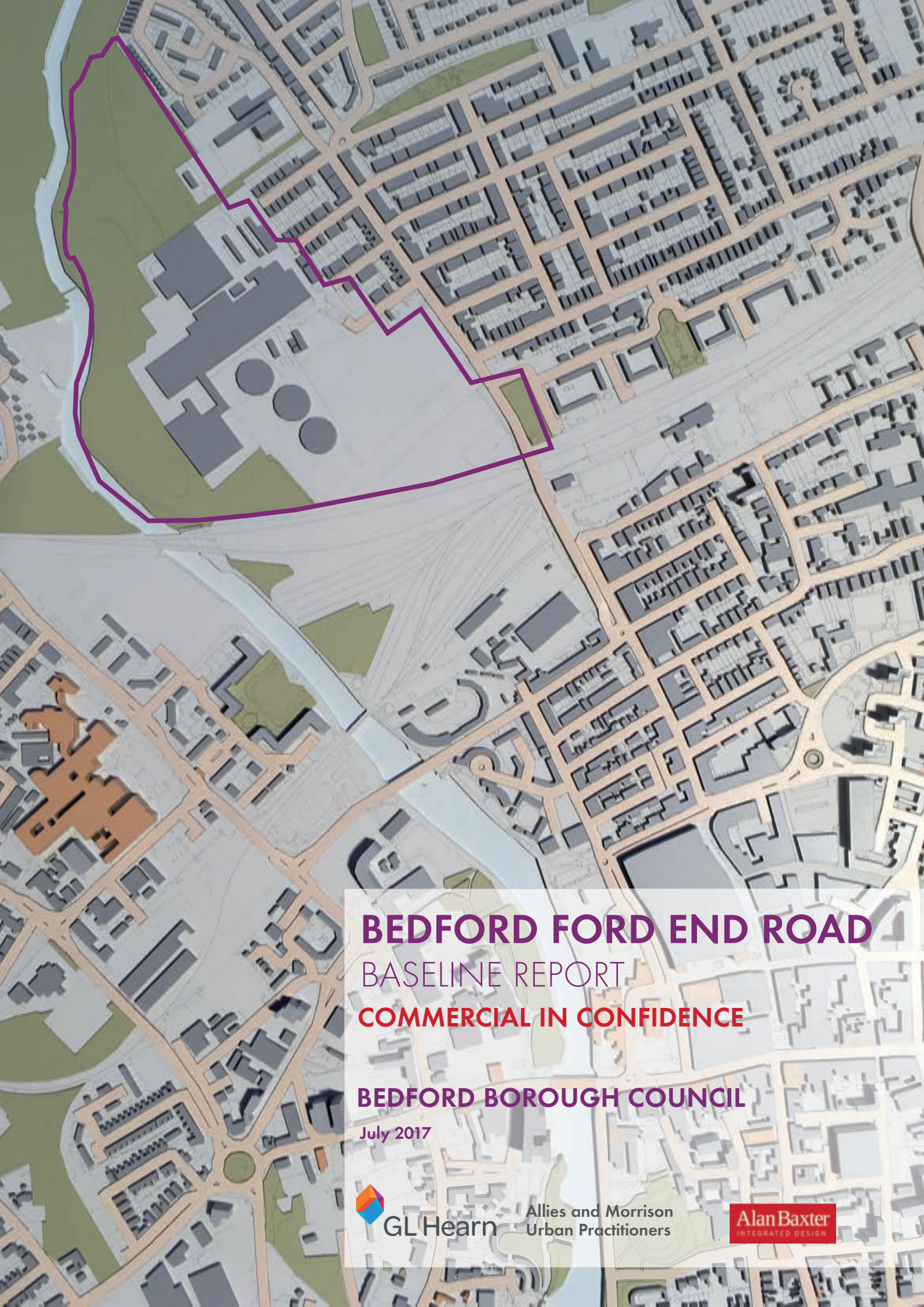


BEDFORD FORD END ROAD

BASELINE REPORT

COMMERCIAL IN CONFIDENCE

BEDFORD BOROUGH COUNCIL

July 2017

GL Hearn
Allies and Morrison Urban Practitioners
Alan Baxter INTEGRATED DESIGN

CONTENTS

Fig 1 *Aerial photograph of the study area*

1 INTRODUCTION

1.1.1 Bedford Borough Council has appointed GL Hearn Ltd, together with its consultancy team Allies & Morrison, Alan Baxter, Capita and Johnson Associates to prepare a masterplan and delivery strategy for the Ford End Road area that comprises the land between the River Great Ouse and Ford End Road, the majority of which is brownfield.

1.1.2 The area is experiencing a number of changes, with the recent sale of the Charles Wells to Marston's, National Grid marketing their land holdings for sale and NHS Property progressing land disposals.

1.1.3 The masterplanning exercise for Ford End Road is a key project within the One Public Estate Transforming Bedfordshire Partnership programme that is seeking to utilise public sector assets to deliver cost savings to central and local Government, as well as facilitating regeneration though new residential and mixed-use developments. The document is one of two masterplans being produced by Bedford Borough Council, with the other focusing on sites in and around the town centre.

1.1.4 The One Public Estate Partnership Board is chaired by the Mayor of Bedford, and includes the Chief Executives from Bedford Borough Council and Central Bedfordshire Council and representatives of Bedfordshire Clinical Commissioning Group, Network Rail, SEMLEP, NHS Property, Bedfordshire Police, Bedfordshire Fire and Rescue Service, Bedford Hospital NHS Trust, Bedford College, and the Homes and Communities Agency.

1.1.5 The masterplan is also designed to assess the capacity and land use mix of development sites to help inform the emerging Bedford Local Plan 2035, which has identified the land at Ford End Road for circa 500 dwellings together with a primary school.

1.1.6 This baseline report provides the first stage in preparing the masterplan, which is to be a Supplementary Planning Document to the new Local Plan once adopted. The various stages of the masterplan include:

2 PLANNING POLICY CONTEXT

Planning History

2.1.1 A review of the planning applications database that the Council has on-line provides an insight into the recent permissions granted across the site at Ford End Road. The table below identified the key permissions since 1990.

Site	Description	Reference	Date of Permission
Brewery			
	Extension to plant building and erection of tank and transformer compound	10/00743/FUL	August 2010
	Change of use of land as staff car park	08/03194/COU	January 2009
	Redevelopment of factory to form B1 office units	05/00980/FUL	July 2005
	Two storey side extension to existing offices	04/00008/FUL	February 2004
	Erection of a store	02/02328/FUL	November 2002
	Demolition of existing and construction of new two storey staff restaurant and training centre. Erection of 1.5m high galvanised steel fencing to existing wall.	02/00168/FUL	April 2002
	New gatehouse and alterations to entrance including gates and fencing	96/00856/FUL	September 1996
	Erection of new offices and warehouse and alterations to store	95/01826/FUL	February 1996
	New warehouse (phases 1 and 2) - reserved matters	93/00028/FUL	June 1993
	Extension to existing brew house	90/01293/FUL	November 1990
National Grid	Demolition of No.3 gas holders and associated structures	17/00847/DEM	April 2017
	Proposed residential and employment development - outline - means of access not reserved	03/01660/OUT	December 2003

2.1.2 The planning history shows a number of changes to the Brewery site over the past 30 years, including new offices, warehouses and stores. The northern part of the National Grid land secured planning permission for a residential scheme of 146 apartments, 8 live-work units and 9 B1 employment units totalling 9,000 sq.ft.

2.1.3 In addition, Network Rail's land at Ford End Road (the Sidings) formed part of a wider

planning application at Bedford Station that was submitted in 2010, but subsequently withdrawn. The proposals for the Sidings included 79 residential units.

Planning Policy Context

National Planning Policy

2.1.4 The National Planning Policy Framework was introduced in March 2012 and must to taken into account by local planning authorities in formulating local plans and determining planning applications. The NPPF contains a 'presumption in favour of sustainable development' in both plan-making and decision-making.

2.1.5 In formulating Local Plans, local planning authorities should meet objectively assessed needs. In terms of housing, the NPPF directs local planning authorities to significantly boost the supply of housing (Paragraph 47) through the delivery of the full market and affordable OAN and maintain a 5-year housing land supply together with buffer of 5%, or 20% where there has been a persistent under-delivery of housing.

2.1.6 The NPPF supports the development of brownfield sites (Paragraph 111) unless the previously developed land is of high environmental quality.

2.1.7 In appropriate development in areas at risk of flooding should generally by avoided under the NPPF (Paragraph 100) by directing development from areas at highest risk (flood zone 3).

Local Planning Policy

2.1.8 Under Section 38(6) of the Planning and Compulsory Purchase Act 2004 and Section 70(2) of the Town and Country Planning Act 1990, planning applications must be determined in accordance with the development plan, unless material considerations indicate otherwise.

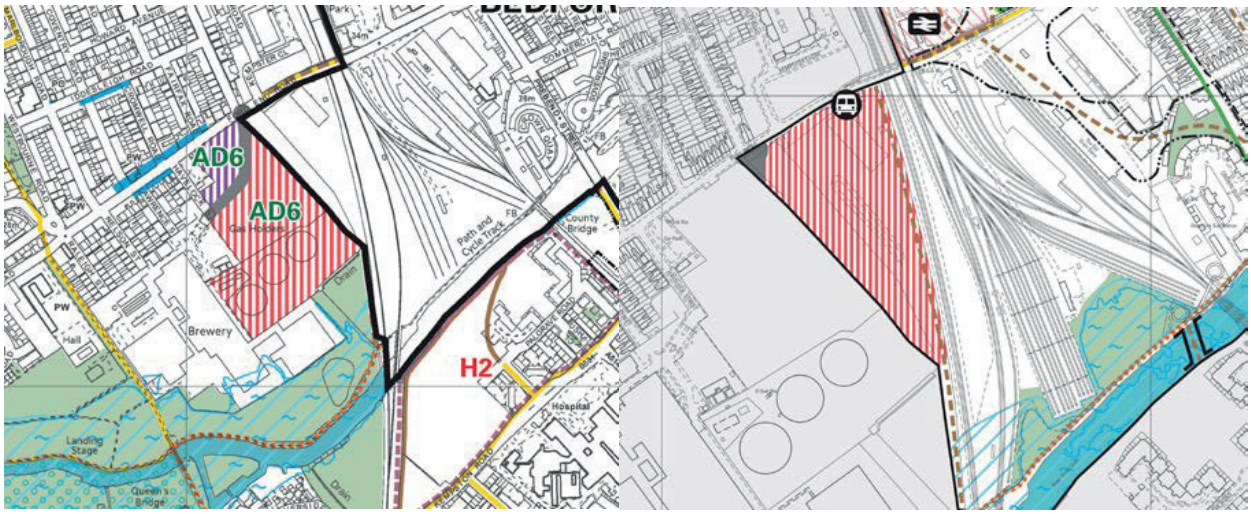
2.1.9 The development plan for Bedford Borough Council local authority area currently consists of:

- Bedford Borough Core Strategy and Rural Issues Plan (April 2008);
- Saved Policies within Bedford Borough Local Plan (October 2002);
- Allocations and Designations Local Plan (July 2013);
- Bedford Town Centre Area Action Plan (October 2008); and
- Policies Map 2014.

2.1.10 It should be noted that several of these documents are pre-NPPF and require updating. In light of this, the Bedford Borough Local Plan 2035 is being prepared, with a consultation document published in April 2017.

Planning Allocations/Designations

2.1.11 The land within the ownership of National Grid, Rolls Royce and Network Rail is allocated in Bedford Borough Council's Allocations and Designations Local Plan and the Bedford Town Centre Area Action Plan, which both cover the period up to 2021. Policy AD6 allocates this land for a mix of housing and employment uses. The policies map below shows the employment allocation (in purple) and the housing allocation (in red), which indicates that the predominant proposed use within the land is housing.



2.1.12 The key principles set out within the policy are:

i. Provision of a mix of dwelling types and sizes.
ii. 0.4 hectares of employment provision to be provided as managed workspace and located to the north west of the Ford End Road link.
iii. Assessment of the nature and extent of ground contamination and preparation of a remediation strategy for the site including methods of disposing of contaminated material, measures to prevent the pollution of surface and ground water, and provisions for future monitoring, to be approved by the Council.
iv. Submission of a comprehensive planning brief, to be agreed by the Council in consultation with relevant property owners.
v. Provision of a layout which takes full account of the noise environment relative to both the railway line and the brewery.
vi. Submission of a site specific Flood Risk Assessment along with appropriate mitigation proposals.
vii. Retention and enhancement of the land adjacent to the railway to improve biodiversity value.
viii. Improvements to transportation networks, including:
a. Provision of a cycle and pedestrian link between Sustrans Route 51 along the riverside and Ford End Road and provision for the safe crossing of Ford End Road.
b. Provision of a bus drop off point adjacent to Ford End Road on the eastern side of the site (in accordance with the Council's Bedford Town Centre Area Action Plan) to include bus shelters and real time information (or equivalent).
c. Provision of the Ford End Road link (alternative vehicular access between Havelock Street and Ford End Road).
d. Contributions to improvements at the Prebend Street junction.
ix. Pre-determination archaeological evaluation.

2.1.13 One of the key requirements of the existing allocation is the need to provide a new road link between Havelock Street and Ford End Road to create an easier route into Charles Wells Brewery for its HGV vehicles.

2.1.14 The Policies Map also shows that the Council's land that is located to the south of the Brewery and National Grid sites is designated as Open Space. The majority of the open space is also located within the functional floodplain (3b). Policy AD43 presents the policies on Urban Open Spaces, and states that "Development will not be permitted on land designated as urban open space and gaps unless it can be demonstrated that the reasons for designation are not compromised or that other material considerations outweigh the need to retain the urban open space and gaps undeveloped. The Council will seek in association with new development, the provision of new and/or the enhancement of existing open space."

2.1.15 The Allocations and Designations Local Plan also mentions some infrastructure requirements to deliver the housing and employment scheme. The document states that

- Water - To supply this development it will be necessary to lay 95m of 125mm reinforcement main along Ford End Road and 100m of 225mm reinforcement main along Old Ford End Road. This development will also need to contribute to towards phase 1 of the Bedford south and west reinforcements.
- Foul Sewerage – Major upgrades may be required, and sewers crossing the site may need diverting.

- Surface Water Drainage – Major upgrades and attenuation may be required.

2.1.16 Bedford Borough Council is currently in the process of revising its Local Plan to cover the period up to 2035. A Consultation Paper on the Local Plan has been produced and this sets out the preferred spatial strategy for housing growth and the key housing allocations in the Borough. The Plan has a requirement of 8,103 homes to be allocated up to 2035. Within the urban area a total of 877 residential units have been identified on a number of sites including land at Ford End Road. The whole site at Ford End Road is included within this preferred allocation as shown on the plan below, although the developable area of the site is focused on the brownfield part of the site. An estimated number of 500 homes are set out in the plan document, together with the requirement for a new primary school. The emerging Local Plan allocation for the site at this stage does not make mention of the link road to the Brewery across the National Grid land, or the need to provide an employment uses as part of the development.

Affordable Housing

2.1.17 Policy CP8 of the Core Strategy states that affordable housing will be required on sites of 15 residential units or more (0.5 hectares and over). The Council will expect the provision of 30%. The Council's preference of the affordable split is 66.7% affordable or social rent and 33.3% shared ownership.

Design and Housing Standards

2.1.18 Housing Mix – Core Strategy CP7 states that "New housing developments will be expected to provide a mix of dwelling size and type to meet the identified housing needs of the community. Larger sites should provide a broad mix of housing suitable for different household types. On smaller sites, the mix of housing should contribute to the creation of mixed communities." The latest mix is presented within the Council's Strategic Housing Market Assessment Update (October 2016), and provides the following mix for the Borough as a whole:

- Private 1 bedroom flats = 3% / Affordable 1 bedroom flats = 24%
- Private 2+ bedroom flats = 4% / Affordable 2+ bedroom flats = 12%
- Private 2 bedroom houses = 10% / Affordable 2 bedroom houses = 27%
- Private 3 bedroom houses = 59% / Affordable 3 bedroom houses = 27%
- Private 4 bedroom houses = 20% / Affordable 4 bedroom houses = 8%
- Private 5+ bedroom houses = 4% / Affordable 5+ houses = 2%

2.1.19 Housing Standards – This is set out in the Policy Update Housing Standards, October 2015. This includes the following design standards:

- 10% of new housing should meet Building Regulation M4 (3) (2)(a) – 'wheelchair user dwellings';
- new housing of 10 dwellings and over or 0.3 ha and over should meet the optional requirement set out in Building Regulation G2 (restricts water use to 110 litres per person per day where required by planning condition and where supported by a local plan policy) provided that this does not make the development unviable;
- As the Council does not currently have a policy requiring compliance with an internal space standard, there is no requirement for new dwellings to comply with the optional national standard;
- New residential developments larger than 50

dwellings should include the supply of at least 10% of energy requirements from decentralised and renewable or low-carbon energy sources provided that this does not make the development unviable.

2.1.20 Residential Parking - The Parking Standards for Sustainable Communities SPD was adopted by the Council's Executive on 10th September 2014, and proposes the following:

- 1 bedroom units / 1 space
- 2/3 bedroom units / 2 spaces
- 4+ bedroom units / 3 spaces
- Visitor parking – 0.4 spaces per dwelling, except where 60% of the total parking is unallocated

2.1.21 Open Space Standards – guidance on open space standards is set out in the Council's Open Space SPD, September 2013. The on-site open space requirements are as follows:

2.1.22 Parks and Gardens – threshold is 250 dwellings / 0.5 ha per 1,000 people (15 min walk / 1,000m straight line distance);

2.1.23 Accessible natural green space – threshold is 200 dwellings / 0.5 ha per 1,000 people (5 mins / 300 straight line distance);

- Equipped/natural play areas – threshold is 35 dwellings or 20 dwellings (if local deficiency) / 0.25 ha per 1,000 people (5 mins or 15mins / 300 or 1,000 straight line distance for up to 12 yrs or 13-16/17 yrs);
- Informal and Amenity Green Space – threshold is 10 dwellings / 0.5 ha per 1,000 people (1-2 mins walk / 100m straight line distance);
- Outdoors sport space – threshold is 250 dwellings / 1.12 ha per 1,000 pople (15 to 20 mins travel time);
- Allotments – threshold is 500 dwellings / 0.35 ha per 1,000 people (15 mins walk or 1,000m straight line distance).

URBAN DESIGN

3 URBAN DESIGN ANALYSIS

3.1 Strategic context

3.1.1 Bedford is the county town of Bedfordshire and is strategically located to the north of London, well connected to the wider UK via good rail services and motorway routes. The station operates frequent services to London, Nottingham and Sheffield on the Midland Mainline (East Midlands Trains) and connections to London and the south coast. The town also has direct connections to two of the cities major airports, Luton and Gatwick on the Thameslink Line (First Capital Connect). As well as this strong relationship with London, the town is strategically located within the Cambridge/Milton Keynes/Oxford corridor. This area contains four of the UK's fastest growing towns and cities with rising populations, world renowned education institutions with some of the highest rate of business start-ups in the country outside London.

3.1.2 This is a time of significant change and opportunity for Bedford town centre. Regional and national policy recognises this areas as growth area and the role that the town has the potential to play within the Milton Keynes and South Midlands sub-region.

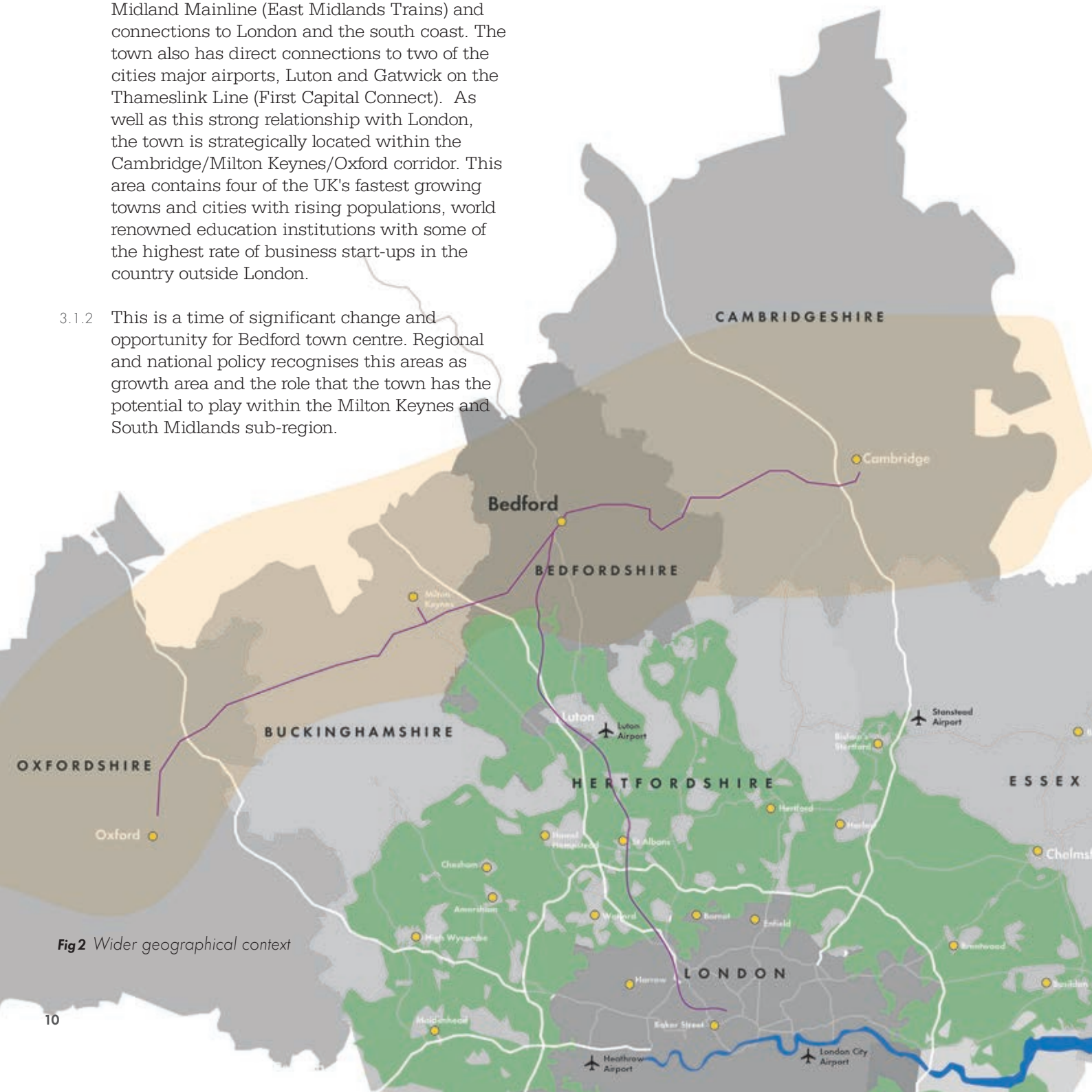


Fig 2 *Wider geographical context*

Fig 3 *1882*

Fig 4 *1901*

3.2 Historic context

3.2.1 The Ford End Road site sits to the west of the town centre and to the west of the train line. The plan from 1882 shows these lines recently opened with land around the station still relatively undeveloped. The plan shows the gas works on the site, which are still in situ today. Farmed fields extended into the site during this time with Prebend Farm and nurseries occupying the area to the north of Ford End Road. Bedford was active with industry during this period with a large iron works occupying the southern side of the river bank. The brewing industry was also booming in the town centre with major brewer Charles Wells that still exists today, now on the Ford End Road site.

3.2.2 By the early 1900's (illustrated in figure 5) the town saw rapid change with the railway connections to London. Extensive housing growth extended outside of the older core of the town centre and the population of Bedford doubled during this period. For the first time housing was developed to the west of the railway line, growing up around the gas works, but set back from the edge of the river and its flood plain. Queens works Engineering and other Midland Railway infrastructure and sheds are also now visible to the west of the railway lines.

Fig 5 *1946*

Fig 6 *Today*

3.2.3 By 1946 the town has continued to grow westwards with new housing and social amenities such as a football ground and allotment gardens established at Cox's Pits. By this time a small parade of shops had also been established on Ford End Road.

3.2.4 The gas works within the site area has also expanded southwards by this stage towards the river banks.

3.2.5 After rapid expansion on its formed site in the town centre, Charles Wells Brewery moved into the new brewery at Havelock Street in 1976.

3.2.6 The adjacent morphology plan for the town centre today shows a similar pattern of streets as in the historic plan above. Both The Britannia Iron Works and Queens works have both been replaced by residential development. Large parts of the gas works site have also been cleared.

3.3 Heritage assets

3.3.1 The area does not have any formally protected historic assets but the historic grain of the surrounding terraced streets are an important part of the character of the Ford End Road area. Some of the buildings associated with the railway have an attractive industrial quality and their retention should be considered as sites are redeveloped.

3.3.2 Similarly, the areas social, industrial and brewing history should be reflected in proposals for the area.

Fig 7 *Historic assets*





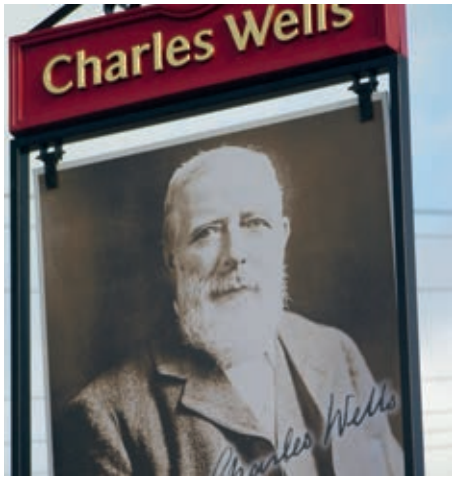




Fig 8 *Site context photos*


BEDFORD DEPOT


Queens Park
Biddenham
Allen Park
Queens Park
Biddenham
Bromham
3
Bedford


MR FISH


Charles Wells
BREWING FAMILY SINCE 1876

3.4 Character and townscape

3.4.1 The Ford End Road area has a number of landmark buildings and structures. Religious landmarks are an important feature in the area, many of which have towers or attractive roof designs that are visible from a distance. This includes the Gurdwara Temple with key views along Ford End Road, and more local views to Bedford Central Misque on Westbourne Road, and All Saints Church on Iddesleigh Road. The large gas cylinders are also a more industrial landmark, visible from the railway line.

3.4.2 Generally buildings within the area are either brick residential terraces or industrial buildings associated with the gas works, brewery or railway.

Fig 9 *Character and townscape*

3.5 Building heights

3.5.1 The area is generally low rise with terraced streets of two storey houses surrounding the site to the north. Some blocks of flats sit immediately to the west of the railway line that rise to three and four storeys. Within the site area the industrial buildings associated with the brewery and the gas works are more varied in height.

Fig 10 *Building heights*

3.6 Land use

3.6.1 The land use plan below illustrates the immediate land use context surrounding the site. This includes residential streets to the north of the area with a mix if uses including retail, food and drink and faith uses along Ford End Road.

3.6.2 The site itself contains industrial uses and a small amount of office/business space. To the west side of the site there is a small community centre and associated sports pitches.

Fig 11 *Land use*

3.7 Topography

3.7.1 The Ford End Road site is adjacent to the River Ouse and is therefore generally low lying in a shallow river valley. The change in heights of the railway land and road network are also visible as the land rises to accommodate the railway line crossing the river.

Fig 12 *Topography*

3.8 Landscape assets

3.7.1 The Ford End Road site is well served in terms of landscape assets and amenity spaces. Land to the west of the study area contains a community centre and hard surfaced pitch with other playing fields. A pedestrian bridge over the river connects to other more formal sports pitches and the Kempston Swimming Pool.

3.7.2 A pedestrian route runs along the edge of the river along its north bank which connects the site to the wider countryside around Bedford. The eastern half of the site is scrub land that is not publicly accessible, parts of which may have a value in ecological terms or as wildlife habitats.

Fig 13 *Landscape assets*

3.9 Flooding and waterways

3.8.1 The site is bound to the south by the River Ouse and as such,large parts of the study area are within its flood zone. Most of the site is covered by Flood Zone 2, with southern parts covered by Flood Zone 3.

Fig 14 *Indicative Flooding and waterways*

MOVEMENT

4 TRANSPORT & MOVEMENT

4.1 PLANNING AND TRANSPORT POLICY

4.1.1 Relevant national and local policy and guidance documents have been reviewed and are set out in this Chapter. The local policies have been summarised outlining key transport aspects from each document.

National Policy and Guidance

4.1.2 The National planning policies and guidance documents considered most relevant to the transport aspects of the masterplan sites are set out in the following key documents:

- National Planning Policy Framework (2012)
- Local Transport White Paper (2011)
- Manual for Streets (2007)
- Manual for Streets 2 (2011)

Local Policy and Guidance

4.1.3 The local policies and guidance considered most relevant to the transport aspects of the development sites are set out in the following documents:

- Bedford Borough Local Plan 2035 (January 2017)
- Local Plan 2032 Issues and Options - Town Centre Discussion Paper (2014)
- Traffic Data Report, Bedford Borough Council (2012)
- Transport Asset Management Plan, Bedford Borough Council (2011)
- Bedford Benchmarking: Sustainable Transport, JMP (June 2015)
- Local Transport Plan 3 2011-2021, Bedford Borough Council (Feb 2011)
- Bedford's Network Management Strategy 2011-2021, Bedford Borough Council (2010)
- Bedford's Parking Strategy 2011-2021, Bedford Borough Council (2010)
- Ford End Road Bedford JLL (March 2016)

4.1.4 Each of these policies is summarised below in relation :

Bedford Borough Local Plan 2035 (January 2017)

4.1.5 Following the publication of the National Planning Policy Framework, Bedford Borough Council is preparing a local plan that will set out how much growth there should be in the borough for the next 15 years. It will explain the amount and location for housing, employment and other development as well as associated infrastructure that will be required. The draft Local Plan 2035 has recently undergone consultation (24 April to 9 June 2017). A previous summary consultation paper referred to objectives of reducing congestion particularly around the town centre and making journeys by public transport, walking and cycling more attractive to encourage an increase in more sustainable and healthy modes of transport.

Local Plan 2032 Issues and Options - Town Centre Discussion Paper (2014)

4.1.6 In the preparation of the Local Plan the Council prepared and consulted on an Issues and Options Paper in 2014. This set out varying levels of growth and five options for spatial distribution.

A range of technical studies will be used to inform the Plan of these studies the most relevant in terms of transport include an assessment of infrastructure needs including highway infrastructure and assessment of cumulative impact and a town centre study.

4.1.7 The Local Plan sets out key themes and issues that the new Local Plan 2032 (revised to 2035) will need to address, the most relevant is outlined below;

- 'Local Plan Theme 5: Transport: Around 60% of the borough's residents in employment travel to work by car. We recognise the importance of more sustainable alternatives and are working with local bus operators to ensure that rural bus services are maintained. We are doing this by providing financial assistance to support the viability of some rural routes and latest figures show that in certain areas passenger numbers are now rising. However there is still the potential for improvements to public transport accessibility between rural areas and Bedford particularly during peak times. Whilst public transport accessibility remains a key challenge for some rural residents traffic congestion, particularly in the town centre, and resulting poor air quality issues are the key challenges to be addressed in the urban area. The proportion of those cycling and walking to work has remained largely unchanged over the past decade at 3.8% and 9.7% respectively.

- Key transport projects for the borough include the Bedford Western Bypass phase 2, Batts Ford bridge, the electrification of the Midland Mainline and East West Rail. These are major projects for the future of our borough and the council will continue to work with its partners to bring them forward at the earliest opportunity

- Issue 5: How to improve the borough's transport infrastructure in order to support growth in the local economy and to make the borough more attractive as a place to live and do business. In particular how to reduce congestion in and around the town centre and make journeys by public transport, walking and cycling more attractive to encourage an increase in more sustainable modes of transport.'

4.1.8 Furthermore this document recognises the need to look beyond the boundary of Bedford borough stating that; 'Bedford's main linkages by road connect the town to Milton Keynes to the west, Cambridge to the east, Northampton to the north west and Luton to the south. The Midland Mainline railway runs north-south through the Borough providing connections to London and the Midlands. First Capital Connect services link Bedford to London stations, Gatwick Airport and Brighton whilst the Marston Vale line provides local rail services to Bletchley. The Borough is thus part of a complex network of living, working and leisure activity.'

Traffic Data Report, Bedford Borough Council (2012)

4.1.9 This report has been prepared to provide information about traffic flows in Bedford. Most of the data used to prepare this report relates to motorised traffic although additional information about pedestrians and cyclists has been provided where possible. A survey was carried out on 4th October 2012. The data collected from the inner cordon (a ring around the town centre, see Figure 1.1) recorded that nearly 35,000 vehicles entered Bedford town between 7am and 12am, the majority of these movements were by car (85%), and the majority (62%) were single occupancy cars. Commercial vehicles (vans and lorries) made up 11% of vehicles. Buses (1.5%), pedal cycles (3%) and motor cycles (<1%) together made up just 5% of vehicles. Additionally, numerous counts were undertaken at Bedford station which revealed that almost

half of people arriving at the station do so on foot, with only a quarter of people using the car park.

Transport Asset Management Plan, Bedford Borough Council (2011)

4.1.10 Bedford's Transport Asset Management Plan (TAMP) forms an integral part of the Local Transport Plan. The purpose of the TAMP is to set out current systems in place to manage overarching transportation strategies to maximise the benefits to the community. Key aims include;

- maintaining an accurate, up to date comprehensive inventory of all transport assets (such as roads, street lights, bus stops, traffic signals, car parking signs, cycle facilities and pedestrian crossings)
- supplement the inventory with performance data
- provide a compendium of performance targets to support the Sustainable Communities Strategy and the Local Transport Plan.

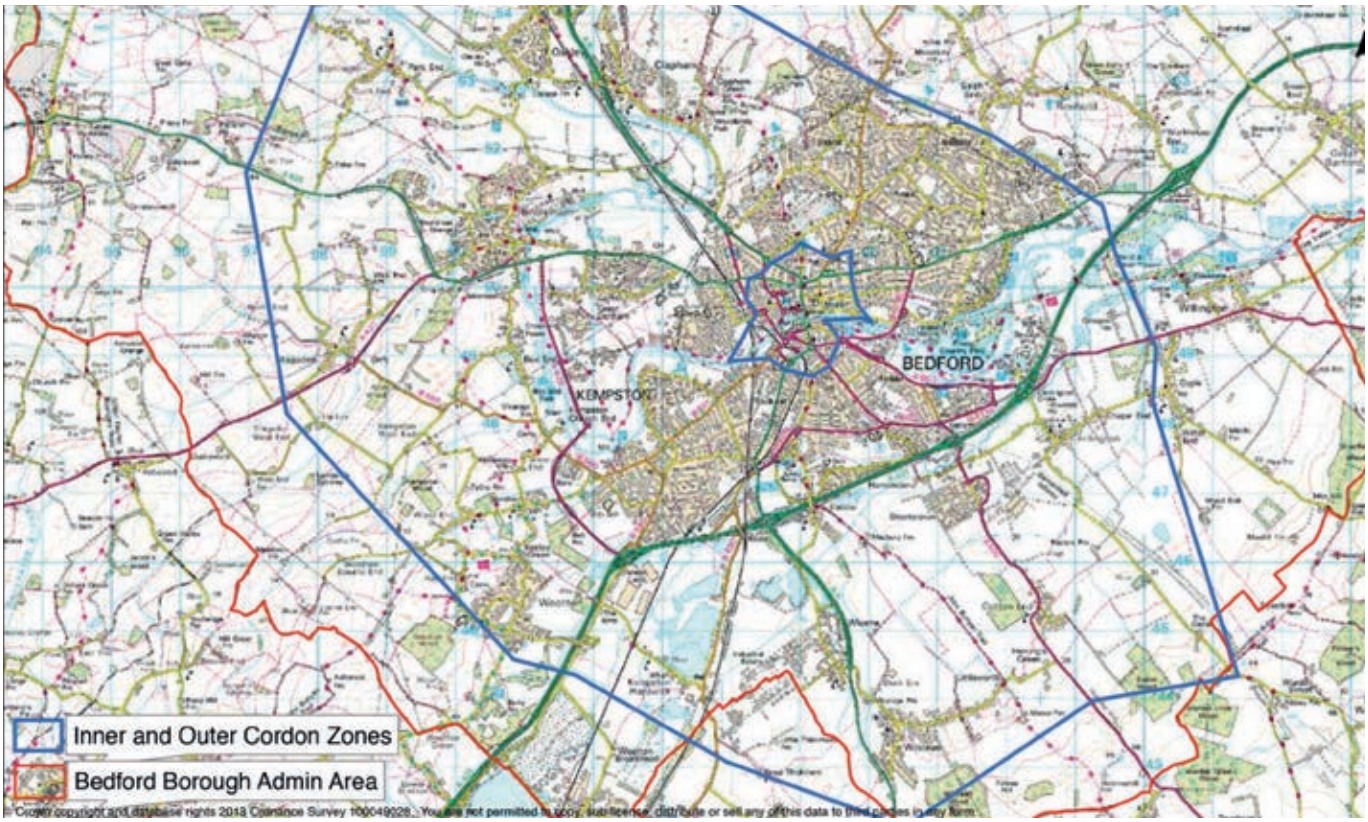


Fig 15 *Bedford inner and outer cordon areas, source: Traffic Data Report, 2012*

Bedford Town Centre Strategy. Bedford Benchmarking: Sustainable Transport (2015)

4.1.11 This report aims to assess whether Bedford has the potential to tackle its current and future transport problems through traffic demand management and a modal shift towards sustainable travel. To achieve this it provides baseline analysis of the physical and transport characteristics of Bedford and presents the challenges that must be addressed by the town's transport strategy. Additionally the report identifies eight comparable UK towns that have similar characteristics to Bedford, and presents their modal split from the 2011 census data.

4.1.12 In conclusion this report indicates that the levels of sustainable transport in Bedford are lower than in other comparable towns, in particular the levels of walking and bus use. Bedford relies heavily on the car in comparison to other towns which could indicate a poor provision of alternatives. However, it suggests that given its size and density Bedford should be able to achieve significantly greater levels of walking and bus use.

Local Transport Plan 3 2011-2021 (2011)

4.1.13 The Local Transport Plan (LTP) 2011-2021 sets out the long term transport strategy and contains an implementation plan which is designed to tackle the Borough's transport problems. It identifies the key projects, schemes and initiatives necessary to deliver the outcomes which will build sustainable local communities, and strengthen its place shaping role. The LTP for Bedford Borough sets out the Transport Goals and Challenges that need to be met to achieve the priorities for transport, which are specifically:

- A - Understand and change travel behaviour and perceptions.
- B - Prioritise and deliver with limited resources.

4.1.14 The overall vision for transport in Bedford Borough is 'to create a transport system in which walking, cycling and public transport are the natural choices of travel for the majority of journeys because they are affordable, healthy, convenient and safe alternatives to the private car'.

Bedford's Network Management Strategy 2011-2021 (2010)

4.1.15 The Bedford Borough Council Network Management Strategy has been developed to support local and national policies on tackling congestion and disruption on the highway network and meet the Council's statutory obligations as laid out in the Traffic Management Act 2004 (TMA).

Bedford's Parking Strategy 2011-2021 (2010)

4.1.16 This Parking Strategy (2010) seeks to address the environmental objectives and benefits of increased pedestrian and public transport trips and discouraging unnecessary car based trips. This document acknowledges that this needs to be balanced with the need to encourage regeneration and enhance economic activity.

Ford End Road Bedford JLL (March 2016)

4.1.17 The purpose of this report is to explore the potential of the Ford End Road site in Bedford to provide new housing in the future. It provides a transport review which assesses the amount of highway works which may be required to facilitate a new residential mixed use development. The assessment includes details on existing access arrangements and traffic flows on nearby streets as well as predicted traffic generations and potential new access points.

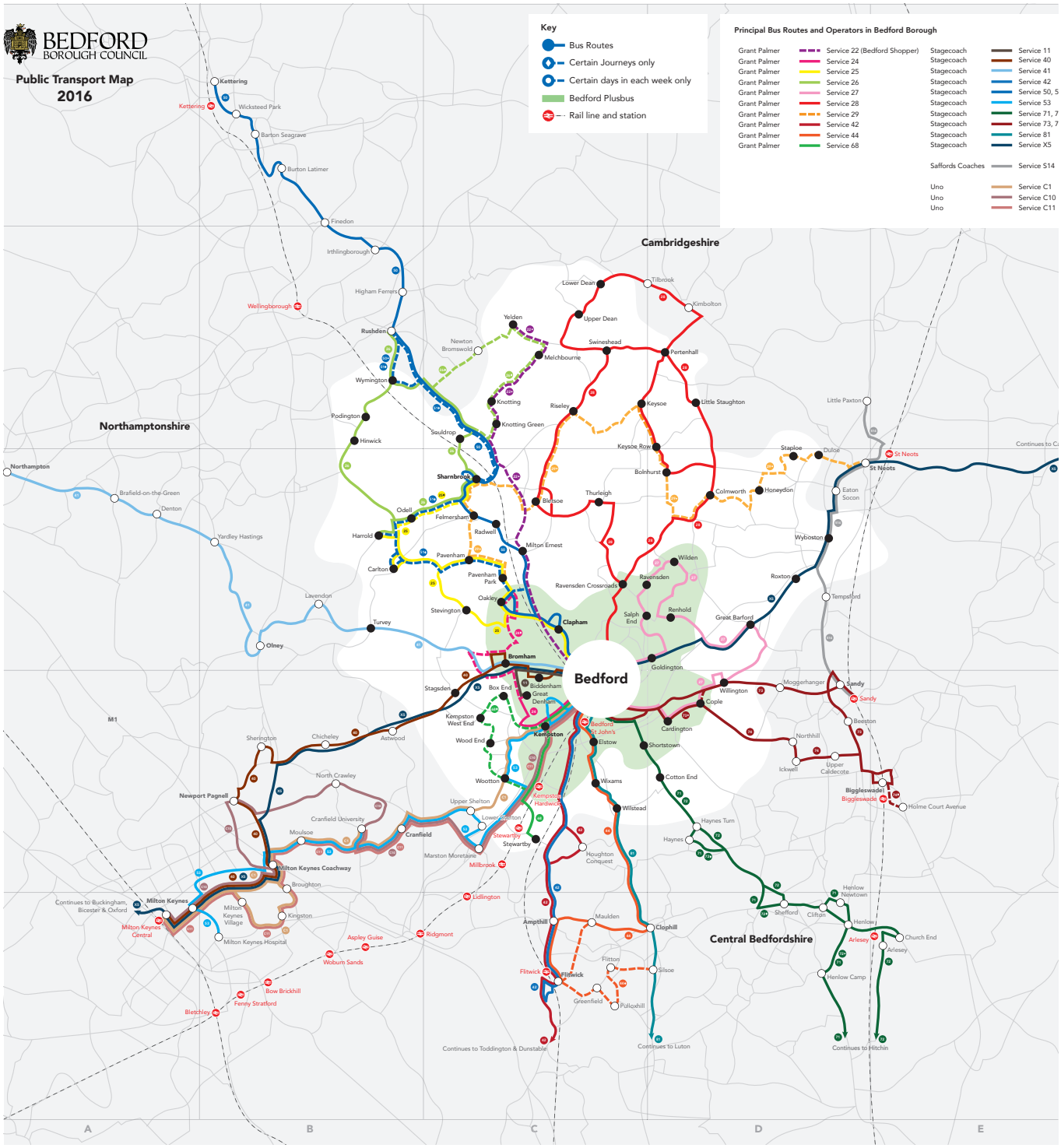


Fig 16 *Existing rural bus network connecting Bedford to nearby villages , source: Bedford Borough Council (2016)*

4.2 TRANSPORT BASELINE

4.2.1 This chapter outlines the baseline review of existing transport conditions including assessment of bus services, local provision for walking, cycling, train services as well as road networks and parking. Significant planned transport improvements in the vicinity of the sites are also highlighted. The baseline review is based on desk-based research and information gained from site visits.

Existing bus network

4.2.2 Bedford town centre is well served by bus, with relatively high frequency services operated by Stagecoach and Grant Palmer connecting the centre to residential areas of Bedford. The rural network is less comprehensive and is primarily made up of individual linear routes from Bedford connecting to the surrounding towns and villages (Figure 4).

4.2.3 Within the town centre there are a total of 12 local bus services which serve Bedford, connecting the residential areas of the town to the town centre (Figure 4 & 6). All of these routes stop at Bedford Bus Station off Greyfriars (A600). Along these town centre routes bus stops are relatively spaced out, around every 800m (10 minute walk) between stops. They generally comprise a flag, a bus bay cage marked on the carriageway, some stops also have a bus shelter. However, in general there is limited provision of route information and insufficient footway space for waiting bus passengers and passing pedestrians. Additionally there are a number of bus services connecting Bedford to further destinations such as;

- Oxford / Cambridge : X5 (every 30 minutes) provides a frequent coach service between Oxford and Cambridge via St Neots, Bedford, Milton Keynes, Buckingham and Bicester.
- Northampton- bus service 41 provides a frequent service every 30 minutes to Northampton.
- Milton Keynes- bus services C1, C10 and C11 provide up to two buses per hour.

4.2.4 Bedford Bus Station opened in March 2015 and has a travel centre and a new departure hub with a sheltered waiting area for bus passengers and four additional bus shelters in the front forecourt for services 3, 4, 7, 8 and 10. All bus stops have real time display screens. Whilst the bus network is relatively comprehensive connections to the station by bus are poor, only two local bus routes serve the station. The bus stops at the station comprise of a bus shelter and bus cage marked on the carriageway. A PlusBus service operates within the whole urban area of Bedford and is inclusive of all town centre sites. This service enables rail passengers to purchase a ticket for unlimited bus travel on participating operators' services, namely Stagecoach, Grant Palmer, Bedford Park and Ride and Bedford Borough Council contracted services.

4.2.5 Stagecoach operates a bus based park and ride service from Bedford town centre to Elstow, situated to the south of the town centre. There are up to two buses per hour in each direction to and from the town centre.

Bus network in relation to the site

4.2.6 The site has reasonable proximity to the bus station which provides reliable and frequent services to the residential areas of Bedford and destinations further afield such as Milton Keynes, Northampton, Oxford and Cambridge. Only one route the 8 directly serves the site providing a service every 30 minutes between Bedford town centre and Great Denham, a residential area of Bedford. The bus stops of this route are at the junction of Grove with Ford end Road.

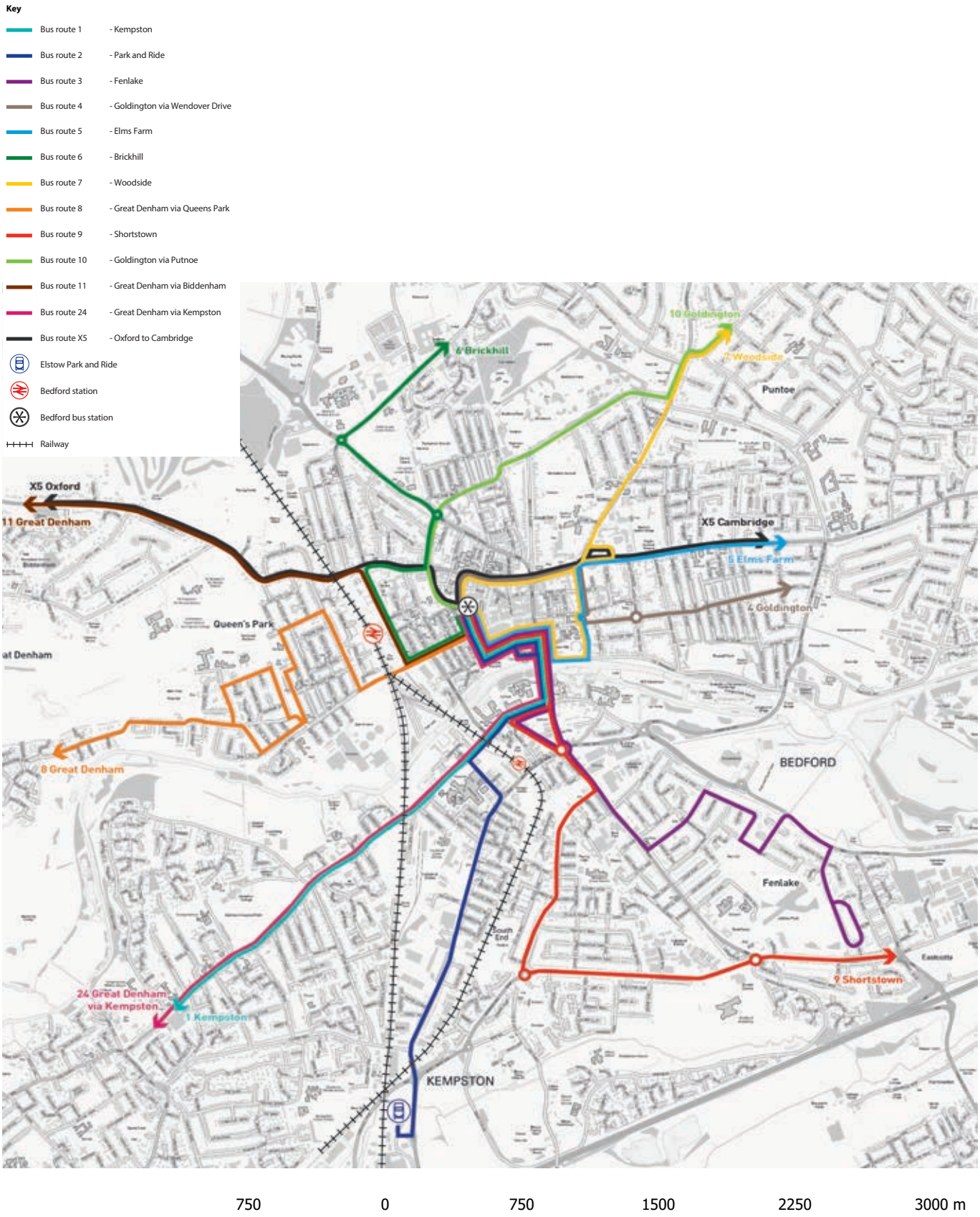


Fig 17 *Existing bus network*

Service	Operator	Route	First	Last	Frequency (Mon-Sat)
Bedford Town Centre					
1	Stagecoach	Bedford Town Centre - Kempston Circular	M-Sat: 06:00	M-Sat: 23:41	Every 12 minutes to one hour
2 (P&R)	Stagecoach	Bedford Town Centre - Bedford Hospital - Elstow Park & Ride	M-Sat: 06:39	M-Sat: 22:58	Every 15 minutes to one hour
3	Stagecoach	Bedford Town Centre - Barford Avenue - Fenlake.	M-Sat: 06:45	M-Sat: 19:18	Every 30 minutes
4	Stagecoach	Bedford Town Centre - Castle Road -Riverfi eld Drive - Goldington (Tesco)	M-Sat: 05:59	M-Sat: 23:15	Every 30 minutes
5	Stagecoach	Bedford Town Centre - Haylands Way - Elms Farm (Norse Road) - Waitrose Goldington	M-F: 05:33 Sat: 6:58	M-F: 22:55 Sat: 22:55	Every 12 - 30 minutes
6	Stagecoach	Bedford Town Centre - Brickhill Drive - Tyne Crescent	M-F: 05:33 Sat: 6:45	M-F: 23:01 Sat: 23:01	Every 12 minutes
7	Stagecoach	Bedford Town Centre - Woodside	M-Sat: 06:05	M-Sat: 22:50	Every 30 minutes
8	Stagecoach	Bedford Town Centre - Queens Park - Great Denham	M-Sat: 06:05	M-Sat: 23:34	Every 30 minutes
9	Stagecoach	Bedford Town Centre - Mile Road - Shortstown	M-Sat: 06:35	M-Sat: 22:35	Every 12 - 30 minutes
10	Stagecoach	Bedford Town Centre - Putnoe - Goldington	M-Sat: 06:20	M-Sat: 19:58	Every 30 minutes
11	Stagecoach	Great Denham – Bedford Rail Station – Bedford Bus Station	M-Sat: 06:40	M-Sat: 20:54	Every 30 minutes
24 24	Grant Palmer	Bedford Town Centre - Bedford Hospital - Kempston - Great Denham Great Denham - Kempston - Bedford Hospital - Bedford Town Centre	M-Sat: 07:45 M-Sat: 07:08	M-Sat: 19:45 M-Sat: 19:28	Every hour (school days only)
X5	Stagecoach	Oxford - Bicester - Buckingham - Milton Keynes - Bedford - St Neots - Cambridge			Every 30 minutes
41		Bedford- Northampton	M- Sat: 05:45	M- Sat: 18:35	Every 30 minutes

Fig 18 *Existing bus services*

Existing walking and cycle network

4.2.7 Walking and cycling within the town should be relatively easy given Bedford's flat terrain and the short distances around the town. The majority of the town is within a 15 minute cycle to the town centre. Whilst the cycle network appears extensive the network as a whole is disjointed and many of the cycle routes are situated along main roads alongside traffic. Figure 2.3 provides an overview of the existing walking and cycling network in Bedford town centre.

4.2.8 The retail core of the town centre has a pedestrian focused environment with a number of pedestrianised streets namely, Harpur Street, Midland Road and Allhallows (Figure 8). Within these streets cycling is permitted between 6pm and 9am. Aside from the small number of pedestrianised shopping streets the nature of the town's development and substantial infrastructure has meant many streets are designed around the car, particularly at the key junctions such as Prebend Street/ Cauldwell Street (A5141) junction, Kingsway gyratory and Shakespeare Road/Bromham Road/ Ashburnham Road junction. This car focused environment has limited the attractiveness of the streets for pedestrians and cyclists and restricted ease of movement.

4.2.9 The High Street is one of the main streets within the town centre and is the focus of pedestrian movements with significant numbers of pedestrians using the street. Whilst there is a 20mph speed limit on High Street there are two lanes of frequent traffic making crossing the road difficult except at a few controlled crossing facilities.

4.2.10 Within the town centre Midland Road, Greyfriars and St Paul's square area are also well used by pedestrians but the high traffic flows, lack of crossing points, narrow footways and street clutter combine to create an unpleasant pedestrian environment in which ease of movement for pedestrians is restricted (Figure 9).

4.2.11 Bedford station suffers from a poor interface with the surrounding area generally but specifically with the town centre. There is a walking and cycle link marked on the footways between the station and the town centre and bus station. However, this route is along quiet residential streets so lacks activity and a sense of place. It should be noted that the connection to the town centre was historically along Midland Road but this was lost when the current station building was constructed, north of the original building.

4.2.12 As shown in Figure 9 the majority of the cycle network consists of individual sections of what are primarily on road cycle lanes (on carriageway) or paths (off carriageway). A trafficfree shared path adjacent to the road along the north side of Kempston Road, connects to the National Cycle Network (NCN) route 51. There are a few traffic-free routes away from roads immediately to the south and north of the River Great Ouse connecting the NCN 51 into the wider cycle network within the town.

4.2.13 NCN route 51 passes through the town between Milton Keynes and Great Barford. The western section connecting Milton Keynes and Bedford currently offers on-road sections as part of an interim route until the Wixams development is complete. The eastern section provides a high quality off-road section following a disused railway line. In Bedford the route passes through residential streets in the area of Kempston and along Bedford Road before utilising paths along the River Great Ouse. A section of the route adjacent to the river passes along the northern

Fig 19 *High quality walking and cycle link south of the River Great Ouse (part of the NCN route 51)*

Fig 20 *Shared path along Cauldwell Street (part of the NCN route 51)*

Fig 21 *Existing walking and cycle routes in the town centre*

boundary of the Riverside South site. Within the wider context, NCN route 51 will eventually link up with NCN 12 and NCN 6 to create a triangle around Bedfordshire some of these links are in the process of being completed.

Walking and cycle network in relation to the site

4.2.14 NCN route 51 passes through the site along its southern boundary adjacent to the River Great Ouse. Additionally, there is a traffic-free route away from roads in the south west corner of the site connecting the NCN 51 to an on-road marked cycle route along Ford End Road and to a riverside path. Connections to the town centre on foot are poor with a narrow footpath on one side of the carriageway which extends into a long pedestrian ramp. The pedestrian environment at the western end of Ford End Road is of slightly higher quality with footways on both sides of the carriageway.

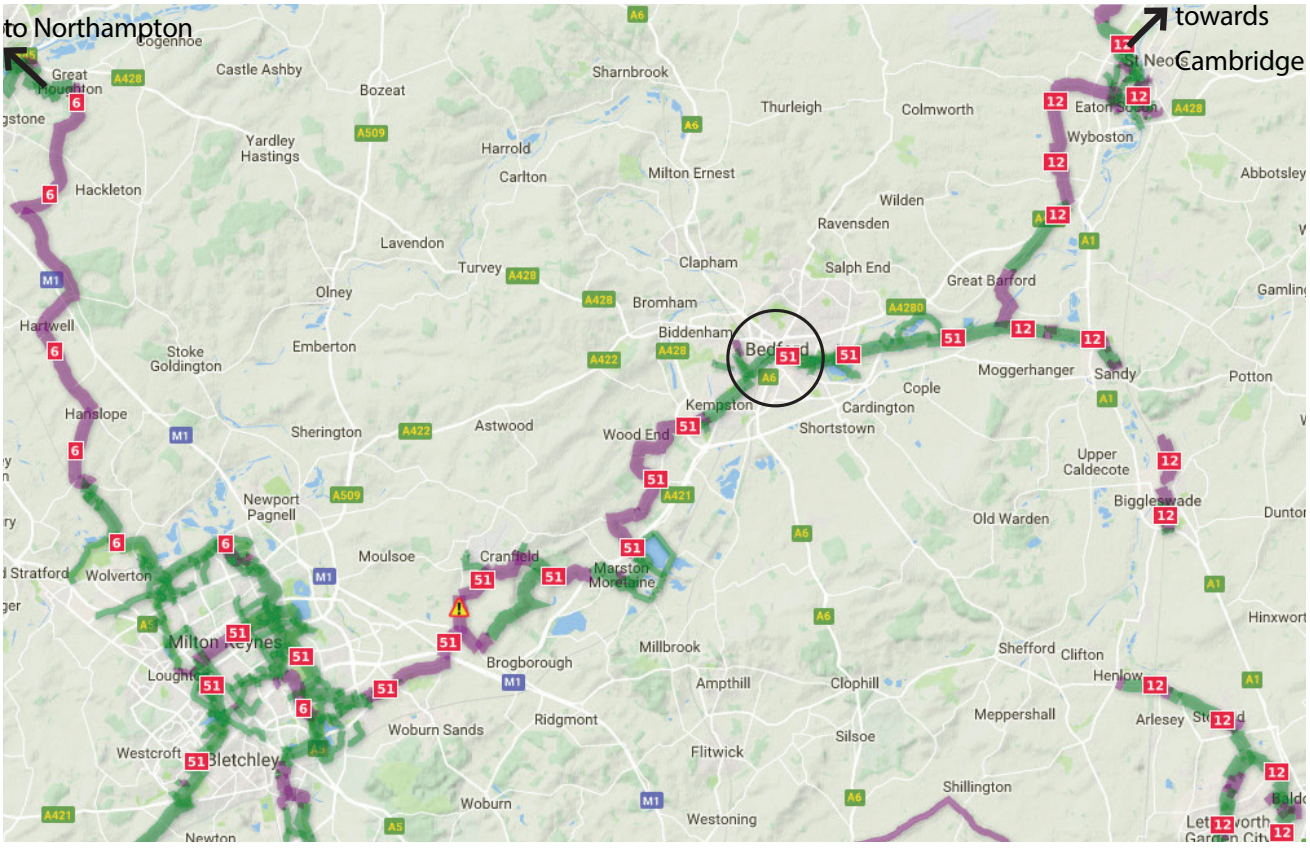


Fig 22 *National Cycle Network route 51*

Strategic road network

4.2.15 Bedford is situated between the M1 to the west and A1 to the east approximately 16 miles north east of Milton Keynes. The historic route of the A6 passes through the town centre linking to Luton in the south and Rusden to the north. Within recent years the route through the town centre has been de-trunked in parallel with the opening of a new link road connecting the A4290 with the A6 north west of the town centre. This has had some impact in reducing the volume of traffic passing through the town centre.

4.2.16 Within the town centre there is a network of one way streets, namely High Street, Horne Lane, St Paul's Square, River Street, St John's Street, Kingsway, Dame Alice Street, Harpur Street, and The Broadway as well as a number of tertiary residential streets east of the station. This causes some congestion on key roads within the town centre. The character of the key streets in the town centre is detailed below;

- The High Street provides a key route for vehicles through Bedford, It is a one way street southbound with two lanes of traffic and footways on both sides.

- Midland Road connects River Street in the east to the Prebend Street/ Ford End Road to the west. This street has the character of a high street with independent shops on both side of the road and accommodates two way traffic with 2m wide footways on both sides of the carriageway.

- River Street is a one way street for northbound traffic only and it has a contra-flow bus lane. This street provides access to the bus station and pedestrianised streets in town centre.

- Horne Lane connects River Street to St Paul's Square. The western end of the street at the River Street/ Horne Lane/ Commercial Street junction is a one way street (westbound) with a contra-flow bus lane.

- St Paul's Square is currently dominated by vehicular traffic as it forms one of the main gyratory systems in the town centre. It operates a one way system around St Paul's Church which detracts from the quality of this building and its associated public space.

- Kempston Road follows a north east to south west alignment connecting to the Kingsway in the east and the residential area of Kempston in the west. It has a traffic-free shared cycle path on the north of the carriageway.

- Kingsway is a one way street with two lanes of northbound traffic and a bus lane. Traffic flows are generally high in this area. There are footways on both sides of the road both of a generous width of approximately 3m.

- Ashburnham Road runs broadly in a north south alignment connecting Midland Road in the south and Brompton Road in the north. It has the character of a residential road with footways on both side of the carriageway and provides access to Bedford Station.

- Ford End Road is a two way street providing a connection across the railway line from Midland Road and is subject to a 20mph speed limit. At the Ford End Road/ Midland Road/ Prebend Street junction the ramp dominates the space. A separate ramp for pedestrians is provided from Midland Road. There are narrow footways on both sides of the carriageway.

4.2.17 Travel surveys undertaken by JMP consultants

and Systra in 2014 showed that the busiest parts of the highway network during both AM and PM peaks are routes leading in from the northwest (Clapham Road) and south (Cardington Road/ London Road). Only a small number (around 20%) of trips are made through the town centre, for example from Clapham Road to London Road. A high proportion of vehicles were recorded making radial movements around Bedford, travelling to and from Cardington Road. Furthermore, around 20% of the southbound trips on the High Street originated from the south or west of Bedford and therefore are classified as radial movements rather than 'through-trips'.

4.2.18 The river presents a substantial barrier to moving around Bedford, and the three bridges carry a substantial amount of traffic. Traffic surveys carried out (2012) showed that there are around 5,750 vehicle movements during a single AM peak hour with the Longholme Bridge the busiest. Vehicle movements across the bridges increase to 6,600 in a single PM peak hour, with most of the increase being attributed to the Town Bridge.

Annual Average Daily Traffic (AADT) Data (2015)

4.2.19 Table 2.2 and Figure 2.13 illustrate the levels of traffic on the highway network surrounding the sites within the town centre (Traffic counts data 2015 source: Department for Transport, DfT). Currently, the A6, north of the High Street takes 12,082 vehicles on an average day and 19,869 vehicles south of the river.

4.2.20 To the north of the river Greyfriars takes 7,319 vehicles, Ashburnham Road takes 13,656 vehicles, High Street takes 13,234 vehicles and Horne Lane takes 13,137 vehicles on an average day. South of the river Kingsway takes 17,649 vehicles per day, Cauldwell Street takes 18,522 vehicles, Britannia Road takes 11,423 vehicles.

4.2.21 This shows that there are higher traffic flows south of the river, with the majority of vehicles travelling in an east-west direction. The highest traffic flows occur around the Kingsway (A6) triangle. North of the site the river the High Street has relatively high traffic flows, especially given it is a one way street.

AADFYear	ID (CP)	Road	Start Jct.	End Jct.	Pedal Cycles	Motorcycles	Cars/Taxis	Buses/Coaches	LGV	HGVs	All Motor Vehicles
2015	48355	A6	A428	Clapham Rd	269	73	11722	474	1092	224	13,586
2015	7121	A428	A6	Kimbolton Rd r.	285	83	13692	409	2095	344	16,623
2015	7711	A5141	A428(T)	A6	147	71	10845	103	1390	231	12,640
2015	7994	A6	Union St	A5141	159	92	15003	473	2462	455	18,485
2015	8288	A6	A6 Cauldwell St	A6 St Pauls Sq.	321	217	16321	940	1987	404	19,869
2015	8393	A428	A6	Harpur St	262	62	9016	244	1372	175	10,869
2015	16165	A6	Rope Walk roundabout	Cauldwell St	85	112	13271	311	1893	271	15,858
2015	17944	A5141	A6(T)	A5141 Prebend St	152	67	9459	269	1307	321	11,423
2015	18273	A6	St Peter's St	Harpur St	132	59	9979	110	1499	381	12,028
2015	26170	A6	A5141	A6 Apthill Rd r.	178	172	14301	750	2139	286	17,649
2015	27150	A428	Deep Spinney	A5141	344	114	15430	200	2130	433	18,307
2015	27997	A6	A5141	A600 r.	142	136	14883	64	2110	356	17,548
2015	28317	A428	Harpur St	High St	262	62	9016	244	1372	175	10,869
2015	28422	A6	Harpur St	Union St	132	59	9979	110	1499	381	12,028
2015	36173	A6	St Paul's Sq	A428	147	61	10765	70	2045	293	13,234
2015	37823	A5141	A5141 Cauldwell St	A428	188	96	11527	216	1546	270	13,656
2015	38262	A5141	Prebend St	Kingsway	374	100	14956	739	2429	297	18,522
2015	38371	A6	A428(T)	St Paul's Sq	126	31	5875	406	778	229	7,319
2015	38403	A428	Dame Alice Street	Tavistock St.	120	84	9787	118	1807	276	12,071
2015	46178	A600	Elstow Rd	A6	402	182	20058	347	2193	259	23,039
2015	47881	A5140	A6	A603	106	234	21404	133	2306	661	24,737
2015	48246	A6	A5141	A6 St Marys St	117	75	15926	584	2326	246	19,157
2015	48753	A6	Horne Lane	High St	115	91	11106	499	1242	199	13,137
2015	57763	A428	A5141	A6	353	49	11890	126	1247	280	13,592
2015	75208	A6	St Paul's Sq (south side)	St Paul's Sq	147	61	10765	70	2045	293	13,234
2015	75209	A6	Horne Lane	High St	115	91	11106	499	1242	199	13,137
2015	57113	A5140	A603	A428	155	93	14212	74	1887	248	16,514

Fig 23 *Annual Average Daily Traffic flow on roads surrounding the masterplan sites, dft.gov.uk/traffic-counts , 2015*

Fig 24 *Pedestrian routes*

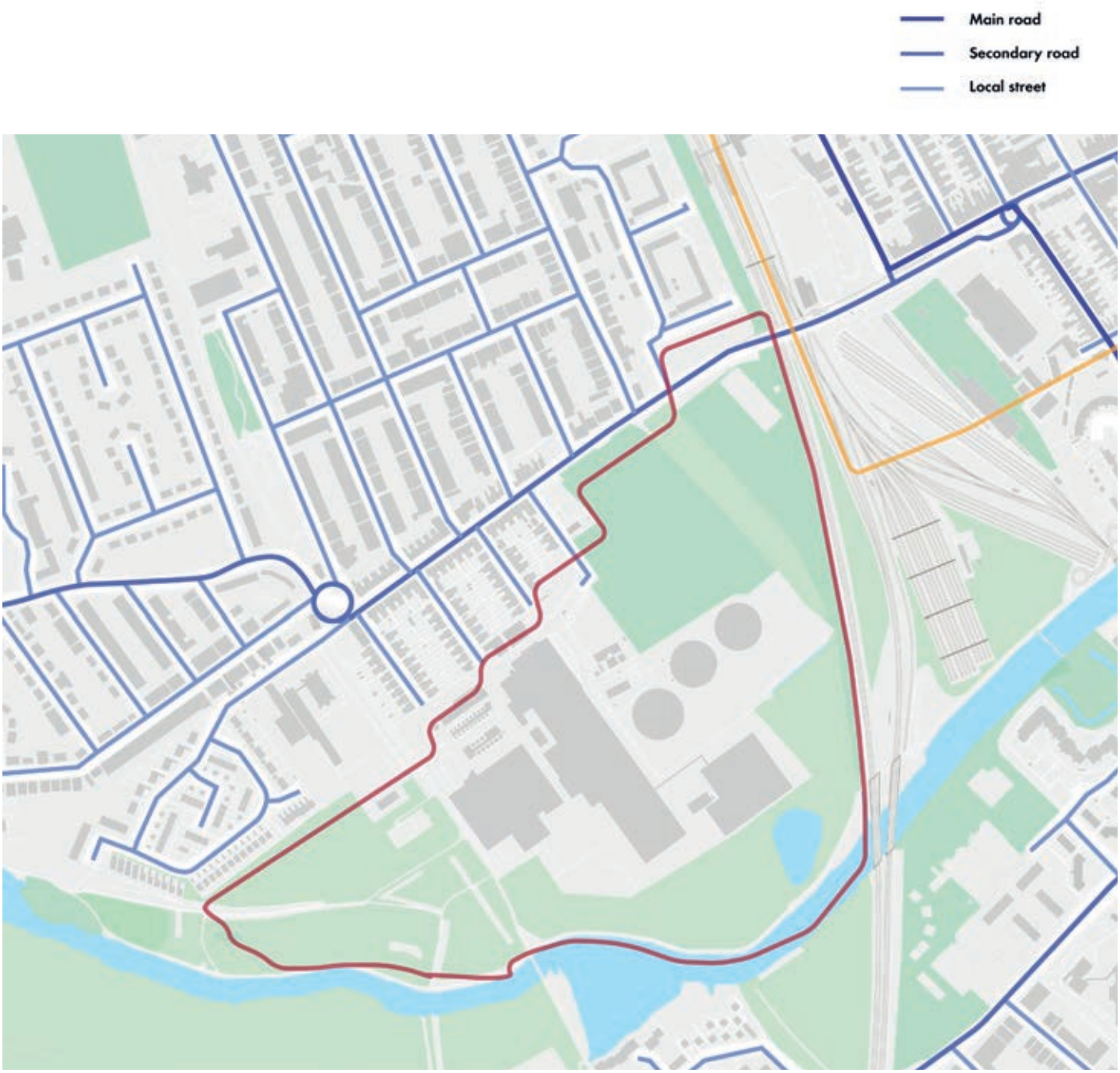


Fig 25 *Vehicular routes*

Fig 26 *Traffic Flows (AADT) Data 2015 within Bedford town centre*

Public car parking - Existing

4.2.22 In Bedford, the majority of public off-street parking provision is located within the town centre in the form of formal surface and multi-storey car parks, which are mainly managed by Bedford Borough Council. Table 2.3 summarises parking provision within the town centre giving details of parking type and capacity, charging regime.

4.2.23 Parking in all council owned surface and multi-storey car parks in the town centre is free for up to two hours (Monday to Saturday), all day on Sundays and every day after 6pm with the exception of River Street car park. Parking in the adjacent residential areas consists of on-street controlled parking zones (CPZ), including shared use of on-street spaces for residents and paid for shorter stay use.

4.2.24 Current occupancy level data provided by Bedford Borough Council highlight that all MSCP and surface car parks in the town centre operate under capacity. In the MSCPs occupancy levels are highest around midday with occupancy levels reaching between 32% and 65%. During the morning and afternoon occupancy levels are around 20% to 40 %. During the evening period (6pm- 10pm) occupancy levels drop to around 4% in Queen Street, 7% Allhallows and around 15-17% in Lurke Street and River Street. Surprisingly all four MSCPs in the town centre have some occupation overnight with average figures recorded as follows; Allhallows (7%), Lurke Street (10%)Queen Street (3%) and River Street (9%). MSCP's with the highest number of visitors per month (March 2017) were in Lurke Street (32,592 visitors) and River Street (30,966 visitors). The higher visitor numbers in Lurke Street and River Street are very likely due to their proximity to the core retail and leisure area.

4.2.25 Data collected for surface car parks recorded usage based on the number of visitors per month (based on ticket machine receipts). It should be noted that the ticket machines in Forester Hill and Robinson Pool have been out of order since October 2016, and therefore the most recent data for these car parks was collected in September 2016. As anticipated surface car parks situated to the north of the river near the core shopping area and transport hubs receive the highest number of visitors, namely Greyfriars (11,417), St Peter's Street (7,189) and Ashburnham Road (3,129). Surface car parks that are less well used include Forester Hill (2,195), Prebend Street (1,872) and Duck Mill Lane (671). It is expected that Duck Mill car park would have a lower number of visitors given its small capacity. Whilst Prebend Street has a lower number of visitors than other car parks of a similar size, this could be due to visitors staying for longer periods of time (all day rather than 2-3 hour shopping trips).

4.2.26 There is currently one bus based park and ride site in Elstow to the south of Bedford with a total of 486 car parking spaces. The park and ride car parking is free and passengers are only required to pay for the bus service.

4.2.27 Overall the available data shows that across the town centre as a whole there is spare capacity in the car parking provided.

Public car parking - Relation to site

Car parking in the vicinity of the site comprises that provided at Bedford Station only.

Name	Type	Capacity	Opening and chargable hours	Tariff
Public car parks				
Allhallows	MSCP Pay on Foot	440 spaces (including disabled)	M- Sun: 6am-8pm Charges M-Sat: 6am- 6pm	M-F: 1 hr £1.30, 2 hrs £1.90, 3 hrs £3.40, 4 hrs £4.20, 4+ hrs £7.80, free after 6pm. Sat: up to 2 hrs free, 3 hrs £1.30, 4 hrs £1.90, 5 hrs £3.40, 6 hrs £4.20, 6+ hrs £5.60 Sun: Free
Queen Street	MSCP Pay on Foot	640 spaces (including disabled)	M-Sat: 6am-8pm. Sunday closed	M - Sat up to 2 hours free,1 hr £0.50, 2 hrs £0.90, 3 hrs £1.50, 4 hrs £2.40, 4+ hrs £3.50 Sun: Free
Lurke Street	MSCP Pay on Foot	790 spaces (including disabled)	M-Sun: 24 hrs. Charges M- Sat: 6am- 6pm	M-F: 1 hr £1.30, 2 hrs £1.90, 3 hrs £3.00, 4 hrs £3.90, 5 hrs £4.50, 5+ hrs £7.20 Sat: up to 2 hours free, 3 hrs £1.30, 4 hrs £1.90, 5 hrs £3.00, 6 hrs £3.90, 6+ hrs £4.50 Sun: Free
River Street	MSCP Pay on Foot	465 spaces (including disabled)	M-Sun: 24 hrs. Charges M- Sat: 6am- 11:59pm	M-F: 1 hr £1.50, 2 hrs £2.20, 3 hrs £4.00, 4 hrs £5.00, 4+ hours £8.00, Evening charge £1.00 / Overnight £4.00 Sat: up to 2 hrs free, 3 hrs £1.50, 4 hrs £2.20, 5 hrs £4.00, 6 hrs £5.00, 6+ hours £8.00, Evening charge £1.00 / Overnight £8.00 Sun: Free
Ashburnham Road	Surface Pay & Display	200 spaces (including disabled)	Maximum stay 14 hours. Charges M-Sun: 6am-11:59pm	M-F: All day £8.00, 10am-11.59pm £3.50 Sat/ Sun: £2.50 per visit
Greyfriars Street	Surface Pay & Display	142 spaces (including 7 disabled)	M- Sun 24 hrs Charges M-Sat: 8am-6pm	M-F: Maximum stay 2 hours £2 Sat/ Sun: Free
Duckmill Lane	Surface Pay & Display	40 spaces	M- Sun: 24 hrs M- Sat 8am-6pm	M-F: Up to 2 hrs £1.60 Sat: Up to 2 hrs free / Sun: Free
Prebend Street	Surface Pay & Display	284 spaces (including disabled)	M- Sun: 24 hrs. M- Sat: 6am-6pm	M-Sat: 2 hours £1.80, 2 hours £4.20, 4+ hours £5.60 After 5pm £1.00 Sunday £1.80 (all day)
Melbourne Street	Surface Pay & Display	197 spaces (including disabled)	M- Sun: 24 hrs. M- Sat: 7am- 6pm. Commericial vehicles: 6:30am-10:30pm	M-Sat: 2 hrs £1.20, 4 hrs £2.80, 4+ hrs £4.00, up to 16 hrs £5.00 Sun: Free

Name	Type	Capacity	Opening and chargable hours	Tariff
St Peter's Street	Surface Pay & Display	113 spaces (including disabled)	M- Sun: 24 hrs. Charges M-Sat: 7am- 6pm	M- F: 1 hr £1.20, 2 hrs £1.80, 4 hrs £3.20, 4+ hrs £6.20 Sat: up to 2 hours free, 3 hrs £1.20, 4 hrs 2.80, 6 hrs £3.20, 6+ hrs £6.20 Sun: Free
Foster Hill Road	Surface Pay & Display	66 spaces (including disabled)	M- Sun: 24 hrs. Charges M-Sat: 8am- 6pm	M-F: Up to 3 hrs free, 4 hrs £1.20, 5 hrs £2.20, 5+ hrs £8.00 Sat/ Sun: Up to 5 hrs free, 5+ hrs £8.00
Robinson Pool	Surface Pay & Display	34 spaces (including disabled)	M- Sun: 24 hrs. Charges M-Sat: 8am- 10pm	M-F: Up to 2 hours free, 3 hrs £1.20, 4 hrs £2.20, 5 hrs £3.20, 5+ hrs £8.00 Sat/ Sun: Up to 5 hrs free, 5+ hrs £8.00
The Broadway	Surface Pay & Display	125 spaces	M- Sun: 24 hrs Charges M-Sun all day	Mon-Sat: 1 hr £0.90, 2 hrs £1.60, 3 hrs £2.50, 4 hrs £3.20, 24 hrs £5.50 Sun: 12 hrs £1.50, 24 hrs £2.50
Merton Publlic	Surface Pay & Display	100 spaces	M-Sun: 24 hrs Charges all day	M-F: 1 hr £1, 2 hrs £1.50, 3 hrs £2.50, 4 hrs £3.50, maximum £5.50 Sat: 3 hrs £1.00, 4 hrs £1.50, maximum £4.50 Sun: day £1.00
Harpur Centre	MSCP underground	97 spaces (including disabled)	M- Sat: 9am- 5:30pm Sun: 10am-4pm	M- Sat: 2 hrs £1.60, 4 hrs £3.00, day £8 Sun: Free
Bedford Station	Surface Pay & Display	702 spaces (including disabled)	M- Sun: 24 hrs Charges M-Sun all day	M-Sun: 24 hrs £8.10, Flat Rate (in after 10am/ out before 12am) £3.30, Evening (after 5pm) £2.50 Week £38.20 / Month £137.00 / Quarter £377.00 / Year £1290.00 / Bank Holiday £2.50
Elstow Park and Ride	Surface	550 spaces (including disabled)	M- Sat: 6am- 11pm. Sun:10am-5pm	M-Sun Free parking (pay for bus)
Havelock Street	Surface Pay & Display	50 spaces (including disabled)	M- Sun: 24 hours. Maximum stay 2 hrs	M- Sun: Free

Existing rail network

4.2.28 Bedford is relatively well connected to the wider UK rail network (see Figure 18), with two railway stations; Bedford station (Midland Mainline) and Bedford St Johns (London Midland service).

4.2.29 Bedford station is the larger of the two stations and is located 1.2km to the west of the town centre (Figure 19). The station operates frequent services to London, Nottingham and Sheffield on the Midland Mainline (East Midlands Trains) and connections to London and the south coast, serving Luton and Gatwick airports on the Thameslink Line (First Captial Connect). The facilities at the station comprise two waiting rooms, cafe/ newsagent/ bar and coffee bar, toilets, a surface car park with 614 spaces, and two bus shelters. Additionally, there are a substantial number of secure cycle parking which caters for around 400 to 500 users per day (Figure 20). Despite the provision of bus shelters the station is poorly served by bus with only two local services. There is a walking route known as 'station link' painted on the footways through the adjacent residential streets to the town centre and bus station (Figure 21). Bedford is part of the PlusBus scheme allowing train passengers to combine rail and bus tickets at a reduced cost (refer to 4.2.1).

4.2.30 Bedford St Johns station is the smaller of the two stations which provides a local service to Bletchley on the Marston Vale Line. Generally there is an hourly service to Bletchley and to Bedford station (Mondays to Saturdays with no Sunday service).

Proposed rail network: East West Rail

- The East West Rail (EWR) is intended to provide a strategic rail corridor connecting Oxford and Norwich/ Ipswich with Aylesbury, Milton Keynes, Bedford and Cambridge. The proposals are divided into three sections;

- The Western Section between Oxford and Bedford and Aylesbury. This route has undergone recent improvements between Oxford Parkway and London Marylebone via Bicester Village, which will be followed later with connections to Bedford.

- The Central Section between the EWR western section and Cambridge, where there is now little or no existing rail infrastructure following the closure of the former 'Varsity Line' in 1967. This route will connect Bedford to Cambridge via either Sandy or Hitchin. The route in relation to Bedford is still subject to an options study.

- The Eastern Section between Cambridge and Norwich and Ipswich, where an operational railway already exists.

Proposed rail network: Electrification

4.2.31 The Midland Main Line (MML) section between St Pancras and Bedford is electrified and forms the northern half of Thameslink. Electrification of the MML north of Bedford to Kettering and Corby is scheduled to be completed by December 2019. This requires electrification of the lines through Bedford that are not currently electrified.

Rail network in relation to sites

4.2.32 The site is within a 10 minute walk of Bedford Station and 20 minute walk of Bedford St Johns. Cycling journey times are around 5 minutes and 10 minutes respectively.

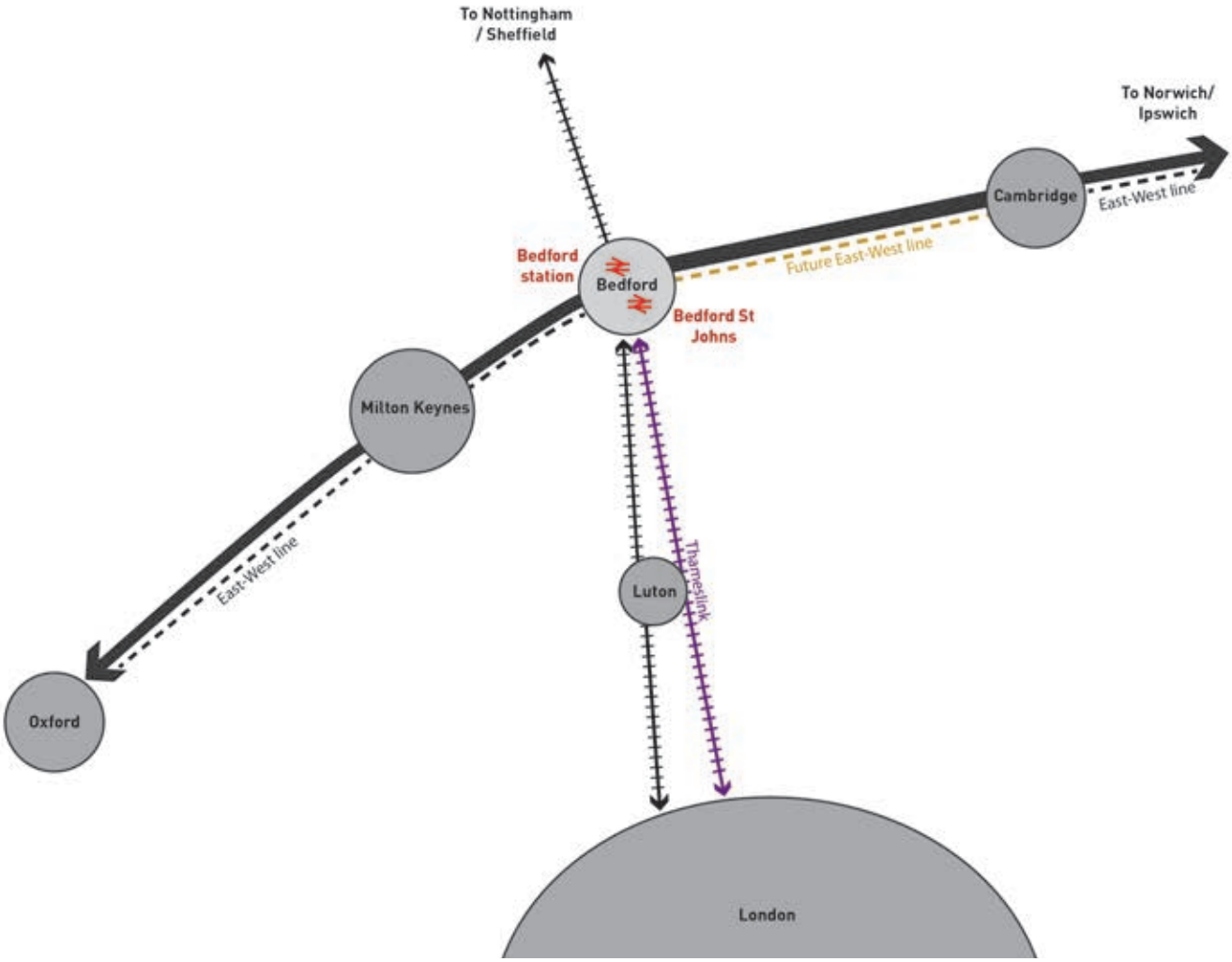


Fig 27 *Bedford is relatively well connected into the wider rail network*

Fig 28 *Bedford station has a poor interface with the street*

Fig 29 *Secure cycle parking provision*

Fig 30 *Walking route to the town centre*

PROPERTY

5 PROPERTY MARKET ANALYSIS

Residential Market

Socio-economic Context

5.1.1 Bedford Borough has an estimated population of 166,300 (2015), of which 104,000 are of working age (16-64 years). The development site at Ford End Road is located in the Queens Park area of Bedford. A review of the ONS data from NOMIS shows that 68% of residents in Queens Park are economically active compared to Bedford Borough as a whole 79%. The levels of economically inactivity are higher than the national average, with high levels of students, and residents looking after the home or family.

5.1.2 In terms of occupations, there are lower levels of professional and managerial jobs in Queens Park compared to Bedford Borough as a whole. Managers, Professional and Associate Professionals make up circa 30% of the total occupations in Queens Park compared to 41% in Bedford and England and Wales (2011 data). Residents in Process Plant and Machine Operatives and Elementary Occupations are significant above average at 14% and 19% respectively, compared to 7% and 12% in Bedford Borough. This shows that Queens Park has lower skilled residents.

5.1.3 Educational attainment is low in Queens Park with only 21% of residents with Level 4 Qualifications or above, compared to Bedford Borough and England and Wales with 30% (2011 data). The proportion of residents with no qualifications in the ward is 23%, which compares to 13% for the Borough and 15% for England and Wales.

5.1.4 The levels of unemployment are generally low in the UK at the moment, and this is reflected in the claimant count in Queens Park, which is 2.9% compared to the Borough at 2.1% and England and Wales at 1.9% (May 2017 data).

5.1.5 The housing stock in Queens Park shows that there are 2,945 dwellings in the Ward as at 2011, with 10% detached homes, 37% semi-detached, 31% terraced properties, and 17% flats. This compares to the Borough with 27% detached homes, 32% semi-detached, 22% terraced properties, and 13% flats. The higher proportions of terraced and semi-detached dwellings at Queens Park reflect the Victorian housing that is found in the ward.

5.1.6 Home ownership in Queens Park as at 2011 was 55%, of which 25% own their own property out right and 30% have a mortgage. This compares to 66% home ownership in the Borough as a whole, with 31.5% owning property out right and 34.5% owning property with a mortgage in place. Whilst levels of social housing in Queens Park mirror the Borough average at 16%, the proportion of private rented accommodation is markedly higher in Queens Park at 26% compared to the Borough at 16%.

National Residential Market Overview

5.1.7 House prices have continued to grow at strong level since Autumn 2013 but there are signs that this continued rate of growth is beginning to ease. The Land Registry House Price Index (HPI) reported in February 2017 that the annual rate of growth of house prices in the UK was 5.8%, and the monthly rate of change was 0.6%.

5.1.8 Nationwide's April 2017 press release reports that house prices decreased by -0.4% month on month in April. They note that annual house price growth has also dropped to 2.6%, compared with 3.5% in March. However they comment that "it is too early to conclude whether the slowdown in house price growth is merely a blip, a reflection of the impact of the squeeze on household budgets, or is due to mounting affordability pressures in key areas

of the country. Given the ongoing uncertainties around the UK's future trading arrangements and the upcoming election, the economic outlook is unusually uncertain, and housing market trends will depend crucially on developments in the wider economy".

5.1.9 Halifax's latest House Price Index Commentary reports that house prices in the three months to April 2017 were 3.8% higher than in the same three months a year earlier. The monthly change was -0.1% against a quarterly change of -0.2%. They comment that "House prices have stagnated over the past three months. Overall, prices in the three months to April were marginally lower than in the preceding three months; the first quarterly decline since November 2012. The annual rate of growth remained at 3.8% in April, the lowest rate since May 2013. "Housing demand appears to have been curbed in recent months due to the deterioration in housing affordability caused by a sustained period of rapid house price growth during 2014-16. Signs of a decline in the pace of job creation, and the beginnings of a squeeze on households' finances as a result of increasing inflation, may also be constraining the demand for homes. "Continuing very low mortgage rates, together with an ongoing acute shortage of properties for sale, should nonetheless underpin house prices over the coming months."

5.1.10 The slowing down of the residential market has been largely as a result of the decision to leave the European Union (Brexit) in June 2016, with the uncertainty surrounding the form and nature of the UK trading position with Europe and the rest of the World. The triggering of Article 50 and the presidency of Donald Trump in the USA has increased the uncertainty to global stock markets generally. In the UK, plc housebuilders have recovered from initial falls in share prices following the referendum result, with several of them reporting increased profits and robust underlying demand in the market.

Local Market Analysis

5.1.11 In Bedford Borough as at March 2017 average house prices stood at 273,216, which represented an annual house price increase of 11.25%. By way of comparison, the average house price in England and Wales was £227,549, which represents an annual house price increase of 4.43%.

5.1.12 The chart below shows the average house price increase in Bedford Borough over the last ten years, which shows a change from £196,038 in March 2007 to £273,216 in March 2017, a percentage change of 39%. Since the middle of 2013, the Borough has experienced a rising annual percentage change in house prices.

5.1.13 The number of sales in Bedford as at January 2017 was 149 transactions. During 2016, the number of sales in the Borough was 2,565, which is the lowest annual number since 2012, when the number of transactions was 2,084.

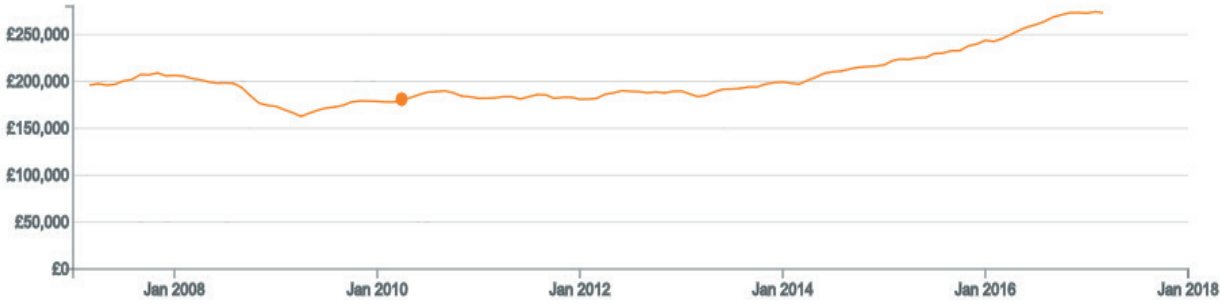


Fig 31 *Bedford Borough Average House Prices 2007-2017*

Fig 32 *Bedford Borough Average House Price Annual Percentage Change 2007-2017*

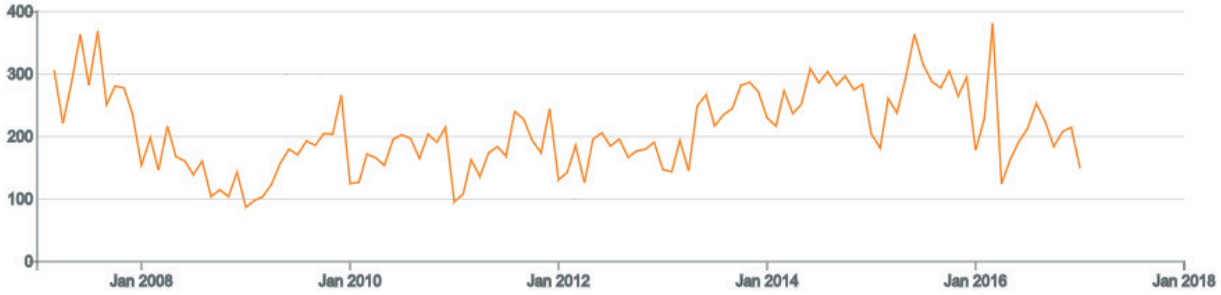


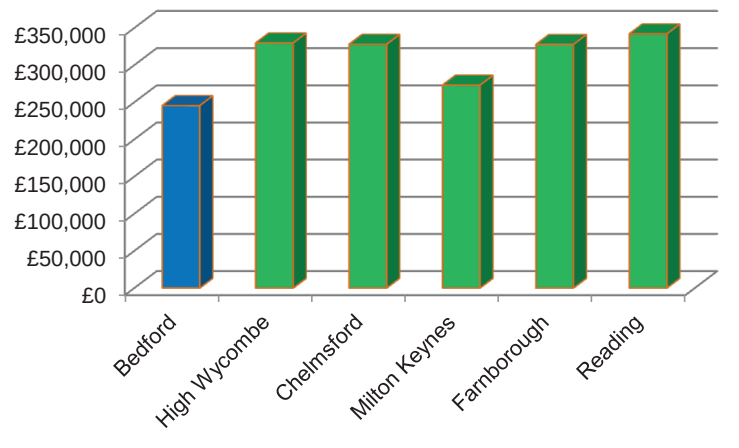
Fig 33 *Bedford Borough Total Sales Volume*

5.1.14 In comparison, for England and Wales the average house prices have increased from £183,838 in March 2007 to £227,549 in March 2017, which is a percentage change of 24%, which is lower than Bedford Borough over the same time period.

5.1.15 Bedford is well connected to London, with journey times to London St Pancras only 35 minutes. However, an analysis of other towns within a similar commutable distance to London using data over the past year from Right Move shows that Bedford is lagging behind in terms of average house prices, as shown in the chart below.

5.1.16 Data from Right Move indicates that the average house prices over the past year in Bedford have been circa £245,000, lower than Milton Keynes at £273,000 and markedly behind other commutable towns such as High Wycombe (£330,000), Chelmsford (£328,000), Farnborough (£328,000) and Reading (£342,000). There should be an aspiration that house prices could rise to these levels in the future.

5.1.17 Selected London Commuter Towns – Average House Prices



5.1.18 At the local Queens Park level, data from Right Move indicates that average house prices over the past year were £176,769, which reflects the sale of two bedroom flats at Henley Road (range: £135,500-£150,000), and two bedroom terraced Victorian houses (range: £152,500-£159,000) and three bedroom detached houses (range: £160,000-£213,000). The average value in Queens Park is well below the average house price for Bedford Borough and reflects the socio-economic issues within the ward.

New Build Sales Values

5.1.19 To estimate the new build sales values that could be delivered through a comprehensive development at Ford End Road, we have undertaken an assessment of new schemes coming forward in Bedford. The schemes include:

Kings Field, Biddenham – Linden Homes and Bovis Homes
Great Denham Park – Barratt Homes and Linden Homes
Orchid Fields, Kempston – Barratt Homes
Berryfields, Wootton – Persimmon Homes
Hansons Reach, Stewartby – Persimmon Homes
Britannia Gate, Palgrave Road – WN Development
Austin Mews, Austin Canons, Kempston – Asha Paulson
De Montford Place, Warwick Avenue – Storey Homes
Merchant Square, Riverside North – Delph Property Group
Swan House, The Embankment – P4i Developments
Albion House, 14-18 Lime Street
41-43 Mill Street

Kings Field, Biddenham

5.1.20 Linden homes and Bovis Homes are building 203 homes at St Marys and St Andrews, Kings Field at Biddenham. The asking prices of houses at the scheme are as follows:

Bed	Type	Sale Price	Size (sqft)	£psf
2b flat	Flat (The Barton)	£254,995	n/a	-
3	Semi-Detached (The Avenham)	£291,500	n/a	-
3	Semi-Detached (The Southwold)	£294,995	n/a	-
3	Detached (The Forbury)	£335,000	n/a	-
3	Detached (The Epsom)	£344,995	n/a	-
3	Detached (The Espom)	£339,995	n/a	-
4	Detached (The Canterbury)	£439,995	n/a	-
4	Detached (The Casterton)	£455,000	n/a	-
5	Detached (The Burghley)	£560,000	n/a	-
5	Detached (The Warwick)	£459,995	n/a	-
5	Detached (The Warwick)	£464,995	n/a	-
5	Detached (The Oxford)	£494,995	n/a	-
5	Detached (The Arundel)	£549,995	n/a	-
5	Detached (The Winchester)	£624,995	n/a	-
5	Detached (The Winchester)	£619,995	n/a	-
5	Detached (The Truro)	£629,995	n/a	-
5	Detached (The Ascot)	£699,995	n/a	-

Great Denham Park

5.1.21 Great Denham Park is a housing scheme of 102 homes by Barratt Homes providing 1, 2, 3, and 4 bedroom houses. The asking prices of the homes for sale at the scheme are as follows:

Bed	Type	Sale Price	Size (sqft)	£psf
3	Detached (Finchley)	£285,995	n/a	-
4	Mid Terrace (Helmsley)	£310,995	n/a	-
4	Town House (Faversham)	£319,995	n/a	-
4	Detached (Mid Terrace)	£324,995	n/a	-
4	Town House (Faversham)	£329,995	n/a	-

Orchid Fields, Kempston

5.1.22 Orchid Fields is a housing scheme of 101 homes in Kempston by Barratt Homes. The asking prices of homes for sale at the scheme are as follows:

Bed	Type	Sale Price	Size (sqft)	£psf
2b flat	Flat (Amble)	£196,995	635	£310
2b flat	Flat (Malton)	£215,995	795	£302
2b flat	Flat (Malton)	£217,995	795	£302
2b flat	Coach House (Alchester)	£226,995	766	£296
2b flat	Coach House (Alchester)	£227,995	766	£296
3b house	Town House (Brentwood)	£340,995	1,168	£292
3b house	Town House (Brentwood)	£341,995	1,168	£292

Berryfields, Wootton

5.1.23 Berryfields is a scheme by Persimmon Homes delivering 3, 4 and 5 bedroom houses. The asking prices as set out below are part of Phase 4 of the scheme, which comprises 108 dwellings.

Bed	Type	Sale Price	Size (sqft)	£psf
3	Detached (The Hatfield)	302,950	969	£313
3	Detached (The Hatfield)	307,950	969	£318
3	Detached (The Birch)	312,950	969	£323
4	Detached (The Chedworth)	362,950	1,237	£293
4	Detached (The Chedworth)	364,950	1,237	£295
5	Detached (The Corfe)	414,950	1,429	£290
5	Detached (The Corfe)	416,950	1,429	£292
5	Detached (The Hadleigh)	429,950	1,574	£273

Hansons Reach, Stewartby

5.1.24 Persimmon Homes is also developing a housing scheme of 325 homes at Hansons Reach Stewartby. Phase 1 of 157 dwellings offers 3, 4 and 5 private houses. Most of the units have been sold, although three four bedroom houses are available on the market for £360,995 (£257 per sq.ft.) and £406,995 (£290 per sq.ft.).

Britannia Gate, Palgrave Road

5.1.25 Britannia Gate is located just off Kempston Road, Bedford. Developed by WN Development it is made up of sixty-four 1 and 2 bed flats plus additional houses. The site is in central Bedford directly opposite Bedford Hospital.

Bed	Floor	Sale Price	Size (sq.ft.)	£psf
1b flat	1st	£155,000 (April 2017)	551	£281
2b flat	Gr fl	£185,000 (April 2017)	725	£255
2b flat	n/a	£192,000 (March 2017)	729	£263
3b flat	n/a	£234,000 (April 2017)	1,009	£232
2b house		£225,000 (last 6 months)	793	£283
3b house		£245,000 (last 6 months)	900	£272
3b house		£260,000 (last 6 months)	1,200	£216

5.1.26 Speaking to the agent they were able to confirm the below sales had completed in the last 6 months. Typically the 2 bed houses have sold for between £220,000-£230,000, standard 3 three bedroom houses between £240,000-£250,000 and large three bedroom houses between £260,000-£275,000.

Austin Mews, Kempston

5.1.27 Austin Mews is a development of 24 houses by Asha Paulson (12 terraced and 12 semi-detached) located in Kempston. The agent confirmed that none of the houses in this development have had a completed sale but the following are all under offer. The earliest completed sale will be August 2017.

Bed	Date	Sale Price	Size (sqft)	£psf
3	STC	£275,000(end of terrace £270,000(mid terrace)	1,205	£228
3	STC		1,205	£224
4	STC	£330,000(semi- detached)	1,383	£239

5.1.28 De Montfort Place, Warwick Avenue

5.1.29 De Montfort Place is being sold off plan by the developer Storey Homes. It is a scheme of 56 units with a mix of 2-5 bedroom houses and 1-2 bedroom flats in central Bedford. The sole agent for the development was able to confirm that in the last 6 months they have sold 20-25 flats and houses, all off plan.

5.1.30 1 bed flats in the development over the last 6 months have sold for between £175,000- £195,000. They are built to approximately the same size of 470 sq ft. The 4 bed houses have sold for between £450,000-£475,000 and all measure 1,450 sq ft. The 5 bed houses have sold for £500,000 and measure 1,700 sq ft.

Bed	Floor/type	Sale Price	Size (sqft)	£psf
1b flat	Gr fl	£180,000 (April 2017)	470	£383
1b flat	Gr fl	£180,000 (April 2017)	470	£383
1b flat	Gr fl With garden	£195,000 (April 2017)	470	£415
2b flat	1	£245,000 (April 2017)	740	£331
2b flat	1	£245,000 (April 2017)	740	£331
4b house	Semi-detached	£475,000 (Last 6 months)	1,450	£327
5b house	Semi-detached	£500,000 (Last 6 months)	1,700	£294

5.1.31 Merchant Square, Riverside North

5.1.32 Merchant Square is a flatted development scheme by Delph Property Group located at the Riverside North leisure scheme that is being developed by CoPlan Estates, and includes a 7 screen Vue cinema, Premier Inn Hotel (100 bedrooms) and 12 restaurants. The development is of a high specification and consists of 46 units. This is made up of two 3-beds, thirty-five 2-beds and eight 1-bed flats. As of the end of April 2017 there are 10 units which are yet to be sold. As indicated by the unit £psf price, these flats are of higher quality than other comparable evidence and have set a new record for riverside development in Bedford. The prime buyer market for this scheme is retirement down-sizers, seeking a central position and access to services and entertainment facilities.

Bed	Floor	Sale Price	Size (sqft)	£psf
1	1	£194,000(April 2017)	538	£361
1	2	£217,000(March 2017)	538	£403
1	1	£217,000(Nov 2017)	538	£403
2	3	£335,000(Nov 2016)	872	£384
2	2	£340,000(Nov 2016	884	£385
2	3	£342,000(Jan 2017)	872	£392
3(Penthouse)	4	£650,000(June 2016)	1,250	£520
3 (Penthouse)	4	£650,000(June 2016)	1,250	£520

Swan House, The Embankment

5.1.33 The Swan House is a conversion by P4i Developments consisting of 16 one and two bedrooms apartments and two studio flat in central Bedford split over two floors above retail space. The sole agent for the development is Compass due to complete on 2 units as shown below.

Bed	Floor	Sale Price	Size (sqft)	£psf
1	1	£192,000 STC	581	£33
1	1	£192,000 STC	549	£349

Albion House, Lime Street

5.1.34 Albion House is a town centre office conversion under permitted development rights comprising of studio, 1 bed and 2 bed flats. The values for these are circa £220-£230 per sq.ft.

Bed	Floor	Sale Price	Size (sqft)	£psf
Studio	n/a	£110,000	500	£220
Studio	n/a	£110,000	500	£220
1	2	£170,000 (Jan 2017)	n/a	n/a
1	2	£175,000 (March 2017)	815	£214
1	1	£155,000 (Feb 2017)	671	£230
2	3	£225,000 (Jan 2017)	n/a	n/a

Mill Street

5.1.35 41-43 Mill Street is an office conversion under permitted development rights made up of 1, 2 and 3 bedroom flats. It is located in the centre of Bedford, a short distance from the river. Parking is available.

Bed	Floor	Sale Price	Size (sqft)	£psf
1	1	£137,500 (Oct 2016)	Not available	Not Available
2	2	£180,000	684	£263
2	Gr fl	£185,000	889	£208

5.1.36 The annual housing monitoring reports produced by the Council indicate that over the period April 2012-March 2017 the average annual net completion of dwellings in the Borough was 887 units. For Bedford town, the average annual net completions over the past three years was 314 units.

Residential Lettings

5.1.37 Speaking to local agents they confirmed that 1 bed new build flats in central Bedford are typically let for between £700-£850 pcm. New build 2 bed flats are let for between £800-£1,000 pcm

5.1.38 The below table shows what new build flats to let on the market in central Bedford.

Bed	Address	Price pcm	Size (sqft)	Comments
1	St Peters Street, MK40 2PN	£749	N/A	Modern new build apartment block. Flat is built to high quality spec, central Bedford
Studio	St Peters Street, MK40 2PN	£695	n/a	Modern new build apartment block. Flat is built to high quality spec, central Bedford
2	St Peters Street, MK40 2PN	£995	n/a	Modern new build apartment block. Flat is built to high quality spec, central Bedford
1	Castle Lane, MK40	£995	N/A	New build modern apartment. Built to high spec. Near to the river, more centrally located than st Peters Street.
1	Zurich House, Goldington Road	£700	463	New built apartment block, looks to be reasonable spec from the outside but no inside photos available.
2	Goldington Road, MK40	£850	724	Relatively new build with modern finish. Balcony, East of central Bedford.

Retail Market

National Retail Market Overview

5.1.39 The retail market is undergoing major structural change and this transformation is happening at a rapid rate with mobile and digital technologies creating new platforms for retailers to sell to consumers, who are becoming increasingly connected and savvy with their shopping habits. In the past five years there has been considerable change in the convenience food sector, with the drive for smaller store formats in increasingly more locations, especially around transport hubs, and the comparison goods sector is now experience a similar structural change, as shopping habits change and evolve.

5.1.40 The British Retail Consortium's recent paper 'The Changing Face of Retail' highlight recent forecasts from Javelin that suggest that the number of stores is likely to decrease by circa one-third between 2010 and 2020 (although the impact of this change is likely to happen in more secondary retail locations), and recent research by Jones Lang La Salle that predicts that 50% of retail leases are due to expire in the next five years. The BRC suggest that a large proportion of these leases will not be renewed and vacant rates across town centres are set to remain high and possibly rise.

5.1.41 The advent of omni-channel retailing and the changing role of technology are continuing to drive changes in shopping habits with social media becoming increasingly popular as a means of influencing consumer behaviour. In April 2017, BRC reported that online sales represented 22% of the non-food market in the UK. The rise in 'click and collect' and the use of smartphones has supported growth in on-line sales. Whilst retailers are focusing increasingly on click and collect services and smaller and more flexible formats (e.g. John Lewis goods delivered to Waitrose stores) new strategic partnerships (e.g. Morrison deal with Amazon to supply food through the Amazon Prime Now and Amazon Pantry services) are set to change how we shop.

5.1.42 The food and beverage market is one area that is experiencing continued growth and activity. Figures from Local Data Company indicate that turnover in the UK restaurant industry is up by 40%, with a rise from £15.5bn to £21.6bn. The number of restaurants in the UK has increased by 20% in the last five years (an increase of 14,000 new restaurants). There are a number of operators with growth plans such as Byron, Chilango, Ed's Diner, Five Guys, Bill's, Frankie and Benny's, Nandos, Pizza Express, Prezzo, and Tortilla. Like any market, the food and beverage market is likely to mature over time, and change due to wider economic conditions.

5.1.43 In terms of property, the IPD Annual Property Index for 2015 shows that total returns for retail property was 9.7%. This is slightly down on the 3 years average of 10.8% and slightly up on the 5 year average of 8.3%. Capital growth over 2015 for retail property was 4.5%, which is the lowest of all market sectors.

Local Retail Market

5.1.44 Ford End Road has a small number of shops providing convenience food, takeaways and retail services. The key anchor store is Tesco Express.

5.1.45 We do not anticipate any major changes to the retailing at Ford End Road from the new development envisaged at Ford End Road, although there may be one to two additions to the parade.

SITES

6 SITES

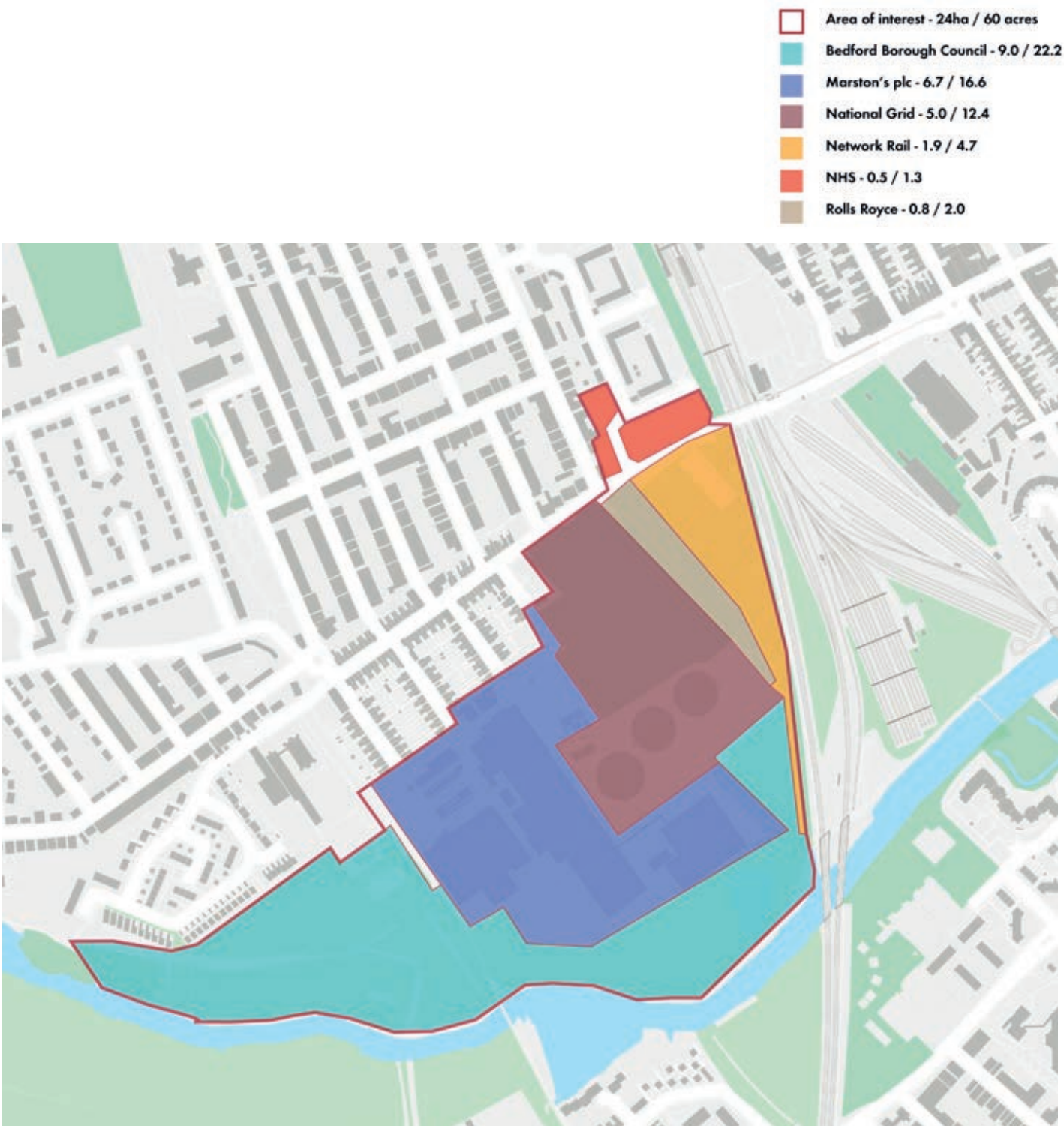
Ford End Road

6.1.1 The Ford End Road site extends to 24 hectares (60 acres) and is located in the Queens Park area of Bedford to the west of the town centre and the rail station. The site comprises a large area of part brownfield part undeveloped land that is bounded to the south by the River Great Ouse, to the east by the railway line, to the north by residential dwellings on either side of Ford End Road and open space to the west. Ford End Road includes a number of shops including Tesco Express, as well as the Guru Nanak Gurdwara Temple. A right of way from the Temple connects to the river and footpaths running west to east and over the river north to south.

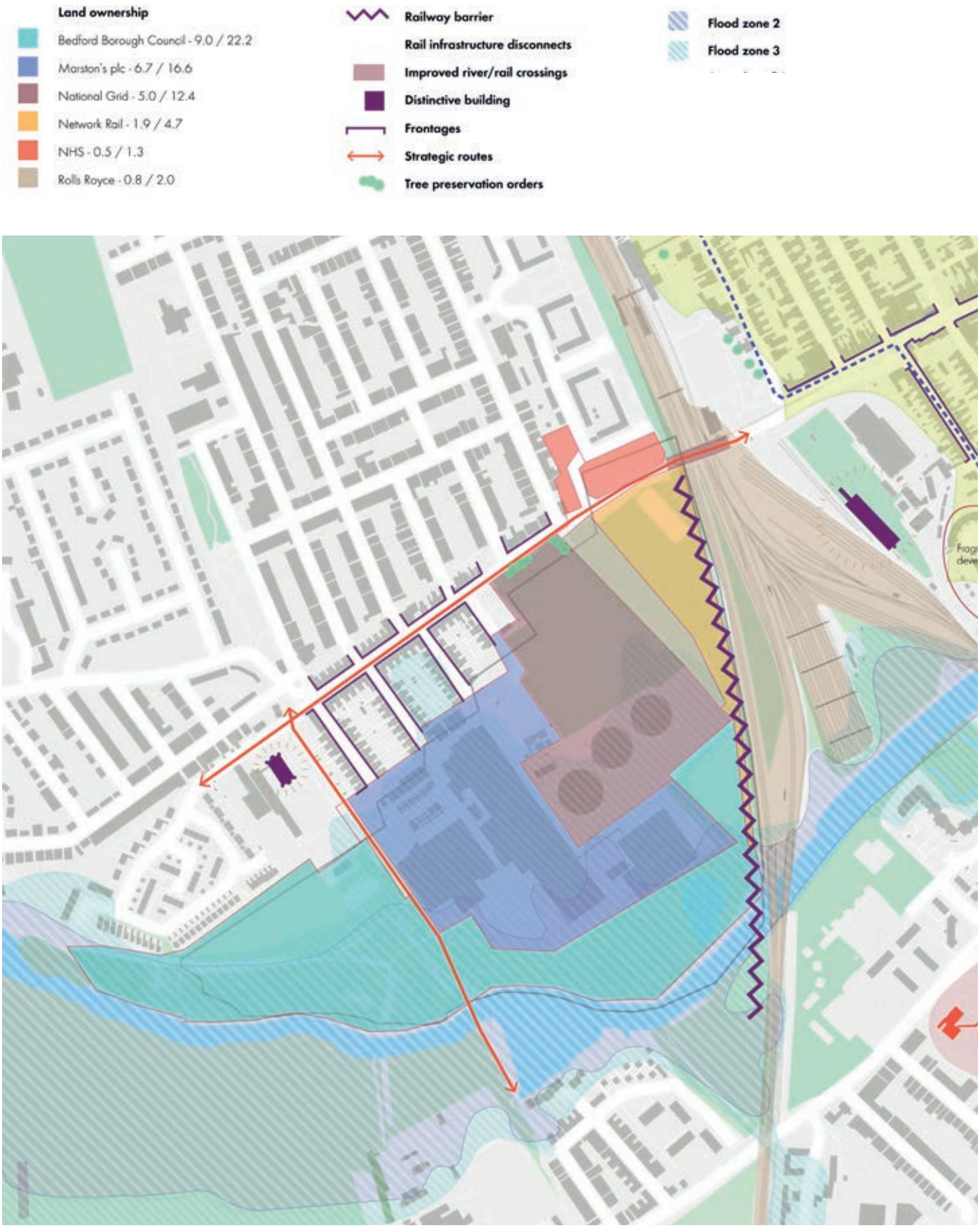
6.1.2 The key occupier on the land is the Eagle Brewery, which has recently been acquired by Marston's from Charles Wells. The Eagle Brewery is a key employer in the town with 300 employees in production, sales and marketing. The other land within the masterplan area is vacant with the exception of small areas of operational land.

6.1.3 The adjacent plan shows the landowners within the Ford End Road site:

- Marston's plc – which recently acquired the Eagle Brewery from Charles Wells for £55m, has intimated in press releases that it is not closing the Brewery and there would be limited job losses as a result. The Marston's land holding extends to circa 6.7 hectares. The site is currently accessed via Havelock Street, although it remains a tight turn into this street for HGVs from Ford End Road. [redacted]
- National Grid – The National Grid site extends to circa 5.0 hectares, although 4.3 hectares is currently on the market for sale in two phases, which are held under two separate titles. Phase 1 is to be released in April 2018 and the second is to be released in Q1 2021 following remedial works to the former gas holder land. Three parcels of land extending to 0.28 hectares (0.69 acres) are to be retained by National Grid for operational requirements. A right of access through the phase 1 and phase 2 land parcels connects to the operational land.
- Rolls Royce – the motor/engine manufacturer, formerly which occupied a factory to the north of Ford End Road retains a long strip of land extending to circa 0.8 hectares situated between the National Grid and Network Rail land. We understand that the site was formerly used as a car park, although it is current vacant and comprises a tarmac area.
- Network Rail – The land adjacent to the railway line is owned by Network Rail and extends to circa 1.9 hectares (4.7 acres). [redacted]
- NHS Property – NHS Property is disposing of its land assets to the north of Ford End Road for residential development, which extends to circa 0.5 hectares (1.3 acres). [redacted]
- Bedford Borough Council – the Council landholdings at Ford End Road is adjacent to the River Great Ouse and currently undeveloped, comprising open space or wooded or scrubland areas. The land extends to circa 9 hectares (22 acres).


Area of interest - 24ha / 60 acres
Bedford Borough Council - 9.0 / 22.2
Marston's plc - 6.7 / 16.6
National Grid - 5.0 / 12.4
Network Rail - 1.9 / 4.7
NHS - 0.5 / 1.3
Rolls Royce - 0.8 / 2.0

CONSTRAINTS AND OPPORTUNITIES


Land ownership
Bedford Borough Council - 9.0 / 22.2
Marston's plc - 6.7 / 16.6
National Grid - 5.0 / 12.4
Network Rail - 1.9 / 4.7
NHS - 0.5 / 1.3
Rolls Royce - 0.8 / 2.0
Railway barrier
Rail infrastructure disconnects
Improved river/rail crossings
Distinctive building
Frontages
Strategic routes
Tree preservation orders
Flood zone 2
Flood zone 3

7 CONSTRAINTS AND OPPORTUNITIES

7.1 URBAN DESIGN

Through urban design analysis and site visits a number of constraints and opportunities have been identified. These are summarised below and illustrated on the adjacent plans.

Constraints

- Land ownership - a series of land ownership parcels fall within the site and will partially determine proposed routes and development blocks. The masterplan for the site will need to consider these and allow landowners to work either jointly or independently.

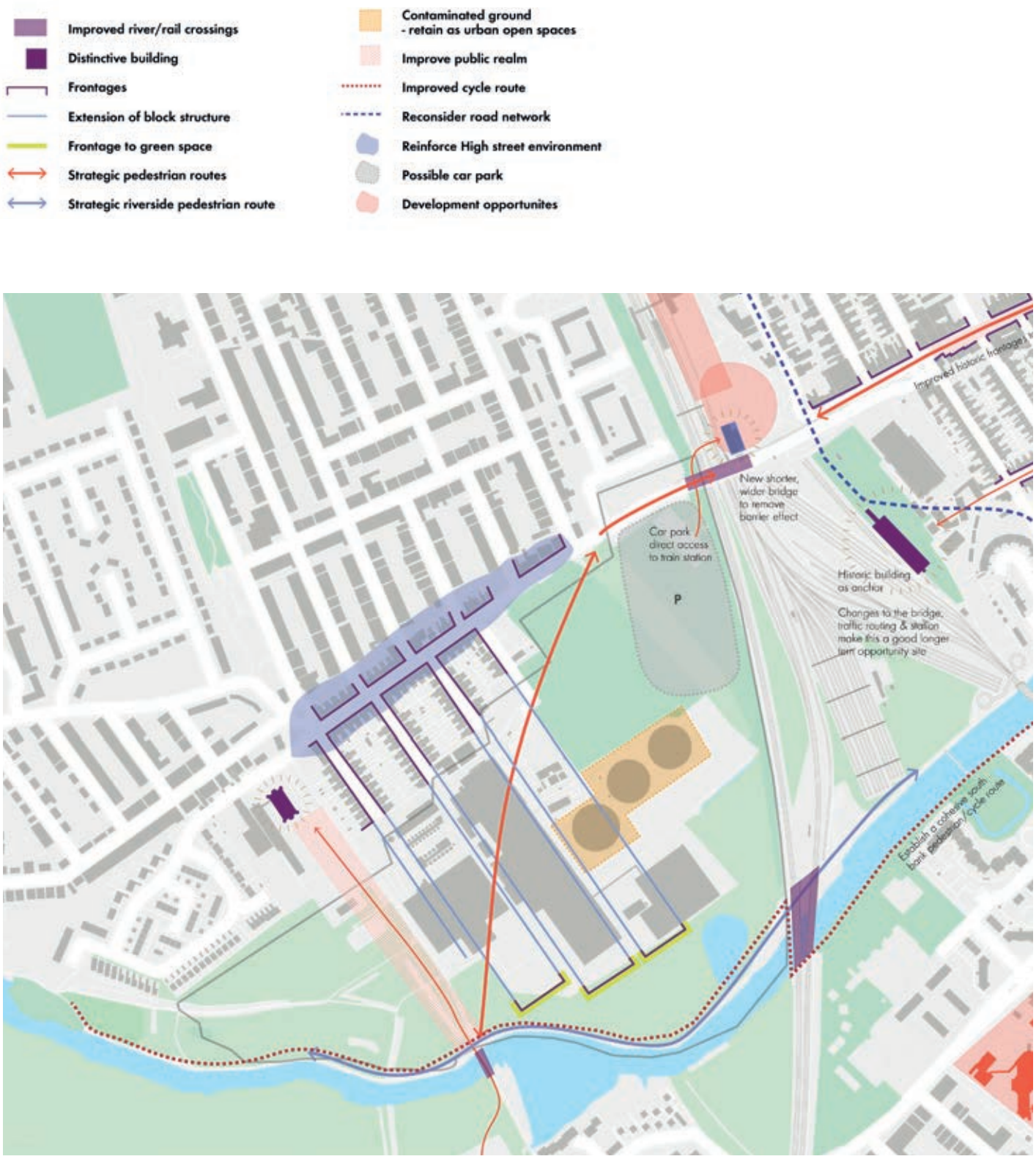
- Existing urban grain - the block structure will have an impact on the structure of routes and blocks within the site to ensure natural integration with the surrounding area.

- Landmarks - the context and views of landmarks including the Gurdwara Temple and the rail buildings to the east of the tracks will need to be considered.

- Flooding - the site falls within the flood plain of the River Ouse which will impact the extent of the site which can be developed and the uses on the site which can be proposed, particularly at ground floor.

- The railway line - the extensive railway infrastructure bounding the site to the north east will need to be considered both as a barrier to movement and in terms of the noise it generates.

- Scale and massing - the existing built infrastructure has large footprints but the surrounding areas are small scale. This will need careful consideration.


Improved river/rail crossings
Distinctive building
Frontages
Extension of block structure
Frontage to green space
Strategic pedestrian routes
Strategic riverside pedestrian route
Contaminated ground
- retain as urban open spaces
Improve public realm
Improved cycle route
Reconsider road network
Reinforce High street environment
Possible car park
Development opportunites
Improved historic frontages
New shorter, wider bridge to remove barrier effect
Car park direct access to train station
P
Historic building as anchor
Changes to the bridge, traffic routing & station make this a good longer term opportunity site
Establish a coherent south bank pedestrian/cycle route

URBAN DESIGN

Opportunities

- Existing urban grain - the block structure of the existing urban terraces provide a series of routes that will help to anchor the new development within the existing place.
- Connections to the pedestrian bridge over the River Ouse - The site presents an opportunity to improve strategic connections between residential neighbourhoods to the south of the river and the train station. Currently pedestrians and cyclists skirt around the edge of the site, but opportunities should be explored to open up a more direct connection diagonally through development blocks within the study area.
- Enhancing the riverside - explore opportunities to improve the setting of the River Ouse in terms of its recreational offer and pedestrian and cycle routes. Environmental enhancements should also be explored including habitat retention and enlacement.
- Frontage for green spaces - new development should explore the potential to improve the edge condition and active frontage to the green spaces opening up to the river.
- Shopping parade at Ford End Road - explore opportunities to enhance the environment and setting for the range of shops along Ford End Road
- Connectivity to the station - Explore the potential to utilise part of the site for a decked car park to serve the station. Pedestrian connectivity over the bridge across the railway lines should be enhanced.
- Setting of the Gurdwara Temple - explore opportunities to enhance the setting of the temple by opening up views to the temple along the route from the river and along Ford End Road.
- Civic/community offer - consider the range of uses to the west of the study area and explore the potential for a new school to utilise some of the playing fields and open spaces.
- Contaminated land - explore the potential to use heavily contaminated land, for example within the gas holders, as amenity spaces rather than built development plots.

Fig 34 *Constraints*

Key

High traffic flows causes congestion

Conflict of movement at key junctions causing congestion

Car dominated streets create a barrier to pedestrian movement

7.2 TRANSPORT AND MOVEMENT

7.1.1 The baseline review has revealed a number of constraints and opportunities for the Ford End Road site.

Constraints

- High traffic flows along key routes in the town centre causes congestion and conflict of movement between vehicles. Key points of congestion are the Midland Road/ Ford End Road mini-roundabout and the Ashburnham Road/ Bromham Road double mini-roundabout
- Poor pedestrian facilities with narrow footways, street clutter such as excessive barriers and a combination of high traffic flows and a low number of crossing points restricts pedestrians ease of movement and reduces the quality of the walking environment
- There are poor linkages between the bus and train station which does little to encourage these modes of transport as a viable alternative to the car
- There is excess car parking, both surface and MSCP which creates an unattractive pedestrian environment and reduces the amount of developable land available
- A disjointed and poor cycle network with the need for joining up existing routes and creating a stronger north south link
- Poor quality facilities along the bus network including poor maintenance of shelters and stops and a lack of real time information
- Frequency and reliability of buses generally to facilities in the town centre such as the station, particularly in the evenings and weekends and from rural areas

Fig 35 *Opportunities*

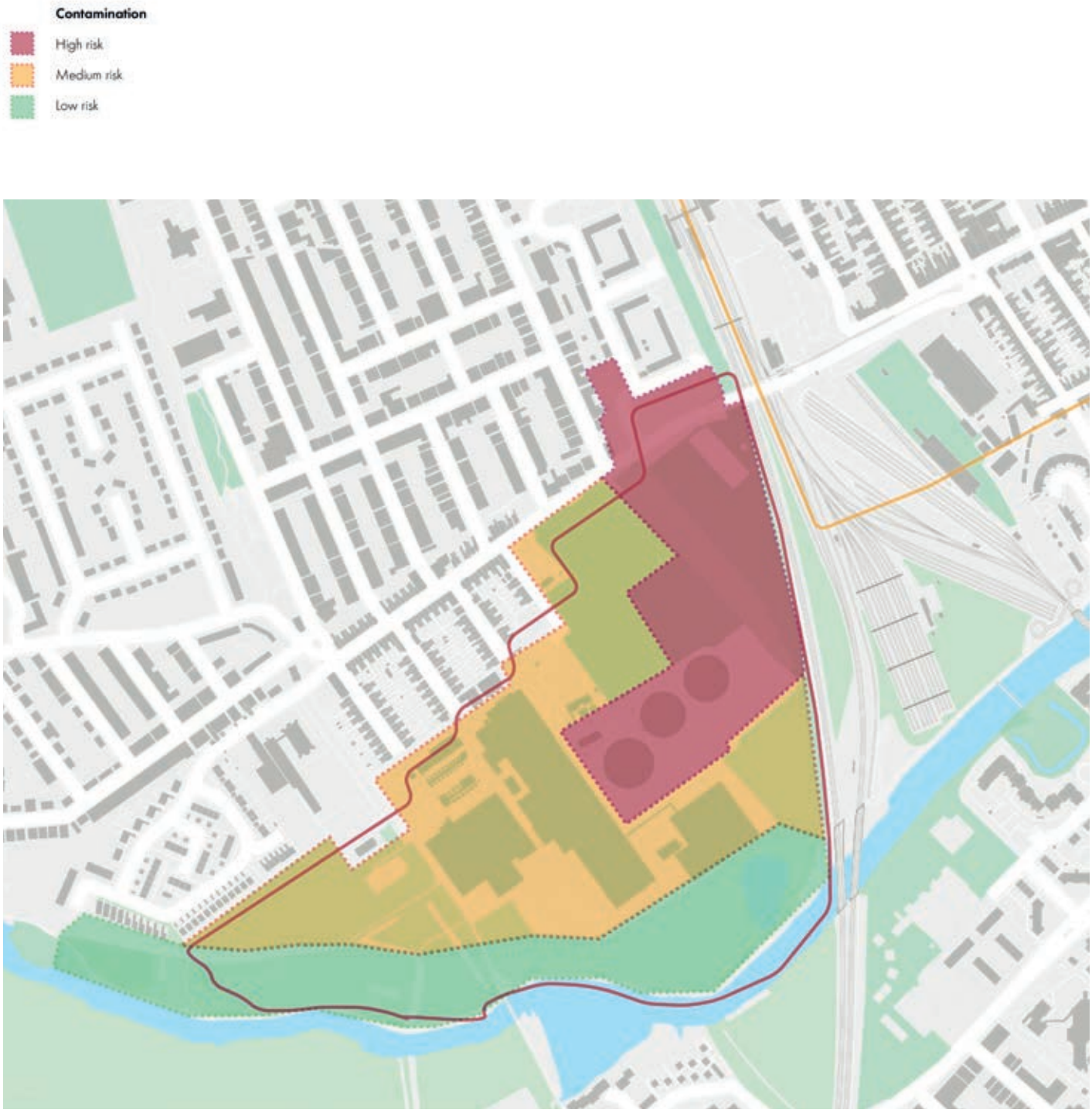
Key

- Enhance pedestrian and cycle routes and facilities between the site and station
- Relocate the station entrance to Ford End Road/ Midland Road
- Retain high quality walking and cycle route along the riverside
- Public relam improvements on key roads in the town centre
- Opportunity to maximise the use of the waterway for sustainable travel and leisure uses
- Key junction improvements to increase space for pedestrian and cyclists and create new crossings

TRANSPORT AND MOVEMENT

Opportunities

- Retain the existing high quality walking and cycle route along the riverside south of the River Great Ouse. Potential to extend this route to the west should be assessed
- Key public realm improvements on main pedestrian and cycle routes through the town centre to reduce carriageway dominance and street clutter, in turn giving more space to pedestrians and cyclists.
- Highway re-configuration along key cycle and walking routes would allow for improved cycle facilities and wider footways to give more space to pedestrians and cyclists
- There is potential to improve the quality of the cycle routes and facilities to encourage residents and visitors to travel by bicycle instead of using the car. This could include increasing the number of pedestrian and cycle crossings and providing cycle lanes where possible along main roads. Riverside paths should also be upgraded to ensure they are cycle friendly. Overall the cycle routes within the town centre should be connected to establish a comprehensive cycle network
- Potential to relocate the station entrance to Ford End Road / Midland Road to create a frontage and improve passengers sense of arrival. This would also greatly improve legibility to the station and connections to the town centre
- Opportunity to utlilise the waterway to promote the river corridor as a means for sustainable transport provision (ie boats) and to to attract river activity all year round
- Junction improvements at the key Midland Road/ Ford End Road mini-roundabout to improve capacity of north-south movement through the town and to unlock the Ford End Road site.
- In the longer term there is the opportunity to rationalise and redevelop car parks to release land for redevelopment
- In the longer term there is potential for a new park and ride to the north of the town centre


Contamination
High risk
Medium risk
Low risk

7.3 TECHNICAL CONSIDERATIONS

Constraints

This section of the report summarises the key physical constraints within the Ford End Road site. Separate reports for archaeology, contamination and flood risk have been produced by Capita and these are presented within the appendices.

Other physical constraints such as tree preservation orders, ecology, noise and air quality are also commented on, although further technical studies are required to establish the level of constraint and mitigation measures required to ameliorate the issues.

- **Contamination** - A desk-top contamination review of the Ford End Road site reveals that the land is sensitive due to the presence of a principal aquifer in most part overlain by permeable River Terrace deposits. The River Great Ouse is likely to receive baseflow from groundwater beneath the site. The report highlights the levels of contamination risk across the site, which is summarised as follows:

  High risk (red) – north east land (NHS/Network Rail/Rolls Royce/Part National Grid)

  Medium risk (yellow) – (Part National Grid/ Brewery/Part BBC/Part Network Rail)

  Low risk (green) – (Bedford BC land)

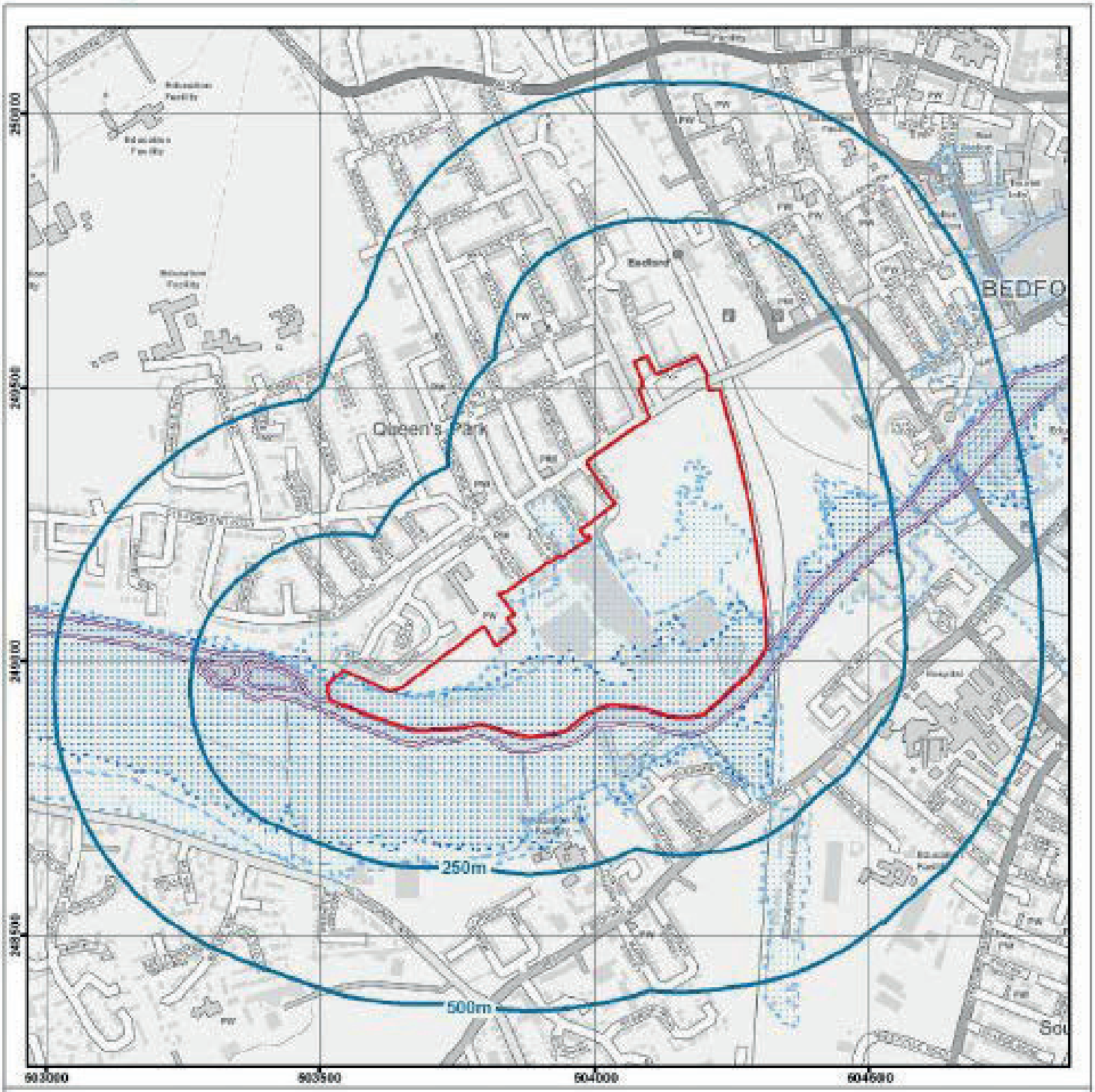
- The risk to groundwater is preliminary assessed to be moderate to high.

- The report indicates that remediation is likely in all areas apart from the low risk area adjacent to the River. Remediation involving capping in conjunction with localised deeper remediation at hotspots is considered a likely technique to be employed.

- **Tree Preservation Orders** - Ford End Road has several Tree Preservation Orders. There are two clusters of TPOs at the northern end of the National Grid land fronting Ford End Road. The eastern cluster of TPOs includes 1 ash tree and 3 non common lime trees, and the western cluster includes 1 ash tree and 4 non common lime trees. In addition, on the north side of Ford End Road within the NHS Property land there are two clusters of TPOs, with the eastern cluster comprising 18 beech tree and 1 crab apple tree, and the western cluster comprising 1 horse chestnut, 4 purple plum trees, 1 elder tree and various box trees.

- **Noise** - There are several sources of noise within the Ford End Road site, most notably of which is the Eagle Brewery and the railway line. Currently there is no date available from these sources to assess the potential impact on residential development. However, appropriate mitigation measures can be introduced for dwellings in close proximity to these sources, including an increased level of glazing for windows and doors, plus acoustic fencing if necessary. A noise assessment would be undertaken as part of a planning application to establish the level and frequency of the noise and an appropriate strategy for its mitigation.

- **Ecology -** The area of vegetation on the site at the southern end has the potential to accommodate species of ecological value. A Phase I Extended Habitat Survey would be undertaken as part a planning application to establish the potential for protected species within the site. This would be followed by a series of absence and presence surveys where necessary. As this land is located predominantly in Flood Zone 3, it would be utilised as public open space rather than built development.



- **Air Quality** - The Council monitors air quality in relation to the Air Quality Management Area that covers a larger portion of Bedford town centre. As expected air pollution is greater near busy roads, particularly where traffic builds up. Key roads are Bedford High Street, Shakespeare Road, Prebend Street and Ampthill Road. Although average levels of pollution are not necessarily above the threshold, health impacts are seen at levels below threshold. In Bedford, the annual mean objective for NO2 is exceeded at a number of locations across the Borough. All but one of the exceedances are within the town centre AQMA (Bedford town centre AQMA shown below), the site that exceeds outside the AQMA does not present relevant exposure (people living or working in the vicinity).

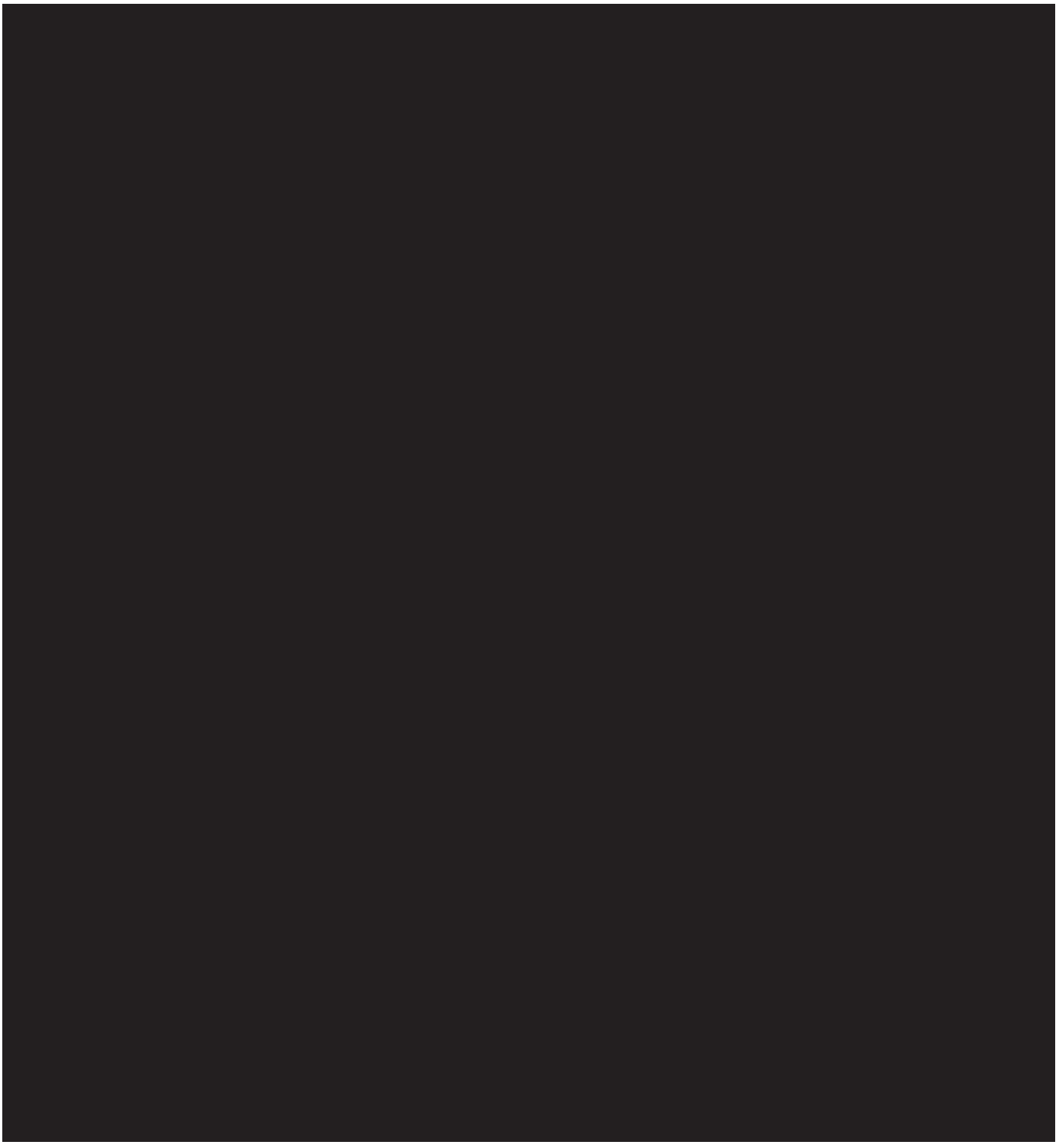
- **Archaeology-** A desk-top review of the archaeological assets within the Ford End Road site shows a limited number of previous finds. The key entries from the Historic Environment Record (HER) (as shown below) relate to iron-age coins. These finds are not deemed to be a major constraint on the site's development, although Bedford Borough Council may require further information to be submitted at planning application stage, including some intrusive works to be undertaken.

- **Flood Risk** - A desk-top flood risk review of the Ford End Road site reveals that the site is located in Flood Zone 1, 2 and 3. The history of the site shows that in 1947 a larger proportion of the site was affected by widespread flooding and in 1998 up to 50% of the site was affected.

Fig 36 *Key entries from the Historic Environment Record (HER) relate to iron-age coins*

Fig 37 *Aerial photograph of the study area*

7.4 SUMMARY AND SWOT



CAPITA

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Ford End Road, Bedford

Flood Risk Statement for Bedford Borough Council
June 2017

We | Listen Create Deliver

Quality Management

Job No	CS092598		
Project	Bedford Masterplan		
Location	Ford End Road, Bedford		
Title	Ford End Road, Bedford, Flood Risk Statement		
Document Ref	001	**Issue / Revision**	**001**
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Checked by	Kevin Hemmings	**Signature (for file)**	
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Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised
1	**30.6.17**	Draft for Comment	AJW	KH	DS

Contents

Figures

1. Executive Summary

Site Name	Ford End Road
Location	Bedford
Client	GL Hearn
Grid Reference	TL 03990 49188
Area	0.24km^2
Current Site Use	Mixed industrial and open land
Proposed Development	Residential units
Flood Zone Classification	Flood Zone 1, 2 & 3
History of Flooding	Fluvial flood events at site in 1947 & 1998
Summary of Risks	Fluvial – High risk of flooding Tidal – Negligible risk of flooding Artificial Sources – Negligible risk of flooding Groundwater – Low to moderate risk of flooding Surface Water – Moderate risk of flooding

2. Introduction

2.1 Scope of Assessment

2.1.1 Capita have been commissioned by GL Hearn to undertake a Flood Risk Statement for residential accommodation at Ford End Road, Bedford.

2.1.2 The purpose of this Flood Risk Statement is to provide a brief assessment of the flood risk to allow GL Hearn to make an informed decision about the development of the site Masterplan. This report will consider flood risk from all sources (fluvial, tidal, groundwater, surface water and artificial sources), using existing available information.

2.1.3 The Flood Risk Statement will cover an assessment of:

- Risk of flooding from all sources;
- Impact of the flood risk conditions.

2.1.4 The Statement has been prepared in accordance with guidance provided by the National Planning Policy Framework (March 2012).

2.2 Description of the site

2.2.1 The site, 0.24km^2 of mixed industrial and open land, located to the west of the town centre of Bedford is bounded by the River Great Ouse to the south and Ford End Road to the north. The proposed development is for the construction or circa 500 residential units. Land use on the site currently comprises of industrial land, owned by National Grid and Network Rail among others, and mixed grass and woodland owned by Bedford Borough Council.

2.2.2 Directly to the south of the site is the River Great Ouse which drains a catchment area approximately 1462km^2 to this point.

2.2.3 The site is indicated in Figure 1.

Figure 1 Ford End Road site

2.3 Summary of flood risk

2.3.1 The site has a risk of flooding from multiple flood sources. Fluvial flood risk at the site is high due to the proximity of the River Great Ouse. The site is located within Flood Zone 1, 2 and 3.

2.3.2 In 1947 a large proportion of the site was affected by widespread flooding and in 1998 up to 50% of the site was affected by flooding.

2.3.3 The site is within the mid reaches of the River Great Ouse catchment, approximately 100km from the coast. The River Great Ouse is not influenced by tidal action at Bedford, therefore there is no risk of tidal flooding in this area.

2.3.4 In addition to fluvial flooding the site has a moderate risk of surface water flooding. Surface water flow pathways are present on site flowing in a south-eastern direction. The Environment Agency (EA) updated Flood Map for Surface Water (uFMfSW) indicates that the land directly adjacent to the River Great Ouse has a low risk of flooding. In the centre of the site where buildings and structures impede surface water flow pathways there is a small area of high risk associated with a drop in elevation, however surface water risk is predominantly moderate. To the north east of the site on the southern side of Ford End Road is an area of medium to low risk of surface water flooding associated with ponding.

2.3.5 The site is on low lying ground with geology and soils that are conducive to increased groundwater flood risk.

2.3.6 Artificial sources of flooding are not considered a risk on this site as there are no canals, reservoirs or lakes in proximity.

3. Policy and Guidance

3.1 Flood and Water Management Act, 2010

3.1.1 Combined with the Flood Risk Regulations 2009, (which enact the EU Floods Directive in England and Wales), the Act places significantly greater responsibility on Local Authorities to manage and lead on local flooding issues. The Act and The Regulations together raise the requirements and targets Local Authorities need to meet, including:

- Playing an active role leading Flood Risk Management;
- Development of Surface Water Management Plans (SWMP);
- Implementing requirements of Flood and Water Management legislation;
- Preparation of preliminary flood risk assessments and flood risk management plans;
- Development and implementation of drainage and flood management strategies; and
- Responsibility for first approval, then adopting, management and maintenance of Sustainable Urban Drainage System (SuDS).

3.1.2 The Flood and Water Management Act also clarifies three key areas that influence development:

1. **Sustainable drainage (SuDS) -** the Act makes provision for a national standard to be prepared on SuDS, and developers will be required to obtain local authority approval for SuDS in accordance with the standards, likely with conditions. Supporting this**,** the Act requires local authorities to adopt and maintain SuDS, removing any ongoing responsibility for developers to maintain SuDS if they are designed and constructed robustly.
2. **Flood risk management structures -** the Act enables the EA and local authorities to designate structures such as flood defences or embankments owned by third parties for protection if they affect flooding or coastal erosion. A developer or landowner will not be able to alter, remove or replace a designated structure or feature without first obtaining consent.
3. **Permitted flooding of third party land** - The EA and local authorities have the power to carry out work which may cause flooding to third party land where the works are deemed to be in the interest of nature conservation, the preservation of cultural heritage or people's enjoyment of the environment or of cultural heritage.

3.2 National Flood and Coastal Erosion Risk Management Strategy, (November 2011).

3.2.1 The Flood and Coastal Erosion Risk Management Strategy (FCERMS), developed under the Flood and Water Management Act 2010, also taking findings of the Pitt Review of the summer 2007 flooding, provides the national framework for flood and coastal erosion risk management in England.

3.2.2 Its overall aim is "to ensure the risk of flooding and coastal erosion is properly managed by using the full range of options in a co-ordinated way". This is to be met by the following objectives:

- Reducing the consequences for individuals, communities, businesses and the environment from flooding and coastal erosion.
- Raising awareness and engaging people in the response to flood and coastal erosion risk.
- Providing an efficient and sustained response to flood and coastal erosion events.
- Understanding the risks of flooding and coastal erosion, working together to put in place long-term plans to manage these risks and making sure that other plans take account of them;
- Avoiding inappropriate development in areas of flood and coastal erosion risk and being careful to manage land elsewhere to avoid increasing risks;
- Building, maintaining and improving flood and coastal erosion management infrastructure and systems to reduce the likelihood of harm to people and damage to the economy, environment and society;
- Increasing public awareness of the risk that remains and engaging with people at risk to encourage them to take action to manage the risks that they face and to make their property more resilient;
- Improving the detection, forecasting and issue of warnings of flooding, planning for and co-ordinating a rapid response to flood emergencies and promoting faster recovery from flooding.

3.2.3 A set of measures has been developed through the Strategy to address the above objectives.

3.2.4 The Strategy identifies the Risk Management Authorities (RMAs) in England and the flood and coastal erosion risk management functions they may exercise:

- Environment Agency;
- Lead Local Flood Authorities;
- District Councils;
- Internal Drainage Boards;
- Regional flood and coastal committees; and
- Highway authorities, water and sewerage companies.

3.3 National Planning Policy Framework (March, 2012).

3.3.1 The National Planning Policy Framework sets out the government's planning policies for England. In determining an approach for the assessment of flood risk and consequences for the proposed development there is a need to review the policy context. UK Sustainable Development Strategy Securing the Future advises that managing flooding makes an important contribution to achieving sustainable development.

3.3.2 The National Planning Policy Framework establishes a presumption in favour of sustainable development, establishes the local plan as the keystone of the planning system and provides robust protection of the natural and historic environment. Sustainable development means that economic, social and environmental objectives should be pursued in a balanced way and it is explicit that Council policies should encourage the reuse of brownfield land.

3.3.3 Local planning authorities should apply this balanced approach to sustainable development when determining planning applications and plan making, as will Inspectors when determining appeals.

3.3.4 Paragraph 103 of the NPPF states "When determining planning applications, local planning authorities should ensure flood risk is not increased elsewhere and only consider development appropriate in areas at risk of flooding where, informed by a site-specific flood risk assessment following the Sequential Test, and if required the Exception Test, it can be demonstrated that it gives priority to the use of sustainable drainage systems".

3.4 Great Ouse Catchment Flood Management Plan (CFMP)

3.4.1 The Great Ouse CFMP covers the entire extent of the River Great Ouse catchment. The site is located within sub-area 4. The plan considers social, economic and environmental objectives to identify appropriate approaches to flood risk within its sub areas. The site is covered by policy 5, areas of moderate to high flood risk where further action can be taken to reduce flood risk.

3.4.2 The CFMP states that organisations must work together to manage the risk of surface water flooding in Bedford.

3.4.3 The need to work with local planning authorities to ensure that urban development does not increase flood risk is also identified. Flood risk management planning should be linked with development so that the location, lay-out and design of the development can help to manage flood risk.

3.5 River Basin Management Plan (RBMP): Anglia River Basin District (2015)

3.5.1 The RBMP provides a framework for protecting and enhancing the benefits provided by the water environment. Water and land resources are closely linked as such the RBMP informs decisions on land use planning.

3.5.2 The plan fulfils the requirements of the Water Framework Directive (WFD) and contributes to the objectives of other EU directives.

3.6 Bedford Borough Council Strategic Flood Risk Assessment (2015)

3.6.1 The Strategic Flood Risk Assessment (SFRA) for Bedford Borough Council was updated in 2015. The primary objective of the SFRA is to inform planning and development management policies within the Borough in accordance with the NPPF and supporting guidance. This aim is met through the following objectives:

- Provide an up to date assessment of the impact of all potential sources of flooding in accordance with the NPPF, including assessment of the future impacts associated with climate change;
- Update the guidance specific to local flooding issues and inform emerging planning policies;

- Provide information required to apply the Sequential Test for identification of land suitable for development in line with NPPF;
- To provide baseline data to inform the Sustainability Appraisal of the Local Plan 2032 regarding catchment-wide flooding issue which affect Bedford Borough;
- Provide sufficient information to allow Bedford Borough Council to assess the flood risk (including representation of flood hazard) for specific development proposal sites, thereby setting out the requirements for site specific Flood Risk Assessments (FRAs);
- Provide recommendations of suitable mitigation measures including objectives of Sustainable Drainage Systems (SuDS);
- Enable Bedford Borough Council to use the SFRA as a basis for the considerations of planning applications; and
- Present sufficient information to inform Bedford Borough Council of acceptable flood risk in relation to emergency panning capability.

3.7 The SuDS Manual, CIRIA (2007)

3.7.1 This guidance provides best practice on planning, design, construction, operation and maintenance of SuDS to facilitate their effective implementation within developments.

3.7.2 The guidance supersedes previous general guidance on SuDS and addresses landscaping, biodiversity issues, public perception and community integration as well as water quality treatment and sustainable flood risk management. The output is based on results contained in the Environment Agency R&D Report SCO20114/2.

3.7.3 The SuDS Manual aims to provide comprehensive advice on the implementation of sustainable drainage techniques in the UK. It provides guidance on:

- Initial planning;
- Design through to construction;
- The management of SuDS in the context of the current regulatory framework; and
- Advice on landscaping, waste management, cost, and community engagement.

3.8 Designing for Exceedance in Urban Drainage: Good Practice, CIRIA (2006)

3.8.1 The good practice guide aims to provide best practice advice to designers and managers of urban sewerage and drainage systems to reduce the issues arising from exceedance in urban drainage systems. The guide also provides advice on risk assessment procedures and planning that can reduce the impact of exceedance events to those at risk.

3.8.2 The guide has been used to provide direction on the design of urban drainage systems capable of coping with extreme events and within an assessment of the likelihood and impact of exceedance.

3.9 Sewers for Adoption 7th Edition (August 2012)

3.9.1 This document is the definitive guide for those planning, designing and constructing sewers and pumping stations for subsequent adoption by water companies in England and Wales under Section 104 of the Water Industry Act.

3.9.2 This guidance provides best practice on planning, design, construction, operation and maintenance of SUDS to facilitate their effective implementation within developments. The 7th Edition extends the guidance to cover small types of sewers and lateral drains that were not previously covered and which have been brought under the management of sewer companies through the Flood and Water Management Act 2010.

3.10 UK Climate Impact Programme

3.10.1 The UK Climate Impact Programme released guidance with respect to climate change allowance and adaption.

3.10.2 In June 2009, the UK Climate Impact Programme released new guidance with respect to climate change predictions (superseding UKCIP02). The predictions have moved from a deterministic approach (i.e. one range of outcomes) to a probabilistic approach (i.e. a range of possible outcomes based on a range of climate change scenarios).

3.10.3 The UKCIP09 predicts some difference in the seasonal variations of the storm events with winter rainfall expected to increase compared to a decrease in summer with more frequent short term droughts. Peak rainfall intensity is likely to increase.

3.10.4 The Government climate change guidance in England was updated in April 2016. For the Anglian region, the central estimate for the 2050s is a 15% change in peak rivers flows with an upper end estimate of 35%. Across England the peak rainfall intensity central estimate is a 10% increase with an upper end estimate of 20% increase.

4. Sources of Flood Risk

4.1 Site Description

4.1.1 To assess the risk of flooding to the development site and the area in which it lies it is important to understand local characteristics.

4.1.2 The site is located to the west of Bedford town centre. The site is adjacent to the north bank of the River Great Ouse and is bounded by Ford End Road to the north and the Midland Main Line to the east. Current land use on the site consists of mixed industrial and open land of mixed grass and woodland.

Local Geology

4.1.3 British Geological Survey (BGS) mapping (1:50,000) indicates that the site is underlain by Jurassic period (formed approximately 165-168 million years ago) interbedded sedimentary bedrock consisting of Limestone and Argillaceous Rocks. Quaternary period superficial deposits formed by river deposition of sand and gravel (formed approximately 3 million years ago) are also present. These superficial deposits have the potential to act as Secondary A aquifers which are permeable layers capable of supporting groundwater supplies at local scales.

4.1.4 The BGS Geological Indicators of Flooding (GIF) data indicates that the site has geological deposits present that indicate a history of flooding. The map (1:50,000) characterises superficial deposits in terms of their susceptibility to flooding (coastal and fluvial) and reflects areas which may have flooded in the recent geological past i.e. they have formed within the last few tens of thousands of years.

4.1.5 Additionally, borehole scans are available at the site ranging in depth from 0-32m. Borehole scans are available to view on the British Geological Survey website. For example, borehole record TL04NW296 is a 5m core identifying five distinct strata. The first 2m is a compact mixture of ashes, clay, clinker, stones and small brick fragments. Between 2m and 2.3m is a layer of soft grey silty clay, below that to a depth of 3.5m is a layer of soft to firm silty clay with traces of shell and stone. From 3.5m to 4.5m there is a layer of silty clay with rubbly limestone. From 4.5m to 5m is a medium hard limestone. The geology is therefore relatively permeable with the potential for groundwater flooding.

Local Soils

4.1.6 Soilscapes is a soils dataset covering England and Wales developed by Cranfield University sponsored by DEFRA. This mapping (1:250,000) indicates that the site is covered by freely draining acid loamy soils (Soilscape 6).

Local Topography

4.1.7 The site is located adjacent to the River Great Ouse and generally slopes gently northwards. Elevation across the site ranges from approximately 25mAOD next to the river to 32mAOD on a small mound to the north east of the site.

4.2 Historical Flooding

4.2.1 This site has a history of flooding. Two major historical fluvial events that caused flooding at the site occurred in 1947 and more recently 1998. Furthermore, geological deposits present also indicate a history of fluvial flooding. Figure 2 highlights areas that have recorded history of flooding at the site. The historical mapping shows flooding covering large sections of the site within proximity of the river channel. The north-eastern section of the site was unaffected by these recorded floods.

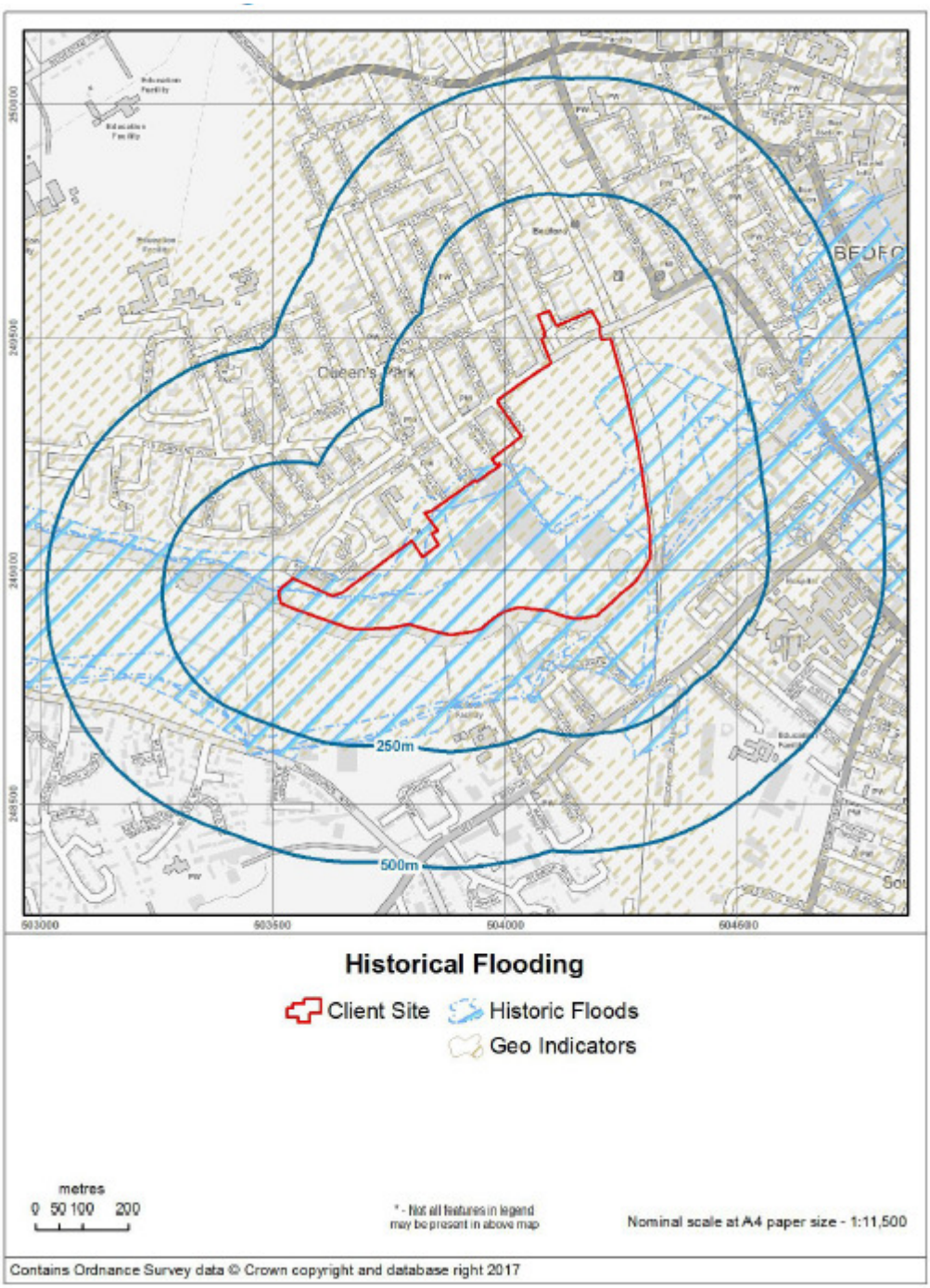

Figure 2 Historical Floods

4.3 Flood Risk from Rivers

4.3.1 The risk of flooding from rivers and sea has been assessed through the Environment Agency flood risk data. The risk of fluvial flooding at the site is high due to the proximity of the River Great Ouse.

4.3.2 Flood Zones identify the extent of flooding that would occur ignoring the presence of flood defences. They describe the probability of river or sea flooding splitting this into three categories or zones.

4.3.3 The site lies within Flood Zone 1, 2 and 3. Flood Zone 1, which includes approximately 30% of the site, is classified as land having a less than 1 in 1000 annual probability of fluvial flooding. Approximately 40% of the site is within Flood Zone 2 which is defined as having between a 1 in 100 and 1 in 1000 annual probability of fluvial. Further to that 30% of the site, directly adjacent to the River Great Ouse is within Flood Zone 3 which is land assessed as having a 1 in 100 or greater annual probability of fluvial flooding. Flood Zone extents are shown within Figure 3.

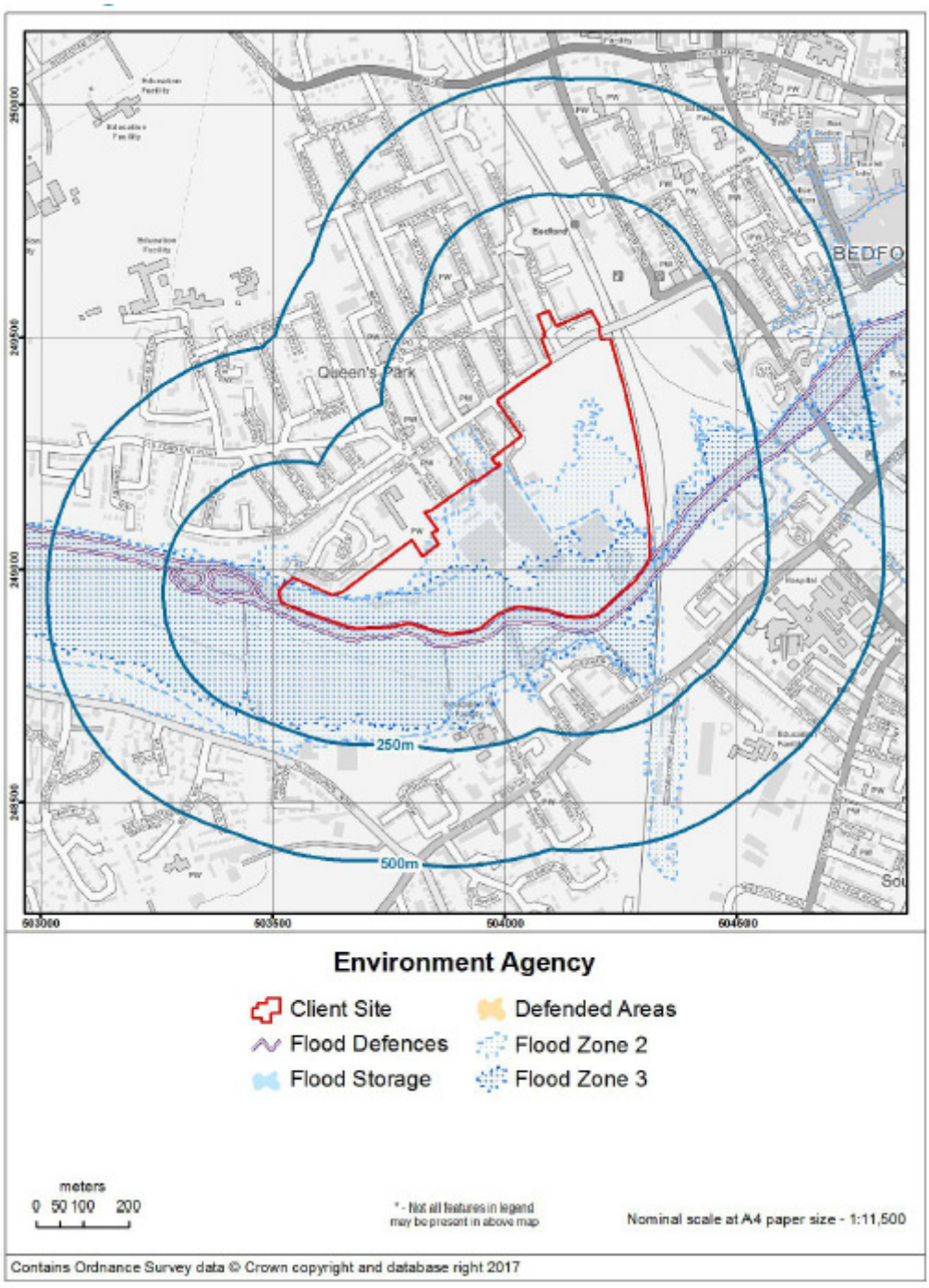

Figure 3 Flood Zones

4.3.4 A flood risk assessment is required as part of a planning application for developments located within Flood Zones 2 and 3.

4.3.5 Bedford Borough Council SFRA hazard mapping also indicates that the site, in particular the areas directly adjacent to the River Great Ouse, is affected by fluvial flooding including at the 1 in 25 annual probability fluvial event and greater. The 1 in 25 annual probability event only covers a small proportion of the site, directly adjacent to the river channel.

4.3.6 EA flood mapping, Figure 4, highlights the extent of fluvial flood risk on site.

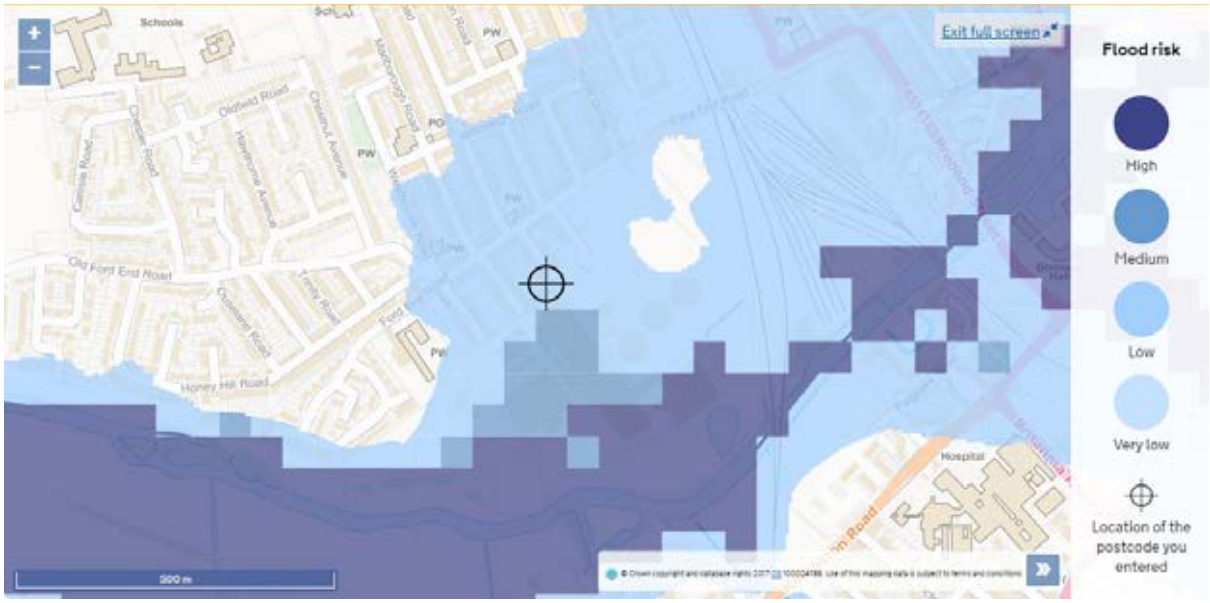

Figure 4 Flood risk from rivers or the sea

4.3.7 Flood defences on site run adjacent to the River Great Ouse. However, there is a residual risk of flooding should the defence fail or the standard of protection of those defences be exceeded.

4.3.8 The EA is responsible for issuing flood alerts and warnings to the public and professional partners including emergency services, local authorities, utility companies and the media. This service operates in areas at risk of flooding. The site is partially covered by the EA Flood Alert Area (FAA) Middle River Great Ouse (052WAFMIDOUSE) which extends from Newport Pagnell to Roxton. Additionally, two Flood Warning Areas (FWA), River Great Ouse at Bedford Area 1 (052FWFMOBED1) and River Great Ouse at Bedford Area 3 (052FWFMOBED3), have partial coverage of the site. The presence of FWAs further highlights the vulnerability of the site to fluvial flooding should defences fail or design standards be exceeded.

4.4 Flood Risk from the Sea

4.4.1 The site is not influenced by tidal flooding due to its location in the mid reaches of the River Great Ouse catchment.

4.5 Surface Water Flood Risk

4.5.1 Surface water flooding is typically associated with high intensity storms often with a short duration. Flooding of land can be caused by rainfall being unable to infiltrate into the natural ground surface or entering formalised drainage systems due to blockage, or the capacity of the collection system being insufficient to convey runoff to the underground drainage network. The result of this is temporary localised ponding and flooding. The natural topography and location of buildings/structures can influence the direction and depth of water flowing off impermeable and permeable surfaces.

4.5.2 Additionally, flooding can also arise from the sewage network, becoming overwhelmed or blocked and this leads to localised flooding.

4.5.3 Bedford Borough Council SFRA uses the Environment Agency updated Flood Map for Surface Water (uFMfSW) as the preferred source of surface water mapping. The uFMfSW was published in December 2013 and provides an indication of surface water flood risk for the 1 in 1000, 1 in 100 and 1 in 30 annual probability events.

4.5.4 In general, the site has a moderate risk of surface water flooding. The mapping, Figure 5, indicates localised surface water risk is present across the site ranging in severity. The land directly adjacent to the River Great Ouse is considered to have a low risk of surface water flooding. An area of vacant land south of Ford End Road at the north-east corner of the site has a medium to low risk of surface water flooding. Centrally where there is a presence of buildings and structures impeding the flow of surface water there is a small area at high risk.

Figure 5 Flood risk from surface water

4.5.5 Digital terrain model (LiDAR) hydraulic analysis of the site identifies surface water pathways flowing in a south-eastern direction towards the River Great Ouse.

4.5.6 The SFRA provides a list of historical flood events in Bedford Borough. This list, although not comprehensive, does not indicate any historical surface water flood events on the site. However, this does not mean the area is not susceptible to surface water flooding, as highlighted by the uFMfSW, and as such the impacts of surface water runoff should be considered and managed going forward.

4.6 Groundwater Flood Risk

4.6.1 Groundwater flooding occurs when water levels in the ground rise above surface elevations. It is most likely to occur in low-lying areas underlain by permeable rocks.

4.6.2 The site is low-lying and situated in the River Great Ouse valley bottom within close proximity of the river channel, that combined with the bedrock geology, superficial deposits and soils results in the site lending itself to increased risk of groundwater flooding.

4.6.3 Ground water flooding management is the responsibility of Bedford Borough Council acting as the LLFA in this instance.

4.6.4 A review of the SFRA and the Environment Agencies Areas Susceptible to Groundwater Flooding (AStGWF) dataset indicates that the site is susceptible to groundwater flooding. The SFRA highlights land adjacent to the River Great Ouse as being susceptible to groundwater flooding. The site therefore should be considered vulnerable to groundwater flooding.

4.6.5 Information from GeoSmart Information Ltd, Figure 6, indicates a moderate risk of groundwater flooding at the site for a 1 in 100 annual probability event.

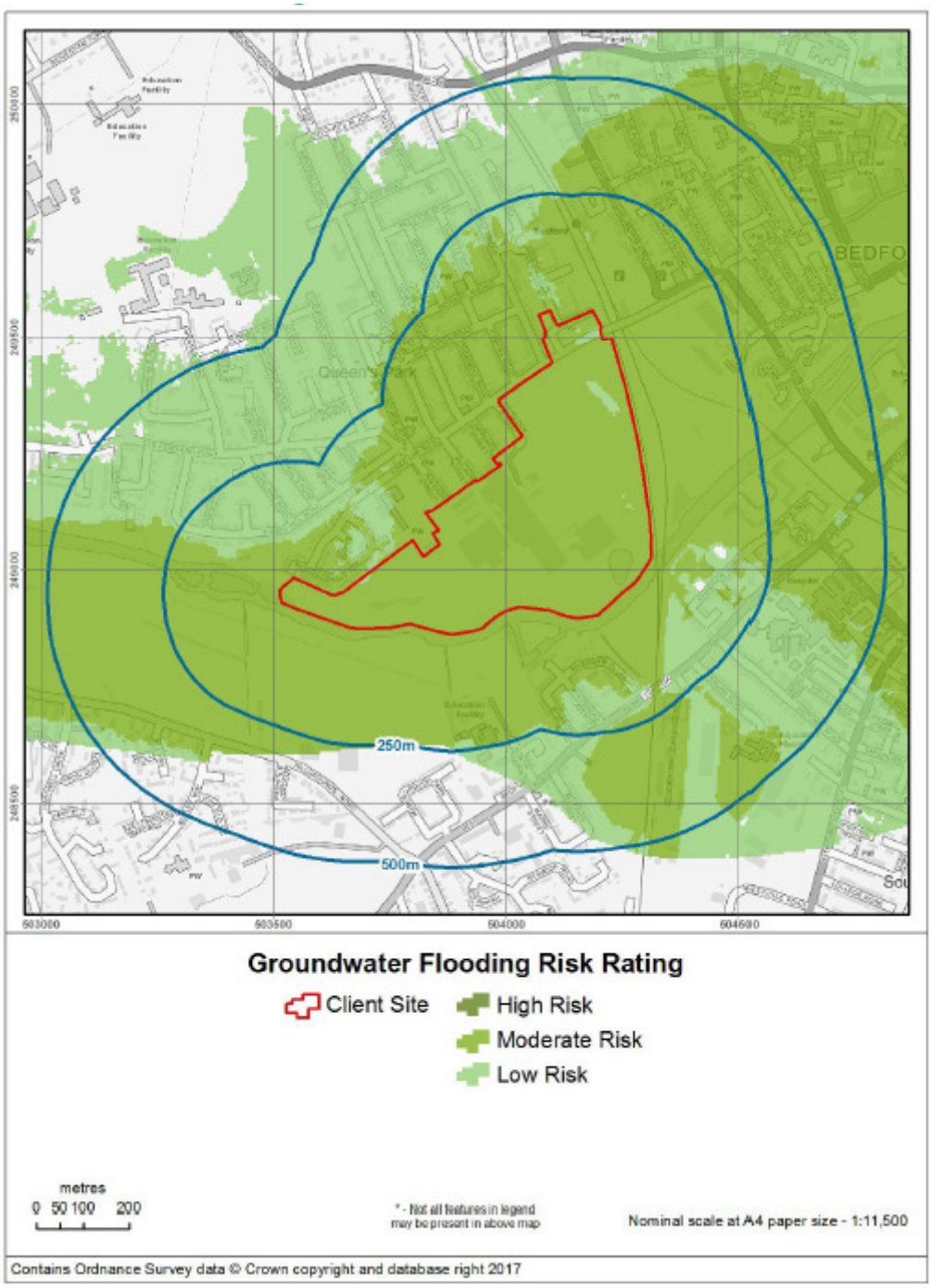

Figure 6 Flood risk from groundwater

4.6.6 There is history of groundwater flooding in areas within proximity of the site for example Kempston (2002 and 2003) which is around 1.5km to the south west and Harpur Shopping Centre (2009) which is around 750m to the eastern extent of the site. These events have been recorded by the Environment Agency, Bedford IDB and Bedford Borough Council, however there is uncertainty of a direct link to groundwater flooding for these events.

4.6.7 There are no groundwater level monitoring points registered by BGS within the proposed site area.

4.6.8 Flood risk from groundwater flooding is deemed moderately likely in this location due to the geology and soils within the area.

4.7 Flood Risk from Artificial Sources

4.7.1 Artificial sources of flooding include reservoirs, canals, lakes and mining abstraction.

4.7.2 Flooding from artificial sources is deemed unlikely in this location as there are no reservoirs, canals or lakes in proximity to the site.

4.7.3 EA flood risk from reservoir mapping does not highlight risk from reservoir flooding at the site.

4.8 Summary

4.8.1 A summary of the potential sources, pathways and receptors of flood risk within the Ford End Road site is provided in Table 4-1.

Table 4-1 Summary of Source-Pathways-Receptor at the Ford End Road site

Type	Source	Pathway	Receptor	Management Required
Fluvial	River Great Ouse	Overtopping / Flood plain inundation	Site	Development should adhere to planning guidelines in Flood zones 1, 2 and 3.
Tidal	N/A	N/A	N/A	N/A
Surface Water	Heavy Rainfall	Ponding / flow paths	Site	Design surface water management infrastructure to manage runoff to Greenfield runoff rates
Sewer	Sewer Capacity	Sewer	Properties and downstream network	Manage discharge within best practice guidance.
Groundwater	High water table coupled with prolonged rainfall	Bedrock, superficial deposits and soils	Site	Mitigate groundwater flooding by implementing flood compatible techniques for example raised electrics.
Artificial Sources	N/A	N/A	N/A	N/A

4.9 Flood Risk Constraints

Fluvial

4.9.1 Local planning authorities apply a sequential approach to site selection with the aim of keeping development outside Flood Zones 2 and 3 where possible. Local planning authorities consider the application of the sequential tests and if required the exception test to steer development to areas with the lowest probability of flooding.

4.9.2 National Planning Policy states that where development needs to be in locations where there is a risk of flooding, if alternative sites are not available, then local planning authorities and developers ensure development is appropriately flood resilient and resistant, safe for its users for the development lifetime, and will not increase flood risk overall.

4.9.3 As part of the site is within Flood Zone 2 and Flood Zone 3 a Flood Risk Assessment will be required with submission of planning application.

Surface Water

4.9.4 National Planning Policy Framework states that development should consider opportunities to reduce flood risk to existing communities and developments through better management of surface water, provision of conveyance and of storage for flood water.

4.9.5 National Planning Policy Framework states that development should not increase the risk of flooding elsewhere through an increase in surface runoff. Runoff from a development can, if not appropriately controlled, result in flooding at other locations and significantly alter the frequency and extent of flooding downstream in the catchment.

4.9.6 National Planning Policy Framework also advises that the aim of any new development should not be to create additional runoff when compared to the undeveloped state of the site. The use of SuDS is recommended to help achieve this aim. Implementation of SuDS should be considered at this site to limit surface water runoff to Greenfield Runoff Rates.

Groundwater

4.9.7 Groundwater flooding should be investigated in more detail as part of site specific Flood Risk Assessments for developments located where a potential for groundwater flooding exists.

4.10 Additional Flood Risk Constraints

4.10.1 As discussed previously, the flood risk from tidal and artificial sources has been deemed to be negligible. Therefore, no development considerations to mitigate flooding from any of these sources is required.

5. Conclusion and Recommendations

5.1.1 Capita have been commissioned by GL Hearn to undertake a Flood Risk Statement for a proposed development site at Ford End Road, Bedford.

5.1.2 The site, 0.24km^2, is currently a mix of industrial and open land. Located to the west of Bedford town centre the site is directly adjacent to the River Great Ouse.

5.1.3 Flood risk at the site has been considered from all sources.

5.1.4 Parts of the site have a high risk of fluvial flooding and are located within Flood Zones 1, 2 and 3. Development on site should adhere to local and national planning guidelines for the respective Flood Zones.

5.1.5 Flood history indicates parts of the site have been affected by fluvial flooding, most notably in 1947 and 1998.

5.1.6 The site has a moderate risk of surface water flooding. Land adjacent to the River Great Ouse has a low risk of surface water flooding. There are additional areas of site associated with buildings and structures that have a higher risk of surface water flooding. Thus, it is recommended that the National Planning Policy Framework guidance is adhered to by ensuring surface water management infrastructure is designed to manage runoff to greenfield rates.

5.1.7 The site has a low to moderate risk of groundwater flooding due to the local geology and soils. It is recommended that flood compatible building techniques are adopted to mitigate the risks of groundwater flooding.

5.1.8 Flood risk on site has been identified from several sources, development should consider the management of risk in association with policy and apply appropriate measures to mitigate different risks. Parts of the site are within Flood Zones 2 and 3 and development should be suitable for this level of risk for example residential living space should be lifted from the ground floor and safe access / egress from the development should be ensured. Flood resilient construction methods should be adopted across the site where increased risk has been identified.

5.1.9 A Flood Risk Assessment will be required for the site. For development to proceed it is recommended that a Flood Risk Assessment is undertaken, this should be submitted with planning application and include the following information:

- Location plans;
- Surveys;
- Assessment of flood risk;
- Assessment of surface water runoff;
- Managing flood risk; and
- Extra flood resistance and resilience measures.

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Bedford Masterplan- Ford End Road

Summary of Archaeological Assets

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Quality Management

Job Number	CS092497		
Project	Bedford Masterplan – Ford End Road		
Location	Bedford		
Document Title	Summary of Archaeological Assets		
Document BIM Ref	BED-CAP-EHR-01-RP-V-0001	**Revision / Status**	P01
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Revision Status / History

Rev	Date	Status/ Purpose	Prepared	Checked	Authorised
P01	01/06/2017	Issued	PS	RT	RT

CAPITA

Contents

1. Introduction

1.1. Purpose of report

1.1.1. Bedford Council has commissioned GL Hearn to produce an environmental baseline report to inform a masterplan for development of two areas within Bedford City Centre: Ford End Road and the wider City Centre. The baseline report is intended to provide a desk top summary of environmental constraints within the masterplan study area.

1.1.2. GL Hearn has commissioned Capita to produce a summary of archaeological constraints to inform the baseline report.

1.1.3. This report focusses on the Ford End Road development area.

1.2. Site Location

1.2.1. The Ford End Road development area is located to the west of Bedford City Centre. The site is bordered to the east by the Bedford-Bletchley railway line and to the south by the River Great Ouse.

1.2.2. The site boundary is shown on the archaeological assets plan included within appendix A.

1.3. Site History

1.3.1. There have been few recorded finds of Neolithic or Bronze Age date from the historic core of Bedford itself, however there is plentiful evidence of settlement in the surrounding area. The Iron Age period is also well presented in the landscape around Bedford.

1.3.2. There is substantial evidence of Roman settlement in Bedfordshire but Roman finds in the historic core of Bedford are rare. The Viatores group identified a complex network of Roman roads in Bedfordshire. Four of the suggested roads pass within the vicinity of the town though none through the historic core itself. Viatores no 173 (HER 485) is orientated NNE-SSW and passes to the west of the town. Viatores no 210 (HER 10480/717) runs in NW-SE direction to the south of Bedford.

1.3.3. The name 'Bedford' has Anglo-Saxon origins. The River Great Ouse played a major role in the Anglo-Saxon settlement with farmsteads gradually establishing along the river valley. There is evidence that Bedford became an established settlement in the 6th-8th century and it is believed that the first fortification of Bedford was centred on St Peter's. The only surviving building with stonework surviving from the Anglo-Saxon period in Bedford is St Mary's Church.

1.3.4. The King's Ditch which encloses the southern part of Bedford, is generally assumed to have been built in 915 on the orders of King Edward. The primary function of the earthwork was to provide a defensive boundary against attackers with the secondary function being a flood defence. The earthwork consisted of a large bank and ditch just under a kilometre in length and semi-circular in shape.

1.3.5. Bedford castle was constructed during the reign of William II (1087-1100), occupying a strategic position on the north side of the river.

1.3.6. The importance of Bedford as a trading centre in the 10th and 11th centuries is illustrated by the coins minted in the town. Furthermore in 1166 Bedford received a charter from Henry II giving the town's right to a merchant guild.

1.3.7. The Franciscan Friars arrived in 1238 and built the Friary at Greyfriars in the late 13th century. Throughout the 14th century Bedford was primarily an agricultural town.

1.3.8. During the Civil War, Bedford was principally a Parliamentary town and played host to the headquarters of the Parliamentarian army and frequent visits by Oliver Cromwell.

1.3.9. In 1689, the River Great Ouse was made navigable throughout its length to the sea opening Bedford up to waterborne trade. The increase in wealth this generated was a major factor in the revival of the town. The most valuable commodity coming to Bedford was coal. The most common trades during the 18th century included: stationer, tinman, hatter, ironmonger, builder, butcher and baker. In the 19th century watchmakers, jewellers and engravers also established on the high street.

1.3.10. In the early 18th and 19th centuries civic improvements were made to the town including a new County Gaol in 1801 and a new bridge replaced the medieval bridge in 1811-13.

1.3.11. Rapid growth continued throughout the 19th century with the coming of the railways and the expansion of the Harpur Trust schools. Bedford became renowned for its relatively cheap public education, which attracted many middle class families to the town and stimulated building of houses.

1.3.12. The coming of the railways allowed the manufacturing industry to develop. The Britannia Iron Works located itself beside the railway and became the largest employer in the town. Trades listed during this period included: dressmakers, shoemaker, bricklayer, stonemason and printer etc.

1.3.13. During the 20th century the expansion of Bedford continued with electrical and automobile engineer's workshops starting to establish. The town expanded through ribbon development along Kimbolton Road, Bromham Road, Ampthill Road and other main routes into the town.

2. Archaeological Assets

2.1. Summary of known archaeology within the development area

2.1.1. The following sources have been reviewed to identify known archaeological assets within the masterplan area:

- Albion Archaeology (2001) Extensive Urban Survey for Bedfordshire- Bedford Archaeological Assessment
- The Historic Environment for Bedfordshire (accessed online via the Heritage Gateway)
- Historic England List of National Heritage Assets

2.1.2. Information pertained from these sources is depicted on the Archaeological Assets plan included in appendix A.

2.1.3. Table 1 includes the HER records located within the development area boundary and further information is provided in the site gazetteer contained within appendix B.

Table 1 HER records within Ford End Road development area

HER Reference	Description
7332	W.H Allens Queens Works. Engineering works opened in 1906.
17536	Engine Shed
19974	Iron Age Coin
19975	Iron Age Coin
19994	Iron Age Coin
11248	Iron Age/ Roman Cremation. Findspot of pottery and a bronze brooch.

2.1.4. The area covered by the Ford End Road development boundary contains known archaeological finds dating from the Iron Age and also provides significant evidence relating to the development of Bedford during the 20th century.

2.1.5. The area surrounding the proposed development site provides evidence that the railways facilitated development in the area. There are many HER records relating to the operation of the railways for example signal boxes, engine sheds and warehouses.

2.1.6. To the south of the development area is the site of Cauldwell Priory (HER 250) which has potential to contain medieval remains.

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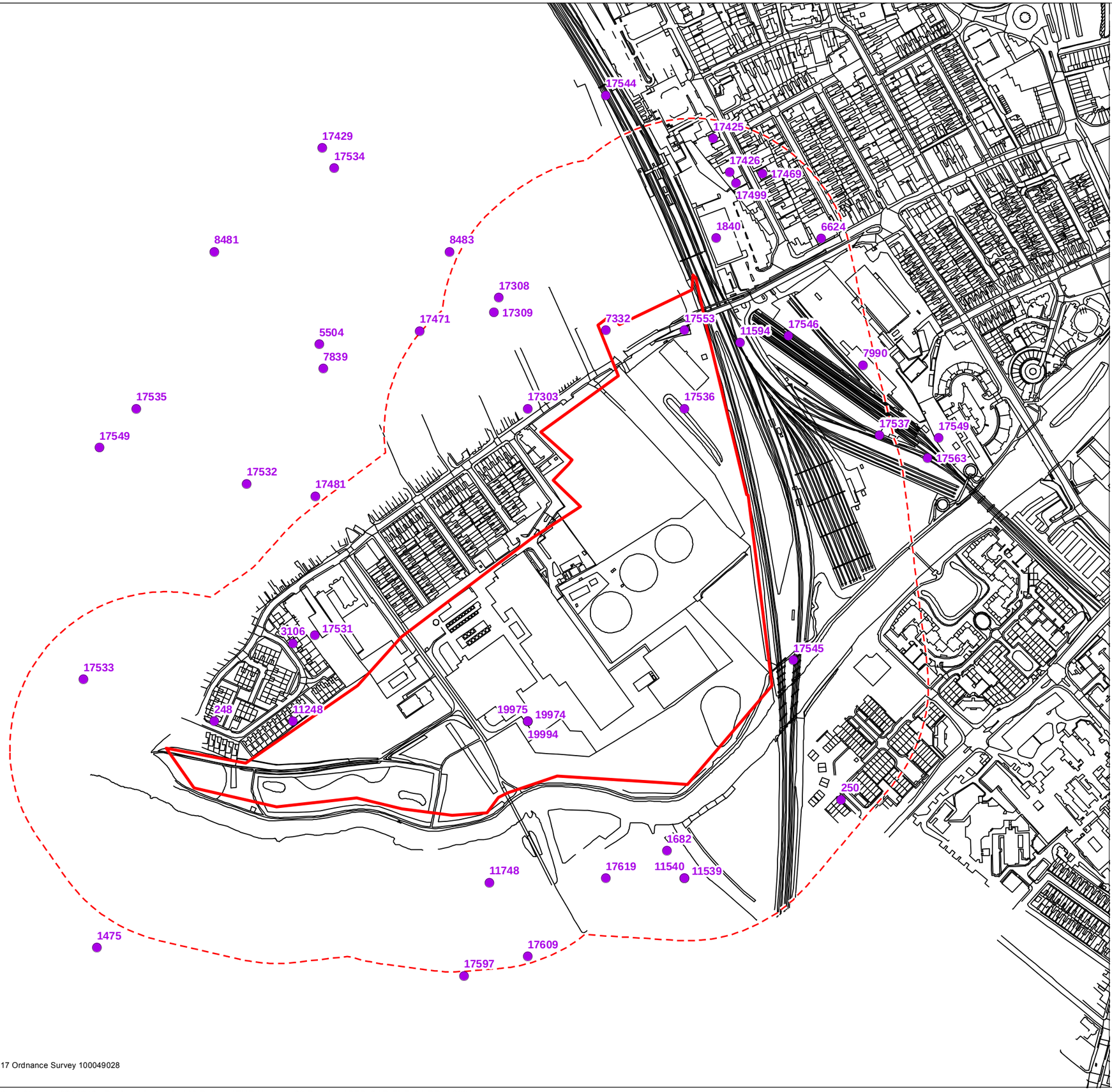
Appendix A – Archaeological Assets Plan



KEY:

- Site Boundary
- 200m Buffer
- Archaeology Assets

Rev	Drwn	Chk'd	App'd	Description	Date
01.1	SH	PS	PS	Created	31/05/2017

Purpose of Issue

S2 - Issued for Information

Classification

Commercial in Confidence

Client

Bedford Borough Council

BEDFORD BOROUGH COUNCIL

Project

Bedford Masterplan

Drawing

Archaeology Assets -
Ford End Road

Scale @ A3	Drawn	Checked	Approved
1:5,000	SH	PS	PS

Project No: CS092497

Date: 31/05/2017

Drawing Identifier
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Plot date: 31/05/2017

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Appendix B – Archaeological sites gazetteer

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Bedford Masterplan

Gazetteer of Archaeological Assets

01 June 2017

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Quality Management

Job Number	CS092497
Project	Bedford Masterplan
Location	Ford End Road site
Title	Gazetteer of Archaeological Assets
Reference	BED-CAP-GEN-01-SH-V-0001
Date	01 June 2017

Prepared by	Paula Smith	Signature (for file):
Checked by	Rachel Taylor	Signature (for file):
Authorised by	Rachel Taylor	Signature (for file):

Revision Status

Revision	Status	Prepared	Checked	Authorised
P01	Issued for approval	PS	RT	RT

Gazetteer of archaeological assets

HER reference	Description	Additional Information	Easting	Northing	Grid reference
7332	W.H Allens Queens Works. Engineering works opened in 1906.	W.H Allen's Queen's works moved to Bedford in 1894. It occupied originally about an area of 10 acres. Institute built around 1900. (opened in 1906). In 1900 employed 900 peoples. Now part of the Amalgamated Power Engineering group. 20th century to modern 1906 to 2050. Bibliographic reference: True North Books 1999, Memories of Bedford pp96-98.	504100	249500	TL 041 495
17536	Engine Shed	On Ford End Road is an engine shed that is associated with the Midland Line. 16th century to Victorian 1540 to 1900. Article in Kelly's Directory 1901, 1926. Cartographic materials 1972 OS 1:2500.	504200	249400	TL 042 494
MBB 19974	Iron Age Coin	Iron Age silver coin of Cunobelin. (findspot)	504000	249000	TL 04 49
MBB 19975	Iron Age Coin	Iron Age silver coin of Cunobelin. (findspot)	504000	249000	TL 04 49
MBB 19994	Iron Age Coin	A gold quarter stater	504000	249000	TL 04 49
11248	Iron Age/ Roman Cremation. Findspot of pottery and a bronze brooch.	Letter, T.G Elger: Roman find at bedford, on north bank of Ouse, consists of the following pottery, found in close contiguity c.3' below surface: 1 - Nearly perfect cinerary urn, reddish, containing calcined bones and rough unworked flints; unornamented, but furnished with well - fitting cove, on upper and under sides of which are a number of concentric grooves rectangular in section. 6.25" high, 4" diameter mouth. 2 - Shallow vessel black, 4.75" diameter, having curious stamp in centre inside 1" deep. 3 - Shallow vessel, also dark ware, scarcely >0.2" thick; very elegant, ornamented by delicate incisions extending round it near the rim. 4.25" diameter, 1.75" deep. 4 - Wide mouthed vessel, similar ware to 2, ornamented by rounded bands, nearly 5" diameter, 4.5" high. 5 - Remains of large cinery urn, at least 9" high, beautiful form, composed of yellowish tinted ware, apparently glazed, ornamented with bands inclined between lines, forming reticulated pattern. In connection with these objects was a small bronze disk, probably representing a personal ornament, possibly a brooch or fibula	503700	249000	TL 037 490
17303	Cabinet maker's, 10 Hurst Grove	The site of a post medieval cabinet maker's in Bedford. 16th century to Victorian 1540-1900. Article in Kelly's Directory 1914.	504000	249400	TL 040 494
17309	Tinsmith's, 16 Iddesleigh Road	The site of a post medieval tin man that was mentioned in Kelly's Directory of 1914.	503957	249523	TL 039 495
17308	Tinsmith's, 11 Iddesleigh Road	The site of a post medieval tin man that was mentioned in Kelly's Directory of 1906.	503963	249542	TL 039 495
17471	Wheelwright's, 47 Iddesleigh Road	The site of a post medieval to 20th century wheelwright's. Article in Kelly's Directory 1936, 1937.	503862	249499	TL 038 495
7839	All Saint's Church, Iddesleigh Road, Queen's Park	Site of early 20th century Parish Church, replacing earlier Iron built example. Old church built of iron designed to hold 360 persons, a similar aisle was added in 1897. Plans for proposed current church dated 1909. Joint Architects Arthur W. Blomfield and son/George P Allen. Church also holds two war memorials. Newspaper Article: Bedfordshire Times. Unpublished document: Bedfordshire & Luton Archives and Records Service Documents. BLARS Boro B.P 5090. Unpublished document: Imperial War Museum - National Inventory of War Memorials Record Sheet. 11/92.	503739	249451	TL 037 494
5504	All Saint's Church Hall, former Sunday School, Mrlborough Road	20th century building by CE Mallows, originally designed as a Sunday School but currently used as a Church Hall. Sunday School built 1903. SBD10551 - Unpublished document: Bedfordshire & Luton Archives and Records Service Documents. Plans & Elevations Boro BP4089. SBD10976 - Bibliographic reference: Service A. 1977. Edwardian Architecture. pp205	503734	249482	TL 037 494
8483	Queen's Park Moravian Chapel	Built 1911-12 by Architect AE Allen. SBD10544 - Newspaper Article: Bedfordshire Times	503900	249600	TL 039 496
8481	Queen's Park Schools, Marlborough Road	Opened 8th April 1899. Architect Henry Young. Plans prepared 18th Jan 1898, built by Bedford School Board. SBD10545 - Newspaper Article: Bedfordshire Mercury.	503600	249600	TL 036 496
17534	Garage, 109 Coventry Road	The site of a 20th century garage at 109 Coventry Road located near to the Queens head public house. SBD11259 - Cartographic materials: 1972. OS 1:2500.	503753	249707	TL 037 497
17429	O'Dells Garage, 123 Coventry Road	123 Coventry Road is the site of O'Dell's Garage Ltd, the garage did repairs and sold petrol as well as a hiring out private cars. Article in Kelly's Directory 1924-1936. Bibliographic reference: R Wildman & A Crawley. 2003. Bedford's Motoring Heritage. p120.	503738	249733	TL 037 497
1840	Former Bedford Midland Road Railway Station	Ridge and furrow canopies on cast iron columns dating from the building of the station 1858-1859 and extended over the concourse with 3 centred arch brick arcade towards platform when the Midland Railway was opened through to St Pancras in 1868. Cast iron bracket supports to furrow beams and bracing to principals rising from original openwork bracing above the capitals; highly decorative slightly gothicized leaf ornament to spandrels. The canopies are glazed and their ridge and furrow system was devised and patented by Sir Joseph Paxton, a director of the Midland Railway. The quality of the decorative ironwork is a hallmark of Midland Railway standards of design. The main station building was demolished in 1979	504241	249618	TL 042 496
17544	Signal Box, Midland Line, Ashburnham Road	Site of a post medieval to 20th century railway signal box. Article in Kelly's Directory. 1884, 1901, 1926	504100	249800	TL 041 498
17425	Ashburnham Motors Limited, 16a Ashburnham Road	16a Ashburnham Road was the site of F E Jones and Son garage, it was also known at Ashburnham Motors Ltd. The garage was a Vauxhall Motors dealership, in 1926 a tyre depot was located at 8a Ashburnham Road which was trading under the same name. Article in Kelly's Directory. 1924-1947. Cartographic materials: 1972. OS 1:2500. Bibliographic reference: R Wildman & A Crawley. 2003. Bedford's Motoring Heritage. p119.	504237	249745	TL 042 497
17426	Tyre Depot, 8a Ashburnham Road	8a Ashburnham Road is the site of F E Jones and Son tyre depot that was established by 1926. The site was associated with Ashburnham Motors Limited as they were owned by the same person.	504258	249702	TL 042 497

17499	Motor Tyre Manufacturers 6 Ashburnham Road	The site of a tyre makers.	504266	249688	TL042 496
11594	Bedford-Bletchley Railway	The Bedford - Bletchley line was the brainchild of Bedford buisnessmen who, in 1844 realised they were losing out on the massive reductions in time and transport cost which the railways had introduced. Local townspeople were not in favour of the line initially. However George Stephenson, whose interest was to supply coal from his Clay Cross Colliery influenced its development and his son Robert was appointed chief engineer by the Bedford, London and Birmingham Railway. The proposed route cut across much of the Duke of Bedford's land, part of his substantial landholdings in Bedfordshire. Initially, the railway company had difficulty persuading the Duke for access. However the substantial price offered and the agreement to purchase vast quantities of timber from his estate for fencing and sleepers proved too alluring. And the railway was opened 17 November 1846. Unpublished document: T. Garratt. 2001. Conservation Of A Railway Line: A case study of the Bedford to Bletchley line considering possible approaches to Conservation	504271	249484	SP 989 431
17553	Signal Box, Midland Line, Ford end Road	On the Midland Railway line, near Ford End Road in the site of a signal box that was only recorded in 1901 in Kelly's Directory.	504200	249500	TL 042 495
17546	Signal Box, Midland Line, Ford end Road	On the Midland Railway line, as it nears Ford End Road is the site of a 19th to 20th railway signal box.	504333	249493	TL 043 494
7990	Former Midland Railway Warehouse, Midland Road	19th century former grain store associated with Midland railway. Converted into office space c.2001.	504428	249455	TL 044 494
17537	Engine Shed	The site of an engine shed for the Midland Line trains. Cartographic materials: 1972. OS 1:2500.	504449	249366	TL 044 493
17563	Signal Box, Midland Road, Prebend Street	The site of a Victorian signal box on the Midland Railway Line was recorded in Kelly's Directory 1901.	504511	249337	TL 045 493
17549	Engine House, Prebend Street	The site of a Mildland Line engine house. Recorded in Kelly's Directory 1884.	504525	249362	TL 045 493
17545	Signal Box, Midland Line	On the Midland Railway line, as it crosses the River Ouse by Bedford, is the site of a 19th to 20th century railway signal box. Article in Kelly's Directory 1884, 1901, 1926.	504339	249078	TL 043 490
250	Cauldwell Priory (site of)	The site of the Priory of St John the Baptist, founded c.1154 and dissolved in 1536. It seems originally to have belonged to the Order of the Holy Sepulchre but by 1280 was under the Augustinian general chapter. After the Dissolution the priory and lands were granted to William Gostwike of Willington, and then passed through various hands as detailed in wills, abstract of title and other documents, untill the property was divided up and sold in lots in the early 19th century. The Priory site was subsequently the site of the Britannia Iron and Steel Works, and a former employee recalled seeing the remains of priory buildings being demolished there in 1917. Human remains were found at the factory in 1950 and were thought to be Bronze Age based on skull proportions; further remains dated to the medieval period were found in 1980, and medieval pottery has also been found on the site.	504400	248900	TL 044 489
1682	Cauldwell House	An early 19th century house, possibly incorporating parts of earlier cottages. Demolished in the 1970s.	504178	248835	TL 041 488
11539	Farm Buildings, Paradise	Farm buildings occupying almost exactly the site of the later Caldwell House (see HER 11540) are shown on 1818 sale catalogue plan. In the catalogue itself, they are described as; "various farm buildings at the Water side". Caldwell house, previously to the North East (HER 11541) was presumably rbuilt on this site when the railway was constructed, and the barns would have been demolished then.	504200	248800	TL 042 488
11540	Cauldwell House	Probably built as a replacement for Caldwell House (1) when the railway was constructed. Occupied the site of old farm buildings - so exactly that possibly parts of the previous structure were re-used. (see HER 11539 for farm buildings; HER 11541 for Caldwell House (1))	504200	248800	TL 042 488
17619	Boat Yard	Marina Court in Bedford was the site of a post medieval boat builders. Cartographic materials: 1972. OS 1:2500.	504100	248800	TL 041 488
11748	Warren, Caldwell	Three 17th century references to a Rabbit Warren which has since been demolished. Unpublished document: Bedfordshire & Luton Archives and Records Service Documents. BLARS OR1484S (1648).	503951	248794	TL 039 487
248	Palaeoliths - numerous stone implements	Numerous stone implements are said to have been found in the area of TL 036 490, but there are no further details.	503600	249000	TL 036 490
3106	Quarry and Lime Kiln	The site of a quarry and limekiln, shown on the Ordnance Survey 25" of c.1882, Now built over.	503700	249100	TL 037 491
17531	Transport Depot, Old Ford End Road	The site of a transport depot in Bedford. Cartographic materials: 1972. OS 1:2500	503728	249110	TL 037 491
17533	Garage, Honey Hill Road	The site of a 20th century garage in Bedford. The site was redeveloped in the 1990s. Cartographic materials: 1972. OS 1:2500.	503433	249054	TL 034 490
17481	Haulage Contractors, 1 Old Ford End Road	The site of a 20th century haulage contractor's in Bedford. Article in Kelly's Directory. 1947	503729	249288	TL 037 492
17532	Warehouse, Old ford end Road	On Old Ford End Road is the site of a post medieval to 20th century ware house that was demolished sometime after 1969AD. Cartographic materials: 1967-1968. OS 1:2500.	503641	249304	TL 036 493
17549	Engineering Works, Old Ford End Road	The site of an engineers in Bedford. Cartographic materials: 1972. OS 1:2500.	503453	249350	TL 034 493
17535	Biddenham Works	The site of an engineering works in the Queens Park area of Bedford. Article in Kelly's Directory. 1926.	503500	249400	TL 035 494
17469	Cable Maker'ss, 21 Ashburnham Road	The site of a post medieval cable maker's in Bedford. Unpublished document: Unknown origin	504300	249700	TL 043 497
6624	Royal County Theatre, Midland road	Adapted from existing building - The central Hall completed 1898. Opened 1899 as "Royal County Theatre and Opera House" with one of Vanbrugh sisters in "Brother Officers". Training school for officers in world war 2. used as canteen by Salvation Army in world war 2 and sustained only bomb damage in Bedford. - Re-opened as theatre and continued as such until 1959. Closed for next four years and empty. Re-opened 1964 as Bingo Hall. Since converted into Mount Zion pentecostal Church. Late 19th century. Red brick. 3 storey. Slate roof. Gable facing street with stone coping. Central paired 2nd floor windows with pedimented head, flanked by circular windows and 2 round-headed sash windows. First floor casement windows with mullions and transomes. Ground floor cast iron portico.	504375	249617	TL 043 496
17609	Transport Depot	The site of a transport depot in Kempston. Demolished between 1996 and 2007. Cartographic materials: 1972. OS 1:2500	504000	248700	TL 040 487
17597	Transport Depot	The site of a transport depot. Cartographic materials: 1972. OS 1:2500.	503919	248675	TL 039 486
1475	Cursus/Beaker Pot and Inhumation (find spot)	A length of ditch found in a gravel pit in 1936, apparently interrupted by a causeway. The ditch measured approx 90m in length and ran north east to south west. Near the south west end was a beaker vessel, and at the north east end was a crouched inhumation burial. The site has been interpreted as a cursus but this is uncertain. There is no aerial photograph evidence of linear features in the area.	503450	248711	TL 034 487

CAPITA

Commercial in Confidence

Ford End Road, Bedford

Contaminated Land Statement

For Bedford Borough Council
July 2017

We | Listen Create Deliver

Quality Management

Job No	CS/092598		
Project	Bedford Masterplan		
Location	Ford End Road, Bedford		
Title	Contaminated Land Statement for Ford End Road, Bedford		
Document Ref	BM-CAP-FER-00-RP-0001	**Issue / Revision**	P0
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Checked by	James Nicholas	Signature (for file)	
Authorised by	Jenny Smith	Signature (for file)	

Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised
P01		Draft for Comment	NG	ND	BT

Contents

Drawings

Drawing: BM- CAO-00-XX-Dr-A-0002 Rev P01

Tables

Not used

Appendices

Appendix A: High Level Desk Study Summary and Conceptual Models

1. Executive Summary

Site Name	Ford End Road
Location	Bedford
Client	Bedford Borough Council
Grid Reference	TL 03990 49188
Area	24 ha
Current land use	Mixed industrial and open space
Proposed development	In land lying away from flood risk areas the development will include some low rise housing and some of these areas will be multi-storied with commercial at ground floor. In areas of higher flood risk, multi-storied blocks are proposed but with car parking at ground floor.
Land use History	NE sector -dominated by engineering works, railway sidings, railway embankment filling Central 'NE sector – dominated by gas works and a holder station Central and E sector – dominated in part by a brewery, football stadium, in parts by railway/storage area serving gas works, allotments and in other areas a backfilled quarry Southern riverside – open land, lightly wooded
Land sensitivity	High throughout due to presence of a principal aquifer, in most part overlain by permeable River Terrace deposits. River Great Ouse likely to receive baseflow from groundwater beneath site. Housing on adjacent land in the northern periphery.
Preliminary land quality risk status	NE sector - **high risk** Central NE sector – part **medium risk** (as previously remediated) and part **high risk**. Central and E sector – **medium risk**. Backfilled quarry has potential to be either **low** or **high risk** as very little data is known about this feature. Southern riverside – **low risk** (but possible overspill issues from neighbouring historic quarry filling operations)

Possible remediation need*	Remediation is assessed as being likely to facilitate development in all areas apart from the riverside zone where no remediation is likely. Remediation involving capping in conjunction with localised deeper remediation at hotspots is considered a likely technique to be employed. Dig and cart away remediation has already been completed in 1998 in the 'depot' component of National Grid property and a 2010 pump and treat remediation exercise was commenced at the holder station and south eastern sector of 'depot' land. The completeness of the pump and treat works is unknown. Supplementary remediation in all or at least the most part of gas works areas is thought likely as previous remediation employed 'open space' land use and this does not match with master planning aim for housing. Further in-situ or ex-situ remediation for groundwater outside gas works areas cannot be ruled out.
Key constraints and opportunities	A number of constraints and opportunities have been identified and are provided in the main body of the report. It would appear that the NHS property and the backfilled quarry area would lend themselves to an early stage of remediation. Other areas have more complex ownership, access and land release issues. Aggregating sites to make as large a land parcel as possible would help keep remediation costs down.

*Note Possible remediation need is assessed at desk study only using the experience of CPI and recommendations may change when intrusive GI and risk assessment and optioneering is completed.

2. Introduction

2.1 Scope of Assessment

2.1.1 Capita have been commissioned by GL Hearn (acting Agent) on behalf of Bedford Borough Council (the Client) to undertake a Contaminated Land Statement for residential accommodation at a collection of properties known as Ford End Road, Bedford. The land collective forms a part of the Bedford Masterplan.

2.1.2 The purpose of this Contaminated Land Statement is to provide a high level assessment of the contaminated land risk and associated constraints and opportunities to inform master planning decisions.

2.1.3 The objectives of this contaminated land statement are:

- To provide high level contaminated land assessment for the property (formed using Argyll land quality reports, and to supplement information as detailed later in this document);
- To identify, at a high level, remediation requirements for the property and what constraints and opportunities delivering this level of remediation will pose to master planning; and
- To prepare, using GIS techniques, a constraints drawing for contaminated land risk zoning for each sub area.

2.2 Sources of Information

2.2.1 As part of this study Capita have commissioned Argyll Environmental Ltd. to compile and summarise all relevant Envirocheck Data on or within 500m of the Site. Capita have reviewed the data and provided an interpretation of their contaminated land summaries to inform the Conceptual Site Model and Preliminary Risk Assessment.

2.2.2 Additional sources of information used during the compilation of this report include:

- Environment Agency (EA) website – '*What's in your backyard?'* [Accessed 21st to 30th June 2017];
- British Geological Survey (BGS) website – *'GeoIndex'* and *'Lexicon of Named Rock Units'* [Accessed 21st to 30th June 2017]; and
- Department of Environment, Food, and Rural Affairs (DEFRA) website – *'MAGIC Map Application'* [Accessed 21st to 30th June 2017;
- Bedford Borough Council – Planning Portal [Accessed 21st to 30th June 2017]
- National Grid and BNP Paribas online Development Portal
- JLL Development Consulting, Ford End Road, Bedford, report for Homes and Communities Agency, March 2016.

2.3 Limitations

2.3.1 This report is concerned solely with the ground conditions (soil, groundwater and surface water quality) that may have been affected by chemical contamination arising directly from historic on-site industry, manufacturing, chemicals storage and other uses of the site. Similarly, the report is concerned with chemical contamination potentially migrating onto the site across the ground surface or in the sub-strata from off-site sources. The scope of this commission includes a preliminary assessment of risks to human health, controlled waters and the environment from such chemical impacts.

2.3.2 It is outside of the scope of this commission to have carried out a site walkover and investigated and/or surveyed site structures and made assessments of risks, regulatory compliance and associated liabilities concerning other potential health hazards, including for asbestos. Specialist surveys would be required to assess such potential liability issues.

2.3.3 This report relies on publicly available information which Capita assumes to be correct: Capita cannot and does not verify accuracy of this data, and it is outside the scope of this commission to do so.

2.4 Description of the Site and its sub areas

2.4.1 The site, 0.24km^2 of mixed industrial and open land, located to the west of the town centre of Bedford is bounded by the River Great Ouse to the south and Ford End Road to the north, there is a small sector of land which includes a land parcel lying north.

2.4.2 The proposed development is for the construction of circa 500 residential units. In land lying away from flood risk areas the development will include some low rise housing and some of these areas will be multi-storied with commercial at ground floor. In areas of higher flood risk, multi-storied blocks are proposed but with car parking at ground floor. The riverside edge is designated under BCC Policy AD43 and should generally be retained as open space and not developed.

2.4.3 Land use on the site currently comprises of industrial land, owned by National Grid and Network Rail among others (refer Figure 1 for ownership split), and mixed grass and woodland owned by Bedford Borough Council.

2.4.4 Directly to the south of the site is the River Great Ouse which drains a catchment area approximately 1462km^2 to this point.

2.4.5 The site is indicated in Figure 1 which shows the various land ownership parcels and their sizes.

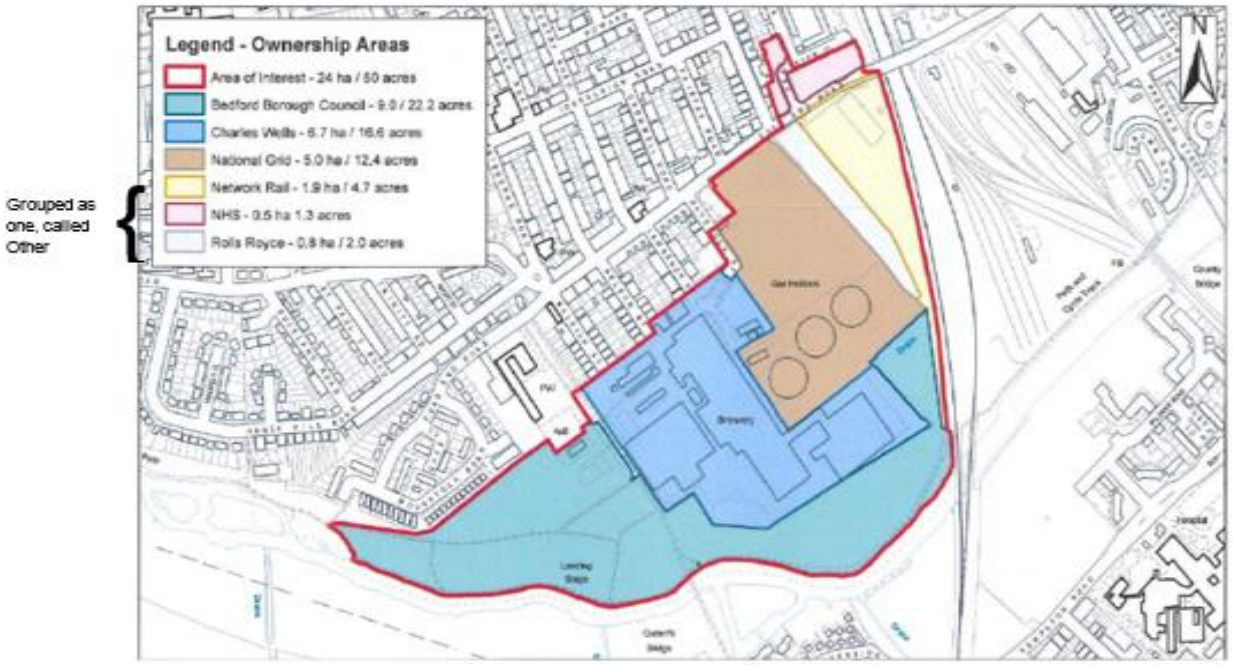

Figure 1 site red line boundary and site ownership split

2.4.6 The various land ownership is described below:

- Charles Wells (light blue on above plan) – Charles Wells Brewery with associated lorry despatch areas. The total site area of Charles Wells is 6.7 hectares;
- National Grid (brown on the above plan) – part cleared open land, part a gas pressure reduction station and part a gas holder site. The total site area is 5.0 hectares;
- Rolls Royce (white on the above plan) - The site historically has been used as a car park (amongst other uses). The total site area is 0.8 hectares;
- Network Rail (pale yellow on the above plan) The total site area is 1.9 hectares;
- NHS (pink on the above plan) –A small parcel of land which is situated to the north of Ford End Road. The site measures 0.5 hectares;
- Bedford Borough Council (BBC) (pale turquoise on the above plan) – The BBC site comprises mainly flood plain and is situated in the south of the subject site. The site measures a total of 9.0 hectares.

2.4.7 The site is located on sloping terrain between 25m AOD and 29m AOD with the site being laid out in roughly concentric terraces. Site levels rise to the east as the railway passes over the River Great Ouse and there is an approach embankment. The lowest lying land is mixed open grassland and open wooded areas. Based on Lidar generated terrain modelling there would appear to be large mounded area within the Network Rail land parcel.

3. Policy and Guidance

Legislative Context

3.1.1 A summary of key UK ground contamination legislation is provided below:

- Environmental Protection Act 1990: Part IIA of the Environmental Protection Act 1990 described the regulatory role for Local Authorities in dealing with land contaminated from historical use;
- Environment Act 1995: The Environment Act 1995 established a regime for the identification and remediation of contaminated land. The provisions are set out in Section 57 of the Act, which inserts Part IIA into the Environmental Protection Act 1990;
- Water Resources Act 1991: the Water Resources Act regulates water resources, water quality and pollution, and flood defence. Part III of this Act describes the standards expected for controlled water and what is considered as water pollution;
- Groundwater Regulations (England and Wales) 2009: The Regulations are an environmental protection measure which complete the transposition into UK Law of Directive (2006/118/EC) and provide protection for groundwater against pollution and deterioration. The Regulations place requirements on the Environment Agency in relation to the issue of permits and creates an offence of the discharge of hazardous substances or non-hazardous pollutants without a permit; and,
- Contaminated Land (England) Regulations 2006 (as amended 2012): The contaminated Land Regulations provide for procedural matters of the regime such as the description of special sites, public registers, remediation notices and appeals. Guidance published by DEFRA (Department for Environment, Food & Rural Affairs) that accompany this Act is described below in section 14.2.4.

National Policy

National Planning Policy Framework (NPPF), 2012[1]

3.1.2 Paragraph 120 of the NPPF seeks to prevent unacceptable risks from pollution. It also states if a site is affected by contamination responsibility for securing a safe development rests with the developer and/or landowner. Furthermore, paragraph 143 states that planning authorities are urged to evaluate planning applications against certain set environmental criteria which includes potential migration of contamination from the site;

[1] Department for Communities and Local Government, 2012, National Planning Policy Framework

Local Policy

Bedford Borough Council website 2017

3.1.3 Bedford Borough Council's policy on contaminated land is in line with the National Planning Policy Framework and states that an adequate assessment of contaminated land is required to support planning applications. The minimum information that should be provided by an applicant is the report of a desk study and site reconnaissance. All investigations of land potentially affected by contamination should be carried out in accordance with established procedures (such as BS10175 (2001) Code of Practice for the Investigation of Potentially Contaminated Sites).

Guidance

3.1.4 Guidance documents relating to ground contamination are listed below:

- Model Procedures for Management of Contamination (CLR11), 2004 and 2011 update: A framework for risk assessment and management of land contamination published by the Environment Agency. Further guidance on the risk assessment process is given in the Environment Agency Contaminated Land Exposure Assessment (CLEA) Framework of documents (SR2, SR3, SR4, and SR7). The CLEA model is intended to be used as the common basis for contamination assessments in the UK.

- Assessing Risks Posed by Hazardous Ground Gases to Buildings – CIRIA C665 (2007) published by CIRIA London. This guidance provides good practise in investigation, the collection of relevant data and monitoring programmes in a risk-based approach to gas contaminated land.

- British Standards Institution 10175:2011+A1 – Investigation of Potentially Contaminated Sites Code of Practice, 2013, which provides guidance on the various aspects of investigation and sampling of soil and soil materials to determine quality.

- Contaminated Land Statutory Guidance, 2012: The Contaminated Land Statutory Guidance published by DEFRA accompanies the Contaminated Land Regulations Act, which provides updated advice on what constitutes significant harm and what constitutes significant possibility.

- Asbestos in Soil and Made Ground: a guide to understanding and managing risks – CIRIA C733 (2014) published by CIRIA London. This guidance identifies key areas of uncertainty in the current understanding of Asbestos Containing Materials and recommends a 'lines of evidence' approach whereby more than one method is used to estimate the airborne fibre concentrations likely to be generated from soils at a site.

- Managing and Reducing Land Contamination – Guiding Principles (GPLC), updated 2016: The GPLC document published by the EA aims to help clarify roles and responsibilities; encourage compliance with regulatory requirements, or avoid the need for regulation; and provide a guide to authoritative guidance and advice in other documents.

- Groundwater Protection – Principles and Practice (GP3), 2017: The GP3 document published by the EA has been updated in 2017 and continues to set general requirements for groundwater protection. The guidance is intended to be used by anyone interested in groundwater and those whose activities may impact on groundwater or could do so.

- Environment Agency, 2017 – Protect Groundwater and Prevent Groundwater Pollution.

- With regard to pollution of controlled waters, the EA has prepared guidance on methods of assessment. These are contained within their Remedial Targets Methodology Publication[2].

3.1.5 Underpinning the guidance above is a source-pathway-receptor methodology which is used to identify significant pollution linkages (SPLs). The following definitions apply:

- Source of Pollution: presence of substances (potential contaminants/pollutants that may cause harm);
- Receptor: the entity which is vulnerable to harm from the source e.g. the water environment or site users, buildings, fauna and flora; and
- Pathway: the means by which the hazardous contamination can come into contact with the receptor i.e. the existence of a linkage between the source and the receptor.

[2] Environment Agency (2006) Remedial Targets Methodology. Hydrogeological Risk Assessment for Land Contamination.

4. Conceptual Site Model

4.1 Methodology

4.1.1 A Conceptual Site Model (CSM) is a simplified view of the Site and its surroundings and in particular the potential interactions between soil and groundwater, site users and the environment.

4.1.2 Capita have assessed the ground conditions based on a desk based study. We have not been provided with any previous intrusive ground investigation reports or any previous reports pertaining to the Site.

4.1.3 The CSM provides a qualitative evaluation of potential pollutant linkages based on plausible contaminant source-pathways-receptor at the site where:

- Sources of contamination include identified potentially contaminating materials and/or activities, located either on or in the vicinity of the Site by referral to Argyll land quality report[3] and as supplemented by on line search of the BCC planning portal and the National Grid/BMP Paribas web portal;
- Potential pathways are routes or mechanisms by which contaminates may migrate from the source to the receptor; and
- Identified receptors include present or future land users, the wider environment and the build environment.

4.1.4 The Site's land use history is quite varied for different sub areas of the land. As a result it was concluded that a single CSM would not be appropriate to act as a base for contaminated land risk assessment. Instead a three-fold sub division of the site has been made as shown in Drawing BM-CAP--00-XX-DWG-0002. The conceptual models are provided in Appendix A. The outcomes are that there is a broad banding of the site moving from east to west with high/very high potentially polluting land uses to the east and lower risk to the west and with a low risk river frontage area.

[3] Argyll Site Solutions Combined (report) for Ford End Road, Bedford. Ref AEL-4383-SSC-908525 dated June 2017

5. Preliminary Risk Assessment

5.1 Qualitative Assessment

5.1.1 A qualitative assessment of the preliminary level of risk to the identified potential pollutant linkages is provided below.

5.1.2 The term risk is widely used in different contexts and circumstances, often with differing definitions. In UK Government publications about the environment, the standard definition is that "Risk is a combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence" (CLR11, 2004).

5.1.3 Following the development of the conceptual model and the identification and assessment of potential pollutant linkages, a preliminary risk assessment can be made of risk estimation and risk evaluation, as discussed in CLR 11 and CIRIA C552, to determine whether an unacceptable contamination risk is likely to exist.

5.1.4 The key criteria for determining the preliminary risk where a pollutant linkage is present are the magnitude of the potential contamination source (hazard) and the sensitivity of the receptor. In general terms the assessment is based on the following preliminary risk classifications and professional judgement:

- Low: low likelihood of significant harm occurring to low sensitivity receptor;
- Moderate: likelihood of significant harm occurring to low or medium sensitivity receptor;
- High: likelihood of significant harm occurring to medium or high sensitivity receptor; and
- Very High: high likelihood of significant harm occurring to high sensitivity receptor.

5.2 Risk to Receptors

Current Site Users

5.2.1 The majority of the overall high risk areas are used by large national companies, such as Network Rail and National Grid where workers adopt PPE and where the work force is informed of risks. In this setting the risk is low to medium to current users. The risk to trespassers is moderate.

5.2.2 In the brewery sector the risk is overall medium. The brewery has extensive areas of hardstanding and the facility is of mid 1970's construction so tanks and equipment would be expected to be suitably designed so as to keep risk very low for spillages and chemical release. The risk here is low. Elsewhere in the overall medium risk areas, the principal potential linkage stems from asbestos and other ubiquitous contaminants such as PAH's and lead being present in the sports ground that is a backfilled pit. The actual risk will depend of turf/topsoil covers and its integrity. The very eastern part of the medium risk sector appears to comprise Victorian age embankment construction and this poses a risk of filling soils potentially being impacted with railways type contaminants.

5.2.3 The housing situated in the Woodstock Road area could theoretically have a degree of risk in the situation where putrescible filling occurred and where ground gas is migrating off site. On the other hand the quarry was backfilled by 1968 so it is possible that any active gassing has long since subsided.

5.2.4 The riverside strip is low risk as no clear sources have been identified.

Construction Workers

5.2.5 In the un-remediated scenario all medium and high risk areas pose construction risks through soil contact and exposure to toxic/carcinogenic dusts and air bourn fibres. In most areas these issues are common to industrial site re-development, but unusual risks apply to the redevelopment of the holder station as this housed the 1920's age gas works purifier beds which pose risk from cyanide compounds. Also under part of the eastern third of the holder compound and in the former depot lying to its north, 2017 dated drawings show that a large number of water monitoring wells are present which are thought to be a result of below ground impact with NAPL's. This poses inhalation risk in outdoor and indoor air depending on the level to which remediation has occurred/been effective. The preliminary risk to construction workers follows the banding of the site shown in Drawing BM-CAP--00-XX-DWG-0002 i.e. low = low risk, medium = medium risk etc.

Future Residents

5.2.6 In the un-remediated scenario the risks to future residents vary with the historic land use and will depend on the type of development i.e. whether houses with gardens or apartment style development with limited planting areas is adopted. Houses with gardens run a higher risk of encountering contamination that will require intensive remediation and remediation will be needed in the both yellow and red shaded areas shown on the risk drawing. The risk is particularly significant where properties will overlie or sit close to the holder station and NAPL treatment zone as described above. Here ingress of VOC's through any unsealed floors could pose an indoor air toxicity risk.

5.2.7 The infilled quarry poses risks of explosive and asphyxiant gases accumulating in any unprotected properties and risks of soil contact in gardens or landscaping areas if planting in existing soils. A host of soil sources are associated with the metal engineering and rail engineering land use located in the north-eastern corner of the site and here risks of toxicity from soil contact/garden produce consumption is high. In the same areas possible inhalation issues (indoor and outdoor air) may be present if there are spillages of fuel and solvents/degreasing chemicals. Inhalation of asbestos fibres and associated carcinogenic problems is assessed to be a risk in all medium and high risk areas shown in Drawing BM-CAP--00-XX-DWG-0002.

5.2.8 In conclusion the preliminary risk to future resident (in un-remediated scenario) follows the banding of the site shown in Drawing BM-CAP--00-XX-DWG-0002 i.e. low = low risk, medium = medium risk etc.

The Great Oolite Principal Aquifers and baseflow via Oolite and Felmersham Member (river terrace deposits) to impact the River Great Ouse

5.2.9 The level of risk to groundwater is preliminarily assessed to be **moderate to high**. The site is underlain, at least in places, by Great Oolite Formation which is classified as a Principal Aquifer and many other areas where this is covered by the Felmersham Member, the strata is also highly permeable which will not greatly hinder downward migration. It is not known (at least not without prior BBC consultation occurring) what are the driving goals for the NAPL remediation but it is thought likely that groundwater quality improvement will be an important consideration. Gas works can also be a source of ammonia leaching to groundwater due to historical release of ammoniacal liquors. It is not known what level of impact there is /is not at the gas works property (including the holder station).

5.2.10 It is also possible that there are some ecological receptors in the river side zone (such as freshwater ecology) but in the absence of an ecological appraisal it is not clear if this receptor is present or not.

Future and Current Built Structures

5.2.11 The preliminary risk to built structures from soil/gas is preliminarily assessed as moderate due to the backfilled quarry falling within the land parcel. As previously described there is the potential for sources of soil gas/vapour of volatile fuels and explosive and asphixiant gases to be present beneath certain parts of the site due to historical uses. Sulphates in shallow ground at railway sites are often present at high levels and the ground may be aggressive to buried concrete forming new foundations. Similarly phenols and PAH's can cause taint to drinking water supplies and this may require consideration in selection of building materials.

6. Possible Remediation Required

6.1.1 As described in Chapter 4, different pollution linkages apply to different land parcels. A zoning of the site based on possible remediation need is provided in Drawing BM-CAP--00-XX-DWG-0002. The likely quantum of remediation is described below for low residential with gardens and higher rise apartment developments. It should be appreciated that in the absence of having site investigation reports at hand the following exercise is high level and is based on Capita experience of remediating similar land.

6.2 Possible remediation of ground lying in higher risk land quality area

6.2.1 Low rise housing has historically been facilitated on engineering sites by application of a cap with focused deeper remediation of soil/water zones causing risk to controlled waters or unacceptably high risk to indoor/outdoor quality. This solution would appear applicable to the whole of the yellow shaded zone with the exception of currently mounded areas that require re-profiling. For example it is anticipated that the bund present on the Network Rail property would be re-profiled to provide a more suitable levelled development platform. The re-profiling would require careful quality control of fill materials raised possibly with segregation and treatment of selected soil components and checks that the newly achieved 'cut surface' meets soil quality standards for the appropriate development type.

6.2.2 The gasworks/gas holder property is a more complex proposition as it is suggested in the JLL document that National Grid would only deliver remediation to open storage land use. Protection of indoor air in low rise developments is likely to require much lower thresholds of soil clean up than apply for 'open storage'. It is suggested in the JLL report that vapour membranes would be a common solution to apply to protect residential properties. Capita concur with this strategy but this solution suits multi-storied blocks which have a housing management or overseeing authority as any installed membrane system will have on –going maintenance issues. This suggests that the zone formerly underlain by NAPL ground impact (there must have been a degree of groundwater impact because Worley Parsons took out an abstraction licence for the activity in 2010) might need to be allocated for multi-storied blocks. It is noted that the list of documentation made available to JLL excluded a validation report for this NAPL remediation activity. This should be sought and reviewed as it is possible that the NAPL contaminants have almost entirely be removed and the assumed legacy vapour risk described above may be an overly pessimistic assumption.

6.2.3 It is evident that the gasometers at the Holder Station were allocated for dismantling in June 2017. This dismantling (in that it will remove obstructing services in the ground and explosive risks when working close to gasometers) will free up the site, or large parts of it, for a new phase of remediation. This remediation need assessment follows scrutiny of the dismantling plans which show that the Holder site formerly housed (i.e. in the 1920's) purifier beds, an oxide shed and an oil store tank. These items of gas works infrastructure commonly leave buried structures with contaminated soils beneath and within the buried structural elements.

6.2.4 Both the railway and gas works historic land uses for the red areas include asbestos fires in soil as a possible source. The presence of such contamination, if present, would have a material bearing to the precise design of a capping system and particular to air quality risks during remediation/new building construction.

6.3 Possible remediation in ground lying in medium risk land quality areas

6.3.1 The parcel of the original gas works fronting Ford End Road and which is shaded yellow (i.e. outside the NAPL treatment footprint) on Drawing BM-CAP--00-XX-DWG-0002 was subject to remediation in 1998, which culminated in a validation report produced by Waterman Environmental. The capping/hotspot remediation strategy would appear (at desk study stage) likely to need applying here since many soil acceptance criteria have become more onerous since this date and it is quite possible that an open storage land use was applied.

6.3.2 The brewery property has a lower risk status than the gas works/gas holder site and it is possible that extensive capping as a remediation solution is not necessary here and rather that local hotpot treatment, such as at the footprints of fuel tanks may be sufficient. This statement stands for low rise housing as well as higher rise housing and commercial property. The brewery buildings and its foundations are almost certainly substantial and the demolition/removal of below ground obstructions will be a material consideration and it may be beneficial to conjoin foundation removal with remedial activity.

6.3.3 The infilled quarry located within the yellow area is very much of unknown land quality in terms of remediation need and its remediation status ranges from none, if it contains inert fill, through to perhaps a cap with hotspot remediation approach. Indeed measures to limit ground gas entering buildings may also be required.

6.3.4 The raised area of land, yellow shaded, owned by Bedford Borough Council is also of unknown land quality and the risk being that it contains fill originating from railway type land use. Its proximity to the NAPL monitoring wells suggest there is risk that the NAPL contaminants have migrated under this land or dissolve phase contaminants lie in groundwater here.

6.4 Possible remediation in ground lying in lower risk land quality areas

6.4.1 On the basis of desk study research no remediation is thought necessary for the green shaded areas on Drawing BM-CAP--00-XX-DWG-0002. There is a risk of asbestos products being discarded here when quarry filling was active and also a risk of any mobile contamination in the quarry or leaks from tank areas in the brewery property migrating on to the land. The proposed land use here is parkland and this is a less sensitive land use human health wise as compared with the residential land use proposed elsewhere.

7. Constraints and Opportunities

7.1 Introduction

7.1.1 Chapter 5 provides an assessment of remediation need at the site, albeit at a desk study level of land quality knowledge. The magnitude and type of remediation thought to be appropriate for the various land parcels does have time and cost implication and potential for adverse environmental impacts if appropriate mitigation is not provided. These are discussed in more detail below.

7.2 Remediation time and phasing

7.2.1 There is no reason why remediation could not be commenced on the NHS land sector and the Rolls Royce sub sites as there are no buildings on these sites (assuming commercial terms are all agreed). Timing of remediation activity will be driven by the need to do upfront site investigation and assessment and derive remediation strategies and obtain planning approval. Any unacceptable groundwater impact often requires technologies taking around 4-5 months to implement.

7.2.2 The Holder Site dismantling is currently allocated a 32 week programme and it may be that National Grid do not intend to remediate cleared land until after this date, indeed it is possible they may wish to sell the site 'dirty' and leave it to others to remediate. Remediation will take several months. National Grid willing, the former gas works lying to the north appears immediately available for supplementary remediation to be applied. Ignoring commercial issues there is an opportunity to link the Rolls Royce remediation with the former depot area on National Grid land and the Holder Site all in one.

7.2.3 The Network Rail land parcel does not, according to the JLL report, come available until 2019. There is a derelict building to be demolished. Remediation here would then take several months, again longer if in-situ groundwater treatment is required.

7.2.4 Ignoring commercial issues with Charles Wells any remediation of the brewery property would need to follow dismantling of the building superstructures which will be a lengthy exercise. Remediation timings are difficult to predict at this stage but again will take several months.

7.2.5 In the same position as the NHS/Rolls Royce land there is no reason as to why remediation could not be started on the Bedford Borough Council owned property. Timing of remediation activity will be driven by the need to do upfront site investigation and assessment and derive remediation strategies and obtain planning approval. Ecological issues may have an influence on timings.

7.2.6 The above discussion ignores archaeological assessments.

7.3 Costs

7.3.1

7.3.2

7.3.3

7.3.4

7.4 Impacts on Environment – Noise, Air, Controlled Waters

7.4.1 It is possible that the remediation activity itself will require planning permission and if this is the case the application will need to be supported by relevant ecological and archaeological studies and traffic, noise and air assessments may also be required depending on scale. All remediation work occurring close to Ford End Road (or north of it in terms of the NHS property) will be in close proximity to residential premises which will prove a sensitive receptor.

7.4.2 Relatively intense remediation was achieved by the 1998 National Grid remediation works at the 'depot' and also by the 2010 NAPL ground impact remediation so there is precedent that noise/air quality and controlled waters impact can all be successfully mitigated if appropriate controls are put in place.

7.4.3 There is footpath/cycle route passing through the site so unless it is possible to close this route, members of the public will encroach close to potential remediation activities.

7.5 Other Issues

7.5.1 There will be an amount of permanent National Grid infrastructure left on the site (including we assume the pressure reduction station) and will require constant access during remediation. There may be other key services to protect and a detailed services search should be completed to ascertain this. In particular any surface water drains will give fast pathway linkage to River Great Ouse so care will be required not to release silt and dissolved contaminants into such features.

Drawings

Legend

Remediation Need

- High
- Medium
- Low
- Part of separate masterplan

Name	Notes
Gas and engineering works	3 gasholders present in one sector with a large number of monitoring wells suggestive of groundwaterplume presence. Part of area also contained an engineering works as well as railway engine shed and depot.
Brewery and former quarry	Largest part contains a brewery and associated haulage depot. Large number of associated tanks. Quarry was present in corner of area which has been levelled with unknown material. Also contains a portion of the gas works remediated by Lattice Properties.
Public open space	Allotments in sector, football stadium and latter parkland.

Rev	Drwn	Chkd	Appd	Date

Purpose of Issue
S2 - Issued for Information

Classification
Commercial in Confidence

Client
Bedford Borough Council

Description

Project
Ford End Road Masterplan

Drawing
Estimate of Remediation Need

Scale at A3	Drawn	Checked	Approved
1:6000	CKR	NG	

Project No
CS092958

Date
4/7/2017

Drawing Identifier
BM-CAP-00-XX-DR-A-0002

Revision
P01

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Appendix A: High Level Desk Study Summary and Conceptual Models

Site Name: Ford End Road	
Location & Site Description	National grid ref. 503990,249188 Site area = 24.35 ha Current site use = This site is located to the west of Bedford town centre in the Queens Park district, approximately 200m from Bedford Train station. It is bounded to the south by the River Great Ouse, to the east by railway track and to the north and west by residential properties. The site comprises a range of land uses and can be broken up into four areas. The largest is Bedford Borough Council land: parkland with the majority designated flood plain. The Charles Wells Brewery occupies the centre of the site with National Grid land to the east of it containing a decommissioned gas works. The northeast corner is currently wasteland with sections owned by the NHS, National Rail and Rolls Royce. Refer to main text for ownership plan.
Geology	The Site is underlain by a bedrock of Great Oolite Group limestome and argillaceous rock. Superficial deposits are present, with Alluvium associated with the River Ouse located along the southern boundary. Further from the river two River Terrace Deposits are present. The older Stoke Goldington Member occupies a portion of the northwest corner and comprises sands and gravel. Younger Felmersham Member occupies the rest of the site and also comprises sands and gravel. An area with no superficial deposits is noted and can be attributed to the presence of Cox's Quarry, operational until the early 20th century. **Bedford Borough Council** Superficial = Felmersham Member – sand and gravel Superficial = Goldington Member – sand and gravel Superficial = Alluvium – clay and silt Bedrock = Great Oolite Group – limestone and argillaceous rock BGS historical borehole TL04NW513 located close to the southern boundary to a depth of 15m identified top soil to a depth of 0.30m. This is underlain by alluvium associated with the river Ouse 2.30m thick all over a bed of limestone and argillaceous rock. BGS historical borehole TL04NW505 located at the northern edge of the BBC area found a thick layer of made ground to a depth of 5.20m This was directly underlain by Great Oolite group limestone and is consistent with historical records of a quarry present in the area. **Charles Wells Brewery** Superficial = Felmersham Member – sand and gravel Superficial = Alluvium – clay and silt Bedrock = Great Oolite Group – limestone and argillaceous rock BGS historical borehole TL04NW296 located onsite to a depth of 5m bgl confirms the above geology. **Gas Works** Superficial = Felmersham Member – sand and gravel Bedrock = Great Oolite Group – limestone and argillaceous rock BGS historical borehole TL04NW63 located onsite to a depth of 32m bgl indentified a thin layer, 0.15m, of Made ground underlain by 0.75m of alluvium. **Other** Superficial = Felmersham Member – sand and gravel Bedrock = Great Oolite Group – limestone and argillaceous rock

	Site is not located within a groundwater Source Protection Zone Groundwater vulnerability – soils of High leaching potential (U) located onsite Nearest authorised groundwater abstraction is located 355m west of the site. Nearest revoked abstraction licence is located 311m to the north.
Hydrogeology	Stoke Goldington member = Secondary Aquifer A Felmersham member = Secondary Aquifer A Great Oolite Group = Principal Aquifer The Great Oolite limestone is defined by the EA as the principal aquifer, meaning the rock provides a high level of water storage and high fracture permeability. The site is within an area of high aquifer vulnerability. Groundwater strikes for BGS borehole logs indicate that groundwater is expected between 0.75m (TL04NW507) and 3.20m (TL04NW513). TL04NW63 located in the gas works area noted that water extracted from this borehole contained Gas Oil. Ground water abstraction points within 500m are: • Worley Parsons Ltd. (Pollution Remediation) located onsite (Active); • Rolls Royce Power Engineering (Evaporative cooling) located 42m northeast (Assumed Revoked) • Rolls Royce Power Engineering (Non-Evaporative cooling) located 45m northeast (Assumed Revoked) The EA online maps shows that the site is not located within a groundwater source protection zone (SPZ). There are two discharge consents within 500m whose discharge environment is unknown. Both are revoked and operated by British Rail Engineering. Due to the proximity to the River Great Ouse it is assumed that this was the discharge environment.
Hydrology	The nearest main river is the River Great Ouse which flows northeast through Bedford and is located adjacent south. Two discharge consents are located adjacent to the property, however both licences are revoked. A further four are within 250m, with one active located 217m east for the discharge of sewage to the River Great Ouse. Water features are present onsite in the form of moats around the three gasholders. It is likely that these are completely enclosed by concrete, minimising the risk that any pollutants will become mobile. The National Grid have stated that these water features are recent, with the pumps which previously emptied the moats having failed within the last two years. There are several discharge consents identified within 500m of the site which list the River Great Ouse as the receiving water. All but one are revoked or assumed revoked, associated with industries that no longer operate. Anglian Water Services Limited operate a storm tank and combined sewage overflow 217m east.
Historical Land Use	**Bedford Borough Council** The area contained Cox's Quarry from at least 1884. It was no longer in use from 1926 and was now labelled as allotment gardens. A football ground had been developed by 1968 and the quarry had been levelled by this point. The football ground was demolished c.1993 and the area became parkland. **Charles Wells Brewery** The Brewery and an assumed depot with multiple tanks was developed between 1972 and 1979 on what had previously been undeveloped land lying between a football ground and the gas works. The brewery underwent a period

	of expansion into land formally occupied by the gas works prior to 1999 that brought it up to its current size. **Gas Works** A gas works was present on the site from at least 1884 had expanded by the 1901 mapping. Expansion had occurred again by 1926, when a number of tanks became present, and again in 1968. The site was decommissioned at some point after this, but a number of structures including gas tanks are still present. There is little information currently available from the National Grid. It is noted that buildings associated with the gas works are still present and operational onsite, including the Booster House and PRS compound as well as an electrical substation. **Other** The first buildings had appeared by 1901 when an engineering works extended into the northeast corner. By this time railway track and an associated engine shed had also been developed. By the 1970s the track had been dismantled, with the remaining engine shed and depot along with the engineering works cleared by 2006. At some point a strip of land next to the Gas Works was used as a car park, with hardstanding still present.
Environmental Records	• There are two Control of Major Accident Hazard (COMAH) entries located onsite, both of which are active and relate to the former gas works. • One Notification of Installations Handling Hazardous Substances was formally active at the site and related to the gas works. • Three Local Authority Pollution Prevention and Controls located within 250m. • There are three 'Planning Hazardous Substance Consents' located onsite. They are all for British Gas Plc. and relate to 'Liquefied extremely flammable gas (including LPG) and natural gas (whether liquefied of not)'. • Six Contemporary Trade Directory Entries are located onsite. Three relate to Havelock Street Motors, a garage, however two are inactive. A further two are inactive and relate to the previous operation of the Brewery. Two are active, one relating to Havelock Street Motors, a garage, and one relating to Kuehne & Nagel Ltd. who provide road haulage services. Two inactive entries are also named as Havelock Street Motors and a further two are due to previous operation of the Brewery. • One fuel station was previously in operation located 189m northeast. • 32 Historical Tanks and Energy Facilities are present onsite with a further 26 within 250m. • One site of infilled land has been identified onsite. This is due to the former operation of Cox's Quarry at the beginning of the 20th century. This feature was no longer present in a 1968 mapping, suggesting it had been levelled. BGS historical boreholes onsite have found particularly thick layers of Made ground all over bedrock with no superficial deposits.
Environmental Sensitivity	No Local Nature Reserves, Ramsar, Site of Special Scientific Interest, Special Area of Conservation and Special Protection Areas have been identified within a 1km radius of the site. However the site is located within a Nitrate Vulnerable Zone (groundwater & surface water).

Planning	17/00847/DEM & 17/00891/EIASCR – Planned works looking to dismantle and remove the three gasholders present onsite but leave the concrete slabs and subsurface structures. Estimated time of works is 32 weeks between 01/06/2017 to 28/02/18. The National Grid plan to remediate the site to a level where a cap of clean soil and the use of vapour membranes will be enough for residential development.
Other information the LLR report	In order to inform their report is evident that Arup made a review of existing information relating to the National Grid property. JJL conclude that '*we understand that National Grid propose to remediate the gasworks site to 'open storage' standard before it is released for redevelopment. This will provide suitable protection to controlled waters and remove gross risks to human health'*. JLL also complied useful documentation into the remediation background of the national grid land. Key documents are provided below. • Waterman Environmental Validation Report Former Gasworks Site, Ford End Road, Bedford for BG plc Property Division Volume II 1998. Draft report. • Worley Parsons, National Grid Property Holdings Remediation Documents For The Former Gasworks at Ford End, Bedford, Part One - Overview of Remediation Works At The Former Gasworks, Ford End Road, Bedford December 2008 –Rev A • Worley Parsons, National Grid Property Holdings Remediation Documents For The Former Gasworks at Ford End, Bedford - NAPL Recovery System Design for the Former Gasworks at Ford End Road, Bedford March 2009. Draft report Key information that can be gained from these reports is that the former frontal part of the original gas works had been remediated by 1998 with the result that BG plc's consultant issued a validation report. The rear part (a holder station) and a sector of the frontal part is the subject of remediation design statement and a Non Aqueous Phase Liquid (NAPL) recovery system design. Since there is no validation report for these phases of work (at least not collated by JLL) it is unclear if any work was completed, part completed or is still planned. It is possible that implementation will follow decommission (demolition) of the gasometers due in 2017 as access would thereby be improved.

Conceptual Site Model - Due to the varied nature of the historic land uses of the site it has been split into three areas corresponding to the likelihood of contamination being present (Figure X). A scale ranging from Green (least likely to contain contaminants) to Red (most likely to contain contaminants) has been employed.

Public Open Space (GREEN)

Source	Pathway	Receptor	Potential Linkage
Flood plain sediments (nitrates, metals and metalloids, pesticides, herbicides)	Inhalation, Ingestion and Dermal Absorption	Current site users	Yes, due to presence of open ground and the potential for soil gas to migrate off site.
		Construction workers	Yes, during excavation activities workers could come into contact with contaminated soils and groundwater present beneath the site.
		Future site users	Yes, dependant on whether gardens or landscaped areas are included in the proposed development.
	Leaching and vertical movement	Secondary A and Principal Aquifers	Yes due to lack of hardstanding and large areas of open land.
	Leaching and lateral movement	River Great Ouse	Yes, potential contaminated groundwater beneath the site could migrate laterally through the Felmersham Member which is likely to be in continuity with the River Ouse.

Brewery, Quarry and Remediated Gas Works (YELLOW)			
Source	**Pathway**	**Receptor**	**Potential Linkage**
Quarry with unknown back fill (Potential for a range of contaminants including Asbestos, other anthropogenic contaminants and soil gas) Brewery and associated haulage depot (detergents, TML, TEL, MTBE, alcohols, benzene, PAHs, diesel etc.) Unknown imported fill to railway embankment (Potential for a range of contaminants including Asbestos, other anthropogenic contaminants and soil gas)	Inhalation, Ingestion and Dermal Absorption	Current site users	Yes, due to presence of open ground, the unknown composition of hardstanding on site and the potential for soil gas to migrate off site.
		Construction workers	Yes, during excavation activities workers could come into contact with contaminated soils and groundwater present beneath the site.
		Future site users	Yes, dependant on whether gardens or landscaped areas are included in the proposed development.
	Leaching and vertical movement	Secondary A and Principal Aquifers	Yes due to the presence of open ground. Hardstanding may help to prevent this in other areas.
	Leaching and lateral movement	River Great Ouse	Yes, potential contaminated groundwater beneath the site could migrate laterally through the Felmersham Member which is likely to be in continuity with the River Ouse on the southern border.

Unremediated Gas Works and surrounding land (RED)			
Source	**Pathway**	**Receptor**	**Potential Linkage**
Historic railway land (Fuels, lubricating oils, Solvents, PCBs, PAH, Creosote, Ethylene Glycerol, Asbestos, Herbicides, Ferrous residues, heavy metals, ash and Sulphate). In particular waters leaching sulphates from the historic coal storage. Potential for Asbestos and other anthropogenic contaminants and soil gas within Made Ground from historic demolition activities. Engineering Works (Metals & Metalloids, Cyanide, Sulphates & Phosphates, Fuels/Oils, PCB's and asbestos). Victorian Coal-Gas Works with associated Gasometers (ethylene glycols, resins, alkanolamines, NAPL, cyanide, heavy metals, ammonia, phenols, TPHs)	Inhalation, Ingestion and Dermal Absorption	Current site users	Yes, due to presence of open ground and unknown composition of hardstanding on site.
		Construction workers	Yes, during excavation activities workers could come into contact with contaminated soils and groundwater present beneath the site.
		Future site users	Yes, remediation documents for NAPL impact were prepared in 2009.
	Leaching and vertical movement	Secondary A and Principal Aquifers	Yes due to the presence of open ground. Hardstanding may help to prevent this in other areas. Remediation documents for NAPL impact were prepared in 2009.
	Leaching and lateral movement	River Great Ouse	Yes, potential contaminated groundwater beneath the site could migrate laterally through the Felmersham Member which is likely to be in continuity with the River Ouse on the southern border. Remediation documents for NAPL impact were prepared in 2009.

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