaneous with these foundations was the dual houses/hospitals at what is now called St John's Farm and St Mary's Barn (both scheduled). By 1251 a Survey depicts Ely in a formative stage, although still a small largely rural settlement. However, the Survey of 1416 reveals Ely recognisably as it is today, with most of the streets in what is still 'old' Ely identified by clearly early versions of their present names. The present Bishop's Palace was begun circa 1486-1509 by Bishop Alcock, with further developments circa 1550 and I the 17th century. Limited 'industrial' production of pottery called Babylon-ware took place near the River Ouse.

2.6 Post-Medieval Ely

The Dissolution of the monasteries under Henry VIII affected Ely, but the immediate presence of the Bishop saved the Cathedral and most of the monastic buildings. Otherwise life, farming and commerce in Ely would seem to have continued unchanged for another few centuries. However, from the 1630's the fenland landscape around Ely began to change dramatically with the start of the drainage of the fens by the Dutch engineer Vermuyden. The drying of the Fens created the rich dark peaty soil for which Cambridgeshire has long been famous, but the concomitant was that the drying peat compre4ssed and sank, and the drainage dykes and pumps had to be extended to pump from increasing lower levels into dykes and washes that eventually would flow at higher levels than the surrounding farmland. By 1845 Ely was essentially the same compact city it had been for at least 400 years, the only significant changes being the infill of areas for residences along and between roads and streets originally established in the early medieval period.

2.7 19th – 21st Century Ely

1845 was the year in which the railway (Eastern Counties Railway, from London to Norwich) reached Ely, and this sparked a limited industrial and commercial development that would change Ely. Ely became (and remains) an important railway junction with lines in 5 directions from the complex interchange just to the north at Queen Adelaide. Limited industrial development occurred along with continued residential infill and the appearance of 'ribbons' of housing radiating from the centre along roads to the surrounding villages.

However, it was in the 1920's when this process intensified, marked by the New Barns Housing Estate north of the centre. This was followed by similar developments in the 1930's along Lynn Road, Downham Road, Cambridge Road and Barton Road. The old Market Square was badly developed in the 1960's (and again in the last few years).Later, more housing was added at High Barns and at West Fen, and also off St Johns Road, West End Road, and the Wichford Road. The A10 was taken around the city centre on a bypass.

During the 1980's and especially the 1990's very large new housing estates were built, in-filling almost all the remaining green spaces in the Medieval and post-Medieval city, and adding vast areas of housing to the west inside the A10 bypass at Wichford Road and St Johns Road, and to the north between High Barns and Prickwillow Road. An industrial estate near the railway station has developed since the late 1980's, and a smaller estate off Lisle Lane.

Today the historic centre of Ely is characterised by a 'Medieval' core focussed around the 'ecclesiastical precinct' of Cathedral with monastic buildings, Church of St Mary's and the Bishop's Palace around the Green and including many buildings owned by the King's School to the west of the King's Palace. A commercial centre is along High Street and Market Street, Forehiill and Brays Lane, Nutholt Lane at St Mary's Street leading south-west towards Cambridge. These areas contain many historic buildings – a surprising number are medieval in origin. Surrounding the core are areas of terrace and semi-detached houses, typically in the local vernacular of yellow Gault-clay brick with white or red brick details and slate or tile roofs – these mark the housing areas established through the later 18th and 19th centuries.

2.8 Areas of Opportunity

The Heritage Map suggests that there are five areas in relative proximity to the core of Ely that might be considered areas for development from a heritage perspective.

1. The golf course. Very limited archaeological investigations (ECB910 and 2015) revealed only Neolithic/Bronze Age flint scatters, which in themselves are unlikely to be a bar to development.

2. Land south of the Angel Drove industrial estate. Limited archaeological investigation (ECB379) revealed no archaeological finds of significance.

3. Land between the Railway and the river. There have been no archaeological investigations but this area included within the Fenland Survey of the 1970's – 1980's which recorded no finds.

4. Land between the Babylon Marina and Queen Adelaide Way. The only recorded heritage feature is a WWII Spigot Mortar emplacement (CB15073). There have been no other archaeological investigations but this area included within the Fenland Survey of the 1970's – 1980's which recorded no finds.

5. Land between the A10, the Witchford Road and the Cambridge Road. Very limited archaeological investigations (ECB910) revealed only Neolithic/Bronze Age flint scatters, which in themselves are unlikely to be a bar to development. The investigation of the adjacent land to the north (ECB69) and east revealed Anglo-Saxon burials in very plough-damaged condition. Whilst these remains are likely to extend into this field, they are not considered to be a bar to development.

6. Land at Queen Adelaide has had extensive industrial use in the past and is unlikely to have any significant heritage constraints and would be appropriate for development.

Land to the west of the A10 Ring road and between the A142 and A10 is considered more likely to contain sites of prehistoric through to Saxon date which was probably focussed westwards toward the Fens as a source of livelihood, and development in these areas would therefore have a greater heritage impact. In contrast, the occupation on the eastern slopes of the Isle of Ely were focussed on the River Ouse for resources, and are more likely to be based upon trade or low-level industrial production.

2.9 General Issues for Development

The City of Ely is spatially limited and densely occupied by individually small-scale buildings, many of 19th century or earlier origin, and possesses a strong local vernacular and character. There are very few areas of 'no-go' and almost any plots of land within the core of the city could be developed in principle, but archaeological mitigation through the planning process may be punitively expensive, and the historic townscape will impose strong constraints upon massing and materials.

In pragmatic terms, successful regeneration and development will be achieved through an integrated and proactive implementation of the ethos of PPGs 15 and 16 for dealing with historic buildings and buried archaeology. Regeneration of the Market Square would be a good example of where this approach could produce beneficial results. Infill development should be expressly designed to contribute to the sense of place of Ely through appropriate use of mass and materials whether in sympathy with the historic fabric or using entirely modern materials.

Heritage resources should however be used proactively – there are several options for walking routes through the city, some starting at the rail station, which would be attractive for visitors and residents alike should appropriate signage, maps and leaflets be provided.

Cherry Hill Park is a no-go area for development because of its views of the Cathedral, and nearby developments might be expected to enhance public access to and appreciation of this area and its adjacent Medieval castle motte (Cherry Hill itself).

The services infrastructure (especially water and sewerage) in Ely is said to be at or above peak capacity, and new developments will necessitate new services provision. This will inevitably have archaeological implications which should be considered in both design and implementation stages.

3. GEOLOGY ISSUES

3.1 Introduction

The British Geological Survey map, Sheet 173, (Ely – Solid and Drift) shows the city of Ely to be underlain by the Cretaceous Lower Greensand. In turn, this is underlain by the Kimmeridge Clay over the Ampthill Clay, both from the Jurassic period. During the Cretaceous and Jurassic era much of the area was covered with shallow tropical and sub-tropical seas.

Towards the north and the south of the city, Glacial Boulder Clay outcrops with an area of Glacial Sand and Gravel outcropping across the area of the golf course to the immediate south of the city. The Quaternary glaciations of 250 000 to 18 000 years ago saw ice sheets up to several thousand feet thick cover the district. Following the retreat of the ice, when temperate climates returned and the broad glaciated hollow that was to become Fenland was in filled with mud and peat.

Era	Period	Formation	Typical Thickness (metres)
Cainozoic	Quaternary	Glacial Sand and Gravel	0 to 10
Cainozoic	Quaternary	Glacial Boulder Clay	0 to 10
Mesozoic	Cretaceous	Lower Greensand-Woburn Sands	0 to 10
Mesozoic	Jurassic	Kimmeridge Clay	15 to 46
Mesozoic	Jurassic	Ampthill Clay	20 to 50

Table1: Geological Succession Expected at the Site According to the BGS Map

3.2 Historical Exploratory Hole Logs

Historical exploratory hole logs for boreholes located within the vicinity of the site were requested from the British Geological Survey.

Logs for five boreholes were returned. Two of the borehole logs relate to a ground investigation carried out at the rear of Market Street in Ely, just south of Waitrose supermarket, during August 1992. These boreholes are located at approximate national grid reference TL 542 803, and were drilled to a maximum depth of 12.0 metres below ground level.

Logs for two boreholes were returned for a proposed extension to the Ely RAF Hospital completed during May 1979. These boreholes were located at approximate national grid reference TL 533 799 and were drilled to a maximum depth of 15.0 metres below ground level.

A log has been returned for one borehole carried out during the ground investigation completed along the route of the A10 Ely to Littleport by-pass during April 1978. The borehole was drilled to maximum depth of 9.0 metres below ground level and is located on the south western area of the city at approximate grid reference TL 52 79.

3.3 Ground Conditions Encountered in the Exploratory Holes

The ground conditions encountered at the borehole locations confirm the geology expected from the British Geological Survey map and are summarised in Table 2.

Stratum	Depth (metres below ground level)	Thickness (metres)	Description
Glacial Boulder Clay	2.4 to 3.1	2.4 to 3.1	'Firm to stiff brown sandy CLAY with occasional gravel and chalk.'
Lower Greensand (Woburn Sand)	3.6 to 4.6	1.6 to 3.1	'Medium dense SAND' and 'soft to firm green very sandy CLAY.'
Kimmeridge Clay	>9.0 to >15.0	>5.4 to >11.0	'Firm to hard grey CLAY with shell fragements.'

Table 2: Summary of Ground Conditions from Historical Exploratory Hole Logs

Groundwater was encountered as slight seepages within the Kimmeridge Clay from 4.0 to 4.8 metres below ground level. It is most likely that the groundwater is trapped between the fissures of the clay. It is probable that once on the lower lying ground on the outskirts of the city, groundwater levels will be higher.

3.4 Foundation Assessment

From the information obtained, it appears as though shallow spread foundations may be a suitable solution for any proposed low rise residential and commercial buildings. However, from the logs obtained from the boreholes drilled at Ely RAF Hospital, a layer of soft sandy clay (Woburn Sand) was present from 2.4 to 4.0 metres depth. This stratum may not have adequate strength to carry and distribute the loads of the proposed buildings without intolerable levels of differential settlement. This can be confirmed following a ground investigation.

The Woburn Sand was encountered within the boreholes drilled at the rear of Market Street in Ely to a maximum depth of 4.6 metres below ground level. It is considered that shallow spread foundations could be constructed within this material that has been described as a medium dense sand with the load being distributed adequately through the underlying stratum of the firm to hard Kimmeridge Clay. The density of the sand and the strength of the underlying clay can be confirmed following a ground investigation.

Glacial Boulder Clay was encountered within the borehole drilled along the proposed route of the A10. Generally encountered at the depth at which shallow spread foundations would be constructed, this stratum was described as firm to stiff thus indicating an undrained shear strength of approximately 75 to 150 kN/m^2. However, Boulder Clay can be variable in its strength and material properties thus affecting the foundation design solution. This can be confirmed following a ground investigation.

3.5 Recommendations for Ground Investigation

Before any potential sites are developed, a ground investigation will be required in order to assess the ground and groundwater conditions at the site and establish geotechnical

parameters for foundation design. Boreholes and trial pits are likely to be the most suitable form of exploratory holes for the ground conditions in order to produce engineering geology logs and to provide samples for geotechnical and geoenvironmental testing. The scope of the works will need to be such that it meets the requirements of BS5930 (1999)/EN Eurocode 7.

4. DRAINAGE AND FLOOD RISK ISSUES

4.1 Flood Risk

Ely is located in the Fens, an area characterised by raised watercourses and low-lying areas, although most of Ely itself is raised above the surrounding land. There are a number of significant water features in the vicinity of Ely. The Ely Ouse is located to the east of the town and flows in a northerly direction, further to the north of the town are the Ouse Washes which provide significant flood storage and alleviation. The main source of flood risk in the Fens is the overtopping of the drainage channels.

The Environment Agency has produced indicative flood maps as a starting point for the assessment of flood risk. These characterise areas into three flood zones which have different levels of risk. These flood risk zones are described in Table D.1 of Planning Policy Statement 25 "Drainage and Flood Risk" (PPS 25). A brief summary of the characteristics of each flood zone follows.

4.1.1 Zone 1: Low Probability (shown white on the indicative flood maps)

According to PPS 25, land in this zone has been assessed as having less than 1 in 1000 chance of river flooding in any year. This is < 0.1%.

4.1.2 Zone 2: Medium Probability (shown light blue on the indicative flood maps)

According to PPS 25, land in this zone has been assessed as having between a 1 in 100 and 1 in 1000 chance of river flooding in any year. This is between 1% and 0.1%.

4.1.3 Zone 3a: High Probability (shown dark blue on the indicative flood maps)

According to PPS 25, land in this zone has been assessed as having a 1 in 100 or greater chance of river flooding in any year. This is > 1%.

4.1.4 Zone 3b: The Functional Floodplain (shown dark blue on the indicative flood maps)

According to PPS 25, land in this zone is used for water flow or storage in times of flood. This flood zone should be identified by a Strategic Flood Risk Assessment (SFRA). It has been assessed as having a 1 in 20 or greater chance of river flooding in any year which is > 5%. Another probability however can also be agreed between the LPA and the E.A.

The Environment Agency indicative flood map for the Ely area is shown below. This shows that the main areas of high flood risk are to the south and east of Ely, following the path of the Ely Ouse.

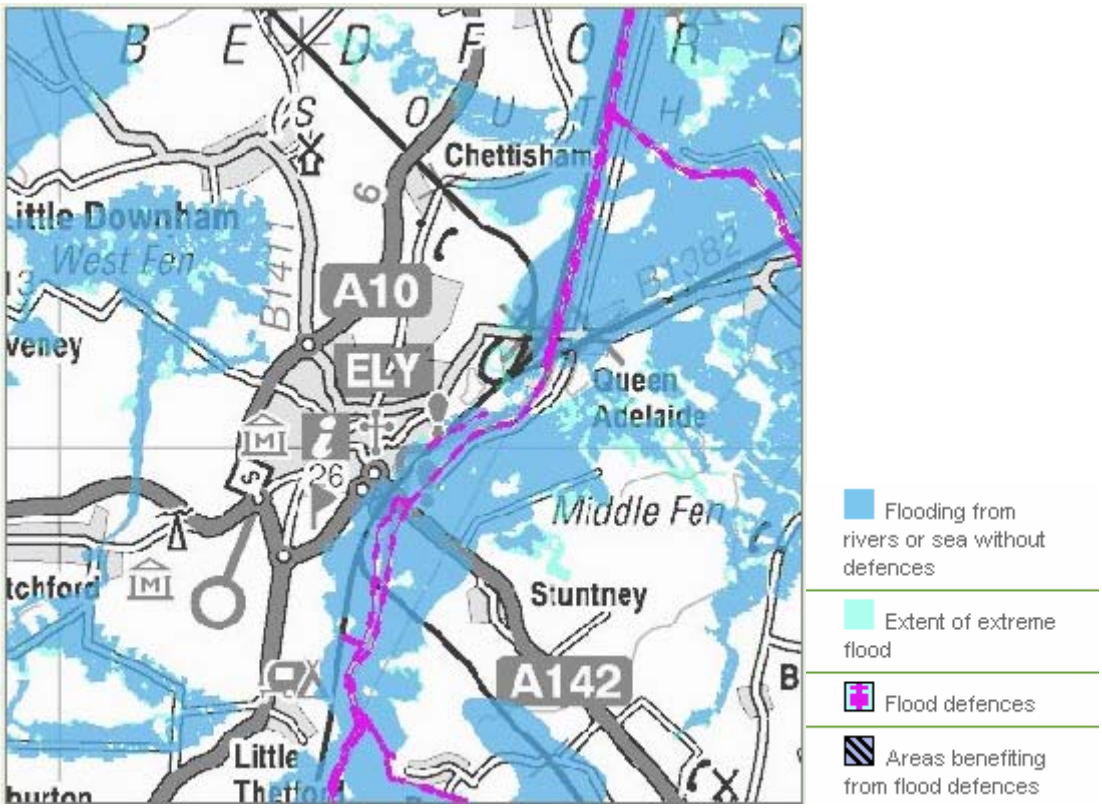

Figure 1: Environment Agency Indicative Flood Map (Dec 2007)

The purpose of the flood maps, in conjunction with PPS 25, is to steer new development to areas at the lowest probability of flooding (Zone 1). This is known as the Sequential Test. As part of this test, PPS 25 categorises different land uses into a "vulnerability" class, ranging from Essential Infrastructure, Highly Vulnerable, More Vulnerable, Less Vulnerable and Water-compatible Development.

If a proposed development site is of a certain size or is located in an area at high risk of flooding, then a Flood Risk Assessment will need to be undertaken to accompany the planning submission for the development. This will need to consider the flood risk to the site, the vulnerability of the land use to flooding, and risks to occupants among other things. The table below shows the general advice for planners when considering if a development is acceptable in an area at risk of flooding.

Flood Risk Vulnerability classification (see Table D2)		Essential Infrastructure	Water compatible	Highly Vulnerable	More Vulnerable	Less Vulnerable
Flood Zone (see Table D.1)	Zone 1	✔	✔	✔	✔	✔
	Zone 2	✔	✔	Exception Test required	✔	✔
	Zone 3a	Exception Test required	✔	✗	Exception Test required	✔
	Zone 3b 'Functional Floodplain'	Exception Test required	✔	✗	✗	✗

Key:

✔ Development is appropriate

✗ Development should not be permitted

The Exception Test is a measure of whether the value of a new development outweighs the potential flood risk that it may have. It should contain a review of all other available sites to demonstrate that the chosen site is the preferable one, and it needs to be written in conjunction with local authority planners. Ultimately the decision regarding then Exception Test lies with the local authority. To assist them in this, PPS 25 recommends that Strategic Flood Risk Assessments (SFRA) are undertaken for each local authority or region looking in more detail at the flood risk in that area, concluding with more detailed flood risk maps for that area.

A Strategic Flood Risk Assessment (SFRA) was undertaken for the East Cambridgeshire area (including Ely) in 2005 by Atkins (Report No 5031051/073/dg/051). This summarised the results of extensive analysis of the river and flood models and flood defences in the area and concluded with the production of more detailed flood maps for the East Cambridgeshire area, including Ely. It should be noted that the SFRA was undertaken prior to the publication of Planning Policy Statement 25 “Development and Flood Risk” (PPS 25) in 2006. Although the SFRA takes some account of the future effects of climate change, it may be subject to further review.

The flood risk map from the SFRA shows that the area at high risk of flooding extends closer to Ely than the indicative EA flood maps. This may further restrict the type of development that may be permitted to the south and east of Ely. The flood map from the SFRA also shows a “Zone of Rapid Inundation” which is an area adjacent to the existing flood defences in which the consequences of a breach would be potentially catastrophic or fatal. This is an area in which planners may not permit future development.

To conclude, any areas for expansion in Ely will need an assessment of flood risk undertaken for them in accordance with PPS 25 and the SFRA. Given the location of the areas at high risk of flooding, the most appropriate areas for future development would seem to be to the north and west of Ely, with the areas close to the river to the south east of the city being particularly restricted.

Term	Definition
Flood Zone 3 (Modelled)	Area at risk of flooding from a fluvial event with a return period of 100 years or less and/or from a tidal event with a return period of 200 years or less, assuming a breach of defences[1].
Flood Zone 3 (Environment Agency)	Area at risk of flooding from a fluvial event with a return period of 100 years or less and / or a tidal event with a return period of 200 years or less, assuming the absence of defences[2,3].
Flood Zone 2 (Environment Agency)	Area at risk of flooding from a fluvial event with a return period of 100 years or less and / or a tidal event with a return period of 200 years or less, assuming the absence of defences[2,3].
Zone of Rapid Inundation (ZRI)	An area adjacent to defences in which the consequences of a breach would be potentially catastrophic or fatal. See section 3.4.13 for a description of how this was derived.
Defence offering protection below minimum standard	Term taken from paragraph 31 of PPG 25 (ref 1). PPG25 offers no specific definition of "appropriate". In this study an appropriate standard is taken as 100 years for a fluvial defence and 200 years for a tidal defence.
Area Benefiting from Defence to an Appropriate Standard	Land that would flood during a fluvial event with a return period of 100 years or more and/or a tidal event with a return period of 200 years or more if it were not for the presence of a defence.
Area Benefiting from Defence to less than an Appropriate Standard	An area protected to less than the appropriate standard that would flood more frequently if not for the presence a defence.
Extent of Modelling	A marker showing the maximum extent of flood outlines generated by breach modelling (not used on all maps).

Table 4-1 Definition of Terms used in Flood Zone Maps

4.2 Drainage - Surface Water

Any development in Ely is likely to increase the impermeable area and therefore result in an increase of surface water runoff following rainfall. This, in turn, would increase the potential for downstream flooding unless mitigation is provided. In line with the recommendations of PPS 25, new development is generally expected to attenuate surface water runoff to existing or even "Greenfield" rates. Greenfield runoff rates are the theoretical rates from an undeveloped site. Any attenuation of surface water would also need to take account of the future effects of climate change through increased rainfall intensities.

The most preferable methods of attenuation are Sustainable Drainage Systems (SuDS) which include grassed swales, balancing ponds, detention basins, soakaways, permeable paving, cellular storage, green roofs and others. These are all methods of storing or infiltrating rainfall runoff without increasing peak runoff rates and therefore not increasing the risk of downstream flooding.

Any sites identified for expansion in and around Ely should consider at an early stage the runoff that will be generated and the opportunities for utilising different forms of SuDS. Some SuDS can have a large footprint, such as balancing ponds and detention basins, and therefore would need to be included at the earliest stage of the masterplan process.

4.3 Drainage – Foul Water

The *Core Strategy Amendment – Preferred Options* paper, produced by East Cambridgeshire District Council has a section on sewage treatment in Chapter 6. This states the following:

Ely - New development will require local reinforcements of the water supply network. In terms of sewerage treatment, both the Ely old and new sewage treatment works are operating at capacity and require upgrading. It is therefore requested that new allocations are phased to come forward post-2017

This means that foul sewage generated by new development is likely to exceed the capacity of the existing sewer network. Consideration should therefore be given to alternative methods of sewage treatment where possible, such as the utilisation of reed-bed systems or similar to provide secondary and tertiary treatment. These may require specialist design, and can have a relatively large plan area. Primary treatment may still need to take the form of septic tanks. Any sites identified for expansion should consider the foul drainage on a case by case basis and should seek to apply a "portfolio" approach, utilising the techniques above (or similar) in conjunction with discharge into the public sewers where possible.

5. CONTAMINATED LAND ISSUES

5.1 Geology

Ely is underlain predominantly by bedrock of Kimmeridge/Ampthill Clays of Jurassic age, with Cretaceous Lower Greensand occurring at higher topographical elevation, forming a geological outlier. Drift deposits comprising the Lowestoft Formation sporadically overly the bedrock in the town area of Ely. To the east of the town lies a river, and bedrock is overlain by alluvial and peat deposits.

5.2 Hydrogeology

Ely is variably underlain by aquifers classed as major, minor and non-aquifers. The major aquifer is coincident with the Lower Greensand rock and minor aquifer with the drift alluvium.

Geological formations comprising major aquifers are considered to be highly permeable usually with a known or probable presence of significant fracturing. They may be highly productive and able to support large abstractions for public water supply and other purposes. The groundwater may be abstracted to produce large quantities of potable water or could be important for local supplies and as a possible future groundwater resource. These aquifers provide base flow to rivers.

Although minor aquifers are unlikely to yield quantities of water substantial enough for abstraction, these aquifers are important for base flow to rivers and could be utilised for local supply.

5.3 Sensitive Land Uses

Sites of Special Scientific Interest (SSSIs) are located at Roswell Pits and Chetisham Meadows. Further the surface water bodies located predominantly to the east of Ely could be sensitive receptors of contamination.

5.4 Contaminated Land

Areas considered for re-development would require contaminated land assessments to be undertaken. As a minimum, Planning Policy Statement PPS23 requires that a desk study and site walkover are undertaken to constitute a preliminary investigation which provides an initial assessment of land contamination risks.

- Where risks are identified, investigations would follow a tiered approach as follows:
- Preliminary Investigation and risk assessment (Desk Study)
- Exploratory / Main Investigation and risk assessment (intrusive ground investigation and monitoring)
- Quantitative Risk Assessment (QRA)
- Development and Implementation of Remediation Strategy
- Validation of remedial works (and long-term monitoring if required)

Re-development of brownfield sites carries greater risk of contaminated land, although potential for contamination also arises at land with previous agricultural uses.

A selection of areas of Ely identified as having potentially polluting historic / current uses are identified on the contaminated land map. The map does not provide a complete record of all industrial land uses within Ely, but can be used to show that the heaviest industry has been

located at the eastern side of Ely, along the river. Further industrial land uses are commonly found within the town, typically comprising small industrial units (e.g. garages, filling stations, yards, depots, smithys and allotments). Of greatest risk from the sites identified on the map are the former tannery/coal yard and landfills.

Developments would require consideration on a site-by-site basis, through which any remediation required would be dealt with under the planning system.

6. NOISE AND AIR QUALITY ISSUES

6.1 Noise

The proposed development in Ely will involve the addition of noise-sensitive receptors to the Ely area in the form of new residential properties. The location of these properties must be carefully considered and as far as practicable, they should be located away from existing noise sources. The major noise sources in Ely include roads (especially those that currently accommodate heavy traffic such as the A10), the railway and certain types of industrial developments.

Planning Policy Guidance Note 24 (PPG24) outlines the considerations to be taken into account in determining planning applications for noise-sensitive developments. The impact of noise can be a material consideration in the determination of planning applications, and as such, if existing noise levels are found to be too high, planning conditions are likely to be imposed, or planning permission refused. However, where existing noise sources are likely to affect the proposed development, there are numerous mitigation measures that can be employed in order to reduce the future occupants' exposure to risk. Noise control engineering solutions can be incorporated into the proposed development design in order to limit exposure to noise and lay-out of buildings can be modified so that non-critical rooms are closest to the source of noise. However it must be remembered that most noise attenuation methods will add to the overall development cost.

Existing noise sensitive receptors in Ely include all residential areas, hospitals and schools. The impact of the new development on these receptors will need to be assessed. Traffic on the road network may increase due to the increase in residential properties and noise could become a determining factor if the increase in traffic noise generated as a result of the new development causes an unacceptable level of noise increase to existing noise-sensitive receptors. The Calculation of Road Traffic Noise (CRTN) (Department of Transport, 1988) can be used to determine the change in noise from a road, when the traffic flow or traffic composition changes.

6.2 Air Quality

Air quality assessment work carried out by East Cambridgeshire Council and CCC shows that air quality in Ely is generally good and meets the national standards. It is therefore unlikely that Air Quality will be a constraint to development although there are a couple of exceptions to this;

- The main possible constraint with regard to air quality will relate to any traffic impacts of development. Any significant increase in traffic along roads with nearby residential properties may cause a problem. Assessment on a case by case basis will need to be carried out.

- Any proposed developments close to sources of nuisance (dust, odour, flies) may also be difficult.

7. ECOLOGY ISSUES

7.1 Introduction

Three designated sites lie within 2km of the centre of Ely, with a further four designated areas within 10km of the town centre. In addition nine County Wildlife sites are present with the Parish of Ely.

7.2 Nationally Designated Sites within 2km of the city centre

Roswell Pits SSSI lies immediately to the south of the residential area of Ely and is designated for its geological interest, representing the best reptile remains in the northern outcrop of the Kimmerage Clay.

Chettisham Meadows Site of Special Scientific Interest (SSSI) lies approximately 1km to the north of the town centre. The SSSI is designated as ridge-and-furrow neutral grassland on calcareous clays, and is one best examples of this type of grassland in the UK, providing habitat for several protected species of plant, such as the Greenwinged Orchid.

A large area of Biodiversity Action Plan habitat lies to the west of the area, designated for its floodplain and grassland habitats.

7.3 Nationally Designated Sites within 10km of the city centre

Further from the city lie a further three nationally designated sites; the Cam Washes SSSI (7km), Delph Bridge SSSI (2km) and Shippea Hill SSSI (8km).

The Cam Washes are a series of low lying pastures which are subject to seasonal flooding which has allowed the development of a range of grassland structures, from damp short grassland to wet tussocky fields, with associated pools, ditches and river margins. This habitat range provides an important site for numbers and diversity of wintering and breeding wildfowl and waders.

Delph Bridge Drain is designated as a SSSI as it supports the only known British population of fen ragwort. Thought to be extinct in 1857 as a result of drainage activities and habitat destruction the species was re-discovered in 1971 at this site.

Shippea Hill SSSI is designated as being a key location for dating the classic ‘Fen Clay transgression’ of the southern Fenland, providing a valuable geological, educational and research resource.

7.4 Internationally Designated Sites within 10km of the city centre

The Ouse Washes SSSI, SAC, SPA and Ramsar are designated as being of international importance for their wildfowl. The washes are the largest area of frequently flooded grazing marsh in Britain, providing an invlaubale area for over-wintering birds. Two Nature Reserves are also situated within the washes; Wildfowl and Wetlands Trust (WWT) Welney and RSPB Ouse Washes.

7.5 County Designated Sites

Nine County Wildlife sites are present within the Parish of Ely, as listed below. County Wildlife Sites are those sites considered to be of particular local importance for nature conservation at

county, rather than at national level. Some of the sites listed also hold higher level designations as SSSI's. The sites are assessed for their habitat value covering a range of flora and fauna.

- Angel Drove drains
- Beald Drove pollard willows
- Black Wing drains
- Chettisham Meadows
- Ely Beet Pits
- Ely Cemetery
- Middle Fen Bank pollard willows
- River Lark and associated habitat
- Roswell Pits and adjacent area

7.6 Conclusion

These designated sites require particular consideration when proposing development in and around Ely as they signifiy particularly sensitive areas. This particularly applies to the Cam Washes, which holds international designations. As a result any plan or project which is considered likely to have a significant effect on such a site is likely to require an Apropriate Assessment.

8. SUMMARY OF LIKELY CONSTRAINTS ON DEVELOPMENT

The following table summarises the likely impact of the constraints discussed in this report, on each of the major development sites identified in the Master Plan.

	Heritage	Geology	Flooding	Contaminated Land	Noise	Air Quality	Ecology	Landscape/ Townscape	Transport and Access
Lisle Lane									
Cam Drive									
EOSA									
Angel Drove									
Standen									
Paradise									
ENS									
Rail Station Gateway									
City Centre/Market Square									
High Flyer Farm									
Roswell Pits									

Key:

Colour	Meaning
	Minimal constraint, or good development opportunity
	Possible constraint, or constraint on certain uses
	Significant constraint to development, or likely to impose considerable costs