

EIA Environmental Statement

HMS Ganges, Shotley Gate, Suffolk

Volume 1: Main Text

On Behalf of Haylink

August 2007



Haylink

HMS Ganges

Shotley Gate, Suffolk

Environmental Statement

August 2007

In accordance with:

Town and Country Planning Act 1990 (as amended)

Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (as amended)

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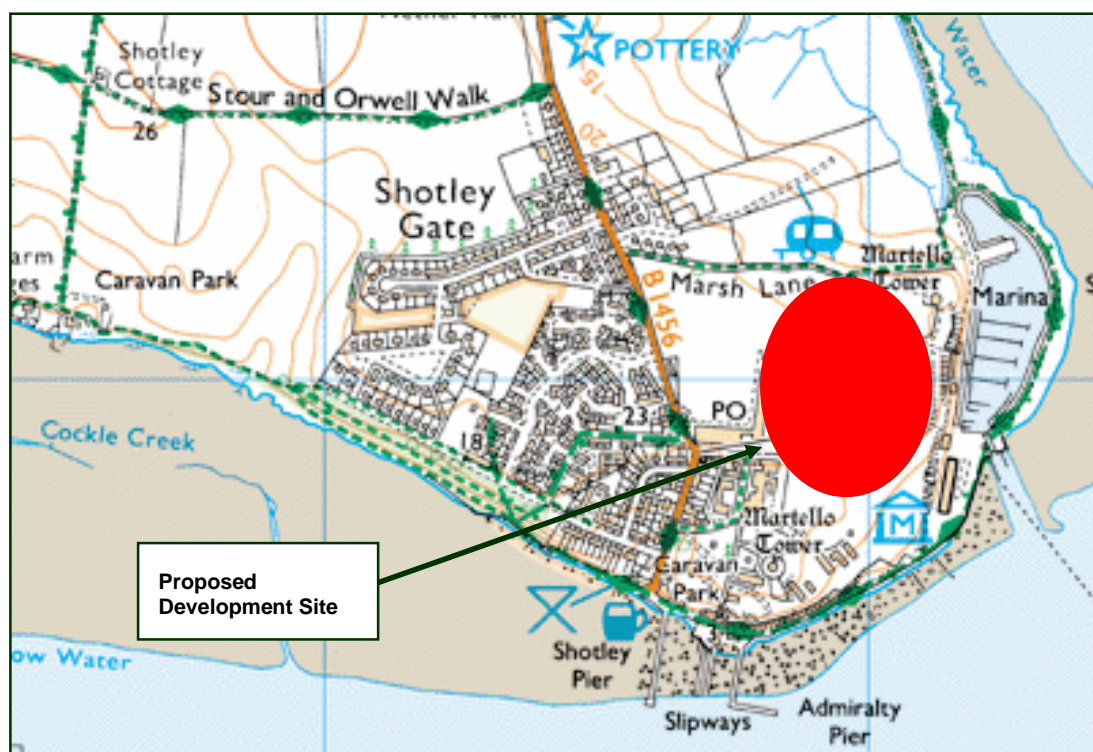
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1. Introduction

1.1. Background

- 1.1.1. Haylink has commissioned Savills incorporating Hephher Dixon to co-ordinate a formal Environmental Impact Assessment (EIA) including the preparation of an Environmental Statement (ES) and Non-Technical Summary (NTS). This document comprises the main report of the ES.
- 1.1.2. Haylink proposes the redevelopment of HMS Ganges, Shotley Gate, Suffolk (Figure 1.1), to provide up to 404 retirement homes, a 330m² Clubhouse and a 60 bedroom care facility including nine units of staff accommodation. Further details are given in Chapter 4.

Figure 1.1: Location of the Proposed Development Site



Source: www.ordnancesurvey.co.uk

Note: Indicative location of the proposed development site may not exactly correspond with the planning application red line.

- 1.1.3. EIA is a systematic and objective process through which the likely significant environmental effects of a development proposal can be identified, assessed and, wherever possible,

mitigated. This process and its outcomes are then reported in the ES to decision makers, the Council and its advisors, and the public. The NTS is provided to allow a wider public understanding of the environmental effects of the development proposal.

- 1.1.4. Should interested parties wish to make representations on the content of this ES they should be made in writing to Planning and Building Control, Babergh District Council, Corks Lane, Hadleigh, Ipswich, IP7 6SJ.

1.2. Structure of the Environmental Statement

- 1.2.1. The ES is set out in a structured manner to allow easier navigation:

- Volume I comprises the Non-Technical Summary;
- Volume II (this volume) comprises the Main Report;
- Volume III comprises the Appendices.

- 1.2.2. In this volume the ES is split into two parts:

- Chapters 1 – 5 set out the assessment requirements, the location and uses on and around the proposed development site, and sets out alternatives that have been considered while formulating the proposed development.
- Chapters 6 – 14 consider the predicted significant effects of the proposed development on the sensitive receptors in the surrounding area. These chapters have been structured in a uniform manner so that the assessment method and criteria, the baseline conditions, the predicted effects and proposed mitigation measures can be easily identified.

2. Background to Environmental Impact Assessment

2.1. What Is Environmental Impact Assessment

- 2.1.1. EIA is a statutory process that is governed by UK and European law. On 3rd March 1997 the Council of the European Union amended Directive 85/337/EEC through Council Directive 97/11/EC, which was given legal effect in England and Wales through the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 in so far as it relates to development under the Town and Country Planning Act 1990. These Regulations came into effect on 14th March 1999.
- 2.1.2. The 1997 amending Directive has several purposes including, the introduction of provisions to “clarify, supplement and improve the rules on the assessment procedure” and enabling developers to obtain an opinion from the competent authority on the need for EIA. The Directive also extends the range of projects to which EIA applies and requires an outline of the main alternatives considered to the development proposed.
- 2.1.3. Council Directive 2003/35/EC further amended Directive 85/337/EEC on 26th May 2003, with the Town and Country Planning (Environmental Impact Assessment) (England) (Amendment) Regulations 2006 coming into force on 15th January 2007. The amending Directive and Regulations bring EIA public consultation procedures in line with the UN/ECE ‘Århus’ Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters, which was signed on 25th June 1998.
- 2.1.4. In addition to the EIA Regulations and Directive, there is a body of guidance that further informs the EIA process, including:
- DETR. (March 1999). Circular 02/99: Environmental Impact Assessment¹;
 - DETR. (November 2000). Environmental Impact Assessment: A Guide to Procedures²;
 - ODPM. (April 2004). Note on EIA for Local Planning Authorities; and
 - DCLG. (June 2006). Applications for Outline Planning Permission, Applications for approval of reserved matters and EIA procedure; The Effect of ECJ judgments in the cases of Ex parte Barker and Crystal Palace/White City³.

¹ Note that the Department for Communities and Local Government is currently consulting on revisions to the Circular.

² Note that the Department for Communities and Local Government is currently consulting on revisions to the Guide to Procedures.

2.1.5. These have been considered in detail whilst undertaking this EIA. Guidance on EIA matters is also found in most of the Government's Planning Policy Guidance (PPGs) and Planning Policy Statements (PPSs)⁴.

2.2. The EIA Process

2.2.1. EIA follows an iterative process that usually follows the following stages:

- Screening is the first stage of the EIA process where the relevant authorities (local authorities or the Secretary of State) decide if EIA is required.
- Once it has been agreed that EIA is required, scoping is undertaken to define what should be assessed as part of the EIA and reported in the ES. This is usually done in partnership between the applicant and the local authorities.
- With the scope set, relevant information on the environmental baseline conditions is collected. This information is then used initially to understand the dynamics of the likely environmental effects and inform the design of the proposed development to minimise the potential for significant adverse effects.
- The formal assessment process is then undertaken of the 'frozen' design parameters to define the significant effects of the proposed development.
- Any significant adverse effects that are identified during the formal assessment process are then reviewed against the design to consider whether alterations could be made to minimise the effect. Should this occur the formal assessment process is reiterated.
- Where significant adverse effects cannot be minimised through alterations to the design itself, mitigation measures are considered. Monitoring may also be considered to measure the actual significance of the effect during and post-construction to allow management of mitigation where appropriate.

2.2.2. Once the EIA is completed, the ES is submitted to the local planning authority for consideration with the planning application.

³ Whilst this planning application is made in full, this note and the more recent House of Lords ruling on the Barker case are still relevant as context to how multi-stage EIA might be required where more than one type of land use consent must be obtained in order for the project to proceed.

⁴ With the changes in planning legislation previously mentioned, PPGs are in the process of being replaced by PPSs.

2.3. Screening – Is EIA Required

- 2.3.1. Development that falls within Schedule 1 of the Regulations always requires EIA and is referred to as ‘Schedule 1 development’. Development listed in Schedule 2 that is located in a ‘sensitive area’ (Regulation 2(2)), or, exceeds one of the relevant criteria or thresholds given in Schedule 2 is referred to as ‘Schedule 2 development’. Not all ‘Schedule 2 development’ will require an EIA, only that development likely to have significant environmental effects due to its size, location or nature. Development that requires EIA is referred to as ‘EIA development’.
- 2.3.2. The proposed development achieved outline planning consent (see Appendix 2.1) on 8th September 1988 (reference B/88/01560/OUT); however, it wasn’t until September 2000 that a reserved matters application (reference B/00/01318/RES) and draft legal agreement were submitted to the Council by Potton Development Limited. This application, within the scope of the outline consent, was for 404 retirement homes, care homes and associated facilities. This has not been approved and has been held in abeyance by the Council to date.
- 2.3.3. In June 2003 an outline planning application was submitted for a wider area covering the proposed development site (reference B/03/01085/OUT). This was for approximately 500 residential units, local retail and employment uses, a naval heritage museum, public open space and access roads, but was later refused permission at Public Inquiry. This application was accompanied by an ES. This was subsequently amended to 325 units and was the subject of a “Call-In Inquiry” between February and March 2006. The application was refused planning permission by the Secretary of State on 27th July 2006. In paragraph 28 of the Secretary of States decision, she makes reference to the fall back position, agreeing with the Planning Inspector, who, in paragraph 150 states:
- “My conclusion is that there is a lawful fall back position with a permission that is capable of being implemented subject to the approval of reserved matters and that the timescale remains open ended until the council chooses to progress the reserved matters application that was made in 2000.”*
- 2.3.4. Haylink now wish to revisit the outline planning consent from 1988 by revising the extant reserved matters application submitted in 2000. Since this outline planning consent was granted the EIA Directive has been implemented in the UK, which would have likely meant that a development such as that consented, within such a sensitive area, would now have required EIA.
- 2.3.5. Since the 1999 EIA Regulations came into force there has been considerable debate in the higher courts as to whether EIA could be required at the reserved matters stage of the

consenting process. The presumption was for many years that it could not be required and consequently no EIA was produced for the 2000 reserved matters application. However, in 2006 the European Court of Justice and the House of Lords confirmed that EIA can be required at reserved matters stage, where the opportunity to assess the potentially significant effects of a proposal on the environment had been missed at the earlier outline consent stage (see case R v LB Bromley ex parte Barker 6th December 2006). Consequently, it is now proposed to undertake an EIA for the revised submission.

2.4. Scoping – What Should the EIA Include

2.4.1. A Scoping Opinion was sought from the Council on 15th June 2007, which was received on 3 August 2007. Table 2.1 below sets out the assessment that have been specified by Babergh District Council in the Scoping issued on the 31st July 2007. The topics coloured in red are topics which were not specifically addressed in the formal Scoping Opinion by Babergh DC but nonetheless addressed within this ES for the robustness of the assessment. Full details of the correspondence on scoping are included at Appendix 2.2.

Topic	Chapter in this Report	Undertaken by
Air Quality	5	JMP Consulting
Archaeology and Cultural Heritage	6	EDP
Drainage and Flood Risk	7	Card Geotechnics
Ecology	8	Jones & Sons Environmental Sciences
Ground Conditions	9	Card Geotechnics
Landscape and Visual Assessment	10	EDP
Noise and Vibration	11	Sharps Redmore
Micro-Climate	12	BMT
Socio Economics	13	Savills Hepher Dixon

Transportation	14	JMP Consulting
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2.5. Sustainability

2.5.1. The proposed development seeks to achieve a Level 3 rating in the new Code for Sustainable Homes. In order to achieve this the proposals will achieve good levels of performance across 6 key issues:

- Energy efficiency / CO2
- Water efficiency
- Surface water management
- Site waste management
- Household waste management
- Use of materials

2.5.2. The proposed development shall support a self sufficient retirement community. It is generally accepted that this will generate less car journeys than an unrestricted development.

2.5.3. The design of the proposed dwellings have incorporated the principles of passive design in order to reduce the embodied energy of the proposals, in addition high specification double glazing will be used. Where feasible material will be locally sourced.

2.5.4. Key sustainable proposals include the following:

- Timber framed construction which has a lower embodied energy than traditional construction and facilitates excellent draught proofing and thermal insulation standards;
- A car club is proposed to reduce car dependency;
- Provision of adequate space for the storage of recyclable waste;
- Provision of rainwater collection facilities across the development in order to reduce mains water consumption;

- Minimising of impermeable hard landscaping materials and the integration of SUDs drainage measures; and
- Planting of trees and copses.

2.6. Cumulative Impacts

2.6.1. There is no accepted methodology for cumulative assessment although guidance is available in the form of:

- EC. May 1999. Study on the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions.
- Council on Environmental Quality. January 1997. Considering Cumulative Effects Under the [US] National Environmental Policy Act.

2.6.2. Usually cumulative impacts are considered in three categories: incremental, accumulative and cumulative.

2.6.3. Incremental impacts relate to small changes over time by numerous developments potentially giving rise to significant impact. In the ES these will be dealt with in two ways:

- Firstly, past changes have been incorporated into the baseline in each chapter and each assessment has described whether the proposed development would cause a significant impact or causing another incremental change; and
- Secondly, the Government's headline sustainable indicators are used in this chapter to show trends in certain environmental issues, which are created by incremental changes over time and show whether targets to improve the environmental are being met, and how the proposed development would affect the achievement of these targets.

2.6.4. Accumulative impacts relate to multiple impacts from a single development, which may give rise to a potentially significant impact upon a receptor. These have been considered throughout the ES by way of cross-referencing between assessments. For example, the accumulation of potential noise, air quality and transport impacts upon nearby residents are considered.

2.6.5. Cumulative impacts relate to multiple developments giving rise to significant impacts at a receptor. For example, a number of golf courses in close proximity may give rise to significant landscape and ecological impacts cumulatively. These will be dealt with in the individual chapters (if relevant).

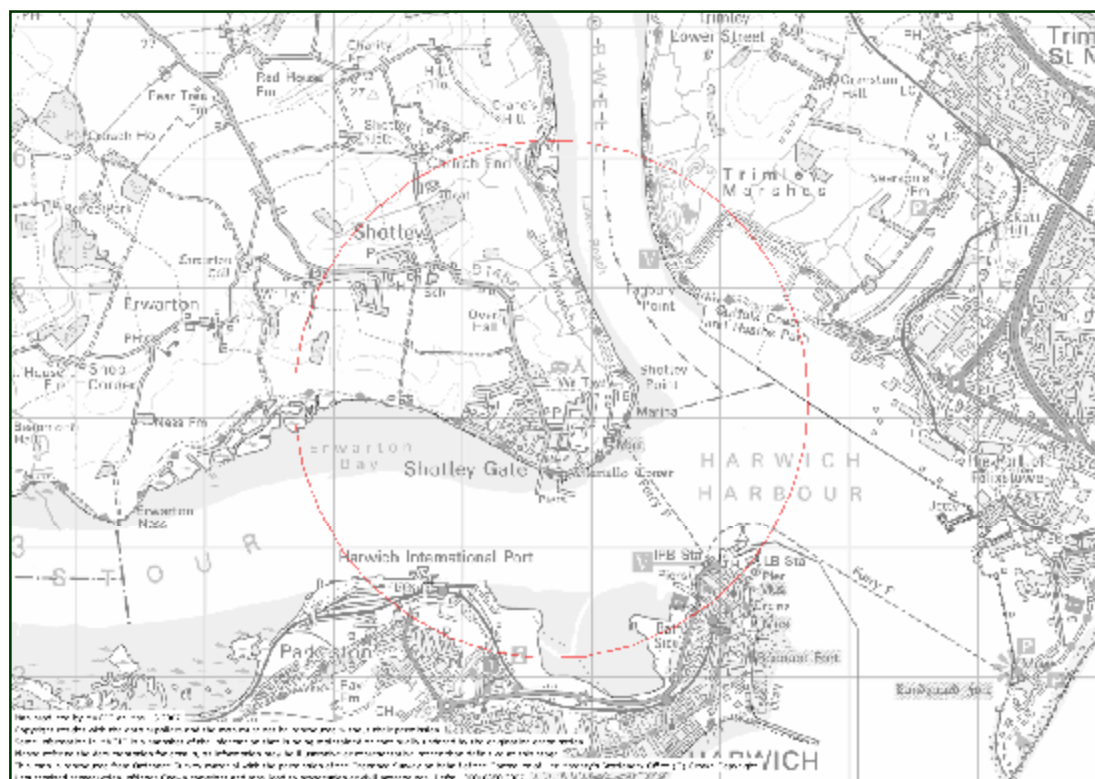
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- 2.6.6. Much of the information necessary to produce quantitative assessments of the detail given in previous sections is not available for other permitted developments. As such this assessment is necessarily qualitative.
- 2.6.7. The assessment of cumulative effects does not lend itself to detailed assessment criteria since it is difficult to determine the exact level of significance that can be attributed to the proposed development. In addition, the assessment covers many aspects that would not allow for a single set of criteria. Consequently, effects are considered in terms of positive or negative, significant or not significant and temporary or permanent only. These conclusions are justified qualitatively through the analysis set out above.
- 2.6.8. The cumulative development considered in this EIA is that of the permitted Marina Housing Scheme (Ref: B/06/00606/ROC/CLD), for approximately 162 residential units and B1 accommodation, and the lawful use development (under a certificate of lawful use application) within the wider HMS Ganges site but outside the application boundary. This accounts for approximately 14,000m² of C2 use.

3. The Site and Its Setting

3.1. Site Location

3.1.1. The proposed development site is located in the village of Shotley Gate at the southeast tip of the Shotley Peninsula, Suffolk (see Figure 3.1). The Shotley Peninsula is bounded to the north by the Orwell Estuary and to the south by the Stour Estuary. The proposed development site extends to approximately 16.5ha with the entire masterplan area covering 24ha.

Figure 3.1: Context to the Proposed Development Site



Note Redline denotes 2km radius from the centre of the proposed development site.

3.1.2. Shotley Gate lies within Shotley Parish, which is centred on the village of Shotley approximately 1,800m to the northwest of the proposed development site. Shotley Gate is made up of about approximately 600 dwellings, a garage, a post office and shop and two pubs. Shotley itself has approximately 300 dwellings, a post office/general store, primary school, garage including petrol filling station, village hall, doctor's surgery, fish and chip shop, football pitches, children's playground and a pub.

- 3.1.3. The main road to the proposed development site is the B1456, known as Bristol Hill in Shotley Gate and just as the Street in Shotley. This continues northwest through various small towns and villages, including Chelmondiston, before passing under the A14 close to the Orwell Bridge and joining with the A137 on the outskirts of Ipswich, approximately 16km from the site.

Figure 3.2: Aerial Photograph of the Area Surrounding the Proposed Development Site



3.2. The Proposed Development Site

- 3.2.1. As discussed previously, the proposed development site forms part of a wider masterplan area. The site itself forms the northern boundary of the masterplan area. It is relatively flat, gently sloping from approximately 22mAOD in the northwest corner to approximately 20mAOD on the southern boundary. The masterplan area however varies to a greater degree with the site largely sloping southeastwards towards King Edward VII Drive, which lies at approximately 3.5mAOD. Beyond this road are mudflats of the Stour Estuary with various piers, slipways and jetties.

3.2.2. The masterplan area covers the former HMS Ganges naval training station, which closed in 1976. This had been in operation since 1905 at Royal Naval Training Establishment (RNTE) Shotley before changing its name to HMS Ganges in 1927 in honour of the sites' first training ship.

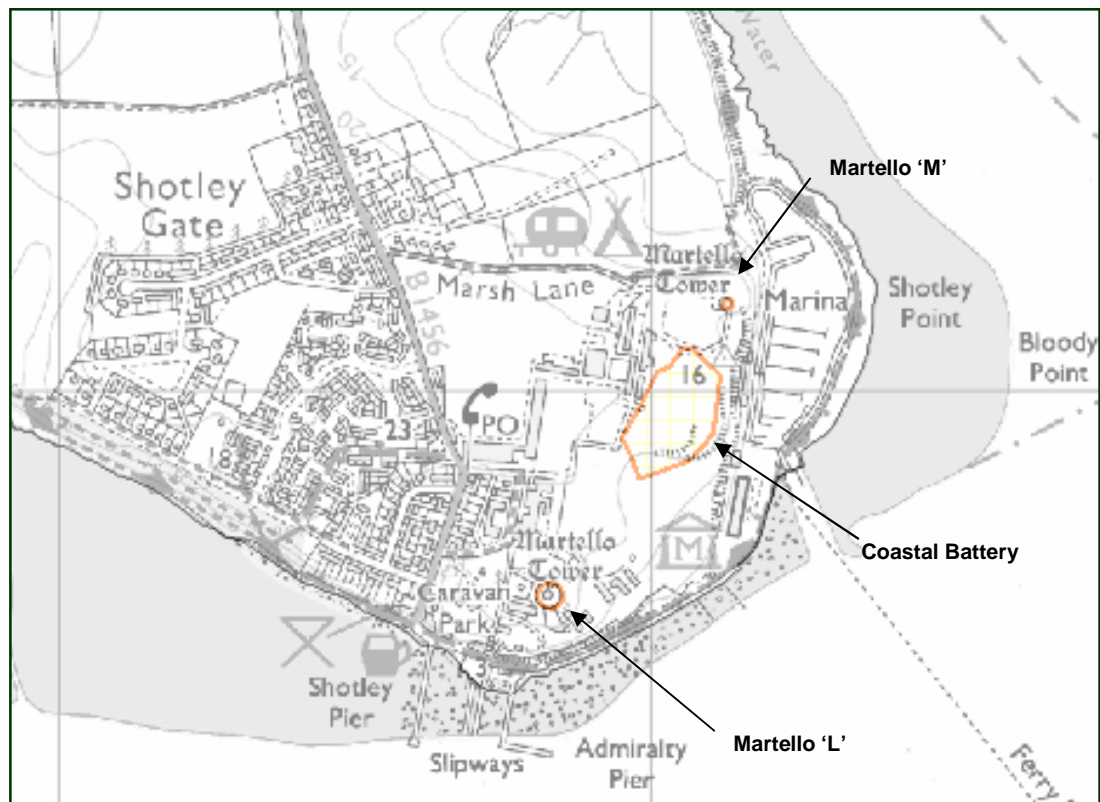
3.2.3. The area is still occupied by an extensive array of substantial institutional buildings and infrastructure, including playing fields, tennis courts and a large indoor swimming pool, that remain following the closure of the training facility, although other parts have been demolished. These have been put to various uses since 1976 including, a Eurosports Village and a police training college from 1988 to 1999. The police continue to use the site on an intermittent basis for training purposes. The proposed development site itself is located on an area that has been previously used as playing fields.

3.3. Land Use Designations

3.3.1. Use of the area for military purposes predates the 1905 training establishment. The masterplan area includes three Scheduled Ancient Monuments (see Figure 3.3):

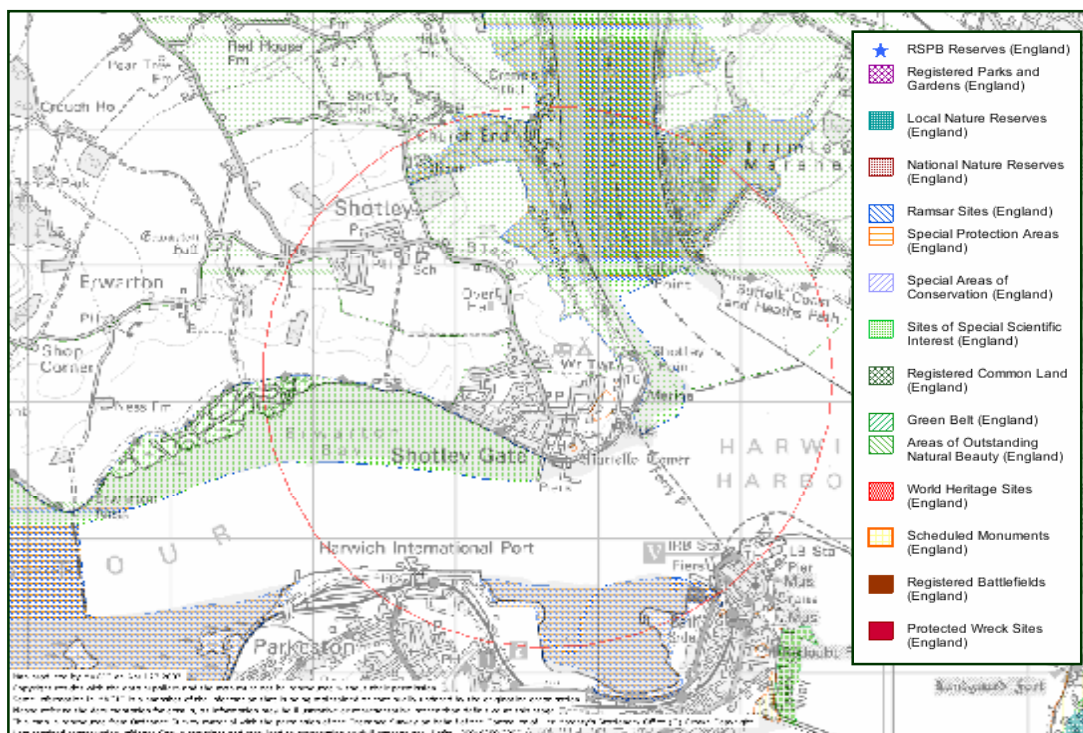
- Martello Tower 'M' built between 1810 and 1812 to support a battery at Shotley. Now used as the base of a water tank. This is located in the northeast corner of the area, sitting outside the development site.
- Martello Tower 'L' also built between 1810 and 1812. It was originally built as a moated tower on high ground overlooking the mouth of the River Stour in the southern part of the masterplan area. The moat has now been infilled, as has the tower itself to first floor level. The roof supports a 20th Century water tank and coastguard observation post, both now disused.
- A coastal battery located on the eastern part of the masterplan area, which was built to a design by Colonel Jervois in 1862. Built on the 70ft contour line, it was all but unassailable from the sea. It was a 14-gun open battery with earth ramparts, surrounded on 3 sides by a ditch containing a brick loopholed wall 8ft high, built as a Carnot wall. It underwent various changes as its armament was upgraded, before being decommissioned and forming part of the training establishment in 1905. Except for the southeast corner where more recent development has occurred, much of the 1862-5 works remain.

Figure 3.3: Scheduled Ancient Monuments in and around the Masterplan Area



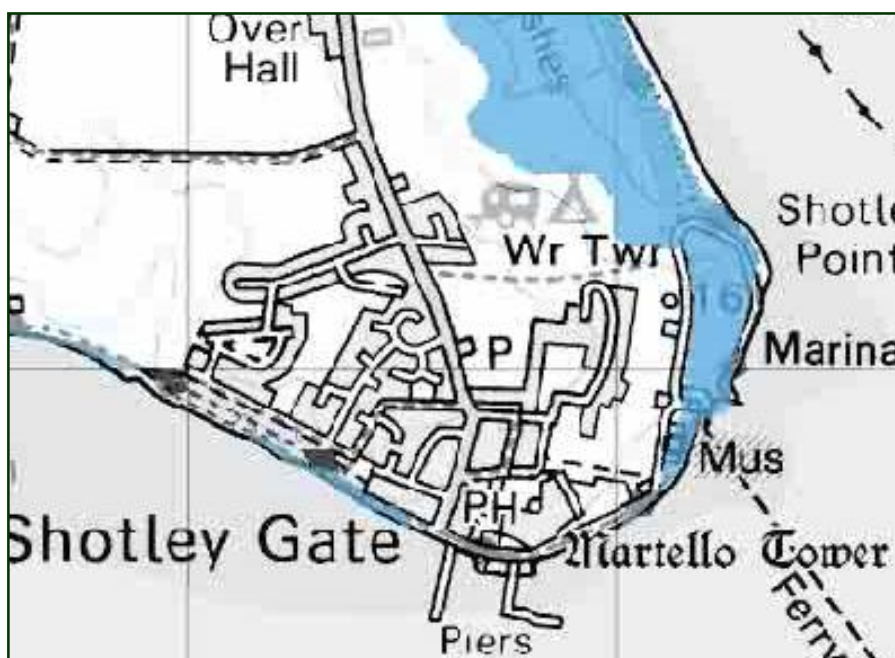
- 3.3.2. Land adjacent to the Stour and Orwell estuaries forms part of the Suffolk Coast Heaths Area of Outstanding Beauty (AONB), this designation applies throughout the Peninsula except for Shotley Gate and the masterplan area, which are both excluded (see Figure 3.4). Both estuaries are also designated as Sites of Special Scientific Interest (SSSI), a Ramsar Site and a Special Protection Area (SPA). Their importance largely relates to over-wintering wildfowl and waders. The boundaries of these extensive areas fall just short of the masterplan area.
- 3.3.3. Along the northern boundary of the proposed development site and masterplan area is an area of trees protected by a 1991 Tree Preservation Order (TPO BT 211). In addition, the former playing fields on the site have been designated as an Area of Visual or Recreational Amenity (AVRA) in the Local Plan. An additional TPO covering the whole site was made in 2006

Figure 3.4: Land Use Designations Identified Using the MAGIC website



3.3.4. Due to elevation of the masterplan area above the estuary (a minimum of 3.5mAOD), it is not located within the Environment Agency’s indicative floodplain for the Stour or Orwell (see Figure 3.5). Areas immediately to the east of the earth ramparts of the former coastal fort are however at risk of flooding during a 1 in 100 year event.

Figure 3.5: Environment Agency Indicative Flood Risk Map



3.3.5. The Environment Agency also provides details of the sensitivity of the water bodies in the context of the EC Water Framework Directive. Both the Orwell and Stour are characterised as small, low altitude catchments on calcareous geology. The site itself is located on superficial glacial sand and gravel deposits, which overlay the London Clay with Chalk beneath. Both estuaries are considered to be ‘probably at risk’ from diffuse sources of pollution (see Figure 3.6). Ground waters in the area are also considered ‘probably at risk’ or ‘at risk’ from diffuse sources of pollution and/or water abstraction (see Figure 3.7).

Figure 3.6: Water Framework Directive – Coastal and Transitional Waters at Risk

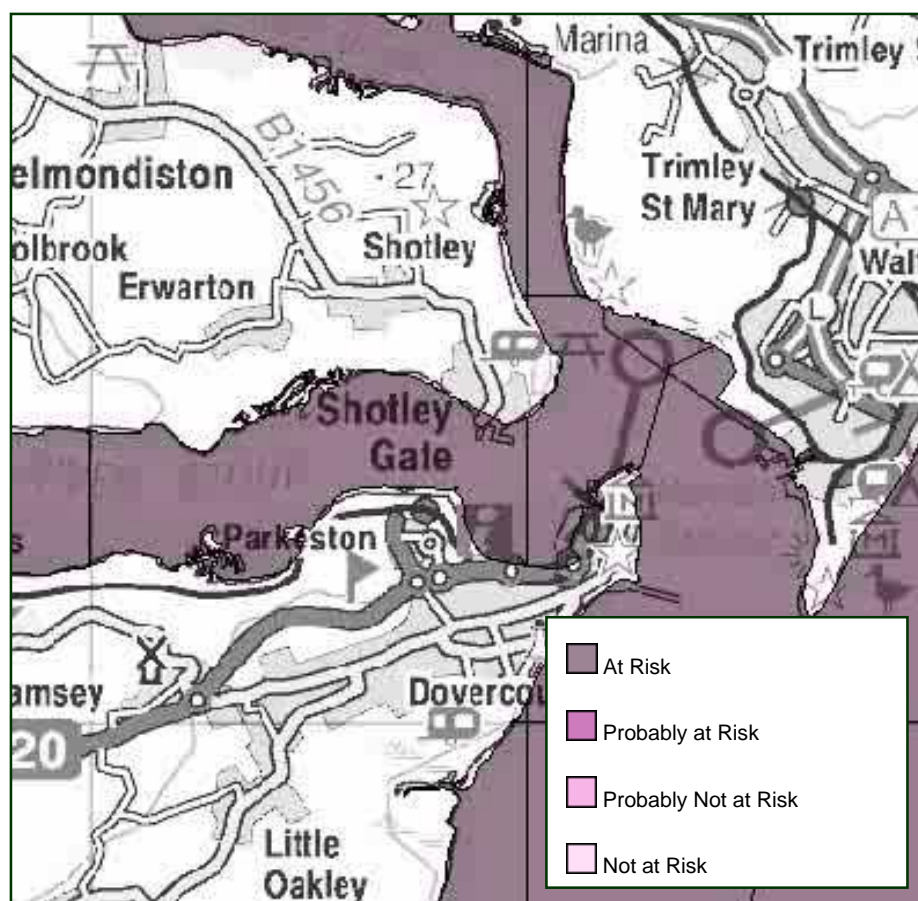
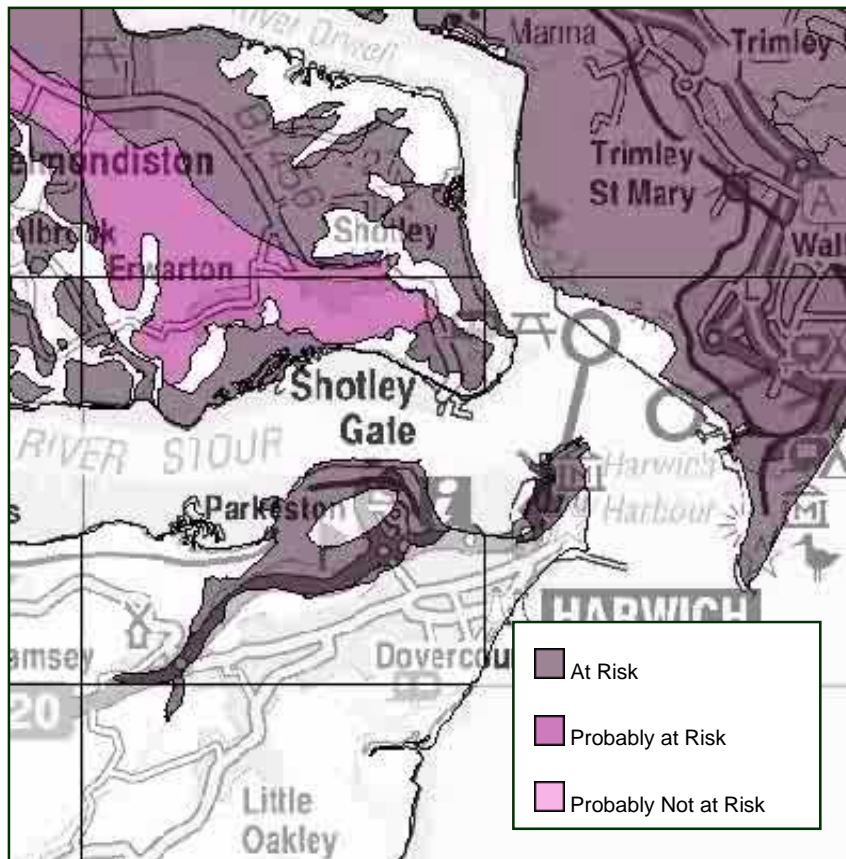


Figure 3.7: Water Framework Directive – Ground Waters at Risk



4. Description of the Proposed Development

4.1. The Proposed Development

- 4.1.1. The ES has been produced as part of a package of information to amend the details submitted on 30th August 2000 in respect of all reserved matters pursuant to an outline planning permission on the HMS Ganges site (ref: B/88/1560). This relates to the erection of a retirement community development (404 dwellings), a nursing home and associated facilities, which was granted outline planning permission on 8th September 1997.
- 4.1.2. The proposed development is for a retirement village comprising 404 retirement homes, a clubhouse, a 60 bedroom care facility and leisure facilities. It is also proposed to undertake associated highways and landscaping works on the site.
- 4.1.3. It is proposed to provide a range of housing types and housing sizes to accommodate for the needs of different groups of elderly. The 404 homes proposed will be split to provide 360 one to five bedroom homes, 53 assisted living apartments and 1 managers home.
- 4.1.4. The majority of the houses will be built in the southern part of the site north of King Edward VII Drive, these will comprise dwellings of a traditional brick and render style.
- 4.1.5. The leisure facilities will be central to the site, and will include the clubhouse, a bowling green, swimming pool and pavilion. These will be in close proximity to the 60 bedroom care facility which is proposed to be located immediately north of the leisure facilities. Leading north from the care facility along the eastern and northern site boundary more homes are proposed aligning the access routes.
- 4.1.6. The 60 bedroom care facility will be accommodated within a redbrick and render building. The red brickwork will be complemented by matching plinths and cast stone cills to the windows. Natural timber boarding, plain tiles and slate are also proposed for the care facility elevations.
- 4.1.7. In order to safeguard the views from the marina onto the peninsula, the marina facing buildings will use timber to improve their aesthetic appearance. Furthermore, high quality landscaping and boundary treatments are proposed for the site including the planting of native plants and trees.
- 4.1.8. The outline planning permission has already established the principle of a new roundabout to the north west boundary of the site and an access road through the site which will link the

B1456 to Shotley Marina. The amended information includes further details on these proposals.

Landscaping

- 4.1.9. The landscape layout incorporates a small range of boundary types and conditions. Contrasting paving such as a row of stone setts are employed in areas of shared surface paving to visually delineate footways from vehicular routes. Raised kerbing is employed on the main routes to clearly separate the vehicular carriageway from the pedestrian pavements. Grass strips and verges are also proposed to create a further visual separation of routes from other areas.
- 4.1.10. Low brick walls (750mm in height) are proposed as a traditional boundary to front gardens and provide screening. Estate railings (1m in height) are proposed as fencing on semi public areas and adjacent to footpaths.

4.2. Alternatives

- 4.2.1. Alternatives are normally considered primarily in terms of location. However, in this case the proposed development site already benefits from an outline planning consent. Therefore it is not appropriate in this instance to consider the selection of an alternative site. There are two realistic types of alternative, 'do-nothing' with the existing land use retained or an alternative layout of development to that proposed. Each of these will be considered in the ES.
- 4.2.2. The alternative type of layout for the proposed development site is at a masterplan stage and at the time of this report entering the public consultation exercise. The development proposals include the development of the whole HMS Ganges, which could potentially include approximately 200 market homes and 30 affordable homes. The alternative masterplan development will integrate the reserved matters application, by incorporating the retirement village (although reduced in size from the 404 homes), along with some commercial, employment and leisure floorspace.

4.3. Implementation and Phasing

- 4.3.1. The construction methodology assessed in this ES is based on that which can reasonably be anticipated to be used based on the experience of the consultancies involved in the development of the proposed scheme.
- 4.3.2. The following anticipated construction details have been used in the assessment of the effects of the proposed development and mitigations measures suggested. These

mitigations measures are in most cases standard construction practice and can be tailored to the detail of the construction process used and their provision ensured through planning conditions or legal agreement.

Phasing

4.3.3. A phasing plan (Drawing No. 18504A/106) submitted as part of the application drawings sets out the redevelopment in the following stages:

- **Phase 1:** Start in Spring 2008, construction of 50 units. The site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 1A:** Start in Summer 2008, demolition of all buildings and the removal of trees which are not to be retained as part of the proposed development (as shown on application drawings plan No. 18504A/107) within the area marked as Phase 1A.
- **Phase 2:** Start in Autumn 2008, demolition of all buildings and the removal of trees which are not to be retained as part of the redevelopment (as shown on application drawing plan No. 18504A/107) within the area marked Phase 2. This will then be followed by the construction of 49 units within this area. Once these have been constructed then the setting of the Martello Tower will be improved as per measures set out in Chapter 6 and the Management Plan. This area of the site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 3:** Start in Spring 2009, construction of the Residential Care Home, Leisure building and Community building. Once this is complete the setting of the Mast will be improved as per the measures set out in the Management Plan. This area of the site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 4:** Start in Autumn 2009, removal of all trees which are not to be retained as part of the development (as shown on application plan No. 18504A/107) within the area marked Phase 4. This will be followed by the construction of 51 units within this area. This area of the site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 5:** Start in Spring 2010, removal of all trees which are not to be retained as part of the development (as shown on application plan No. 18504A/107) within the

area marked Phase 5. This will be followed by the construction of 64 units within this area. This area of the site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.

- **Phase 6:** Start Autumn 2010, removal of all trees which are not to be retained as part of the development (as shown on application plan No. 18504A/107) within the area marked Phase 6. This will be followed by the construction of 54 units within this area. This area of the site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 7:** Start Spring 2011, removal of all trees which are not to be retained as part of the development (as shown on application plan No. 18504A/107) within the area marked Phase 7. This will be followed by the construction of 43 units within this area. This area of the site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 8:** Start Autumn 2011, removal of all trees which are not to be retained as part of the development (as shown on application plan No. 18504A/107) within the area marked Phase 8. This will be followed by the construction of 38 units within this area. This area of the site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 9:** Start 2012, construction of 27 units within this area. The site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.
- **Phase 10:** Start Autumn 2012, construction of 28 units within this area. The site will then be landscaped in accordance with the Landscape Strategy (submitted as part of the application documentation) and within the nearest planting season.

4.3.4. The final stage of the development due to commence in Spring 2013 will involve the improvements to the setting of Shotley Fort in accordance with the Management Plan.

Construction

- 4.3.5. Site access will be taken from Caledonia Road during Phase 1 and 1A. Phase 1A involves the construction of the road which will then be utilised to gain construction vehicle access to the rest of the site.
- 4.3.6. Construction methods will be carried out in accordance with a Construction and Environmental Management Plan (CEMP) or a Code of Construction Practice (CoCP) to be agreed with the Local Authority. The proposed development will join a local 'Considerate Contractors Scheme'.
- 4.3.7. It is anticipated that hours of working would be 8.00am to 6.00pm (Monday to Friday) and 8.00am to 1.00pm on Saturday. No working would be undertaken on Sunday or bank holidays. There may be a need for extended working hours during some phases of the development. However, such extended working would be limited as far as possible by detailed management. Some large and special deliveries may have to be brought into the site out of normal hours though at agreed times to limit off site highway effects.
- 4.3.8. Liaison with the Council would be maintained throughout the construction process. The contractor will be required to nominate a representative to act as contact point with the Council, to ensure that any construction issues that may arise are dealt with efficiently and promptly.

On Site Traffic and Dust Management

- 4.3.9. To reduce dust and particulate matter emission from the site the following measures would be implemented:
- Site access routes would be watered as necessary using and surfaces kept in good order. Additionally, dampening of exposed soil and material stockpiles using sprinklers and hoses if necessary. This would prevent dust and particulate matter becoming mobile. Vehicle wheel washing facilities will be used during foundation works.
 - Regular inspection and, if necessary, cleaning of local highways and site boundaries to check for dust deposits (and removal if necessary). Additionally, a visual inspection of the site perimeter to check for dust deposition (evident as soiling and marking) on vegetation, cars and other objects and taking remedial measures if necessary.

- Observation of wind speed and direction prior to conducting dust-generating activities to determine the potential for dust nuisance to occur, avoiding potentially dust-generating activities during periods when wind direction may carry dust into sensitive areas and avoiding dust-generating operations during periods of high or gusty winds.
- Windbreak netting should be positioned around materials stockpiles and vehicle loading/unloading areas, as well as exposed excavation and material handling operations. Additionally, the surface areas of stockpiles will be minimised (subject to health and safety and visual constraints regarding slope gradients and visual intrusion) to reduce area of surfaces exposed to wind pick-up.
- Scaffolding would be covered with polythene sheets to form a barrier between around buildings being demolished.
- No fires will be allowed on site.

4.3.10. Additionally, construction machinery would include the following measures:

- Vehicles carrying loose aggregate and workings would be sheeted at all times. Construction operatives would use appropriately designed vehicles when handling material and design controls for the use of construction equipment and vehicles. Additionally, it should be ensured that all construction plant and equipment is maintained in good working order.
- Short-term releases may occur during start up of diesel engines, etc. Regular visual checks and routine maintenance should be applied in accordance with the plant specification, to minimise releases. Faulty site plant should be decommissioned until repairs have been carried out and it has been tested and found to be operating satisfactorily.
- On-site aggregate handling should be carried out in enclosed areas and transfer should be completed in a way that minimises the requirements to deposit material from height.

4.3.11. It is particularly relevant to ensure that site clearance materials, which may contain contamination due to previous uses of the site, are safely removed from the site.

5. Air Quality

5.1. Introduction

5.1.1. This chapter of the ES discusses the air quality conditions prevailing around site and changes to those conditions that can be expected to arise as a result of the proposed development.

5.2. Assessment Methodology and Criteria

5.2.1. Air quality in the UK is governed by a suite of policy and legislation from an international (European) through to local level. The policy and legislation context is discussed briefly below.

5.2.2. The Air Quality Framework Directive⁵ sets a framework for monitoring air quality at a European level, and the subsequent Daughter Directives⁶ define specific air quality obligations, or 'limit values' for key pollutants, primarily those which have a direct impact on human health. Having transposed the Directives into legislation for England⁷, the UK is required to report each year to the Commission on progress and compliance with the limit values.

5.2.3. At a national level, the Government's main policies and measures for achieving its EU obligations are set out in the National Air Quality Strategy (NAQS)⁸. The NAQS defines national objectives for pollutants, some of which are more stringent than the corresponding EU limit values. The NAQS objectives have also been adopted into legislation for the purposes of Local Air Quality Management (LAQM)⁹.

5.2.4. The LAQM regime has evolved out the Environment Act 1995, Part IV, which requires local authorities to carry out a review and assessment of air quality in their area, determine locations where defined objectives for key pollutants would not be achieved and declare those areas Air Quality Management Areas (AQMAs).

⁵ Directive 96/62/EC

⁶ 1st Daughter Directive: 99/30/EC; 2nd Daughter Directive: 00/69/EC; 3rd Daughter Directive: 02/2/EC; 4th Daughter Directive: 04/107/EC

⁷ The Air Quality Limit Values Regulations 2003 (SI 2003/2121), The Air Quality Limit Values (Amendment) (England) Regulations 2004 (SI 2004/2888)

⁸ The Air Quality Strategy for England, Scotland, Wales, and Northern Ireland, Defra, January 2000 and the first Addendum, Defra, February 2003. NB: A public consultation on the Review of the NAQS closed in July 2006.

⁹ The Air Quality Regulations 2000 (SI 2000/0928), The Air Quality (Amendment) Regulations 2002 (SI 2002/3043)

- 5.2.5. In the UK today, the key pollutants of concern are nitrogen dioxide (NO₂) and particles (PM₁₀) with the NAQS objectives not being met at many locations. Both of these pollutants present a threat to human health and both are directly associated with pollution from road traffic. In fact, most of the AQMAs throughout the UK are associated with busy roads.
- 5.2.6. A new NAQS is currently being prepared by Defra (Department for Environment, Food and Rural Affairs). A draft of the new NAQS was published for consultation in April 2006. The draft new NAQS explores the potential to include 2010 objectives for PM₁₀ in the regulations and include a similar objective for particles less than 2.5µm diameter (PM_{2.5}).
- 5.2.7. However, there is some concern that the sources of background levels of particles are not directly within local authority control. The 2010 objectives for PM₁₀ are expected to be exceeded at background levels throughout the UK. As such, there are limited measures that can be implemented through LAQM to meet the objective. At the time of writing, it is not known if 2010 objectives for PM₁₀ and PM_{2.5} will be included in the regulations.

Table 5.1: Relevant NAQS Objectives and EU Obligations

Pollutant	Applies	Measured as	NAQS Objective	Date	EU Limit Values Objective	Date
Nitrogen dioxide (NO ₂)	UK	Annual mean	40µgm ⁻³	31 Dec 2005	40µgm ⁻³	1 Jan 2010
	UK	1 hour mean	200µgm ⁻³ not to be exceeded more than 18 times a year	31 Dec 2005	200µgm ⁻³ not to be exceeded more than 18 times a year	1 Jan 2010
Particles (PM ₁₀)	UK	Annual mean	40µgm ⁻³	31 Dec 2004	40µgm ⁻³	1 Jan 2005
	UK	24 hour mean	50µgm ⁻³ not to be exceeded more than 35 times a year	31 Dec 2004	50µgm ⁻³ not to be exceeded more than 35 times a year	1 Jan 2005
	UK (excl. Scotland & London)*	Annual mean	20µgm ⁻³	31 Dec 2010	20µgm ⁻³	<i>Indicative only</i>
	UK (excl. London)*	24 hour mean	50µgm ⁻³ not to be exceeded more than 7 times a year	31 Dec 2010		

- 5.2.8. * The 2010 Objectives for PM₁₀ are not prescribed in the Air Quality Regulations and are indicative only.
- 5.2.9. **Table 5.1** above defines the current (and indicative) NAQS objectives and corresponding EU limit values for key transport pollutants, NO₂ and PM₁₀.
- 5.2.10. This assessment seeks to establish the existing air quality conditions prevailing at the site and ensure that the proposed development will not lead to a breach in NAQS objectives.

- 5.2.11. The assessment has been limited to an evaluation of NO₂ and PM₁₀ concentrations and the relevant changes that can be expected as a result of development-related traffic. For robustness, we include an assessment against the indicative 2010 PM₁₀ objectives.
- 5.2.12. The Control of Pollution Act 1974 also requires consideration of any temporary air quality impacts associated with construction of the proposed development. The main air quality impacts during construction phases are dust generated and additional emissions of PM₁₀ and NO₂ from construction plant. Both of these are considered below.

Methodology

- 5.2.13. The assessment methodology is based on the Local Screening Method set out in the Design Manual for Roads and Bridges (DMRB) Section 11.3.1, published in May 2007. The methodology is consistent with the requirements of LAQM review and assessment¹⁰.
- 5.2.14. The methodology uses the DMRB Screening Method spreadsheet, Version 1.03b published in May 2007, which assesses long-term (daily or annual average) pollutant concentrations at specified receptor locations from the roadside. The spreadsheet requires input of background pollutant concentration data, Average Annual Daily Traffic (AADT) flows, vehicle speed and HGV percentages to evaluate the resulting pollutant concentrations for each scenario.
- 5.2.15. The receptor locations, background pollutant concentrations and input traffic data are discussed in turn below.
- 5.2.16. The DMRB approach notes that, for the purposes of an air quality assessment, sensitive receptors can be thought of as those properties, within 200m of the roadside, where people might be subject to a change in air quality. Beyond 200m from the roadside, atmospheric dispersion (and chemistry) effects render emissions from road traffic negligible.
- 5.2.17. Five sensitive receptor locations (residential properties) have been identified for this assessment at the following locations. Receptor points are identified on maps included at Appendix 5.1 for information.
1. The B1456/Caledonia Road priority junction in Shotley Gate;
 2. The proposed new B1456/Site Access roundabout;
 3. The B1456/Pin Mill Road priority junction in Chelmodiston;
 4. The B1456/Glebe Lane priority junction in Woolverstone; and

¹⁰ Local Air Quality Management, Technical Guidance (LAQM.TG03), Defra, January 2003.

4. The B1456/A137 junction.

- 5.2.18. A potential sixth location, the B1456/B1080 Freston Crossroads junction, was considered and discarded as there are no residential properties located within 200m of the roadside at this location.
- 5.2.19. Background pollutant concentrations for the local area have been obtained from a default background concentration map of the District of Babergh, produced by NETCEN on behalf of Defra (<http://www.airquality.co.uk/archive/laqm/tools.php>).
- 5.2.20. The background maps have a resolution of 1km by 1km, with coordinates provided for the centre of each gridbox. The maps provide 2004, 2005 and 2010 projected concentrations for NO₂ and PM₁₀, amongst other pollutants.
- 5.2.21. The nearest available coordinates for the site have been used (624500, 234500). The NETCEN Year Adjustment Calculator, Version 2.2a, published in January 2006, has been used to adjust for the 2007 and 2012 assessment scenarios.
- 5.2.22. Background pollutant concentrations for each receptor location are included at Appendix 5.2 below for information.
- 5.2.23. The assessment considers the resulting pollutant concentrations at each of the five receptors for five different scenarios as follows:
- 2007 Baseline;
 - 2010 Do Nothing, i.e. 2010 baseline with committed/expected development;
 - 2010 Do Something, i.e. above *plus* proposed development;
 - 2012 Do Nothing, i.e. 2012 baseline with committed/expected development; and
 - 2012 Do Something, i.e. above *plus* proposed development.
- 5.2.24. Traffic flows for each of the above scenarios have been derived from AM peak hour flows assessed and discussed in more detail in Chapter 14: Transportation. As indicated, the scenarios include consideration of both committed and expected development adjacent to the site, such as the consented Marina housing scheme and a proposed C2 Use Class development.
- 5.2.25. The AM peak hour flows at each junction location have been uplifted to 12-hour counts using a locally derived uplift factor of **9.71**. This was derived from 12-hour, 7-day automatic

traffic counter (ATC) data collected during November 2006 and provided by Babergh District Council (BDC). ATC data is included at Appendix 5.3 for information.

- 5.2.26. The 12-hour flows were then uplifted to 16-hour and, finally, AADT flows using known expansion factors prescribed in the DMRB COBA Manual, Section 13.1.4, published in May 2004. AADT flows used for each junction are included at Appendix 5.4 for information.
- 5.2.27. For each location, the road links have been defined as set out in the DMRB guidance notes (11.3.1, paragraph 3.23). This requires continuous links around each receptor to be defined where traffic flow, composition and speed are reasonably homogenous.
- 5.2.28. Given that the five receptor locations are located close to junctions, where traffic is expected to be moving slower than on a straight link, an average speed of 20 km/hr has been assumed. This is consistent with a worst-case scenario in vehicle emissions terms, as tailpipe emissions (and engine efficiency) increase as speed decreases.

5.3. Baseline Conditions

- 5.3.1. The site and the Shotley area in general are rural and coastal in character, located away from major conurbations and associated industry. There are no heavily trafficked roads nearby and the area benefits from on and off-shore coastal breezes due to its prominent location on the Suffolk coast.
- 5.3.2. As a result, the site does not fall within a designated AQMA. In fact, there are currently no AQMAs declared in the Babergh District.

5.4. Potential Effects

- 5.4.1. Tables 5.2 to 5.7 below show the assessed pollutant concentrations for the five receptor locations listed above for the five modelled scenarios. These results should be compared with the NAQS objectives listed in Table 5.1 above and summarised as follows:
- NO₂ average annual concentration not to exceed **40µgm⁻³** by 31 Dec 2005;
 - PM₁₀ average annual concentration not to exceed **40µgm⁻³** by 31 Dec 2004 (further indicative target for **20µgm⁻³** by 31 Dec 2010); and
 - PM₁₀ average daily concentrations not to exceed **50µgm⁻³** more than **35** times a year by 31 Dec 2004 (further indicative target for less than 7 times a year by 31 Dec 2010).

Table 5.3: Receptor One: B1456/Caledonia Road Junction

Pollutant	Baseline/Do Nothing			Do Something	
	2007	2010	2012	2010	2012
NO ₂ annual mean, μgm^{-3}	11.62	10.46	10.22	10.57	10.32
PM ₁₀ annual mean, μgm^{-3}	19.33	18.49	18.04	18.53	18.08
PM ₁₀ Days >50 μgm^{-3}	3	2	1	2	1

Table 5.4: Receptor Two: B1456/Site Access Roundabout

Pollutant	Baseline/Do Nothing			Do Something	
	2007	2010	2012	2010	2012
NO ₂ annual mean, μgm^{-3}	11.58	10.42	10.19	10.56	10.32
PM ₁₀ annual mean, μgm^{-3}	19.35	18.49	18.05	18.55	18.10
PM ₁₀ Days >50 μgm^{-3}	3	2	1	2	1

Table 5.5: Receptor Three: B1456/Pin Mill Road Junction

Pollutant	Baseline/Do Nothing			Do Something	
	2007	2010	2012	2010	2012
NO ₂ annual mean, μgm^{-3}	13.99	12.94	12.41	13.22	12.67
PM ₁₀ annual mean, μgm^{-3}	20.42	19.78	19.26	19.93	19.39
PM ₁₀ Days >50 μgm^{-3}	4	3	3	3	3

Table 5.6: Receptor Four: B1456/Glebe Lane Junction

Pollutant	Baseline/Do Nothing			Do Something	
	2007	2010	2012	2010	2012
NO ₂ annual mean, μgm^{-3}	16.55	15.06	14.37	15.36	14.65
PM ₁₀ annual mean, μgm^{-3}	21.25	20.43	19.82	20.62	19.99
PM ₁₀ Days >50 μgm^{-3}	5	4	3	4	3

Table 5.7: Receptor Five: A137/B1456 Junction

Pollutant	Baseline/Do Nothing			Do Something	
	2007	2010	2012	2010	2012
NO ₂ annual mean, μgm^{-3}	22.82	21.90	20.77	21.88	20.76
PM ₁₀ annual mean, μgm^{-3}	23.36	22.10	21.32	22.13	21.36
PM ₁₀ Days >50 μgm^{-3}	9	6	5	7	5

- 5.4.2. The DMRB spreadsheet output for the three receptor locations is included at Appendix 5.5 for information.
- 5.4.3. The results indicate that increased traffic arising from the proposed development will not lead to a breach in the NAQS objectives (or EU limit values) at key sensitive receptor locations near the B1456/Caledonia Road junction, the proposed B1456/Site Access

junction and the B1456/Pin Mill Road junction. The predicted concentrations fall below the values that should not be exceeded.

- 5.4.4. The results also indicate that the objective for NO₂ will be met comfortably at sensitive receptor locations near the B1456/Glebe Lane junction and the A137/B1456 junction.
- 5.4.5. However, the assessment shows that the indicative 2010 annual mean objective for PM₁₀ (20µgm⁻³) may be marginally exceeded at these receptors for both the 2010 'Do Nothing' and 'Do Something' scenarios. This objective is an indicative target only, and is not included in the regulations. The expected exceedance is marginal, and the results show that it is not related to the increase in traffic expected from the proposed development.
- 5.4.6. As discussed above, the 2010 objective for PM₁₀ is expected to be exceeded at background levels throughout the UK. The impact of the proposed development traffic on concentrations of PM₁₀ at these receptors is therefore negligible.
- 5.4.7. In terms of construction, as noted above, the main air quality impacts that should be considered are the generation of dust and increase in PM₁₀ and NO₂ arising from construction plant.
- 5.4.8. It is not possible to quantify dust emissions as these depend on a variety of factors, including the likelihood of dust being raised, the duration of works, distance of receptors from the sources and the frequency of weather conditions likely to exacerbate dust concentrations. As discussed later in this chapter, construction of the proposed development will be supported by a CMP, which will ensure dust is kept to a minimum.
- 5.4.9. For plant-generated PM₁₀ and NO₂, it is expected that the construction traffic flows will increase AADT flows by less than 10% and will therefore have a minimal impact on air quality.

5.5. Mitigation Measures and Residual Effects

- 5.5.1. As there will generally not be a breach in air quality obligations arising from the proposed development, specific mitigation measures for air quality are not necessary. However, it is anticipated that the proposed development would be supported by a proposed Travel Plan to encourage the uptake of sustainable travel modes and reduce the number of single occupancy vehicle trips. This is discussed in more detail in Chapter 14.
- 5.5.2. As noted above, the construction phases for the proposed development will be supported by a Construction and Environmental Management Plan, developed in consultation with BDC. This is considered in more detail in Chapter 14, and is expected to include agreed HGV routes, construction times and wheel-washing arrangements.

6. Archaeology and Cultural Heritage

6.1. Introduction

6.1.1. This Environmental Statement (ES) chapter considers the impact of the proposed development of the proposed development on archaeological remains and built heritage resources within the site and the immediate surrounding area. In particular, the chapter considers the impact of the proposed development at both the demolition and construction phase and at the completed development phase.

6.1.2. The chapter describes relevant legislation, policy and guidance concerning the conservation of archaeological remains and built heritage resources, the methodology used to assess baseline conditions, the potential impact of the proposed development and any mitigation measures that may be required in order to prevent, reduce or offset any negative impacts arising from it.

6.1.3. The preparation of the chapter has been informed by a desk-based archaeological and heritage assessment, which was completed by EDP in July 2007. This report is included as Appendix 6.1.

6.2. Assessment Methodology and Criteria

6.2.1. Legislative Background and Planning Policy Context

6.2.2. The following sections summarise existing legislation regarding nationally important archaeological remains and built heritage resources. They also summarise the current national, regional and local planning policy context.

Ancient Monuments and Archaeological Areas Act, 1979

6.2.3. The Ancient Monuments and Archaeological Areas Act, 1979, as amended¹¹ built on previous Acts in confirming legal protection for nationally important archaeological remains through their addition to a centrally maintained “schedule”.

6.2.4. Archaeological remains that have been “scheduled” are known as a Scheduled Ancient Monument (SAM). Proposed works affecting a SAM for the most part require Scheduled

¹¹ Department of the Environment (DoE) 1979 *Ancient Monuments and Archaeological Areas Act* London

Monument Consent (SMC), which is issued by English Heritage acting on behalf of the Department of Culture, Media and Sport (DCMS).

- 6.2.5. In the Act, “works” are defined as demolishing, destroying, repairing, altering or adding to the monument. With the exception of “consented” activities, under the Act, it is an offence to damage a SAM by carrying out works without having first obtained SMC.

Planning (Listed Buildings and Conservation Areas) Act, 1990

- 6.2.6. The Planning (Listed Buildings and Conservation Areas) Act of 1990 highlights the importance of listed buildings within planning in Section 66¹². With regard to the local authority’s duty regarding listed buildings in the planning process, Section 66 of the Act states that “...*in considering whether to grant planning permission for development which affects a listed building or its setting, the local planning authority or, as the case may be, the Secretary of State shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses*”.
- 6.2.7. In addition, Section 72 of the Act emphasises the value of conservation areas in built heritage planning. It states that, with respect to the duties of the local authority “...*(1) In the exercise, with respect to any buildings or other land in a conservation area, of any powers under any of the provisions mentioned in subsection (2), special attention shall be paid to the desirability of preserving or enhancing the character or appearance of that area*”.

Planning Policy Guidance Note (PPG) 15: Planning and the Historic Environment, 1994

- 6.2.8. PPG 15: Planning and the Historic Environment, 1994¹³ provides a full statement of Government policies for the identification and protection of historic buildings, conservation areas and other important elements of the historic environment. There is a general government commitment to preserve the historic environment.
- 6.2.9. The statutory tests set out in the 1990 Act are reiterated and it is noted that, in the requirement to enhance or preserve the character and appearance of a listed building or conservation area, development which renders them unharmed or improved is acceptable.
- 6.2.10. PPG15 states that “...*the setting of a [listed] building may be limited to obviously ancillary land, but may often include land some distance from it. Even where a building has no ancillary land – for example in a crowded urban street – the setting may encompass a number of other properties. The setting of individual listed buildings very often owes its*

¹² Department of the Environment (DoE) 1990 *Planning (Listed Buildings and Conservation Areas) Act* London

¹³ Department of the Environment (DoE) 1994 *Planning Policy Guidance (PPG) Note 15: Planning and the Historic Environment* London

character to the harmony produced by a particular group of buildings...and to the quality of the spaces created between them”.

- 6.2.11. With regard to conservation areas, PPG15 states that “...*the desirability of preserving or enhancing the area should also, in the Secretary of State’s view, be a material consideration in the planning authority’s handling of development proposals which are outside the conservation area but would affect its setting, or views into or out of the area”.*
- 6.2.12. The guidance also advocates early consultation with the local planning authority and, where appropriate, English Heritage during the design of a proposed development.

Planning Policy Guidance Note (PPG) 16: Archaeology and Planning, 1990

- 6.2.13. PPG16: Archaeology and Planning, 1990¹⁴ sets out the Government’s policy on the preservation and investigation of archaeological remains affected by development. The general policy is similar to that for the historic environment, in that archaeological remains are seen as finite and non-renewable and therefore require appropriate management to ensure their preservation in a good condition.
- 6.2.14. Field evaluations and early consultations with local authorities are advocated where proposed developments may impact upon significant archaeological remains. It indicates that there is a presumption in favour of preservation *in situ* of both a site and its setting, where remains are of national importance. It confirms that “preservation by record”, or the excavation and recording of remains in advance of construction, may be a suitable alternative to mitigate the impact of development on remains of lesser importance.

Draft Regional Spatial Strategy for the East of England, 2004

- 6.2.15. Policy ENV5 of the draft East of England Regional Spatial Strategy¹⁵ sets out principles to be incorporated into local plans and policies regarding the conservation and enhancement of the historic environment, including protection of SAMs and other sites of nationally important archaeological remains.
- 6.2.16. Policy ENV5 covers the historic environment as a whole. It states that “...*planning authorities and other agencies in their plans, policies and proposals will identify, protect, conserve and, where appropriate, enhance the historic environment of the region, its archaeology, historic buildings and areas and historic landscapes, including those features and sites (and their settings) especially significant in the East of England [including] coastal fortifications...listed buildings and conservation areas”.*

¹⁴ Department of the Environment (DoE) 1990 *Planning Policy Guidance (PPG) Note 16: Archaeology and Planning* London

¹⁵ East of England Regional Assembly (EERA) 2004 *Draft Regional Spatial Strategy for the East of England* Bury St. Edmunds

Suffolk Structure Plan, 2001

- 6.2.17. Policy ENV22 of the Suffolk Structure Plan, 2001¹⁶ covers archaeology. It states that *“...development will not be acceptable if it would have a material adverse effect on Scheduled Ancient Monuments or other sites of national archaeological importance, or their settings. On other sites of archaeological importance or potential, provided there is no overriding case against development, planning permission will be subject to satisfactory prior arrangements being agreed...”*.
- 6.2.18. In addition, Policy ENV1 deals with the treatment of listed buildings and conservation areas within the planning process¹⁶. It states that *“...the character and setting of conservation areas and buildings listed as being of special architectural and/or historic interest will be protected and enhanced”*. It adds that *“...new developments in conservation areas or affecting the setting of listed buildings must be in harmony with their surroundings”*.

Babergh Local Plan, 2006

- 6.2.19. The treatment of archaeological remains within the planning process is set out in Policies CN26 and 27¹⁷. The former states that *“...owners of Ancient Monuments will be encouraged to take measures to conserve and enhance them and their settings and improve visitor access at a level appropriate to their long-term preservation”*. The latter adds that *“...if research indicates that archaeological remains may exist, a developer will be required to submit an archaeological field evaluation before determining a planning application. Planning permission will not be granted without adequate assessment of the nature, extent and significance of the remains present, and the likely extent to which the proposed development is likely to affect them”*.
- 6.2.20. It is further noted that *“...where nationally important sites, whether scheduled or not, and their settings are affected by a proposed development, there will be a presumption in favour of their preservation”* and *“...where there is an overriding case for preservation, the impact of the proposed development...will be required to be mitigated by modifying the proposals to increase physical preservation in preference to recording and excavations”*.
- 6.2.21. Finally, *“...on sites where there is no overriding case for preservation, development will not be permitted unless agreement has been reached to provide for their recording and, where desirable, their excavation prior to development commencing”*. If development proposals are considered acceptable *“...the agreed measures for conservation and preservation will be secured by a condition of planning permission or a Planning Obligation”*.

¹⁶ Suffolk County Council (SCC) 2001 *Suffolk Structure Plan* Ipswich

¹⁷ Babergh District Council 2006 *Babergh Local Plan* Ipswich

6.2.22. Policy CN10 covers development affecting the setting of a listed building. It states that “...proposals for the alteration (including part demolition), extension or change of use of buildings of special architectural or historic interest (including curtilage structures), or for the sub-division of a new work within the curtilage or setting of a listed building, should...retain a curtilage area and/or setting which is appropriate to the listed building and the relationship with its surroundings [and] respect those features which contribute positively to the setting of a listed building including space, views from and to the building and historic layout”.

6.2.23. Policy CN02 deals with conservation areas. It states that “...proposals for the alteration, extension or change of use of an existing building, or for the erection of new buildings in a conservation area, or which have an impact on views into or out of a conservation area, should preserve or enhance the character of the conservation area or its setting [and] retain all elements and components, including spaces, which contribute to the special character of the area”.

Methodology

6.2.24. A preliminary archaeological and heritage desk-based assessment of the site was completed in July 2007 by EDP. It is included as Appendix 6.1. This involved consultation of the Suffolk Sites and Monuments Record (SMR), for records of previously identified archaeological sites, monuments and findspots, as well as the locations of listed buildings and the results of previous archaeological site works.

6.2.25. The historical development of the site was documented through a study of historic documents, including maps and aerial photographs, as well as a range of relevant secondary sources, held in the collections of the Suffolk Record Office and English Heritage’s National Monuments Record (NMR) in Swindon, Wiltshire.

6.2.26. A site walkover survey was also undertaken to assess ground conditions, establish the condition of known archaeological remains, define the potential for survival of unknown archaeological remains and describe the character and appearance, and settings, of designated built heritage resources.

6.2.27. A meeting was held at the site with John Ette of English Heritage in May 2007 to discuss the proposed development of the site, particularly with regard to the conservation of nationally important archaeological remains and built heritage resources, as well as the preservation of their settings. The main outcome was that John Ette requested the preparation of an appropriate conservation plan for the designated archaeological / built heritage features within the site in order to secure their long term preservation, management and presentation.

Significance Criteria

- 6.2.28. Having confirmed the nature of known archaeological remains and built heritage resources, as well as the potential for further as yet undiscovered sub-surface archaeological features and deposits, a professional judgement has been made regarding their importance.
- 6.2.29. Having ascribed a level of importance to the known and potential archaeological and built heritage resource at the site, the development proposals have been assessed in order to determine the likely nature of their impact, i.e. a combination of magnitude and duration. The significance of predicted impacts has then been assessed by reference to the criteria outlined below.

Major Adverse: This would include land-take resulting in the total loss or significant degradation of archaeological remains of national importance, i.e. a SAM, in contravention of existing legislation and national planning policy. It would also include demolition of any grade of listed building, or significant adverse alteration of a Grade I or II* listed building, or Grade I or II* historic park or garden.

Moderate Adverse: This would include land-take resulting in limited loss to, or minor degradation of, archaeological remains of national importance, i.e. a SAM, and/or significant change to their setting or visual amenity. It would also include land-take resulting in the total loss, or significant degradation, of archaeological remains of regional importance. It would also include demolition of a locally listed building, significant adverse alteration of a Grade II listed building or historic park or garden, or more limited adverse alteration of a Grade I or II* listed building or historic park or garden. It would also include significant adverse long term change to the setting of either a Grade I or II* listed building or historic park or garden. Proposed development, causing significant adverse change to the character or appearance of a conservation area, would also be included.

Minor Adverse: This would include land-take resulting in limited loss to, or minor degradation of, archaeological remains of regional importance. It would also include the total loss of an area where locally important archaeological remains have been identified. It would also include

demolition of an undesignated historic building, significant adverse alteration of a locally listed building, or limited alteration of a Grade II listed building or historic park or garden. It would also include significant adverse long term change to the setting of a Grade II listed building or historic park or garden, or more minor adverse change to the setting of a Grade I or II* listed building or historic park or garden. Proposed development, causing significant adverse change to the setting of a conservation area, would also be included, as would the removal of an archaeologically or historically important hedgerow.

Negligible: This is where there will be no significant change in the condition or setting of archaeological remains or built heritage resources. It would also include the removal of common hedgerows and limited damage to archaeologically or historically important hedgerows.

Minor Beneficial: This would include minor improvement in either the management or long term setting of archaeological remains of regional importance, or significant improvement in the management of archaeological remains of local importance. It would also include significant improvement in the structural condition of a locally listed building, or more limited improvement in the structural condition of a Grade II listed building or historic park or garden. It would also include minor improvement in the setting of a Grade I or II* listed building or historic park or garden, as well as more significant improvement in the setting of a Grade II listed building or historic park or garden. Proposed development, significantly improving the setting of a conservation area, would also be included, as would the restoration of an archaeologically or historically important hedgerow.

Moderate Beneficial: This would include minor improvement in either the management or long term setting of nationally important archaeological remains, i.e. a SAM. It would also include significant improvement in the management of archaeological remains of regional importance. It would also include significant improvement in the structural condition of a Grade II listed building or historic park or garden, or more limited improvement in the structural condition of either a Grade I or II* listed

building or historic park or garden. It would also include significant improvement in the setting of a Grade I or II* listed building or historic park or garden. Proposed development, significantly improving the character or appearance of a conservation area, would also be included.

Major Beneficial: This would include significant improvement in either the management or long term setting of nationally important archaeological remains, i.e. a SAM. It would also include significant improvement in the structural condition of either a Grade I or II* listed building or historic park or garden.

6.3. Baseline Conditions

6.3.1. The following section summarises the baseline conditions within the proposed development site and the surrounding 0.5 kilometre radius study area around its boundary. Known sites taken from the Suffolk SMR are shown in the text by the use of square brackets, e.g. [1], and are all located on Figure 6.1.

Prehistoric to Romano-British

6.3.2. No archaeological remains of definite prehistoric date are recorded within the site boundary on the Suffolk SMR. The earliest recorded remains within the study area relate to the findspot of a Bronze Age barbed and tanged arrowhead at Kirton Close, approximately 500 metres west of the site boundary [SMR 155].

6.3.3. A small concentration of cropmark enclosures and linear features is also recorded approximately 250-400 metres west of the site boundary. Although they remain undated, the Suffolk SMR records them as being of either late prehistoric (Bronze Age / Iron Age) or Romano-British origin. The cropmarks appear to include at least one ring ditch, representing the remains of a ploughed-out round barrow [SMR 051], as well as D-shaped and rectangular enclosures and circular features, which have tentatively been interpreted as the remains of roundhouses [SMR 045, 059].

6.3.4. Two further late prehistoric findspots are located within the environs of the cropmark complex described above. The first relates to a bronze socketed and looped spearhead, which was found to the north of Great Harlings, approximately 250 metres west of the site

boundary. It has been assigned a broadly Bronze Age date [SMR 001]. In addition, the Suffolk SMR records the recovery of 1st century-type (Late Iron Age) pottery during building operations on the western edge of the study area [SMR Misc].

Medieval

- 6.3.5. The proposed development site does not contain any recorded remains of definite medieval date. Furthermore, there is very limited evidence for activity within the environs of the site during the medieval period.
- 6.3.6. Findspots of the neck of a 13th century jar, on the foreshore at the confluence of the rivers Stour and Orwell, approximately 100 metres to the east of the site [SMR 003], and a cluster of 13th and 14th century pottery sherds at Shotley Cliff, approximately 300 metres to the west [SMR 010], do not, in themselves, provide any evidence for activity of this within the proposed development site boundary.

Post-medieval

- 6.3.7. The proposed development site contains two recorded post-medieval archaeological sites within its boundary, both of which relate the establishment and development of coastal fortifications on Shotley Point from the early 19th century onwards.
- 6.3.8. Martello Tower L is located in the south west corner of the proposed development site [SMR 032]. It was built between 1810 and 1812 and has been designated as both a SAM (SM 202) and a Grade II listed building (LB No. 6/55). It was originally built to compliment coastal fortifications at Felixstowe and Harwich, which defended Orwell Haven from seaborne attack. However, it was, itself, provided with an ancillary battery, which was located further down the slope on the south side. Its location is still visible as an area of undulating ground, even though it is now heavily overgrown with dense scrub, thereby making it difficult to discern original historic fabric.
- 6.3.9. The tower itself has been subject to extensive modification and alteration, including the infilling of the basement and the removal of the wooden floor above, enlargement of a window to create a second entrance to the interior and the infilling of other original openings. The addition of a red brick and metal water tower has disfigured the intended proportions of the tower and has further served to obscure some of the original fixtures and fittings associated with its three rooftop gun emplacements, which otherwise survive quite well. The same is true of the 20th century look-out post on the south side of the water tower, which adds little to the special architectural and historic interest of the building.

- 6.3.10. The tower was originally provided with an encircling moat, which was revetted with brick on its outside edge. Although it has now been all but entirely filled in, sections of the brick revetment are still visible above ground, indicating that it probably survives intact below ground also. Beyond the moat was a glacis (earthen slope), which provided the tower with an elevated position, making land-based attack more difficult and providing a commanding view of the surrounding landscape. This has largely been truncated by modern landscaping and only a narrow arc still survives to the north east.
- 6.3.11. The setting of Martello Tower L would be described as its prominent, elevated position, which commands sweeping views of the Stour Estuary, to the south and south west, as well as the edge of Orwell Haven, to the south east. Indeed, this prominent position and commanding vantage point were undoubtedly key factors in its original siting. However, this setting has been compromised by the erection of poor quality buildings immediately to the south west and south east, during the 20th century, as well as the dereliction of the historic landscape to the north east.
- 6.3.12. Shotley Fort is located to the north east of Martello Tower L and straddles the eastern site boundary [SMR 062]. Although the overwhelming majority of the Fort is located within the proposed development site, some of the most well-preserved fabric is actually located outside its eastern boundary. Indeed, the majority of the Fort within the site survives as below ground features and deposits, if it has not been entirely destroyed by later construction and demolition work for the Royal Navy Training Establishment (see below).
- 6.3.13. The Fort was built between 1862 and 1863, at a time of heightened tension with France. It was built to compliment Martello Tower L, as well as Martello M, which is situated to the north of the site boundary. It was designated as a SAM in June 2004 (SM 30638) and originally comprised an irregular, seven-sided work with an un-revetted ditch and loop-holed Carnot wall.
- 6.3.14. The site of Shotely Fort was chosen with great care. It was placed on the 20 metre contour line, set back from the edge of the bluff that defines the eastern edge of the site. This made it impossible for enemy ships in Orwell Haven to direct accurate fire upon it as they would have been unable to elevate their main guns sufficiently.
- 6.3.15. Shotley Fort was initially provided with fourteen 68 pounder smooth bore artillery pieces, although only ten years later it was rearmed with 7" muzzle loading rifled guns. In 1891 plans were made to replace the 7" guns with four 10" guns. In the end, only two of the 10" gun emplacements were constructed and the fort was largely demolished after 1900 to make way for a Royal Navy Training Establishment (see below).

- 6.3.16. The guns of Shotley Fort were removed in 1911 and the south eastern corner levelled to provide space for the Royal Navy Training Establishment's accommodation blocks. Indeed, the majority of Shotley Fort was levelled, with the exception of the north east corner, most of which is actually located outside the site boundary. Within this section, four original gun emplacements survive *in situ*, with their racers intact. The embrasures are now badly corroded, whilst only a single expense magazine remains.
- 6.3.17. Outside the gun emplacements, the north eastern and eastern "arms" of the Carnot wall survive intact, although they are now heavily overgrown with dense scrub and mature trees. Nevertheless, the top of the central bastion, at the southern end of the eastern arm of the Carnot wall, is still visible above ground level, suggesting that it may be reasonably well preserved below.
- 6.3.18. South of the central bastion, only the more northerly of the two 10" gun emplacements, which were inserted in 1891, survives. Although it is in generally good condition, it is now overgrown with emergent scrub. The underground magazine also survives in good condition and still retains many of its original fixtures and fittings, including doors, coat pegs and cupboards. In contrast, only the central pivot of the southern emplacement still survives.
- 6.3.19. Within Shotely Fort, the main magazine survives in reasonably good condition, with the three vaulted chambers still retaining their lamp passages. The passage that runs behind the magazines has been used as a firing range in more recent times, but this does not appear to have impacted significantly upon its fabric. Of more concern is the deleterious impact that the rapid growing trees such as sycamores are having on the fabric of the fort. This is particularly evident at the entrance to the main magazine, where the brickwork is being forced apart.
- 6.3.20. In its original form, the Fort would have been located within an area of clear open space occupied by agricultural fields, whereby Martello Towers L and M would have been clearly visible to the south and north, respectively. However, the most important aspect of the Fort's historic context would have been the clear view across Orwell Haven, to the east, which would not only have been important for early identification of seaborne invaders, but also for rapid and effective communication with nearby fortifications at Felixstowe and Harwich.
- 6.3.21. Although the construction of the Royal Navy Training Establishment initially compromised the fort's setting, as well as its physical preservation, the subsequent clearance of the buildings has had an equal, if not greater impact, through the continued dereliction of the site and the germination of rapid growing trees, such as sycamore, and scrub. This dense

vegetation not only conceals the surviving fabric of the fort, it all but screens views of Orwell Haven, thereby severing it from its historic landscape context.

- 6.3.22. A third recorded post-medieval archaeological site is located adjacent to the northern site boundary. This is a second Martello Tower, which is known as Martello Tower M [SMR 033]. In common with Martello Tower L, at the south western corner of the site, it is designated both as a SAM (SM 203) and a Grade II listed building (LB No. 7/56).
- 6.3.23. Like Martello Tower L, Martello Tower M was built between 1810 and 1812, but was provided with a narrower moat. It, too, has been subject to modification and alteration during the course of its lifetime, including the addition of a huge water tower on the top, which is approximately twice the height of the tower, and the filling of two entrances to the internal stairways and a number of window openings. In addition, it is now in poor condition. The external brickwork, which is patchily rendered with cement, is not only cracking, but also bulging outwards in places, most particularly the west side, whilst the moat has also been infilled. It should be noted that Martello Tower M is located outside the application boundary.
- 6.3.24. With regard to its setting, Martello Tower M would originally have occupied an elevated position within an area of agricultural fields, providing 360 degree visibility. However, it is now located within an area of wasteland overgrown with dense scrub and separated from the site boundary by a large bund of topsoil located to the north of Shotley Fort. As a result, the tower has not only become severed from its historic landscape context, but is both inaccessible and poorly presented.

Modern

- 6.3.25. For the most part, recorded archaeological remains of modern date, within the site boundary, relate to the construction, operation and subsequent closure of the Royal Navy Training Establishment at Shotley Point, which was otherwise known as HMS Ganges.
- 6.3.26. HMS Ganges took its name from a ship, which was launched in 1821. It subsequently became a training ship for boys and was moored in Orwell Haven, just to the east of the site, from 1899 to 1906. However, from 1905, the training facilities that it provided were moved ashore to sit alongside the Royal Navy Hospital that had been established at Shotley Point at the turn of the century [SMR 094].
- 6.3.27. The remainder of the recorded modern sites, monuments and findspots within the study area relate to the establishment of defensive positions and air raid protection on the Shotley Peninsular during World War Two. None of the recorded sites are wholly located within the site boundary and are, instead, scattered within the surrounding study area. However, one,

a complex of air raid shelters, does extend into the site boundary from the west side of Bristol Hill, from where it runs along the south side of Marsh Lane (see Appendix 6.1).

- 6.3.28. The recorded sites comprise barrage balloon tethering points [SMR 076, 082], pillboxes and probable pillboxes [SMR 077, 078, 081, 090], gun emplacements [SMR 074, 079], at least one anti-aircraft battery [SMR 085, 086, 087, 089], both barbed wire obstructions and roadblocks [SMR 072, 080, 083, 084, 091] and air raid shelters [SMR 088]. This air raid shelter, which runs along the north edge of the site, may form part of a more extensive complex, as an underground chamber was located in the south east corner during the walkover survey completed in June 2007.

Undated

- 6.3.29. A single undated archaeological site is recorded on the Suffolk SMR within the immediate vicinity of the site boundary. This refers to a degraded bank in front of the existing seawall and saltmarsh, the purpose and date of which are both unknown [SMR 101].

Historic Buildings

- 6.3.30. As set out above, Martello Tower L, which is located in the south west corner of the site, is a Grade II listed building in addition to being designated as a SAM. The same is true of Martello Tower M, which is located adjacent to the northern site boundary.
- 6.3.31. In addition, two further Grade II listed buildings are located within the site. The Caledonia Road gates, gatepiers, railings and lamp standards, which comprise the "Main Gate" at HMS Ganges, are located on the west side of the site (LB No. 493033). They were erected in 1905 and consist of red brick piers with painted stone caps, wrought-iron carriage and pedestrian gates and also railings and lamp standards. The pedestrian gates, set to either side of the main entrance, have scrolls and cresting decoration, as well as the monogram of Edward VII.
- 6.3.32. The listed building is located on the periphery of the proposed development site, at the eastern end of a relatively narrow residential street. It is also surrounded by large military-style buildings, which were associated with the operational life of HMS Ganges, immediately to the north and south. These prominent and imposing buildings, together with the surrounding historic streetscape, form its setting.
- 6.3.33. The second Grade II listed building, the ceremonial mast of the former HMS Ganges, Royal Naval Training Establishment (LB No. 6/54), is located immediately inside the main gate, on the left-hand side. It was erected in 1907, but the structure itself is originally of 19th century date.

- 6.3.34. It is of timber, with standing rigging 143 feet high and consisting partly of the foremast of HMS Cordelia, a corvette paid off in 1900, and partly of the top mast of the sailing battleship Agincourt, built in Portsmouth Dockyard in 1892. The top gallant and all yards were renewed in 1955 and made in Chatham Dockyard, as was the gaff, which is a spar used to support the gaff sail, when it was renewed in 1961.
- 6.3.35. The ceremonial mast is located at the southern edge of the parade ground, on the left immediately inside the site's Caledonia Road entrance. Accordingly, its setting would be described as the adjacent parade ground, which is an area of formal open space surrounded on three sides by substantial buildings.
- 6.3.36. Aside from the three listed buildings, none of the standing structures within the site boundary, with the exception of the gates that define the Caledonia Road entrance, are of any intrinsic architectural or historical interest.

Conservation Areas

- 6.3.37. The proposed development site is not located within a conservation area and does not include any part of one within its boundary. Chelmondiston (Pin Mill) Conservation Area, which is located approximately four miles to the north west, is the nearest conservation area to the site. As a result, the proposed development of the site will have no impact upon its setting.
- 6.3.38. Nevertheless, a second conservation area, located approximately 5.5 miles from the site, straddles the B1456, which is the primary means of vehicular access to the site. Woolverstone Conservation Area defines an estate village, which was laid out and constructed by the Berners family, who purchased Woolverstone Hall in 1773, during the 19th century. As they form an estate village, the individual properties, which flank the road, have a common design theme and architectural detailing. Accordingly, the proposed development could indirectly affect the conservation area through change to its character or appearance, as a result of the generation of vehicle movements.
- 6.3.39. Woolverstone is an elongated, linear settlement strung out along both sides of the B1456 as it winds its way south east from Ipswich to Shotley Gate. At this point, the B1456 is a single carriageway road, which takes a sinuous course through the village. There is no apparent lateral development along side streets or back roads within the settlement, with the vast majority of properties within it, consequently, facing on to the B1456. However, whilst most of the properties face on to the road, they are generally set back from it, with relatively substantial front gardens, and are provided with high hedges and/or red brick walls, which afford effective screening.

6.4. Potential Effects

Construction

- 6.4.1. Shotley Fort and Martello Tower L, which are designated as SAMs, will be preserved *in situ* within open space on the periphery of the proposed development. The open space provision will also include a buffer zone around the scheduled areas, which will not only serve to maintain or enhance their settings (see below), but will also, in the case of Shotley Fort, address the uncertainty surrounding the precise location of the its defensive circuit on the landward side. Nevertheless, there is still potential for a permanent **minor adverse** direct impact to occur at the demolition and construction stage of the proposed development through accidental damage resulting from heavy goods vehicles or plant movement.
- 6.4.2. The proposed development has the potential to adversely impact upon two areas of known and non-designated archaeological remains within the site boundary. These are the earthworks and emplacements of the former ancillary battery to Martello Tower L, which are of 19th century date, and a linear air raid shelter on the south side of Marsh Lane, which is of World War Two origin and may form part of a more extensive complex.
- 6.4.3. The remains of the ancillary battery to Martello Tower L are to be retained within an area of open space. As a result, there is likely to be only a **negligible** impact upon them at the demolition and construction stage of the proposed development.
- 6.4.4. The construction of new units within the site has the potential to impact upon air raid shelters and underground passages, which are believed to be connected with the operations of HMS Ganges during World War Two. These remains are of no greater than local importance in their own right. Their loss through development, if unmitigated, would therefore be evaluated as a **minor adverse** impact.
- 6.4.5. Consultation of the Suffolk SMR has demonstrated that known sub-surface archaeological remains of prehistoric, Romano-British and medieval dates are recorded within the study area surrounding the site. However, given the previously developed nature of the land within the site boundary, it is likely that any sub-surface remains of these periods would have been invisible to remote sensing techniques such as aerial photography.
- 6.4.6. As such, there is potential for hitherto unknown archaeological remains to survive within the proposed development site as sub-surface features and deposits, which could then be destroyed by groundworks associated with the proposed development, such as excavations for foundations and service trenches.

- 6.4.7. Despite the potential for previously unknown, sub-surface archaeological remains to survive within the site boundary, it is likely, given the impact of past land use, that they will have been subject to disturbance and truncation through the excavation of foundations and the construction of basements and air raid shelters, as well as more recent activities associated with site clearance works. As a result, it is unlikely that they would be of any greater than local importance, thereby leading to a permanent **minor adverse** impact through their destruction.
- 6.4.8. In common with the two SAMs (see above), there is potential for the generation of a permanent **minor adverse** direct impact on the two Grade II listed buildings at the Caledonia Road entrance to the site at the demolition and construction stage of the proposed development. This could occur through accidental damage resulting from heavy goods vehicles or plant movement.
- 6.4.9. It is likely that the proposed development will generate an increased number of vehicular movements along the B1456, which is the main road along the Shotley Peninsular, as a result of construction traffic moving into, and out of, the site. This will potentially have a temporary **minor adverse** impact on the character and appearance of the Woolverstone Conservation Area.
- 6.4.10. The remaining, non-listed standing buildings within the site boundary are not considered to be of any intrinsic architectural or historic importance. Their demolition would therefore be considered a **negligible** impact on built heritage resources. Nevertheless, it is recommended that the gates at the Caledonia Road entrance are retained within the proposed development.

Operation

- 6.4.11. Although Martello Tower L remains in reasonably good condition, the alteration and modification of its fabric, as well as the addition of the water tower and look-out post and infilling of the encircling moat, have had a deleterious impact upon its presentation. In addition, the truncation of the surrounding glacis to erect poor quality structures associated with the Royal Navy Hospital, to the south west, and the growth of dense scrub and mature trees following the dereliction and clearance of the Royal Navy Training Establishment, to the north and north east, have eroded its historic landscape context and adversely affected its setting.
- 6.4.12. In the absence of appropriate mitigation measures, the proposed development would potentially have a permanent **moderate adverse** impact on Martello Tower L at the

completed development stage through the erection of units within its setting, in contravention of national, regional and local planning policy.

- 6.4.13. The majority of the above ground remains of Shotley Fort are located outside the site boundary. The remains within the site predominantly relate to the western circuit of the defences, which were levelled, firstly, to erect the accommodation blocks of HMS Ganges and, secondly, when the site was cleared after the Royal Navy vacated. As a result, the continued existence and precise location of below ground remains of the western defensive circuit; i.e. the moat and the Carnot wall; are uncertain because their locations, and hence the SAM boundary, have been plotted from 19th century maps. The destruction of archaeological remains associated with the scheduled fort, which is of national importance, would represent a permanent **major adverse** impact.
- 6.4.14. The setting of Shotley Fort has already been compromised by the growth of mature trees and dense scrub on the seaward side, as well as the construction and then clearance of the standing buildings of HMS Ganges. These processes have both severed the fort from its historic landscape context and served to obscure the surviving fabric, compromising its presentation. Given that the proposed units will be set back 10 metres from the boundary of the SAM, which will be given over to open space, it is likely that the proposed development will at least maintain the setting of the fort, leading to a **negligible** short term impact.
- 6.4.15. Martello Tower M is located adjacent to the northern boundary of the site. It is both a SAM and a Grade II listed building. It has been severed from its historic landscape setting by the infilling of its moat and the development of land within the site, to the south. Moreover, it is now isolated within an area of wasteland, which has become overgrown with dense scrub. As a result, it is considered that the proposed development will have no more than a **negligible** indirect impact upon it, as its setting will be preserved, especially given that the northern boundary of the site is, and will remain, defined by mature trees, thereby screening the new units.
- 6.4.16. The retention and long term management of the earthworks and emplacements representing the remains of the ancillary battery to Martello Tower L would represent a **minor beneficial** impact at the completed development stage.
- 6.4.17. The known air raid shelters exist as underground features, although their precise locations and extents remain uncertain. It is not proposed to investigate and record the underground features within the site in themselves. However, it is envisaged that any such features that are identified during construction will be recorded, filled with appropriate materials, i.e. sand, and preserved *in situ*. In these instances, a piled solution may be adopted for foundations. As a result, the long term residual impact will be **negligible**.

- 6.4.18. There will be no impact upon previously unknown undesignated archaeological remains within the site boundary at the completed development stage.
- 6.4.19. There is likely to be a **negligible** impact upon the setting of the Grade II listed gates, gatepiers, railings and lamp standards at the Caledonia Road entrance to HMS Ganges through the erection of new units within the site.
- 6.4.20. However, the erection of new units within the setting of the Grade II listed ceremonial mast of the former HMS Ganges, Royal Naval Training Establishment would, without appropriate mitigation, result in a permanent impact of **minor adverse** significance at the completed development stage of the proposed development.
- 6.4.21. The traffic assessment (see Chapter 14) clearly shows that the road network in the vicinity of the site, most particularly the junction where the B1456 meets the A137 on the south side of Ipswich, is already operating at close to capacity in the morning (85%) and afternoon (88%) peak hours. Accordingly, the surrounding road network would be operating beyond capacity if the proposed development proceeds, although the assessment clearly shows that it would be anyway by 2012, based on current projections.
- 6.4.22. Given that the B1456 is projected to be operating at beyond capacity by 2012 even if the proposed development does not proceed, the potential impact on the character and appearance of the Woolverstone Conservation Area, if it does, is likely to be of no greater than **minor adverse** significance.
- 6.4.23. There will be no significant impacts on non-designated built heritage resources at the completed development stage.

6.5. Mitigation Measures and Residual Effects

Demolition and Construction

- 6.5.1. The provision of robust hoarding and appropriate signage around the boundary of Shotley Fort and Martello Tower L, at the commencement of groundworks, would serve to offset the likely minor adverse impact on them, through accidental damage from plant and heavy goods vehicles at the demolition and construction stage of the proposed development. As a result, there would be a **negligible** residual impact.
- 6.5.2. The potential minor adverse impact on previously unknown, sub-surface archaeological remains within the site boundary could be mitigated through the completion of an appropriate programme of investigation and recording. This could be secured as a condition

of planning consent and completed prior to, and / or during, groundworks associated with the proposed development. This would lead to a **negligible** residual impact in the longer term.

- 6.5.3. In common with the two SAMs, robust hoardings and appropriate signage would be provided around the Caledonia Road gates, gatepiers, railings and lamp standards and the ceremonial mast of the former HMS Ganges, Royal Naval Training Establishment, at the commencement of groundworks. This would serve to offset the likely minor adverse impact on them, through accidental damage from plant and heavy goods vehicles, at the demolition and construction stage of the proposed development. As a result, there would be a **negligible** residual impact.
- 6.5.4. The temporary minor adverse impact on the character and appearance of the Woolverstone Conservation Area, generated by construction traffic, could be mitigated by control of working hours, in order to complete the majority of movements outside the peak morning and peak afternoon hours. This would potentially lead to a **negligible** residual impact of temporary duration.

Completed Development

- 6.5.5. As set out in section 6.5.1, the masterplan for the proposed development includes the provision of an appropriate buffer of open space around Martello Tower L, so that the new units would be set back away from the scheduled area, thus maintaining its prominence within the surrounding landscape. In addition, a larger area of open space will be retained to the south of the tower, thereby preserving its strategic position with regard to its ancillary battery, the River Stour, Orwell Haven and the fortifications at Harwich, all of which were critical in the adoption of its present site, as well as its operation.
- 6.5.6. In addition to the inherent mitigation incorporated within the masterplan, following preliminary discussions with English Heritage, the current scheme for the proposed development of the site will provide for the preparation and agreement of an appropriate management plan for Martello Tower L. This will reconcile the requirements of public access, nature conservation and archaeology and will set out prescriptions for the conservation and management of the monument's fabric, as well as for improvements in its presentation, including the clearance of scrub from, and partial excavation of, the moat.
- 6.5.7. The implementation of the combined mitigation measures set out above would result in at least a **moderate beneficial** long term residual impact on the condition, presentation and setting of Martello Tower L.

- 6.5.8. In common with Martello Tower L, the current masterplan has been designed to include the provision of a ten metre buffer zone around the boundary of the scheduled area defining Shotley Fort. It is therefore unlikely that the excavation of foundation trenches and service trenches for the new units will have an impact upon below ground remains associated with the scheduled fort, thereby representing appropriate mitigation for the implementation of the proposed development and leading to a **negligible** long term direct residual impact.
- 6.5.9. As well as preserving the remains of the scheduled fort with open space on the edge of the proposed development, the current scheme will provide for the preparation and implementation of an appropriate management plan, in accordance with the results of preliminary discussions held with English Heritage. This will aim to reconcile the requirements of public access, nature conservation and archaeology and would include an initial stage of field-based investigation; i.e. trial trenching; designed to confirm the survival and location of the western defensive circuit.
- 6.5.10. This implementation of the mitigation and enhancement measures set out above would result in a long term, permanent, **moderate beneficial** residual impact on Shotley Fort's condition, presentation and setting.
- 6.5.11. The scheme for the proposed development will involve the construction of a new access road from Bristol Hill (the B1456), which would mean that vehicular traffic entering and leaving the site would avoid Caledonia Road and, as a result, the entrance gates, gatepiers, railings and lamp standards of HMS Ganges. This reduction in traffic movements would have a potential **minor beneficial** residual impact on the setting of the listed building through improvements in its presentation.
- 6.5.12. The setting of the ceremonial mast of the former HMS Ganges, Royal Naval Training Establishment has been considered within the preparation of the current masterplan for the proposed development. The retention of the mast within an area of "formal" open space reflects its historic landscape context and would maintain its prominence within the site, thereby preserving its existing setting. As a result, there is likely to be a **negligible** residual long term impact upon the mast.
- 6.5.13. Whilst mitigation for the predicted minor adverse impact on the character and appearance of the Woolverstone Conservation Area could include the provision of appropriate traffic calming measures, this would only manage the flow and not the overall number of vehicular movements. Moreover, the provision of barriers or obstructions could, in itself, have an adverse impact upon the character and appearance of the conservation area. As a result, it is considered that the long term residual impact will remain **minor adverse**.

Cumulative Effects

- 6.5.14. In 2000, outline planning permission was granted by Babergh District Council for the erection of 150 new residential dwellings at Shotley Marina, which is located immediately east and north east of the site boundary. The construction of a new access road, running through the site, is a condition of the outline planning consent for the Shotley Marina development.
- 6.5.15. The majority of the new dwellings within the Shotley Marina development are located to the north east of the site, beyond Martello Tower M and will not therefore have a significant impact upon the settings of the designated archaeological and built heritage resources within it. However, 67 new dwellings are proposed for “Marina Frontage” element of the consented scheme. These will be located around the existing marina, below the bluff defining the eastern site boundary.
- 6.5.16. Although the available plans of the consented scheme show that the ridges of the new dwellings would be below the height of the bluff defining the eastern boundary of the site, it is still considered that their construction would have a permanent **moderate adverse** impact on the setting of Shotley Fort. The construction of new two and three storey dwellings on the flat ground between Shotley Fort and Orwell Haven will adversely affect the inter-visibility of the two, a symbiotic relationship that was central to the siting and operation of the fort.
- 6.5.17. The preservation and enhancement of the fort’s critical relationship with Orwell Haven, as well as the related fortifications at Felixstowe and Harwich, which will include removal of mature trees and scrub from the defensive circuit on its seaward side, will form a core strand of the management plan drawn up to support the proposed development of HMS Ganges. Its potential effectiveness will undoubtedly be compromised by the development of the Shotley Marina site immediately below.

7. Drainage and Flood Risk

7.1. Introduction

7.1.1. This chapter of the ES deals with the assessment of the potential impacts of the proposed development in relation to surface run off and flood risk.

7.2. Assessment Criteria and Methodology

7.2.1. The flood risk assessment will consider whether the existing/proposed site is situated within a 1 in 100 year flood plain, as recorded by the Environment Agency. The probability of flooding occurring on site from other sources will also be considered. In addition, consideration will be given as to whether the proposed works would have any significant impact to the flood risk elsewhere, including flood flows and flood storage capacity.

7.2.2. It is necessary to determine the maximum discharge from the site that could occur considering factors such as hard paved and roofed areas as well as length, diameter and gradient of pipe runs around the site. A similar exercise for the proposed scheme will determine the maximum proposed discharge.

7.2.3. From the above information, it is possible to determine the magnitude of the increase or decrease in flow from site and so determine appropriate mitigation measures. Some methods of attenuation are, however, dependant upon prevailing ground conditions and soil types.

7.2.4. A detailed drainage layout and design incorporating these measures can be prepared in accordance with current design standards.

7.3. Baseline Conditions

7.3.1. The entire area of the wider HMS Ganges site is approximately 25Ha in plan area, containing a mixture of soft landscaped areas, roads and buildings, however only a proportion of this is proposed for redevelopment under the application which is the subject of the FRA. The site slopes from a level 23m AOD at the north west down towards the south east to level of 3.4m AOD although the slope is generally shallow until it reaches steep embankments to the south and east boundaries

- 7.3.2. Plans from 1968 indicate that the proposed development site was extensively developed with buildings, hard paved areas and roadways covering the majority of the site with the exception of the sports ground to the north west and the sports ground along the eastern edge of the site.
- 7.3.3. Since closure of the facility significant areas of the proposed development site have been demolished including the main barracks blocks, structures around the southern water tower and to the east of the main parade ground. Additionally, the former east sports ground, which is at a lower level than the main site area, has been redeveloped by a third party as a marina.
- 7.3.4. The main area of the proposed development site is generally flat, sloping gently downwards from northwest to southeast from a level of approximately 23m AOD. Along the eastern and southern boundaries there is a steep slope down to a level just above the high water mark of the adjacent estuaries of the River Orwell and Stour. The areas of these slopes and the seaward level area are not considered as part of the development. The rivers are at least 8m lower than the lowest point of the proposed development.
- 7.3.5. The site is not within the defined floodplain (See Figure 7.1). The floodplain of the Stour/Orwell estuaries is contained within the low lying land along the south and east boundaries and is therefore outside the proposed development area. There are no overt signs of any groundwater issues affecting the site. No springs are recorded in the vicinity and there are no nearby watercourses and features other than those noted above. There are no evident sources of local flooding caused by run-off from adjacent land. The land to the west and north west is at similar levels to the site and is generally grassland or wooded areas. The land to the north, south and east of the site is well below the proposed site and are marsh areas with ponds.
- 7.3.6. A walkover survey indicated that surface water drained to outfall via a drain running into the estuary below low water mark near the entrance to the marina. Due to tide levels this pipe could not be inspected, it appeared to be between 300mm and 450mm in diameter.
- 7.3.7. It is understood that at least part of the foul drainage from the facility was transferred to the north east part of the site for treatment and it is possible that some surface water was also conveyed to this point.
- 7.3.8. Calculations suggest that the rainwater discharge from the hard paved (roads, yards and buildings) areas for a 1 year storm only would be well in excess of the capacity of the estuary outfall. As such some surcharging of the drains and flooding of the site would occur in major rainfall events.

7.4. Potential Effects

7.4.1. The redevelopment proposals for the site comprise site clearance and construction of a number of retirement homes and a care facility around the southern and eastern edges of the site. This proposal occupies approximately 16.4ha of the greater HMS Ganges site (24ha). The assessment has been based on the floor space proposed in the application. Calculations for runoff from this area are given at Appendix 7.1. These have been based upon assumptions within HR Wallingford Report SR666 as follows:

Table 7.1: HR Wallingford Report SR666

Impermeable areas	Roofs	25%	
	Car Parking	15%	
	Roads	20%	
	Total		60%
Permeable areas	Gardens	20%	
	Open Spaces	20%	
	Total		40%

7.4.2 The calculations indicate potential runoff rates for the proposed development site for 1:30 and 1:100 year rainfall events (with an allowance of 20% for climate change). These calculations are presented at Appendix 7.1 and give an indication of possible flow rates. However, these will be affected by the nature of the adopted drainage scheme, areas of drained pavings and roofs, amount of infiltration utilised and storage within the system. Two extremes of runoff figures are given covering full site drainage discharge and drainage discharge from roads only.

7.5. Mitigation Measures and Residual Effects

Infiltration:	As part of the site investigation, permeability testing in accordance with BRE Digest 365 – Soakaway Design – will be carried out and this information will be used to determine the viability of the use of soakaways to deal with rainwater runoff. The soakaways can be used to deal with run-off both from buildings and roadways. Soakaway design will have to meet the requirements of PPS25 (designed for the critical 1:30 year storm with a factor of safety of 2.0) which is more onerous than BRE Digest 365.
Permeable paving/discharge to soft landscape	The use of permeable pavings for roadways and/or parking areas combined with discharge from drives onto adjacent garden areas are ideal for reducing run-off via drainage systems and their use in this location would be beneficial. Permeable pavings can be used as an infiltration mechanism to discharge direct to the ground if the sub-strata is sufficiently permeable (see above) or, alternatively, can be used as on-site storage where used in conjunction with a flow restriction to attenuate flows into existing drainage systems (see below).
Ponds or wetlands:	Ponds or wetlands can be used in conjunction with restricted discharge outlets to control the maximum rate of discharge from a site, and for the development as proposed this could be provided in the form of a pond or balancing lake.
Swales:	Swales are similar to wetlands except they are designed to empty when not required to balance flows.
French drains:	The layout of the development does not directly lead itself to the use of french drains. However elongated soakaways - which are in effect inverted french drains - may be required where permeability of the ground is low.
Restricted flows, combined with onsite storage:	Discussions with the Environment Agency have indicated that uncontrolled discharge to the estuary is likely to be permitted. However it is possible that this discharge would require some form of limited storage to cope with either peak flows in short term extreme events or high tides causing a restriction in the practical discharge rate from the outfall into the estuary. A new outfall will be required and the scheme layout would suggest that this could be located at the same location as the existing outfall, using the proposed road down to King Edward VII Drive as the route. There will be practical limits to the diameter of this pipe which will effect the drainage design.

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- 7.5.1. Permeability testing should therefore be carried out to determine the suitability of the substrata to deal with soakaway infiltration from the houses. This testing will have to consider whether this infiltration will cause issues such as outflows where the permeable stratum may outcrop remote from the site.
 - 7.5.2. If soakaways are acceptable then they should not be located within 6m of a building nor should the base of them be within the natural water table.
 - 7.5.3. It would be beneficial to design driveways to shed water onto adjacent gardens rather than be provided with positive drainage.
 - 7.5.4. Roadways should be designed to drain to a positive system discharging to outfall in the estuary. The design of the drains and associated storage (if any) will depend upon a number of factors which can only be addressed at the detailed design stage.
 - 7.5.5. In the event that soakaways cannot be used for properties then the entire site will require a positive drainage which, subject to design parameters, may require storage to deal with peak flows and/or tidal discharge restrictions. Again the storage volumes can only be addressed in line with the detailed design. Depending upon the chosen scheme, it is possible that significant storage could be required which would best be dealt with by a pond designed into the site with appropriate safety features.
 - 7.5.6. Due to the nature of the proposals, failure to of the system will be unlikely. However, in the event of overtopping of the system, it is likely that this would emerge as overtopping of the drainage system at the low points on the access road down to King Edward VII Drive. If correctly detailed this could be advantageous, as the flood flow would then discharge directly into the estuary.
 - 7.5.7. In the detailed design of the drainage scheme, consideration should also be given to the method of drainage of the remaining sections of the site out with the scope of this application. The outfall route for this site would also be the obvious route for drainage from the adjacent areas and appropriate design would obviate the need to duplicate or replace the site drainage in the future.

8. Ecology

8.1. Introduction

8.1.1. This chapter describes the findings of the ecological assessment of the proposed development at HMS Ganges, Shotley, Suffolk. It includes consideration of potential impacts of the development on designated sites, habitats and rare or protected species.

8.1.2. The assessment includes the following:

- Description of the flora and fauna potentially affected by the development;
- Description of the potential impacts of the development on these ecological receptors; and
- Strategy for avoiding, mitigating and compensating for potential impacts

8.1.3. The chapter has been prepared by Jones and Sons Environmental Sciences Ltd on behalf of Haylink Limited. Sources used include previous detailed ecology survey reports on the site by Mike Harding Consultancy¹⁸ (August 2002) and protected species reports by Jones and Sons Environmental Sciences Ltd¹⁹ (April 2007).

8.2. Assessment Methodology and Criteria

Planning and Legislative Context

8.2.1. The National nature conservation policy relevant to the proposed development is Planning Policy Statement (PPS) 9: Biodiversity and Geological Conservation published by the Office of the Deputy Prime Minister in 2005²⁰. PPS9 details national policies regarding how biodiversity and geological features of conservation interest are to be protected through the planning system. One of the key principles of PPS9 is that all plan policies and planning decisions should aim to maintain and

¹⁸ Mike Harding Ecology Land & People (2002) HMS Ganges Ecological Assessment

¹⁹ Jones and Sons Environmental Sciences Ltd (2007) HMS Ganges Bat and Reptile Report

²⁰ ODPM (2005) Planning Policy Statement 9: Biodiversity and Geological Conservation. The Stationary Office, Norwich.

enhance, restore or add to biodiversity and geological conservation interests, with the intention that harm to these resources must be prevented.

8.2.2. PPS9 pays particular attention to the protection of designated sites, stating that development will not normally be granted on land within or outside a SSSI (Site of Special or Scientific Interest) which is considered likely to have an adverse impact on that site's features of interest.

8.2.3. Section 99 of the ODPM Circular 06/2005²¹ which accompanies PPS9 also states that:

' it is essential that the presence or otherwise of protected species, and the extent that they may be affected by a proposed development, is established before planning permission is granted otherwise all relevant material considerations may not have been addressed in making the decision'.

8.2.4. The main piece of wildlife legislation in the UK is the Wildlife and Countryside Act²² (1981 as amended). This Act was significantly strengthened by the Countryside and Rights of Way Act²³ (CROW) introduced in 2000. The CROW Act introduces a statutory duty for government to promote steps to further the conservation of habitats and species listed on the UK Biodiversity Action Plan (BAP).

8.2.5. All wild birds in the UK, their nest and eggs are protected by the Wildlife and Countryside Act²² (1981 as amended). Under this legislation, it is an offence to intentionally or recklessly kill, injure or take any wild bird or egg, or take, damage / destroy the nest while in use or being built. Some vulnerable birds have an additional protection where it is also an offence to disturb nesting birds (for example barn owls).

8.2.6. Reptiles such as adder, grass snake, common lizard and slow worms are protected under Section 9 of the Wildlife & Countryside Act²² (1981) as amended. The legislation makes it illegal to deliberately or recklessly kill or injure any native reptile. Smooth snake and sand lizard have additional protection.

8.2.7. Other wildlife legislation relevant to the proposed development is the European Habitats and species Directive (1994) which is implemented by the Wildlife and Countryside Act²² (1981 as amended). European protected species include species

²¹ ODPM (2005) Biodiversity and Geological Conservation- Statutory Obligations and their impact within the Planning System. Circular 06/05, ODPM, London

²² HMSO (1981) The Wildlife and Countryside Act 1981. The Stationary Office Ltd, Norwich.

²³ HMSO (2000) The Countryside Rights of Way Act 2000. The Stationary Office Ltd, Norwich

such as Natterjack toad, great crested newts, sand lizard, smooth snake, bats, dormouse and otters. Species relevant to the proposed development protected under European legislation are bat species.

8.2.8. All bats and their roost sites are protected by the Wildlife and Countryside Act²² 1981 (as amended), through inclusion in Schedule 5, Section 9. All bats are also included in Schedule 2 of the Conservation (Natural Habitats, &c.) Regulations²⁴ 1994. In summary taken together the legislation makes it illegal to: intentionally, deliberately or recklessly kill, injure or capture bats; deliberately or recklessly disturb bats while they are occupying a structure used for shelter or protection; deliberately or recklessly damage, destroy or obstruct access to areas used by bats for shelter or protection. Structures used by bats for shelter are commonly known as bat roosts. Because bats tend to reuse the same roosts, legal opinion is that, the roost is protected whether or not the bats are present at the time. Actions that would contravene the protection afforded to bats and their roosts sites require a Habitat Regulations Licence issued by Natural England.

8.2.9. Badgers and their setts are protected mainly for welfare reasons under The Protection of Badgers Act²⁵ (1992). This legislation makes it an offence to disturb a badger whilst it is occupying a sett, obstruct access to a sett or damage a badger sett. A badger sett is defined as “any structure that displays signs indicating current use by a badger”.

Methodology

8.2.10. Ecological Impact Assessment criteria involves the identification of the type and distribution of ecological receptors on the site; assessment of the value of the ecological receptors; an evaluation of the type and magnitude of the impacts presented by the proposed development; evaluation of the ecological significance of these impacts and mitigation and compensation proposals designed to reduce the assessed impacts.

8.2.11. Contextual ecological information pertained to the proposed development were collated through a desk-top survey during a previous ecological assessment for development at the site, undertaken by Mike Harding, consultations included English Nature (now Natural England), the Suffolk Biological Records Centre and the Suffolk Wildlife Trust. In addition, the National Biodiversity Web site (NBN) and

²⁴ HMSO (1994) The Conservation (Natural Habitats, & c) Regulations 1994. The Stationary Office Ltd, Norwich.

²⁵ HMSO (1992) The Protection of Badgers Act 1992. The Stationary Office Ltd, Norwich

the MAGIC web site were also consulted. The information provided in the previous ES provided by Mike Harding¹⁸ in 2002 regarding habitat survey and breeding birds provides sufficient basis for these ecological receptors but a Public Inquiry in 2006 recommended that further details were required for the bats and the reptiles on the site. These surveys were undertaken by Jones and Sons Environmental Sciences Limited in 2006 and 2007. Survey data from the 2002 and 2007 reports is presented in this Environment Statement.

8.2.12. Field surveys include the following:

- § Habitat survey;
- § Identification of National Vegetation Classification (NVC) communities;
- § Bat survey (buildings and trees);
- § Reptile survey;
- § Bird survey;
- § Badger survey;
- § Invertebrate Survey

Habitat

8.2.13. Habitat surveys were carried out: between December 2001 and January 2002, between June 2002 and July 2002 with updated surveys in September 2006 and June 2007. The proposed development site was divided into main habitat types and mapped. For each compartment, a plant list was made and notes on bird species also recorded. Photographs were taken to illustrate the habitats. During the summer of 2002, the semi-natural scrub/grassland habitats were surveyed using the National Vegetation Classification scheme. Surveys were undertaken using quadrat data to compile quantitative descriptions of plant communities. During the summer of 2002, 2006 and 2007, general plant species lists were drawn up by following a meandering route through each habitat type and recording all the plant species along the route. Mapped habitats were subsequently transferred to a digital base.

Bats

8.2.14. Bat surveys were initially undertaken by Mike Harding Consultancy¹⁸ during June 2002 (two daytime visits and two night surveys) with updated surveys by Jones and

Sons Environmental Sciences Ltd¹⁹ in 2006 and 2007. Three daytime building assessment/survey visits were undertaken in September 2006 with additional bat survey visits in October 2006, December 2006, January 2007 and February 2007. Evening bat detector emergence and bat activity surveys were undertaken on the 18th September 2006, 27th September 2006 and 7th October 2006. Visits were made to the potential hibernation areas in the winter months (7th December 2007, 16th January 2007 and 28th February 2007) and the trees within the site were assessed for any potential to provide roosting sites during the winter months (January and February 2007) when any crevices in the trees would be more visible.

- 8.2.15. The surveys were undertaken by ecologists from Jones and Sons holding Natural England Scientific and Conservation bat licences (Natural England bat licence 20070258 and 20070257). One licence holder is also licensed by Natural England to train other bat workers. On occasions, the main surveyors were assisted by additional ecologists also experienced in bat survey.
- 8.2.16. The buildings were examined externally and internally, facilitated by the use of binoculars, ladders and bright torches. Due to the presence of asbestos in some of the roofs, asbestos protection clothing was worn. The inspection included looking for bat droppings on walls, windows and the detailed inspection of timbers. Where suitable gaps were located, the holes were examined in detail for any signs of oil staining from the bats fur, urine streaks or accumulation of droppings. The daytime survey also included a detailed investigation inside the buildings for the presence of roosting bats. The floor areas of the buildings, and in particular, the loft areas were systematically searched for any bats, bat droppings or insect wings (feeding remains).
- 8.2.17. The evening bat surveys were designed to watch for any bats emerging from the buildings, to determine the species using the site and also to assess the general bat activity in the area. Two models of detectors were used for the survey - the frequency division Batbox Duet and a time expansion Petterssen D240. Recordings of the bat sounds were made to allow subsequent computer analysis and critical identification of the bat species. A dark red light was also used to assess any presence of bats flying inside the buildings. The evening observations began at sunset and bat activity was recorded for one and a half hours. The temperature and weather conditions were recorded throughout the evening surveys.
- 8.2.18. Temperature data loggers were also installed in the Martello Tower L on the south side of the site and underground bunkers, on the east side of the site (Shotley Fort ancient monument) to monitor temperature and suitability for hibernating bats.

These were installed in December 2006 and removed at the end of February 2007. They were set to record every 6 hours. Humidity measurements were taken in the underground sites during the hibernation site visits.

8.2.19. In addition to the buildings, the trees on the site were also assessed for their potential to support roosting bats. The potential of a tree or building to support bats was assessed by dividing the probability of providing bat roost habitat into high, medium and low. Trees were further divided into medium/high and low/medium.

8.2.20. The probability of a building or tree to support bats can be interpreted as follows:

- High probability: Buildings with favourable roosting features and evidence of bat presence or bats observed roosting/emerging from the building. Trees with high probability have obvious roosting features such as holes leading to cavities or other favourable crevices (split branches/ loose bark) and may also have staining and droppings by the roost entrance or have been identified as a roost by observing bat evening emergence or bat swarming at dawn. Trees without definite signs could be classified in this category if it is thought highly likely that the tree is used by bats particularly if bats are known to be flying within the vicinity of the tree.
- Medium/High: Mature trees with holes/crevices highly suitable for roosting bats located within a favourable bat area.
- Medium probability: Buildings with favourable roosting features but with no obvious signs such as staining or droppings. Trees with medium probability will have holes in addition to cracks, crevices and loose bark suitable for roosting bats but may not necessarily be in highly favourable locations.
- Low/Medium: more mature trees with loose bark, split branches and crevices but no holes to the tree cavity.
- Low probability: Buildings generally considered unfavourable for roosting bats but with some features providing some potential (although low) to provide roosting sites such as a timber ridge, enclosed roof void or external boarding/tiles but either no/ limited access points. Trees with low probability are usually immature trees without any holes; they may have ivy cover or loose bark providing some potential for bat access.

- Unsuitable: Buildings can be classified as unsuitable (no roosting potential) if they are for example open buildings of metal construction with no crevices. Trees with no roosting potential are usually young with completely smooth bark.

Reptiles

8.2.21. Reptiles were surveyed for by using artificial refugia following the best practice guidance given in the Herpetofauna Groups of Britain and Ireland (HGBI) Guidelines²⁶ (1998) and English Nature's Guidelines published in the Species Conservation Handbook²⁷ (1998). Refugia (200 sheets) were distributed across the site on the 7th September 2006. The corrugated black bitumen sheets (onduline) measuring 1.0m x 1.0m were placed throughout the site within areas of suitable habitat. The sheets were placed at an overall density of 10 refugia/hectare. The onduline refugia were numbered and their locations mapped using a GPS (Global Positioning System). The refugia points were subsequently downloaded to a baseline map. The refugia were left to settle on the site for ten days before the first inspection to allow the sheets to bed in and the reptiles to become accustomed to using the refugia. The weather conditions (temperature, humidity, and wind speed) were recorded on a daily basis. Inspections were undertaken in suitable weather conditions (warm, sun, little wind and no heavy rain). Twenty-six inspections were made on consecutive days from 18th September to 13th October 2006. The numbers of reptiles found beneath the refugia sheets were recorded including species and whether they were adult or juvenile and, where possible, male or female. The refugia reference number was noted when reptiles were found and the frequency and distribution of the reptile species plotted on maps.

Badgers

8.2.22. Badgers were surveyed for during the walk-overs of the site by searching for and recorded: any sett entrances and associated signs of use (bedding, fresh spoil), badger paths, footprints, badger hair and latrine sites (shallow pits containing badger dung).

²⁶ Froglife (Herpetofauna Groups of Britain and Ireland HGBI) Guidelines (1999) Reptile Survey

²⁷ English Nature (1998) Species Conservation Handbook

Birds

8.2.23. Bird species observed were recorded during the walk-overs of the site between 2002 and 2007. The methodology concentrating on assessing the importance of the habitats within the proposed development for the birds within the local area including the internationally important bird population using the Stour and Orwell Estuary SPA.

Invertebrates

8.2.24. General invertebrate groups were recorded during the walk-overs of the site with any species of conservation concern observed recorded. The survey did not include insect capture methodologies. There are almost thirty thousand species of invertebrates in Britain, excluding groups that are microscopic. Since complete invertebrate surveys can be extremely time consuming to produce and not always necessary for site assessment, the survey concentrated on assessing the value of the habitats for a diversity of invertebrate species.

Significance Criteria

8.2.25. Following the surveys, the ecological impact assessment was based on the 2006 guidelines produced by the Institute of Ecology and Environment Management²⁸ (IEEM). The assessment is based on the ecological value (significance) of the site or feature and the anticipated magnitude of the resulting impact. The value is assessed according to whether the habitat or species is of international, national, regional, county, district, neighbourhood or less than neighbourhood importance. In addition, the value is determined by habitat integrity, coherence and intactness that enable the habitat or species to be maintained in its present condition. An approach to valuing ecological receptors is given in Table 8:1 below.

Table 8.1: An Approach to valuation of Ecological Resources (receptors)

Level of Value	Examples
International	An internationally designated site such as Special Protection Area (SPA), Special Areas of Conservation (SAC), Ramsar site, Biogenetic Reserve. Any regularly occurring population of an internationally

²⁸ IEEM (2006) Guidelines for Ecological Evaluation and Impact Assessment.

	important species (eg those listed in Annex I, II or IV of the EC Habitats Directive or Annex I of the EC Birds Directive)
National	<p>A nationally designated site such as Site of Special Scientific Interest (SSSI) or non-designated sites meeting SSSI selection criteria, National Nature Reserve (NNR), Marine Nature Reserve.</p> <p>A viable area of priority habitat identified in the UK BAP or smaller areas of such habitats that are essential to maintain the viability of that ecological resource.</p> <p>Hedgerows protected by the 1997 Hedgerow Regulations (ecological criteria).</p> <p>A regularly occurring population of a nationally important species such as priority species listed in the UK BAP and/or Schedules 1,5 (S9 (1,4a,4b) and 8 of the Wildlife and Countryside Act or breeding birds listed on the Red or Amber list of species of conservation concern.</p> <p>A regularly occurring and viable population of a Red Data Book species (i.e. those occurring in 15 or less 10km squares of the UK).</p>
County	<p>Non-statutory designated wildlife sites (e.g. SINC, County Wildlife Site). Ancient semi-natural woodland (>0.25 ha)</p> <p>Viable areas of key habitat identified in County Local BAPs and/or Natural Area Profile or smaller areas of such habitats that are essential to maintain the viability of that ecological resource.</p> <p>Any regularly occurring, locally significant population of a species listed as being nationally scarce (i.e. those occurring in 16-100 10km squares in the UK) or in a County BAP or relevant Natural Area Profile on account of its rarity or localisation.</p>
District/ Borough	<p>A designated Local Nature Reserve (LNR).</p> <p>Semi-natural ancient woodland (<25ha).</p> <p>Species rich unimproved/ semi-improved grassland not meeting County Wildlife Site (SINC) criteria.</p> <p>An ecologically valuable hedgerow (not protected by the Hedgerow Regulations)</p> <p>Sites/features that are scarce within the district/borough or which appreciably enrich the district/borough habitat resource.</p>
Neighbourhood	Commonplace and widespread semi-natural habitats such as: species poor semi- improved grassland, scrub, conifer plantation, arable farmland.
Less than Neighbourhood	Habitats of little or no ecological value such as amenity grassland or hard standing.

8.2.26. Impact magnitude refers to changes in the extent and integrity of an ecological receptor. The magnitude of the impact is assessed from High (large scale

permanent change in ecological receptor and overall integrity), Medium (permanent change in ecological receptor but no change in overall integrity) and Low (small-scale permanent change or temporary change in the ecological receptor but its overall integrity is not permanently affected), Neutral (there is no change in the ecological receptor). Using value and magnitude characteristics the significance of the ecological impact can be determined (Table 8.2)

Table 8.2 Matrix for determining significance of ecological impacts

Value of Ecological Receptor	Magnitude of impact			
	High	Medium	Low	Neutral
International	Major	Major	Moderate	No impact
National	Major	Moderate	Moderate	No impact
County	Moderate	Moderate	Minor	No impact
District	Moderate	Minor	Minor	No impact
Neighbourhood	Minor	Minor	Negligible	No impact
Less than Neighbourhood	Negligible	Negligible	Negligible	No impact

- 8.2.27. Once the impacts have been evaluated and their significance determined, mitigation and compensation measures are proposed which are designed to prevent and minimize all effects.

8.3. Baseline Conditions

Botanical survey

- 8.3.1. A map showing habitat types is given in Figure 8.1. In the past HMS Ganges has been used as a naval training base and police establishment, much of the site is therefore a developed brownfield site supporting abandoned disturbed habitats. The interior of the site supports generally artificial habitats with more established semi-natural habitats around the periphery of the site, particularly along the eastern edge by the estuary shoreline.
- 8.3.2. Artificial habitats within the site include: buildings, roads, lawns, ornamental plantings, playing fields and ruderal short and tall herb vegetation with buddleja scrub growing on rubble spoil. The semi-natural habitats around the periphery include semi-natural scrub/grassland mosaic with patches of semi-improved neutral/acid grassland. Mature trees are also present within the mosaic habitat, around the periphery and scattered across the site.

- 8.3.3. Both the mature tree components and semi-natural scrub/grassland mosaic form the most important ecological habitats within the site. The mosaic of scrub, mature trees and semi-improved neutral/acid grassland lies on the eastern and southern fringes of the site forming a semi-natural boundary to the proposed development area.
- 8.3.4. The acid grassland habitat, is classified in NVC terms as U1(d) supporting sheep's fescue *Festuca ovina* – common bent grass *Agrostis capillaries* – sheep's sorrel *Rumex acetosella* with a sweet vernal grass *Anthoxanthum odoratum* – common bird's-foot trefoil *Lotus corniculatus* sub-community. This type of community typically occurs on more nutrient rich soils, transitional to mesotrophic grasslands. Acid grassland is a declining habitat of conservation concern and although no scarce plants were recorded within the habitat, the grassland within this area supports a good range of relatively common species typical of this type of habitat. Parts of the grassland are rabbit grazed but much of the acid grassland is unmanaged. During the 2007 surveys the grassland was becoming colonised by coarse grasses and tall ruderal vegetation.
- 8.3.5. Within the short acid grassland habitat, the central and southern area have some floristic differences. The central area has higher frequency of *Festuca ovina*, *Anthoxanthum odoratum*, Common mouse-ear *Cerastium fontanum*, red fescue *Festuca rubra*, white clover *Trifolium repens*, narrow-leaved plantain *Plantago lanceolata* and germander speedwell *Veronica chamaedrys*. The southern area has more yarrow *Achillea millefolium*, black knapweed *Centaurea nigra*, mouse-eared hawkweed *Hieracium pilosella* and squirrel-tail fescue *Vulpia bromoides*. It also has a wider range of ruderal and small annuals. Species representing this development are common centaury *Centaureum erythraea*, annual pearlwort *Sagina apetala* and knotted hedge-parsley *Torilis nodosa*. The absence of a dense grass sward and the presence of rabbits ensure that there are high frequencies of ruderals such as common ragwort *Senecio jacobaea* and spear thistle *Cirsium vulgare* and also gaps for scrub species to become established such as sycamore *Acer pseudoplatanus*, and brambles *Rubus fruticosus*.
- 8.3.6. Bordering the eastern edge and southeast edge of the site and within the areas of short acid grassland are stands of tall grassland, classified in NVC terms as MG1b. This type of grassland is dominated by false oat grass *Arrhenatherum elatius* with Yorkshire fog *Holcus lanatus*, creeping thistle *Cirsium arvense* and nettle *Urtica dioica* sub-community. These areas of more coarse grassland form rank swards that are relatively species poor. No uncommon plants were recorded within this community and the habitat is not of conservation concern.

- 8.3.7. Scrub habitats around the Fort to the north and east support predominantly dense blackthorn *Prunus spinosa* scrub with occasional hawthorn *Crataegus monogyna*, sycamore *Acer pseudoplatanus*, ash *Fraxinus excelsior*, oak *Quercus robur*, silver birch *Betula pendula*, elder *Sambucus nigra*, and common gorse *Ulex europaeus*. These habitats are of importance to: invertebrates, small mammals, migratory birds as they enter the estuary, flocks of small birds within the site and as cover for foraging bats.
- 8.3.8. There are also patches of bramble scrub within the semi-natural scrub mosaic classified in NVC terms as W24a *Rubus fruticosus* – *Holcus lanatus underscrub with a Cirsium arvense* – *Cirsium vulgare* sub community. The brambles, with their lateral spread, help to contribute to the structural diversity of the habitat. This is a ubiquitous community with no plant species of conservation value. However all bramble scrub stands offer valuable cover for reptiles and small mammals and are increasingly suitable for migratory birds, song perches and nesting. It therefore forms a valuable feature within the semi-natural scrub-grassland mosaic habitat.
- 8.3.9. The nature of the grassland and scrub on the steep slope along the southern margin of the site is influenced by brackish spray from the estuary and changes to a fen type community with common reed *Phragmites australis* growing within areas of groundwater seepage. The predominant grass species are: false oat grass, common reed and sea couch *Elymus pycnanthus*; all three species are able to withstand brackish spray and are characteristic of estuarine grassland. Sea beet (*Beta vulgaris*) grows within the grasses giving way to scrub at the top of the slope. Where the groundwater seepages decrease, the freely draining mildly acid conditions are indicated by patches of bracken *Pteridium aquilinum* and gorse *Ulex europaeus* scrub.
- 8.3.10. Around the Martello tower in the north (mainly outside the development area) the habitat changes to tall ruderal vegetation dominated by umbellifers (hemlock) with areas of dense bramble scrub. The vegetation also supports salt tolerant plant species such as sea beet.
- 8.3.11. There are a number of mature trees established throughout the site. The majority are planted specimens, and are arranged as plantation, groups, or single trees. In plantations, they form a distinct environment that influences the ecological character of that location, and the associated plant and animal species. As groups, they provide a significant structural dimension to their environs that is exploited by associated faunal elements, such as birds, bats and many invertebrates.

- 8.3.12. A mature linear plantation of beech and birch has been established along the northern boundary of the site. The trees are three deep and about 60 years old. The vegetation beneath is open, dry grassland. The plantation is connected to elm and blackthorn scrub, with holly, that runs along the entire northern boundary outside the fence line. The plantation is of locally significant conservation value in combination with the ground vegetation and elm, holly and blackthorn scrub. The scrub/hedgerow within this section is particularly important for invertebrates.
- 8.3.13. Single lines of pine and sycamore form a significant component of the semi-natural scrub mosaic along the eastern side of the site. Groups of birch are also located at the southern end of the pine and sycamore lines and also to the north of a line of white poplar trees. Many of the silver birch trees provide dead wood habitat of value to invertebrates. The line of prominent mature white poplars extending along the eastern edge southwards similarly forms an important boundary feature within the site. These trees provide sheltered edge habitat of value to commuting and foraging bats and contain holes within the trees providing potential roosting sites for bats. Three of the white poplars (T64, T66, T67) provide medium/high potential to provide roosting sites for bats (see Appendix 8.4. and Figure 8.5). Within the site are groups of lime trees planted as boundary features or to mark routeways across the site. A row of the evergreen Holm Oak has also been planted along the southern boundary of the site from the main entrance. The lines and groups of trees, particularly those along the estuarine boundary have significant landscape value and provide landfall sites for migratory birds and important sheltered foraging corridor for bats.
- 8.3.14. In addition to the groups of trees, there are single mature trees of note. These include a mature oak (T53) and ash (T57) tree at the northern end of the site with high bat roosting potential (see Appendix 8.4 and. Figure 8.5). Other scattered single mature trees of nature conservation value include : mature pollarded poplar trees, walnut specimen, old horse chestnut, beech, London plane with some ornamental apples and cherry trees.
- 8.3.15. Within the previously developed area (artificial habitat) are areas of more improved (nutrient rich) amenity grassland within the extensive playing field to the north and west and within the former lawns around the buildings. Since the site has not been occupied or intensively managed for considerable time, patches of more semi-natural rough grassland are developing.
- 8.3.16. The playing fields are generally dominated by perennial rye grass *Lolium perenne* typical of improved (high nutrient) grassland habitats. Since the field has been unmanaged for many years, tall grassland is developing dominated by a false oat

grassland community. The semi-natural components are more species diverse in the grassland bordering the holly and blackthorn scrub along the north Marsh Lane footpath. The semi-improved grassland habitats within the site have minor nature conservation value.

- 8.3.17. The former amenity lawns are located around the buildings to the north and buildings to the west by the main entrance. The lawns are composed of a matrix of fine grasses, notably red fescue and bent grasses and are being colonised by ragwort and tall fescue grass *Festuca arundinacea*. The amenity improved grassland has negligible nature conservation value.
- 8.3.18. The patches of developing rough semi-natural grassland within the previously developed land are of greater ecological interest and are features regarded as having some locally (neighbourhood) significant nature conservation value. These areas are located on the south side of the site between the tennis courts and the south Martello Tower (L) (including around the ornamental pond) and near the south escarpment, adjacent to the line of white poplar trees.
- 8.3.19. Also within the previously developed land is an area of spoil. To the southeast of Martello Tower L, buildings have been demolished and vegetation is growing through the disturbed area. This habitat is of limited ecological interest but towards the centre of the site, particularly towards the east end by the south slope of Shotley Fort ancient monument, the botanical interest increases. This habitat is described as ruderal open lawn and is found in association with Buddleja scrub around the periphery and bare ground dominated by stands of Alexanders *Smrynium olustratum*. The ruderal open lawn is a temporary habitat that in 2002 supported open ground partly occupied by low growing plants such as squirrel-tail fescue, centaury, annual pearlwort, parsley-piert *Aphanes arvensis*. The locally rare plant green field speedwell *Veronica agrestis* was also recorded. In 2002, 70 higher plant species were recorded within this area including coastal specialists and dry land specialists. It therefore had high botanical interest. This type of habitat is partly maintained by low levels of nutrients, rabbit grazing and is temporary succession vegetation before colonisation by buddleja and other tall ruderal vegetation. During the 2006/2007 surveys the botanical interest was significantly reduced although still supporting low growing plants such as centaury, hedge bedstraw, creeping cinquefoil, yarrow, self heal, sheeps sorrel, birds-foot trefoil, cut-leaved cranesbill and scarlet pimpernel with patches of taller perforate St Johns Wort and coarse grasses such as Yorkshire Fog. Abundant stonecrop (Biting stonecrop and white stonecrop) carpets the concrete areas. Due to the species diversity of the plant

species within this area the habitat is assessed as being of neighbourhood/district ecological value.

- 8.3.20. Buddleja *Buddleja davidii* scrub is extensive across the site occurring within areas formerly occupied by buildings and tarmac. Some Buddleja bushes are growing into the structure of Shotley Fort. Buddleja bushes have become established due to the dry, infertile environment provided by building rubble and is not a botanically significant habitat.
- 8.3.21. An artificial pond was recorded in the rough grassland to the west of the Martello Tower L. This forms an important area of standing water within the survey site providing an important habitat for invertebrates, amphibians, reptiles and bats. The pond is therefore of local neighbourhood value.
- 8.3.22. A plant species list is provided at Appendix 8.2.

Reptiles

- 8.3.23. The long and varied history of the naval site has produced a range of habitats, many of which are favourable for reptiles. The habitats within the proposed development site provide structurally diverse ground vegetation capable of providing a range of thermal microhabitats favourable to reptiles for basking, and for breeding and hibernation. The habitats are also capable of supporting a range of invertebrates (prey items for lizards and slow worms) and also amphibians and small mammals (prey items for grass snakes).
- 8.3.24. The surveys undertaken in 2002 recorded the presence of common lizard *Lacerta vivipara* and slow worm *Anguis fragilis* on the site.
- 8.3.25. During the 2006 surveys, slow worms, common lizards and grass snakes (*Natrix natrix*) were recorded on the site. Both adults and juveniles for all these species were encountered confirming that reptiles are successfully breeding on the site.
- 8.3.26. Full details of the results of the refugia survey (species, sex, stage and weather conditions) are illustrated at Appendix 8.1. The results are summarised below and illustrated in the accompanying map showing reptile distribution (Figure 8.2).
- 8.3.27. The highest count for grass snakes in one day was three animals (2 adults and 1 juveniles). The highest daily count for common Lizards was eighteen (8 adults and 10 juveniles) and the highest daily count for slow worms was ten (3 adults and 7 juveniles). These counts therefore represent the minimum number of individuals

known to be present. Since different reptiles could have been observed on different days, the actual total number on the site is likely to be greater.

- 8.3.28. The reptile population over the whole site is less than one animal of each species per hectare. The density of reptiles therefore represents a low population for each species (HGBI Guidelines 1998).
- 8.3.29. Grass snakes were found in the vegetation of the southern point and the grassland/scrub to the east and north of Shotley Fort. They were most frequently encountered by the artificial pond in the south and near Martello Tower M in the north (outside the application site boundary).
- 8.3.30. A full reptile survey is contained at Appendix 8.5.
- 8.3.31. Common lizards were distributed across the site, but particularly around the site boundaries. The areas where common lizards were located include: the playing field in the northwest, the area around the Martello Tower to the north (Tower M outside the application boundary), the grassland to the east of Shotley Fort, the grassland at the base of the south facing slope of Shotley Fort, the grassland habitats along the southeast coastline, the rough grassland by the pond and former tennis courts and the former lawn by the west buildings to the north of the tennis courts. The refugia placed on the former lawn by the buildings to the west was the most frequently used.
- 8.3.32. The distribution of slow worms across the site is similar to that of common lizards; being encountered at the south west tip of the site, along the south east border, on the grassland south of the slope by Shotley Fort, within the grassland/scrub east of Shotley Fort, by Martello Tower M in the north (outside the application site boundary) and one in the centre of the playing field in the northwest. The highest frequency was at the southern point and by the south facing slope adjacent to the bunkers.

Badgers

- 8.3.33. No badger setts were recorded within the survey area although a badger latrine was recorded on the north side of the site by the north Martello Tower M in both 2006 and 2007. Badgers are therefore crossing the northern section of HMS Ganges though outside the proposed development boundary.

Bats

- 8.3.34. The buildings within the proposed development site provide potential roosting habitat for bats. Many of the buildings provide potentially favourable roosting features such as pitched roof voids, suitable ridge roosting sites, potential crevices between roof tiles and sarking boards and gaps under the soffits. The two Napoleonic Martello Towers situated along the east estuary coastline provide highly favourable conditions for hibernating bats (although it should be noted that the northern Martello Tower M is located outside the site boundary). The Shotley Fort and underground bunkers around the north buildings and in the south east also contain structures suitable for hibernating bats.
- 8.3.35. The bat survey undertaken in 2002 found the buildings within the HMS Ganges site being used by common pipistrelle bat (*Pipistrellus pipistrellus*) and brown long-eared bat (*Plecotus auritus*).
- 8.3.36. During the 2006 autumn survey and winter 2006/2007 surveys, roosting sites for four species of bat were recorded. These are: Common 45kHz Pipistrelle Bat, brown long-eared bat Natterer's bat (*Myotis nattereri*) and Daubenton's bat (*Myotis nattereri*).
- 8.3.37. Full details of the 2006/2007 bat survey can be found in the Bat Report (at Appendix 8.6.). A summarised account is provided within this chapter.
- 8.3.38. Several pipistrelle bat roosting sites were confirmed during the 2006 survey. Common pipistrelle bats were recorded roosting in the Drake building (building 1), Fintry Place (building 3), Vincent Building (building 7), Suffolk building (building 12) and Signals building (building 15). It was also thought probable that pipistrelle bats could be roosting in the classroom building (building 2) and occasionally roosting in the Security Guard building (building 10). The house (building 17) also provides favourable roosting opportunities for this species of bat. Pipistrelle bats are adaptable and are likely to move around the site at different times of the year. Individual pipistrelle bats may roost in crevices almost anywhere on the site.
- 8.3.39. No accumulation of droppings indicating the presence of a nursery colony of pipistrelle bats were found but since pipistrelle bats typically roost in crevices around the exterior of buildings and pipistrelle bat droppings frequently remain within their roosting crevices hidden from view, the presence of a nursery colony in the summer months (late May-August) cannot be discounted.

- 8.3.40. A hibernating pipistrelle bat was recorded in the Shotley Fort north underground bunker (building 22) in January 2007 and February 2007.
- 8.3.41. Several brown long-eared bat roosting sites were also confirmed during the 2006 survey. Brown long-eared bats were recorded roosting in the roof voids of the Drake building (building 1), Fintry Place (building 3), Suffolk building (building 2), Building 13, Signals building (building 15) and Public Order building (building 16). A long-eared bat dropping was also found in the workshop (Building 8) but this was thought to be the result of a bat flying through the building rather than roosting. Other roof voids were considerable favourable for this species of bats although no signs of any bat presence were found in the other buildings during the 2006 bat survey.
- 8.3.42. No accumulation of brown long-eared bat droppings indicative of a maternity site was found and it is thought most likely that the buildings are used by small numbers of individual bats using the buildings as occasionally used roosting sites and night roosts. A small number of bats are likely to move between the buildings at different times of the year. Brown long-eared bats are a species that may remain within building roost sites throughout the year and therefore could be encountered during the winter months.
- 8.3.43. Two hibernating brown long-eared bats were recorded in the south Martello Tower (L) in December 2006 and one hibernating brown long-eared bat was recorded hibernating in the Shotley Fort underground bunker (building 22) in February 2007.
- 8.3.44. A single hibernating Natterer's bat was recorded hibernating in different locations within the Martello Tower L (remove basement- wrong term)basement) in the December 2006, January 2007 and February 2007 visit. The bat recorded could either be the same bat moving between the different sites within the hibernacula or different bats moving between hibernacula within the area.
- 8.3.45. One Daubenton's bat was recorded hibernating in Martello Tower L in December 2006 with three Daubenton's recorded in January 2007 and two Daubenton's in February 2007.
- 8.3.46. A minimum six bats were recorded hibernating in the basement of Martello Tower L, although it is considered that more bats could use the hibernacula.
- 8.3.47. A temperature data logger installed in the Martello tower between December and February found the average temperature to be 7.7 °C with a range of 5.3 to 10.2°C over the three months. Humidity measurements taken during the visits ranged from 71% to 79.1%.

- 8.3.48. The bats hibernating in Shotley Fort were found in the brick underground shelter at the north end of the site (building 22). The average temperature for this building was 7.1 °C with a range of 3.5 °C to 9.7 °C over the three months. Humidity measurements taken during the visits ranged from 77.7% to 87%. The temperature within this bunker provides a cooler average temperature compared to the other chambers/ tunnels within the underground fort that the data loggers showed to be warmer.
- 8.3.49. A summary of bat presence in the buildings within the proposed development site is provided in Table 8.3 and 8.4. Building bat roosting potential is also shown in Figure 8.3.

Table 8.3: Summary of bat presence in buildings within the proposed development site. Those within the Development site are highlighted in red. Those outside are still important as they are adjacent buildings to the proposed development.

Building	Favourable bat features	Evidence of bat presence	Probability of providing bat roost habitat
1 Drake	Roof Voids, Timber sarking.	Small accumulation of brown long-eared and pipistrelle bat droppings. 45 kHz Pipistrelle bat emergence.	High Confirmed
2 Classrooms	Soffit gap Timber sarking	Report of pipistrelles roosting in soffits. No emergence during survey.	High
3 Fintry place	Roof Void. Timber sarking	Small accumulation of brown long-eared and pipistrelle bat droppings.	High Confirmed
4 Prison cells	Timber sarking	None	Medium
5 Social building	Soffit gap	None	Low
6 Baths	Timber sarking.	None	Low
7 Vincent	Roof Voids Timber sarking. Exterior gaps.	Small accumulation of pipistrelle bat droppings	High Confirmed
8 Workshop	Timber sarking.	One long-eared dropping. Probable flying through	Medium
9 Sports Hall	None	None	None/Low
10 Security Office	Roof Voids Timber sarking.	One old pipistrelle dropping	Medium
11 Canteen	Basement	None	Low
12 Suffolk	Roof Voids Timber sarking	Small accumulations of brown long-eared and pipistrelle bat droppings. Confirmed brown long-eared and 45 kHz	High Confirmed

		pipistrelle roosting site.	
13	Roof Void Timber sarking Open windows	Small accumulations of brown long-eared bat droppings in upper storey (not roof void)	High
14	Roof Void Timber sarking	None	Medium
15 Signal building	Roof Void Timber sarking Open windows	Small number of brown long-eared and pipistrelle bat droppings in upper storey. Confirmed pipistrelle roost. Reported long-eared roost.	High Confirmed
16 Public Order	Timber sarking	Small number of brown long-eared bat droppings below ridge	High
17 House	Roof void	1 pipistrelle dropping on exterior window	Medium

Table 8.4: Summary of bat presence in other built structures within HMS Ganges

Building	Favourable bat features	Evidence of bat presence	Probability of providing bat roost habitat
18 Martello Tower L	Favourable temperature & humidity for hibernation. Crevices in bricks	2 long-eared bats, 1 Natterer's bat and 3 Daubenton's bats confirmed hibernating.	Confirmed hibernation site.
19 Underground bunker		None	Medium
20 Underground bunker		None	Medium
21 Tunnel		None	Medium
22 Underground shelter	Favourable temperature & humidity for hibernation. Crevices in bricks	1 long-eared bat & 1 45 kHz pipistrelle bat confirmed hibernating.	Confirmed hibernation site.
23 & 24 Underground bunkers	Temperature & humidity likely to be favourable	Could not be accessed (23 is off site).	High
25 Martello Tower M (off site)	Temperature & humidity likely to be favourable	Could not be accessed	High
26 South underground bunker	Temperature & humidity likely to be favourable	Could not be accessed	High

8.3.50. In addition to Martello Tower L and Shotley Fort , during the 2007 survey, further underground structures were identified within the survey site providing potential for hibernating bats. Underground shelters (Building 23 and 24) were found on the north side of the site by the Drake Building (Building 1)and swimming baths building (Building 6)and also an underground shelter (Building 26) was found on the south side of the site by the line of white poplar trees along the southeast coastal edge. Although human access to the bunkers beneath was not possible, the view through the gaps at the ground surface shows the shelters beneath to be favourable for hibernating bats.

8.3.51. Pipistrelle and brown long-eared bat foraging activity was recorded around the grounds of the proposed development site particularly along the sheltered boundary

hedgerows, artificial pond by the Martello Tower L and scrub/woodland edges by the buildings and Shotley Fort ancient monument. The results of the evening bat surveys are summarised in Figure 8.4.

8.3.52. Most of the trees on the site have little potential to provide roosting habitat; their main value being the sheltered foraging and commuting habitat they provide for bats. Two trees however were identified as having a high probability of providing roosting habitat for bats (oak T53 and ash T57)(see Appendix 8.4. Fig 8.5) at the northeast end of the site and should be treated as bat roosting trees. A further ten trees (lime T21, silver birch T49, silver birch T50, ash T60, poplar T64, poplar T66, poplar T67, walnut T76, plane T88, fruit tree T90) were identified as medium/high potential to provide roosting sites for bats and a further nine trees (poplar T11, poplar T20, lime T34, lime T40, lime T42, beech T46, silver birch T63, fruit tree T92, plane T94) were classified as medium potential. The tree bat roost potential and bat foraging habitat is illustrated in Figure 8.5.

8.3.53. Important semi-natural habitats for bats include: the boundary hedgerows and mature tree lines, the scrub/woodland habitat adjacent to the Shotley Fort, the ruderal/scrub habitat around the north Martello Tower, the artificial pond and tree lines by the south Martello Tower, and the trees and scrub habitat along the south and east estuarine escarpment that provides shelter from the southeast prevailing winds.

Invertebrates

8.3.54. The proposed development site, particularly along the south and east fringes, includes a large area of habitat favourable to invertebrates that can be divided into bare ground, grassland, tall herb communities, scrub and wooded habitats with a small area of standing water. The significance of these habitats in terms of overall invertebrate communities supported on the site are directly related to the interaction and physical continuity of these habitat types to create a mosaic capable of maintaining predator prey relationships essential for invertebrate diversity.

8.3.55. The following invertebrate groups were recorded within the site: MOLLUSCA (slugs and snails), ANNELIDA (worms), MYRIAPODA (centipedes. Millipedes), ISOPODA (woodlice), ARACHNIDA- Araneidae (spiders), COLEOPTERA (beetles), DIPTERA (flies) including SYRPHIDAE (hoverflies), ODONATA – ZYGOPTERA (damselflies), HETEROPTERA (bugs) HYMENOPTERA – APIDAE (bees) and VESPIDAE (wasps), ORTHOPTERA (crickets/ grasshoppers) and LEPIDOPTERA (butterflies

and moths). It is likely that further survey would demonstrate that the site has a high intrinsic invertebrate interest.

- 8.3.56. During the investigation of Shotley Fort, cave spiders were recorded behind the door and in the shafts of the chamber on the south side of the fort (Building 19). The species was identified as either *Meta menardi* or *Meta bournetti*. Both species like to live in total darkness and are very similar. To distinguish between the species, a specimen would need to be collected for examination under the microscope. These species are not legally protected, but *Meta bournetti* is a nationally scarce (notable Nb) spider. In Suffolk it has been recorded in five locations including Ipswich Golf Course.
- 8.3.57. Greater stag beetle *Lucanus cervus* (a UK priority Biodiversity Action Plan and endangered species) was identified along the hedgerow by the Marsh Lane track to the north of the survey area.
- 8.3.58. A full bat survey is contained at Appendix 8.6.

Birds

- 8.3.59. A barn owl (*Tyto alba*) was recorded using the far west end of the Vincent building (Building 7) during a survey in June 2007. Barn owl pellets were found inside the top storey of the building and liming was observed below where the owl had been perching. The owl gained access to the building through a broken window on the north side of the building.
- 8.3.60. A total of thirty bird species were recorded during the surveys. The grassland/scrub mosaic along the east and south side of the site are considered to be the most valuable habitats for the birds within the site and also entering the site from the neighbouring estuary SPA.

Table 8.5: Birds recorded at HMS Ganges (* = flying over)

Scientific name	English name	Scientific name	English name
<i>Aegithalos caudatus</i>	Long-tailed tit	<i>Anas penelope</i>	Eurasian wigeon*
<i>Anas platynchos</i>	Mallard*	<i>Ardea cinerea</i>	Grey Heron *
<i>Columba palumbus</i>	Wood pigeon	<i>Dendrocopus major</i>	Greater spotted woodpecker
<i>Erithacus rubecula</i>	Robin	<i>Falco tinnunculus</i>	Kestrel
<i>Fringilla coelebs</i>	Chaffinch	<i>Gallinago gallinago</i>	Common snipe
<i>Garrulus glandarius</i>	Jay	<i>Larus canus</i>	Common gull*
<i>Larus ridibundus</i>	Black-headed gull*	<i>Motacilla alba</i>	Pied wagtail
<i>Parus caeruleus</i>	Blue tit	<i>Parus major</i>	Great tit

<i>Passer montanus</i>	Tree sparrow	<i>Phasianus colchicus</i>	Pheasant
<i>Pica pica</i>	Magpie	<i>Picus viridis</i>	Green woodpecker
<i>Prunella modularis</i>	Hedge accentor	<i>Regulus regulus</i>	Goldcrest
<i>Scolopax rusticola</i>	Woodcock	<i>Tadorna tadorna</i>	Common shelduck *
<i>Troglodytes troglodytes</i>	Wren	<i>Turdus merula</i>	Blackbird
<i>Turdus philomelos</i>	Song thrush	<i>Turdus pilaris</i>	Fieldfare
<i>Tyto alba</i>	Barn owl	<i>Vamellus vanellus</i>	Lapwing *

8.3.61. Species recorded regarded as UK BAP priority species (RSPB Red List) include tree sparrow and song thrush. Both species have shown a rapid decline in recent years. Species on the amber list (moderate decline) include kestrel, snipe, green woodpecker, woodcock, shelduck, blackbird, fieldfare, lapwing and barn owl. Barn owls are listed under Schedule 1 of the Wildlife and Countryside Act²² (1981 as amended).

Statutory designated sites

8.3.62. There are two national statutory sites for nature conservation situated approximately 100 metre distance from the proposed development site. The King Edward VII Drive, marina, piers and jetties separates the proposed development site from the statutory protected areas.

8.3.63. To the west is the Stour Estuary Site of Special Scientific Interest (SSSI). This site includes all of the inter-tidal areas of the River Stour down to Shotley, plus a number of freshwater marshes along the flanks of the estuary. The site is designated for the large number of waterfowl and waders that over winter along the Stour and use the rich mud flats as a feeding resource. Redshank, grey plover, black tailed godwit, shelduck, turnstone, wigeon, pintail, dark bellied brent goose and mute swan occur in nationally important numbers in winter. The first four species occur in internationally important numbers. The main concentration of birds is in Holbrook Bay, a wide shallow feature 7.5km west of the development area. There is a wide range of other waders and wildfowl utilising the estuary. In addition, there are significant areas of saltmarsh, ranging from eelgrass (*Zostera* spp) and algae on the seaward margins, through cord grass (*Spartina* spp) and glasswort (*Salicornia* spp) to higher saltmarsh grass (*Puccinellia* spp) and herbs such as sea lavender (*Limonium vulgare*). There are also areas of geological importance, especially the brickearths of Stutton which have a rich and important fossil fauna.

- 8.3.64. The SSSI is shown in Figure 8.6. The Stour Estuary SSSI includes Ewarton Bay to the west of Shotley Gate village. The eastern boundary of the SSSI is the Shotley Pier, 100m west of the development.
- 8.3.65. The foreshore directly south is not designated. Mud flats are to be found along the shore but no significant areas of salt marsh. The area is quite disturbed, with Admiralty and Shotley Piers and significant boat and human activity. The King Edward VII drive runs along the margin of the foreshore. Due to the poor substrate and current high levels of disturbance, it is not an important area for feeding waders.
- 8.3.66. To the east is the Orwell Estuary Site of Special Scientific Interest (SSSI). This site covers 1204 hectares of intertidal mud and saltmarsh. Its main interest is also the over-wintering wildfowl and waders. The numbers of waders regularly exceeds 10,000 in mid winter. Dunlin, turnstone, grey plover, ringed plover and redshank attaining nationally significant numbers with redshank attaining internationally important numbers. Up to eighteen species of wildfowl winter on the estuary, with pintail, shoveler, wigeon and shelduck being especially important. The latter species attains nationally important numbers. The estuary supports extensive areas of saltmarsh with a similar sequence of low and high marsh as that found on the Stour. Grazing marshes flanking the estuary are also important for over-wintering geese and support breeding redshank and lapwing.
- 8.3.67. The boundary of the SSSI is shown in Figure 8.6. The southern limit is the boat ferry terminal at the south side of the marina. The Shotley Marina is therefore between the SSSI and the development site. At no point does the development site directly abut the estuary SSSI.
- 8.3.68. In addition to the national designations, the two SSSIs have also been designated as sites of International importance.
- 8.3.69. The SPA site has been designated as a wetland of international importance under the Ramsar Convention. The Ramsar site has the same boundaries as the combined Stour and Orwell SSSIs.
- 8.3.70. The Ramsar qualifies under Criterion 2a by supporting a number of rare species of wetland plants and animals. The site qualifies under Criterion 3a by regularly supporting over 20,000 waterfowl, with an average peak count of 48,410 birds recorded in the five winters between 1986 and 1991. The site also qualifies under Criterion 3c by supporting internationally important winter numbers of dunlin, shelduck, dark-bellied brent geese, redshank, grey plover, black-tailed godwit,

turnstone, and ringed plover. It also has a notable assemblage of species with nationally important bird numbers. This is for essentially the same over-wintering bird features as the SSSI.

8.3.71. The Stour and Orwell estuaries have also been designated as Special Protection Area (SPA). The Stour and Orwell SPA has been designated under the EU Birds Directive because of its international importance for over-wintering wildfowl and waders. The site has the same boundaries as the combined Stour and Orwell SSSIs.

8.3.72. The SPA qualifies under article 4.2 by supporting winter internationally important numbers of dunlin, shelduck, dark-bellied brent geese, redshank, grey plover, black-tailed godwit, turnstone, and ringed plover, and nationally important numbers of wigeon, knot, curlew, pintail, mute swans, goldeneye and scaup.

8.3.73. The proposed development site does not abut any area of internationally important estuary habitat. The quality of the inter-tidal habitat in the near vicinity of the development site is relatively poor. The inter-tidal habitat along the south margin is a mixture of shingle with silt and is of low productivity for invertebrates. It has limited interest for feeding birds. In addition, neither area has freshwater creeks flowing across them.

Valuation of ecological receptors

8.3.74. Using the ecological valuation criteria (see Table 8.1) the value of the main habitat types at the HMS Ganges site is summarised in Table 8.6 below. and the value of the faunal receptors is summarised in Table 8.7, also below.

8.3.75. Since the nearby Stour and Orwell estuaries have been designated by Europe as an SPA and RAMSAR site these areas are valued as sites of International importance.

Table 8.6: Ecological value of habitat types within the proposed development site

Habitat	Level of ecological value	Description
Mosaic of semi-natural scrub with semi-improved neutral/acid grassland components and associated mature trees.	Acid grassland components of national value. Mosaic of district value	Acid grassland is a declining habitat of conservation concern. The structural diversity of the habitat is important for invertebrates, reptiles, birds and bats.
Ruderal open lawn	District/neighbourhood	Artificial habitat of botanical

		interest. Temporary habitat difficult to maintain.
Improved rough grassland with semi-natural components.	Neighbourhood	Widespread and commonplace habitat but with some botanical interest.
Woodland strips, tree lines, mature trees and boundary hedgerows.	Neighbourhood	Widespread and commonplace features but of ecological importance within the local area.
Pond	Neighbourhood	Artificial pond but providing an area of open freshwater habitat within the local area.
Improved amenity grassland	Less than neighbourhood	Widespread and common place habitat with little/no ecological value.
Buddleja scrub	Less than neighbourhood	Widespread invasive habitat with little botanical interest.
Hardstanding (tarmac etc)	Less than neighbourhood	Artificial habitat with little/no ecological value.

Table 8.7 Ecological value of faunal receptors.

Species/ Group	Level of ecological value	Description
Invertebrates	National	Site includes nationally scarce species and priority UK BAP species.
Reptiles	National	Includes species that are protected under UK national legislation.
Badger	National	Protected under UK national legislation. No badger setts found but badgers are crossing the site.
Bats	International	Protected under EU Habitats Directive
Birds (on site)	National	Includes species on the RSPB red list birds of conservation concern.
Birds (on adjacent SPA)	International	Site designated for its importance for birds

8.4. Potential Construction Effects

8.4.1. Ecological impacts can be complex with many inter-linkages between components of ecosystems. Disturbance or destruction of habitats and/or species as a result of development can cause:

- Fragmentation of habitats reducing connectivity and affecting migration of animal species and dispersal of plants;
- Disruption of the food web affecting predator-prey relationships, herbivore-plant relationships, decomposers, plant productivity, nutrient-cycling, fragility and stability of ecological communities; and
- Population ecology and behaviour impacts. Changes within the site may affect species reproductive patterns, feeding behaviour, territory sizes, provision of cover, carrying capacities of habitats, mortality and survival rates and strategies, sex and age ratios, hibernation behaviour.

8.4.2. These changes can be direct (explicit impacts on the ecological receptor) or indirect (manifest via change in some other receptor). These can also be adverse (detracting from the ecological resource) or beneficial (offering some benefit to the ecological resource). Timescales of impacts can also vary some impacts arising from building works may only be temporary whereas others will be permanent and persist indefinitely. Some impacts may be rapid in their effect and others manifest only after a time delay. Impacts can be one-off, repeated or cumulative over time, as well as with other impacts.

8.4.3. With respect to the proposed development at the proposed development site, the construction phase could (without mitigation) result in destruction, disturbance or damage to habitats, with the resultant disturbance or destruction of animals. This includes the loss of bat roost habitat within existing built structures and the loss of reptile habitat. During the occupation of the proposed residential development, impacts will primarily be associated with human disturbance of habitats and/or species, but other impacts such as the disturbance/ predation of protected animal species by domestic pets and altered lighting levels on the site associated with human occupation can affect. These impacts are considered in more detail below.

Habitat

8.4.4. The most obvious potential impacts are the loss of habitat through areas being built over. The majority of the development is on artificial habitat (comprising former buildings, areas of hardstanding and amenity grassland) of low/no ecological value. The habitats of most importance (of district value) will generally be retained and unaffected by development. Large areas of semi-natural scrub/grassland mosaic habitat along the eastern side of the site and a smaller area within the south will be

retained helping to minimise any impact on the ecosystems within the local area and ensuring that the overall integrity of the habitat type remains unaffected.

- 8.4.5. The impacts on habitats (excluding buildings and tarmac) are summarised in Table 8.8. The habitat loss figures assume loss of all habitats within the development footprint. As garden and amenity areas will be recreated, the figures presented are likely to be an over-estimate.
- 8.4.6. A large proportion (80%) of the most valuable semi-natural mosaic habitat, with acid grassland components, will be retained and unaffected by development.
- 8.4.7. 72% of the brownfield spoil vegetation and brownfield open lawn/ scrub habitats will also be retained. The retention of these more artificial habitats will ensure that the flora and invertebrate interests of these areas are also protected and maintained.
- 8.4.8. The retention of the more valuable components of the semi-natural and artificial habitats within the site will help to minimise any impact on the ecosystems within the local area and ensuring that the overall integrity of the habitat types remain unaffected.
- 8.4.9. There is the risk of damaging semi-natural habitats during the construction phase through running of plant across the habitats or storage of materials, but such impacts would be temporary in nature and are not thought to be serious.
- 8.4.10. There is also an increased risk of aerial and aquatic pollution during building demolition and construction works- leading to decreased habitat quality and resilience.
- 8.4.11. Of much greater concern is the long-term management of the remaining semi-natural habitat. The grassland/scrub mosaic and the ruderal open lawns are both dynamic habitats subject to rapid change. Natural succession would rapidly convert them to rank coarse grassland and more homogeneous scrub habitats with significant loss of wildlife interest. They need active management to maintain them in a structurally and species diverse state. Increased public pressure could also subject them to inappropriate management such as heavy mowing, inappropriate re-seeding, complete scrub clearance and conversion to gardens.
- 8.4.12. Increased local awareness of the recreational potential of the site may lead to higher usage not only from the new residents on the site but also from residents within the surrounding local area. This could lead to increased trampling of sensitive habitats by humans and free-ranging dogs and increased litter deposition.

Table 8.8 Summary of potential loss of habitats due to development

Habitat	value	Total habitat (Ha)	Area of direct impact	Area retained		% of habitat retained
				Inside boundary	Outside boundary	
Semi-natural acid grassland/ scrub mosaic	National/District	3.6569	0.7253	1.7180	1.2136	80%
Estuarine grassland	District	0.3643	0.0000	0.0482	0.3161	100%
Semi natural ruderal tall herb	Neighbourhood	1.9575	0.4255	0.0000	0.6320	60%
Semi-natural grassland within amenity areas	Neighbourhood	0.8540	0.7802	0.0738	0.000	9%
Improved grassland	Less than neighbourhood	7.7371	2.7742	0.2419	4.7210	64%
Brownfield open lawn/scrub	Neighbourhood	5.5141	2.5787	2.5829	0.3525	53%
Brownfield spoil vegetation	Less than neighbourhood	1.2253	0.3419	0.8834	0.0000	72%
Total		20.4092	7.6258	5.5482	7.2352	63%

8.4.13. The areas are calculated using overlays for the proposed development, ownership boundary and digitised Habitat Map for the site. This is also shown in the accompanying plans for the ecology chapter.

Reptiles

8.4.14. During the construction phase of the proposed development there is likely to be permanent destruction of reptile habitat and possibly reptiles themselves. Reptiles (common lizards, slow-worms and grass snakes) could be killed through movement of vehicles across the site, excavation of the ground and movement of building materials.

8.4.15. All reptiles are protected under the Wildlife and Countryside Act²² 1981 (as amended), and can therefore be considered to be of national importance.

- 8.4.16. The loss of reptile habitat caused by the development will result in a greater population of reptiles inhabiting the remaining grassland/scrub habitats within the HMS Ganges site. The remaining habitat may not have sufficient carrying capacity (prey availability) to support the displaced reptiles. This would affect reptile survival.
- 8.4.17. The increased fragmentation of reptile habitat resource caused by the construction of buildings and access roads may result in isolation of populations and increase their vulnerability to extinction.

Bats

- 8.4.18. Although some of the buildings with bats roosts or high roost potential will be retained on the site (Vincent -Building 7, Suffolk building complex- Buildings 12 and 13), the development will require demolition of confirmed bats roosts (classrooms - buildings 1 and 3 at the north end of the site and the Signal building 15 at the south end of the site). Buildings with high roost potential (Building 2, 13 and 16) will also be affected.
- 8.4.19. The demolition of the buildings within the site has the potential to have a high impact on bats. Demolition will result in the disturbance to pipistrelle bats and brown long-eared bats and the loss of their roosting sites.
- 8.4.20. The survey results however suggest that the buildings listed above are not used by a nursery colony of bats but used by small numbers of individual bats of the more common species. According to the English Nature, (2004) Bat Mitigation Guidelines²⁹, roost sites used by small numbers of the more common species are assessed as being of low/medium conservation significance to the bats within the local area.
- 8.4.21. Hibernation sites are of greater significance and are assessed as being of medium/high conservation significance (dependant on the species using the site) to the bats within the local area²⁹.
- 8.4.22. Martello Tower L (bat hibernation site- building 18) is a scheduled ancient monument and will be retained. To preserve the important historic features of the tower, structural improvements will be required. Repair works, particularly to the brick structure of the tower may damage hibernating crevices and result in the loss of bat hibernation sites for three species of bat (Natterer's bat, Daubenton's bat, Brown long-eared bat). Hibernating bats have a high reliance on cool humid brick

²⁹ English Nature (2004) Bat Mitigation Guidelines

structures such as those found in the basement of the Martello tower. Changes in the internal environmental conditions that affect the temperature and humidity of the Martello Tower may have a significantly high impact and affect the survival of the bats over the winter months. Works such as the removal of the water tank above and altering the drainage system around the tower has the potential to impact on bats by changing the humidity conditions below.

- 8.4.23. In addition to any direct impact to Martello Tower L, construction works within 30 metres and habitat clearance around the tower has the potential to cause disturbance to hibernating bats. The removal of trees/scrub habitat around the tower has the potential to have a high impact on the bats hibernating in the tower due to loss of linking tree lines to enable bats to fly under cover to neighbouring foraging areas and due to reduction of insect availability within the near vicinity of the hibernation site. During the winter bats hibernate, mainly due to lack of food availability. During the torpid state produced by hibernation, bats utilise their store of body fat to maintain their vital functions. On arousal in the spring, mobilisation of the fat stores is rapid to produce sufficient energy to fly. Should the habitat adjacent to the hibernation site be insufficient to enable the energy store to be replaced quickly, bats will soon use up all their remaining stored fat and become grounded and unable to survive. The artificial pond within close proximity to the tower, similarly provides an important insect food resource for the hibernating bats. Daubenton's bats in particular feed on insects that have larval stages dependant on water.
- 8.4.24. Similarly any works to Shotley Fort and the adjacent semi-natural habitat has the potential to have a high impact on bats. Construction works to the north underground bunker (building 22) within the fort complex could impact on pipistrelle and brown long-eared bat hibernation sites. Repairs works may result in the loss of hibernation sites, vegetation clearance works particularly around the north, and east sides of the bunker may impact on bats through loss of foraging and connecting commuting habitat.
- 8.4.25. The development in the north will require the destruction of an underground bunker (building 24) to the west of building 1. A further underground bunker (building 25) by the swimming pool is outside the proposed development boundary. These bunkers were not inspected for bats (due to openings too small for human access) but are considered to provide highly favourable bat hibernation habitat and should therefore be treated as bat hibernation sites. The reduction in the number of hibernation sites available to bats has the potential to have a high impact on the bats within the local area.

- 8.4.26. The development in the south will also be in close proximity to the underground bunker by the line of white poplars. The extent of this bunker was not determined but similarly any loss of the availability of this underground feature to bats has the potential to have a high impact on the bats within the area.
- 8.4.27. The Martello Tower M (Building 25) is outside the proposed development site but also provides external features highly favourable for hibernating bats. Since the tower is in different ownership it was not surveyed for bats, but it is considered highly probable that hibernating bats also use this building. Any removal of trees/scrub from the HMS Ganges site, within close proximity to this tower has the potential to have a high impact on the bats hibernating in the tower.
- 8.4.28. The quality of foraging habitats for bats is important since the colony size of bats is usually related to the amount of quality feeding habitat within easy commuting distance of their roost. Boundary hedgerows and most of the tree lines will be retained with little damage to the important structurally diverse mosaic of grassland and scrub to the east. The building works will result in loss of foraging habitat around the buildings themselves with loss of more structurally diverse habitats to the south growing over the former buildings. Considering the overall availability of scrub /grassland habitat along the east escarpment, the loss of part of the southern structurally diverse habitats will have a minor impact.
- 8.4.29. Any loss of mature trees along the south and east escarpment has the potential to have a high impact due to increased exposure to wind causing a reduction in the suitability of the habitat to flying insects and therefore to foraging bats. It is expected that the mature trees along the escarpment will be retained, however there will be a net gain of approximately 200 trees across the site.
- 8.4.30. It is probable that a small number of trees within close proximity to the construction works will need to be removed. This has the potential to sever flight lines. Most bats fly close to linear features particularly tree canopies, the presence of favourable flight routes around bat roosting sites is therefore important. Any loss of connecting tree lines may impact on bats by interruption of their flight routes between roosting sites and feeding areas and between different feeding areas. This has the potential to isolate roosting sites from feeding areas and have an adverse impact on the bats within the area.
- 8.4.31. Any removal of trees classified as providing roosting features with a high probability of being used by roosting bats or having medium/high potential to provide roosting sites for bats has the potential to have a high impact on bats through tree surgery

with bats roosting in the tree and loss of availability of roosting sites. Since, the majority of trees within the site offered very little potential for roosting bats the limited number of trees with roosting potential are of particular value.

- 8.4.32. Further impacts may be caused post development by the alteration of lighting levels around, and within, the site. Natterer's, Daubenton's and Brown long-eared are bat species particularly disturbed by light, favouring dark areas³⁰. High light levels may therefore impact on their ability to disperse between their hibernation sites roosting sites and foraging areas.
- 8.4.33. An increase in people may lead to greater disturbance across the site increasing the risk of disturbance to hibernating bats within the Martello tower and Shotley Fort ancient monument. Disturbance during the winter months will cause the bat's fat deposits to be used up. Since little insect food is available during the winter months, repeated disturbance will cause the bats to be depleted of energy and unable to fly, affecting their survival. This serious risk has the potential to have a significantly high impact.
- 8.4.34. Domestic cats are the main predator of bats. An increase in the presence of cats brought in by the residents of the site may also have a high impact on the bats roosting within the site.

Badgers

- 8.4.35. Although no badger sett was identified within the site, the presence of a latrine site near the north Martello tower suggests that badgers are foraging across the site. Since the semi-natural habitats by the north Martello tower M and along the eastern escarpment will be retained, any impact on the badgers will be negligible.

Invertebrates

- 8.4.36. The construction works within the proposed development are likely to result in the loss of invertebrate habitat through the clearance of dead wood, patches of rough grassland, tall vegetation growing through building spoil and scrub and any clearance of scrub itself. Elimination of, for example a prey species from one area may adversely affect an insect that has significant interactions in another part of the site. The invertebrate habitats lost to development however are expected to be minimal. The more species diverse and structurally diverse areas along the south and east fringes will be retained and managed as a nature reserve area. Since the

³⁰ Jones, J. (2000) Impact of lighting on bats. English Nature leaflet

overall integrity of the habitats will be retained the impact on invertebrates in general is expected to be low.

- 8.4.37. Any impact on the southern chamber of the Shotley Fort (Building 19) has the potential to affect the scarce cave spiders within the chamber. Cave spiders require dark damp habitats; any change in the environment has the potential to have a high impact on the survival of the spiders.
- 8.4.38. Greater stag beetle, found along the north hedgerow, is a globally threatened species. The stag beetle requires dead wood to complete its life cycle. Any clearance of logs or dead tree stumps from the site could remove the larvae from the site and impact on the beetle population.

Birds

- 8.4.39. This section only considers the potential impact of the proposed development on birds recorded within the proposed development site. Potential impacts on birds within the nearby SPA are considered in the 'Impacts on Areas Designated for Nature Conservation' section below.
- 8.4.40. All breeding birds within the proposed development are at risk from disturbance, damage or destruction during the development construction phase. Post development there is a risk to birds on the site by predation by domestic cats. There may also be greater disturbance of bird habitats through use by the increased human population of the site and free ranging dogs.
- 8.4.41. Altered night time lighting levels may impact on nocturnal species using the site such as barn owls.
- 8.4.42. The barn owl was recorded using the Vincent building that is outside the development boundary. The roost site is considered not to be a breeding site. Regular human activity in the surrounding area (not within the building itself) can be tolerated by barn owls as long as the barn owls have an undisturbed dark cavity, well above ground level, in which they can safely roost out of sight. The retention of semi-natural scrub/grassland mosaic along the eastern edge should also retain sufficient prey items within the owl's hunting habitat. There is a risk that the barn owl could fly in through open windows and doors of other disused buildings that are subject to demolition.

Impacts on sites designated for nature conservation

- 8.4.43. Due to the geographical separation between the proposed development site and the SPA (Orwell Estuary SSSI and Stour Estuary SSSI), it is highly unlikely that there will be any direct effect on the sites of international nature conservation importance during the construction phase of the proposed development.
- 8.4.44. Any discharge of effluent, particularly any toxic substances, will affect the quality of the inter-tidal mud habitat and reduce the invertebrate productivity of the mudflat. This will have an impact on the ecological interest of the site. The risk is considered very low.
- 8.4.45. Since the designated sites are of prime interest for over-wintering birds, one of the main concerns would be disturbance. The development (improved road and path access) is likely to result in greater use of the surrounding countryside by people and their domestic pets. The mudflats are very open habitats where any human or free-ranging dog intrusion is obvious. Disturbance can seriously affect over-wintering birds because it reduces feeding times, pushes them away from the more productive feeding areas to sub-optimal areas, and burns critical energy reserves at a time when maintenance of body mass is crucial to survival.
- 8.4.46. The potential impacts of the development on the identified features are summarised in the Tables 8.9 to 8.12 below. Risks of damage are assessed as either negligible, very low, medium, high or very high. These impact assessments are prior to any mitigation measures.

Table 8.9: Ecological Impact Assessment: Impacts on habitats/species of greater than neighbourhood value. Short term impacts during construction works (Unmitigated).

Feature	Potential Threat	Implications
Semi-natural scrub/grassland mosaic. (District value)	Works vehicles crossing site Building materials or vehicles stored on habitat.	Habitats damaged but should recover if no chemical residues left on site. Risk is medium. Minor adverse significance.
	Aerial/ aquatic drift of pollutants (dust, oil)	Decreased habitat quality and resilience. Risk is low. Negligible impact.
Species diverse ruderal open lawn. (Neighbourhood/District value)	Works vehicles crossing site Building materials or vehicles stored on habitat	Periodic disturbance helps to regenerate annuals and maintain an open habitat. Consequently, no impacts would arise as long as building materials were entirely removed and there are no chemical residues. Risk is very low. Negligible impact.
	Drift of pollutants (dust, oil)	Decreased habitat quality and resilience. Risk is low. Negligible impact.
Reptiles (National value)	Works vehicles crossing site Building materials (potential refugia) stored and moved around the site. Building works	Disturbance/ injury/death of individual reptiles. Risk is high without appropriate mitigation. Major adverse impact. Damage/destruction of reptile habitat during construction works.
Bats (International value)	Works to existing buildings (Demolition of buildings, underground bunkers). Improvement works to bat hibernation sites (Martello tower/ fort)	Disturbance/injury/death of individual bats. Risk is high without appropriate mitigation. Major adverse impact Loss of bat roosting/hibernation habitat. Risk is very high. Major adverse impact
	Changes in ambient lighting levels during construction	Altered behaviour. Risk is high especially for brown long-eared bat. Major adverse impact
Cave spider (National value)	Works to underground sites	Damage and/or destruction of spiders and/or their habitats. Risk is high. Major adverse impact
Greater stag beetle (National value)	Clearance of dead wood and scrub for construction traffic.	Damage and/or destruction of stag beetles and/or their habitats. Risk is medium. Moderate adverse impact.
Birds within site (National value)	Works vehicles, personnel crossing the site. Works to existing buildings	Disturbance, damage and/or destruction of birds and/or their habitats during construction. Risk is high. Major adverse impact

<p>Over-wintering wildfowl and waders and important mud flat habitat. (International value)</p>	<p>Works traffic or building materials/ waste dumped on the inter-tidal mud flats of the SPA.</p> <p>Discharges to the estuary particularly fuel and oil associated with plant.</p>	<p>Disturbance, damage to bird habitat of international importance. There is no reason for works traffic to use the important mud flat areas. Risk is very low.</p> <p>If lorries used the King Edward VII Drive during construction works a road accident is possible. Risk is low but negative impact would be major. Seepages of contaminants within storage areas on the site. Risk is low but adverse impact would be major.</p>
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Table 8.10: Ecological Impact Assessment: Permanent Impacts on habitats within site

Feature	Potential Threat	Implications
Improved amenity grassland	Permanent construction over habitat	Habitats of little/no ecological interest lost. Risk is very high but habitat is of negligible significance.
Rough semi-natural grassland within built up area	Permanent construction over habitat	Habitats of neighbourhood value lost. Risk is high but habitat is of minor significance.
Woodland strips, tree lines, mature trees and hedgerows	Permanent construction (buildings, access roads) requiring tree felling or causing asphyxiation of roots.	Habitats of neighbourhood value damaged. Risk is high to some of these features but sufficient habitat will remain to ensure overall integrity remains in tact. Habitat is of minor adverse significance.
Semi-natural scrub/grassland mosaic (Habitat of District value)	Permanent construction over habitat. Trampling	Risk is high to parts of this mosaic (around the building works edges and along access routes) but the bulk of the habitat will remain in-tact. Since the magnitude of the impact is low, the impact significance is minor adverse.
	Conversion to other use such as landscaped areas.	Permanent loss of habitat and replacement with an artificial habitat of little ecological value. Risk is high. The impact significance is moderate adverse.
	Lack of management	The open habitats would develop into scrub with loss of botanical interest. A homogenous area of scrub would develop with significant loss of ecological value. Risk is high. The impact significance is moderate adverse.

Ruderal open lawn (Habitat of Neighbourhood District Value)	Permanent construction over habitat	Permanent loss to parts of habitat. Risk is very high but the bulk will remain in-tact. Since the magnitude of the impact is low, the impact significance is minor adverse.
	Conversion to other use such as landscaped areas.	Permanent loss of habitat and replacement with an artificial habitat of little ecological value. Risk is high. The impact significance is moderate adverse.
	Lack of management	This habitat is a temporary one requiring regular disturbance. Lack of management would lead to stabilisation, succession to other less valuable habitats and eventual loss of ecological value. Risk is high. The impact significance is moderate adverse.

Table 8.11: Ecological Impact Assessment: Permanent Impacts on reptiles and bats (Pre Mitigation)

Feature	Potential Threat	Implications
Reptiles (National importance)	Permanent construction over habitat. Amenity landscaping	Reduction in reptile population due to reduction in reptile habitat and therefore the land's capability to support reptiles. Risk is very high. Major adverse impact. Increased fragmentation of habitat resulting in isolation of populations and vulnerability to extinction. Risk is medium (connecting habitat will remain). Moderate adverse impact.
	Post development occupation of houses	Increase use by humans and domestic cats causing disturbance, injury, death of reptiles. Risk to reptiles is medium. Moderate adverse impact.
	Lack of management post development	Reptiles require a mosaic of grassland with sunny hot spots and scrub patches for cover. Lack of management would lead to loss of these elements and the development of homogeneous scrub leading to the loss of reptiles. Risk is high. Major adverse impact.
Bats (International importance)	Loss of buildings.	Permanent loss of original roosting sites. Reduction in bat population due to fewer roosting opportunities. Risk is very high. Major adverse impact
	Demolition/damage to underground sites	Permanent loss of hibernation sites. Reduction in bat population due to fewer roosting opportunities Risk is very high. Major adverse impact
	Construction over semi-natural habitat. Amenity landscaping	Reduction in bat population due to reduction in foraging quality of habitat. Disruption of flight paths. Risk is high, particularly in the southern area, but considering overall availability across the site, the impact magnitude is medium. The impact remains major adverse.

	Post development occupation of houses	Greater use by humans causing increased disturbance, damage and/or destruction of roosts/hibernacula. Increased predation by cats causing injury death of bats. Risk is high. Major adverse impact
	Changes in ambient lighting levels post development	Altered behaviour. Risk is high especially for brown long-eared bat. Major adverse impact

Table 8.12: Ecological Impact Assessment: Permanent Impacts on other species/ habitats of note (invertebrates, birds and SPA) (Pre-Mitigation)

Feature	Potential Threat	Implications
Invertebrates in general	Disturbance, damage or destruction of invertebrates and/or habitats.	Risk is high. Medium adverse impact due to no change in overall integrity of habitat.
Cave spider (National importance)	Works to underground sites	Risk is high. Major adverse impact
Greater stag beetle (national importance)	Landscaping of habitat	Risk is high. Major adverse impact
Birds (National importance)	Landscaping of habitat	Reduction in bird population due to reduction in nesting/ foraging habitat. Risk is high. Major adverse impact
	Disturbance to barn owl roost (building works/ lighting).	Loss of roost, reduction in barn owl population within the local area. Risk is high. Major adverse impact
	Post development occupation of houses	Increase use by humans and dogs causing disturbance to surrounding semi-natural habitats. Increased predation by cats causing injury death of birds. Risk is high. Major adverse impact
Over-wintering wildfowl and waders and important mud flat habitat	Post development occupation of houses	Increase use by humans causing disturbance. However disturbance is already high by the marina and jetties. There is no access to the protected SPA from the development. Therefore the impact on the SPA will be negligible.
	Impact of discharges	All discharges arising from the development will enter the public sewage and water treatment system. There is no impact on the estuary. Risk is negligible.

8.5. Mitigation and Residual Effects

8.5.1. It is possible to reduce the significance of impacts through a combination of mitigation and compensation measures. Mitigation refers to measures taken to

reduce adverse impacts such as alterations of timings of works, exclusion of ecological receptor and provision of educational information to increase awareness. Compensation refers to measures taken to off-set significant adverse impacts, for example habitat creation or enhancement of existing habitats. Where there are protected species issues, there can also be legal obligation to provide such measures. Residual impacts refer to those impacts remaining after mitigation and/or compensation has been implemented. The ecological mitigation and compensation measures included within the development proposal and the residual effects are summarised in Table 8.12 to 8.14.

- 8.5.2. Detailed briefing will be given to all construction workers and other site staff about the ecological interest of the site and the neighbouring SPA including methods required to safeguard the wildlife interests of the site. A Code of Construction Practice will be submitted to and agreed with the LPA prior to commencement of construction.

Habitats

- 8.5.3. It is proposed that the semi-natural habitats around Shotley Fort should be managed for their ecological interest.
- 8.5.4. For on-site mitigation to be successful, a long-term commitment to site habitat enhancement and management is required with detailed management prescriptions. A Management Plan will be submitted which identifies the most important ecological features within the site with prescriptions for the protection, maintenance and the enhancement of existing plant and fauna communities of ecological value. A Management plan (incorporating archaeological and ecological interests) is described in a separate document.
- 8.5.5. The habitats will be managed to encourage the development of the acid grassland characteristics of the proposed development site. This will compensate for any loss of species diverse grassland within the development and help enhance an important BAP habitat. The grassland will be managed to maintain a low nutrient, open sward through establishment of low fertility substrate, with a management regime (mowing and removal of grass cuttings), which regularly depletes nutrients. Sufficient areas, not regularly mown, will be managed for use by reptiles, invertebrate and small mammal species.
- 8.5.6. Amenity areas designated for grassy open space within the proposed development will be planted with appropriate acid grassland mix, using native species of local provenance.

- 8.5.7. Sufficient bare ground scrub areas, dead wood and mature trees will be retained as habitat for invertebrates, nesting birds and foraging bats. Structurally diverse habitats will be maintained by appropriate management of the grassland (areas of short and tall grass), tall herbs, brambles, blackthorn scrub and mature trees to maximize the nature reserve's biodiversity potential.
- 8.5.8. The management of the east and also the south points of the site to provide a scrub/grassland mosaic will provide an ecological buffer between the proposed development and the SPA (Stour estuary SSSI and Orwell estuary SSSI).
- 8.5.9. There will be controlled access (identified pathways) across the site to reduce disturbance to important semi-natural habitats and wildlife caused by recreational activities and free ranging dogs. Appropriate signage will be used to encourage users to keep dogs on leads particularly through the bird breeding season. Educational material will be available to the new residents.
- 8.5.10. The ecological and archaeological sensitive area around the Shotley Fort will have railings erected between the fort and the new buildings to protect the sensitive features from disturbance and damage. This is also important for health and safety reasons.
- 8.5.11. The retention of the dense blackthorn scrub to the east of Shotley Fort ancient monument will also limit human access to the back of the fort and help reduce disturbance to the highly important underground site.
- 8.5.12. Signs will be erected to inform the local residents of the ecological and archaeological interests on the site. Educational signs will help to limit disturbance and damage to the sensitive areas.
- 8.5.13. In addition to preventing access to the Shotley Fort ancient monument, other areas of important semi-natural habitat will need to be temporarily fenced off during the construction phase to prevent plant, machinery and materials being stored and damaging the sensitive areas.

Reptiles

- 8.5.14. In order to fulfil legal and planning requirements, it will be necessary to translocate the reptile species potentially affected by the development. Before commencement of ground clearance works at the proposed development site, all reptiles will need to have been cleared from the areas of impact. Natural England will need to be assured that during clearance/ construction works and following building works;

there is no detrimental impact on the reptile population of the area. This will also require the enhancement of the receptor areas to ensure the survival of the translocated animals.

- 8.5.15. Since reptile translocation can be a lengthy process, a translocation programme will need to be implemented at least one year in advance of construction works commencing. It should also be remembered that during the winter, reptiles retreat underground to hibernate; this means that reptile translocation can only commence from the spring onwards when reptiles are active and above ground.
- 8.5.16. The development area will need to be fenced off with durable reptile exclusion fencing to enable the capture and removal of the reptiles. High snake-proof reptile fencing with an angled lip away from the trapping zone to deter any reptiles from entering the development site is required. To install the fencing, the base needs to be buried underground (300 mm deep) to prevent animals moving under the fence. Prior to digging the trench an ecologist will need to check the route of the fence for the presence of any reptiles. The reptile exclusion fence will need to be retained on the site and regularly checked for any damage for the duration of the project; there should be no gap between trapping and construction works to prevent recolonisation of the area by reptiles.
- 8.5.17. Regarding the receptor site, the best scenario would be to maintain the reptile population within the site as a whole. The translocation of the reptiles to unaffected habitats within the development site would retain the animals in a more or less “on site” location and would be more likely to have a successful outcome than removing them to a more unfamiliar distant location. Translocating the reptiles to areas within the site will also ensure that the genetic composition of the reptiles in the local area is maintained. The protected nature reserve area around Shotley Fort is considered the most appropriate location. No heavy machinery should enter the protected area and no materials from the building site should be stored within the protected area.
- 8.5.18. Translocation of reptiles should be undertaken following the recommendations given in the HGBI Guidelines³¹ for evaluating local mitigation and translocation programmes. Following these guidelines, trapping using artificial 1 metre² refugia (Onduline) should be for a minimum of 60 days during suitable weather conditions. If reptiles are still being caught after 60 days, trapping will need to continue until no reptiles are caught over a minimum of 10 day checks with suitable weather

³¹ Froglife (HGBI) Guidelines (1998) Evaluating local mitigation/translocation programmes:

conditions. Once a zero capture point has been reached a destructive search of the ground can be undertaken involving the slow clearance of the top soil and vegetation on the site under the supervision of a reptile ecologist. The refugia density recommended by HGBI for the capture of the common reptile species is 50/hectare based on the standard size of 0.5m² sheet. The use of large size Onduline refugia (1m²) used for the initial survey at Ganges will enhance the chances of catching reptiles.

8.5.19. The site as a whole was estimated to support a low population of each reptile species; the enhancement of receptor areas within the identified nature reserve to increase the carrying capacity of the habitat should therefore ensure the survival of the translocated animals.

8.5.20. The area available for habitat enhancement is currently thought to be sufficient to support the translocated reptiles. Should, however, the capture programme produce a large number of animals and insufficient reptile habitat is available within the receptor area an alternative receptor site will be required. It may therefore also be necessary to investigate the surrounding area for possible alternative receptor sites.

8.5.21. Generally it is considered that receptor areas should ideally:

- Be local to the donor site.
- Support habitats capable of supporting reptiles.
- Not currently support a population of the species to be translocated (although exceptions are made where receptor sites support only small numbers of the species particularly if the habitat is capable of supporting a higher density following habitat enhancement).
- Receptor sites should also not be subject to planning or any other threat in the foreseeable future.
- Be under appropriate habitat management and preferably be subject to a written pre- and post translocation management agreement including a population monitoring programme.

8.5.22. Reptile capture must be undertaken by an experienced reptile ecologist to avoid harming the animals. Any reptiles caught should be transported in a suitable container and released during favourable weather conditions to the previously enhanced safe areas on the receptor site where they can immediately find cover.

8.5.23. To ensure the habitats within the receptor area can support the reptiles, it will be necessary for habitat enhancement work to be undertaken to provide favourable

basking, foraging, breeding and hibernation areas. The following enhancement works within the nature reserve area will therefore be implemented:

- The provision of a structurally diverse habitat with grass banks and mounds suitable for basking (south facing).
- The designation of some grassland areas for less regular mowing.
- The creation of compost piles/ areas grass cuttings to provide warm incubating conditions for grass snake eggs and warm areas for lizards.
- The retention of areas of dead wood to provide invertebrate prey items and also shelter for reptiles.
- The creation of hibernacula within the site. These will include log piles deposited in sunny aspects adjacent to tall grassland/ woodland edge to provide cover and mound hibernacula constructed over pipes and logs capped with turf allowing access for reptiles around the margins.

8.5.24. Retention of dispersal habitat corridors favourable for reptiles across the site to allow movement along the Shotley Peninsula and to avoid isolation of populations, will be required. The construction of any new access roads may therefore require pipes under the roads for passage of reptiles.

Bats

8.5.25. Due to the presence of bats in many of the buildings on the proposed development site, to derogate from the protection afforded bat roosting sites, a Habitat Regulations Licence will need to be granted from Natural England before any work can start on the buildings where there are confirmed roosting sites. This also applies to any works required to trees classified as high bat roosting potential. An experienced bat ecologist will need to submit a Method Statement for Natural England's consideration before a licence can be issued.

8.5.26. Mitigation measures are required to ensure that, during and following building works, there is no detrimental impact on the bat population of the area. This will require bat exclusion methods to be implemented (under licence) to reduce the risk of harm to individual bats, timing the works to avoid the bats most vulnerable periods and ensuring there is adequate roost provision pre and post demolition of the buildings.

8.5.27. All people working on the site will be made aware of the presence of bats, the protection afforded them and the methods of working required to avoid harm to bats as will be given in the Method Statement submitted to Natural England.

- 8.5.28. Retained buildings with bat roosting sites will be cordoned off during the construction works to prevent disturbance to the bats.
- 8.5.29. Demolition of the buildings with bat roosts/ high roost potential will be planned to avoid the bat's most vulnerable periods; bats tend to be at their most vulnerable during the summer breeding season when they have dependant young and the winter hibernation period when they go into torpor and hibernation and cannot easily fly away from danger. It should be remembered that brown long eared bats are a species that frequently remain within the same site throughout the year and may therefore use the buildings in the winter as well as the summer months. The preferred time to start demolition work is therefore either in the Spring (March-April) or the Autumn (September-October).
- 8.5.30. It is highly important that any building works affecting Shotley Fort or the Martello Tower are planned for the summer months (May-September) to avoid any disturbance to hibernating bats. Consultation with Natural England will be required. The works to the hibernation areas must avoid any disturbance to bats, loss of roost site availability and changes in the internal environmental conditions.
- 8.5.31. To ensure that any displaced bats have suitable roosting sites within the HMS Ganges site, before demolition of the buildings commences alternative roosting sites (bat boxes) will be available. The boxes will be erected on mature trees within the protected area by the fort on the northeast side of the site and near Martello Tower L. Types of bat box recommended are the 'Schwegler' woodcrete boxes. They are made of sawdust and concrete, are maintenance free, long lasting and maintain a stable temperature favoured by bats. A range of boxes suitable for use by pipistrelle, brown long-eared bats, Natterer's and Daubenton's bats will be erected.
- 8.5.32. The provision of a range of bat boxes will provide alternative roosting opportunities but are not acceptable on their own as roost replacements for the total number of roosting sites to be lost within the proposed development site. It will therefore be necessary to incorporate roosting opportunities within the new buildings. According to the Bat Mitigation Guidelines²⁹ the status of the roost sites, in the buildings to be demolished, is assessed as being of low/medium conservation significance to the bat population within the area. As compensation for the loss of roosting sites of this status, the new roosting facilities provided need not be exactly like-for-like but will need to be adequate for the species of bats concerned.
- 8.5.33. Schwegler bat boxes of the type 750/6 (sometimes referred to as bat tubes) will be incorporated into the walls of the proposed new dwellings located near the scrub

habitats at the northeast end of the site and in the dwellings by the scrub/grassland along the southern edge. These are long woodcrete boxes that can be easily installed within brick masonry with only a small horizontal slot visible from the outside. The bat box measures 20 cm wide, 47.5 cm high, 12.5 cm deep with an entrance 20 cm wide by 2 cm deep. Boxes will be installed high up on the apex of south facing walls to provide a warm roosting environment.

- 8.5.34. Because brown long-eared bats prefer to roost inside roof voids, at least one bat loft suitable for a colony of brown long-eared bats will be provided. The loft (s) will be located close to the original brown long-eared bat roosting sites. Buildings with an incorporated bat loft will need to be adjacent to tree lines connecting to favourable foraging areas such as the south east estuary coastline and the north east Shotley Fort scrub. A loft favourable for a colony of brown long-eared bats requires a roof void in excess of 2 metres from the ridge (preferably 2.8m) and a length and width of 5 metres or more; the longer the roof void the more likely it is to be used by bats (minimum length of 10 to 20 metre preferred). Bat access will need to be provided through small horizontal slots just below the ridge tiles or within the wall at the gable apex. The roof interior will need to be lined with either timber sarking boards or traditional bitumastic roofing felt or both. The bat loft should remain dark (no lighting installed) and a lockable small hatchway for human access provided to allow for the monitoring of the bat loft area post development.
- 8.5.35. Consideration within the design of the buildings will also be given to the incorporation of other roosting opportunities such as: the incorporation of roof bat access tiles to allow access to bats to the crevices between the tiles and roof lining, provision of bat access gaps to soffit boxes and the provision of bat roosting crevices behind wooden cladding or hanging tiles on south facing walls.
- 8.5.36. The retention of the Martello Towers and Shotley Fort will ensure that bat hibernation sites are retained within the site. The most important building within the site for bats is the Martello Tower, which is used for hibernation by the less common species (Natterer's bat, Daubenton's bat and brown long-eared bat). The improvement of these areas for hibernating bats may help to enhance the bat population within the local area and also help to counteract the negative impacts due to the loss of other hibernation areas within the Site (northwest underground bunker).
- 8.5.37. Hibernation sites can be sympathetically enhanced for bats by the incorporation of special bat bricks within the building. Hibernation crevices will be provided in both the Martello Tower and Shotley Fort chambers.

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- 8.5.38. The environmental conditions within Martello Tower L will be monitored using temperature and humidity data loggers to ensure the internal conditions remain suitable for hibernating bats. A cool temperature of 7°C or below and a high humidity will be maintained during the winter months.
- 8.5.39. It is highly importance that hibernating bats are not disturbed during the winter months. There will therefore be no public access to the Martello Tower (L)basement during the hibernation period. The currently open doorway will be locked.
- 8.5.40. Bat access to Martello Tower L will be maintained through small gaps around the basement.
- 8.5.41. A sign providing information on the historical and bat interest of the Martello tower will be erected by the monument.
- 8.5.42. The fort complex offers considerable potential for enhancement as a hibernation site for bats. The majority of the bunkers currently contain few crevices favourable for hibernating bats and the environmental conditions are generally too warm. Additional hibernation crevices could be provided and the manipulation of the airflow through the tunnel and bunkers could assist in providing more favourable temperature conditions. The environmental conditions within the fort will need to be monitored with data loggers. The current hibernation area at the north end of the site will need to have a lockable door installed with bat access above. The creation of more suitable conditions and provision of bat bricks will increase the hibernation opportunities for the bat population.
- 8.5.43. Public access to the underground areas of the fort must be restricted to the summer months. It is therefore recommended that visits to the sensitive areas be arranged by appointment or by organised open days.
- 8.5.44. The underground bunkers to the north and south, not accessed during the 2006/2007 bat surveys, will be checked for bats in the winter months (if access is possible) prior to disturbance to these structures. Where the presence of bats is confirmed a licence will need to be granted by Natural England before any works to these bunkers can commence.
- 8.5.45. To preserve favourable outside environmental conditions for bats, tree and scrub clearance around the tower and fort will be kept to an absolute minimum. Some clearance of trees impacting on the structure of the fort will be required and some minor clearance around the Martello Tower (L) basement will be required. Important tree lines providing favourable flight corridors will be retained to the north and east

of the fort, and, from the Martello tower, to the to the west Holm Oak hedge and south to the estuary shoreline. Trees that require removal will be replaced by native trees planted along bat flight paths.

- 8.5.46. Trees identified as having high roosting potential or high/medium roosting potential will be retained. If, for health and safety reasons, it becomes necessary to undertake tree surgery to the trees with roosting potential, a check will be undertaken by a licensed bat ecologist before undertaking tree works. Where the presence of bats is positively confirmed a licence from Natural England will be required before any works to roost trees can commence.
- 8.5.47. A further important consideration is the issue of lighting. There will be no lighting that could directly impact on a bat roosting area and no light spillage affecting bat dispersal routes. This will require areas around the newly created bat roosting sites, Martello Tower, Shotley Fort and woodland edges along the east side of the site to remain dark. There will be no up lighting of the Martello Tower, surrounding trees or Shotley Fort. The location and type of lighting within the site will need to be given careful consideration and where lighting is considered necessary for example along the roads, preference will be given to efficient directional lighting and low-level lighting.
- 8.5.48. Educational material with information about bats will be available to the residents on the site including the risks to bats from predatory domestic cats.
- 8.5.49. The new roost provision and hibernacula will be monitored post development and alterations made where considered necessary to safeguard the bat species within the site.

Invertebrates

- 8.5.50. Significant impacts on invertebrates species can be avoided by ensuring that cleared dead wood is retained on site and not burnt. Site management should be aimed at maintaining a structurally diverse habitat with areas of open grassland, tall herbs, brambles, blackthorn/hawthorn scrub and mature trees. Small patches of bare ground should also be left. Bare ground dries and warms readily in sunny weather and so favours warmth-loving species; solitary bees and wasps dig their burrows into it. Important food plants for the invertebrates within the site should be identified and retained.

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- 8.5.51. To maintain the population of cave spiders within the underground chamber of the Shotley Fort, dark and humid conditions within the shaft location will be preserved. People working on the fort will be informed about the presence of the spiders.
- 8.5.52. To ensure the survival of greater stag beetle on the site, dead wood (logs and stumps) will be retained on the site. Semi-natural buffer zones will be maintained around large dead wood. Buffer zones with grass will not be cut between May and September since adults emerge from the soil beneath dead wood from mid-May to late July.

Birds

- 8.5.53. Scrub and tree clearance works which may potentially impact on breeding birds and their nests will be carried out outside the main bird breeding season (April- August). Timing restrictions will also apply to works affecting areas in buildings in which birds are nesting. If such works cannot be avoided during this period, a check for nesting birds will be undertaken by an ecologist to ensure that the works are executed lawfully.
- 8.5.54. Improvements in the management of the scrub woodland habitats on the site will ensure continued provision of appropriate nesting and foraging habitats for birds within the local area.
- 8.5.55. The use of designated footpaths around the site will reduce disturbance of bird species across the semi-natural habitats. Users of the grounds will be encouraged to keep dogs on leads during the breeding season, using appropriate signage, to minimise disturbance to breeding birds.
- 8.5.56. Because a barn owl has been recorded roosting in one of the buildings (building to be retained), this area must not be disturbed during the development works. Site workers will be prevented from gaining access, unless a check by a suitable expert has been undertaken beforehand. To encourage barn owls away from the buildings themselves, barn owl boxes will be erected on the mature trees within the north and eastern escarpment.

Designated Sites

- 8.5.57. No areas of estuary will be built upon and no vehicles from the development site will enter the SSSI/SPA/RAMSAR site. All waste water (storm and foul water) will be discharged to the main sewerage system. There will therefore be no discharges into the estuary that could impact on important habitats or wildlife species within the specially protected area.

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- 8.5.58. Possible vehicle access points to estuary areas will be cordoned off during the building phase to prevent accidental or careless damage to habitats by construction vehicles.
- 8.5.59. All fuel stores should be bunded, even those associated with individual pieces of plant. All fuel stores and other stores of chemicals will be stored away from retained habitats and away from any trenches/ditches that could leak materials into the habitats or estuary in an accidental spillage.
- 8.5.60. Materials for emergency clean-up of any chemical spills into the estuary (arising for instance due to an accident along King Edward VII Drive) should be retained on-site in a place close to the estuary, clearly marked and known to all site staff. Procedures for an emergency should be agreed with the Environment Agency beforehand.
- 8.5.61. The retention of the scrub/grassland habitat along the east and southern escarpments of the HMS Ganges site will provide a semi-natural buffer between the development and the SPA and the retention of the scrub will ensure that landing points are available for birds migrating inland.
- 8.5.62. A summary of the residual impacts of the proposed development following the range of mitigation and compensation measures described in the previous sections is provided in the Table 8.13 to 8.16 below.

Table 8. 13: Summary of residual impacts on habitats within HMS Ganges Site

Ecological Receptor	Impact significance no mitigation/compensation	Impacts	Mitigation/compensation	Residual impact after mitigation/compensation.
Semi-natural scrub/grassland mosaic	Minor negative	Loss through building/vehicles/trampling.	Induction session for construction workers. Temporary fencing of sensitive areas.	Negligible impact
	Moderate negative	Loss through post development management	Management plan for remaining habitats to encourage acid grassland and achieve appropriate scrub/grassland balance. Use of paths to guide walkers. Educational material/signage	Minor adverse initially with positive benefits over time
Ruderal open lawn	Minor negative	Loss through building	Induction session for construction workers. Temporary fencing of sensitive areas.	Negligible impact
	Moderate negative	Loss though lack of management	Management plan to maintain some open ruderal areas.	Maintenance of some habitat type. Minor adverse.

Table 8. 14: Summary of residual impacts on reptiles

Ecological Receptor	Impact significance no mitigation/compensation	Impacts	Mitigation/compensation	Residual impact after mitigation/compensation.
Reptiles	Major negative	Disturbance, damage and/or destruction of reptiles and their habitat during construction	Reptile fencing and translocation of impacted animals to enhanced habitat on site following Natural England guidelines.	Minor adverse

		Disturbance, damage destruction of reptiles post development (people & pets)	Distribution of educational material Information signage by the nature reserve. Appropriate management of grassland/scrub habitats for reptiles Monitoring to ensure wildlife corridors are maintained across the site for reptile dispersal	Minor adverse
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Table 8. 15: Summary of residual impacts on bats.

Ecological Receptor	Impact significance no mitigation/compensation	Impacts	Mitigation/ compensation	Residual impact after mitigation/compensation.
Bats	Major negative	Disturbance, damage and/or destruction of bats and/or their habitat during construction	Bats excluded under Natural England licence from buildings to be demolished. Appropriate timings for building works. Public access prevented to retained buildings with bats (including hibernacula). Bat checks by licensed bat ecologist. Bat roost provision on the trees and roost provision in new buildings suitable for the different bat species requirements. Enhancement of hibernation site areas.	Minor adverse initially. Enhancement of the hibernation sites is likely to provide positive benefits over time.
		Altered behaviour due to changes in night light levels and/or tree flight lines.	Roosting areas and dispersal routes to remain dark. Low level lighting/ use of directional down lighters. Tree lines between roosts and foraging areas retained with new trees planted where necessary.	

		Disturbance, damage and/or destruction of bats and/or their habitat post development	Distribution of educational material. Information signage by the nature reserve and Martello tower. Controlled public access to ancient monuments. Appropriate management of tree/ scrub habitats for bats. Monitoring of hibernation sites and created roosting sites.	
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Table 8. 16: Summary of residual impacts on other species/ habitats of note (invertebrates, birds and SPA)

Ecological Receptor	Impact significance no mitigation/ compensation	Impacts	Mitigation/ compensation	Residual impact after mitigation/ compensation.
Invertebrates	Moderate negative	Disturbance, damage or destruction of invertebrates and/or habitats.	Protection of important invertebrate sites. Retention of scrub and dead wood on site. Appropriate management of tree/ scrub/ grassland/ bare ground habitat for invertebrates.	Minor adverse.
Birds	Major negative	Disturbance, damage and/or destruction of birds and/or their habitat during construction	Execute works outside of bird breeding season. Undertake checks for nesting birds. Public access prevented to retained building with barn owl. Provision of barn owl boxes.	Minor adverse
Birds	Major negative	Disturbance, damage and/or destruction of birds post development (people & pets)	Use of paths to guide walkers; signage, dogs on leads during breeding season. Distribution of educational material. Appropriate management of tree/scrub/ grassland habitats for birds	Minor adverse
SPA	Major negative	Disturbance, damage and/or destruction of habitat during construction	No vehicles to enter the SPA. Access points to St Edwards Drive cordoned off. All waste water (storm and foul water) will be discharged to the main sewerage system. Measures taken to ensure no leakage of fuel or chemical onto the site. Materials available for emergency clean up of spills.	No impact
	Moderate negative	Increased recreational pressure	Distribution of educational material. Signage.	No impact

- 8.5.63. The proposed development presents a number of ecological impacts considered to be of major or moderate significance that are likely to be of concern. However these impacts can be reduced through licensed protected species exclusions, translocation, creation or restoration of habitats with greater ecological value than those affected by the proposed development, and appropriate long-term habitat and species protection and management.
- 8.5.64. It is concluded that if ecological mitigation and compensation is carefully and fully executed, the benefits of these processes will outweigh the ecological drawbacks of the proposed scheme. The long-term management plan for the site, in particular will ensure that the ecological resource at proposed development site, and its environs, are maintained in a sustainable fashion.

9. Ground Conditions

9.1. Introduction

- 9.1.1. This chapter addresses the potential effects the proposed development may have on the land contamination of the site and surrounding area. Consideration is given to the impacts associated with potentially contaminated land and groundwater during ground preparation, construction and the operational phases of the development. The chapter addresses the need for mitigation measures and identifies the nature of any residual impacts that may arise.
- 9.1.2. The chapter describes the assessment criteria and methodology, the baseline conditions currently existing at the site, the potential environmental effects, mitigation measures, and likely residual effects after these measures have been put in place.

9.2. Assessment Methodology and Criteria

- 9.2.1. The assessment of ground conditions has involved the review of available information, including data from previous ground investigations conducted by CARD. This information has been used to generate a site specific model of baseline conditions at the site. The baseline conditions have been assessed with reference to the proposed development in order to evaluate the short, medium and long term impacts anticipated during ground preparation, construction and operation.
- 9.2.2. The following data sources have been reviewed:
- Ordnance Survey Map³²
 - Ordnance Survey historical maps dating from 1888 - 1997³³
 - Geological Survey of England and Wales, Sheet 48³⁴
 - Borehole logs from British Geological Survey database³⁵
 - National Rivers Authority Groundwater Vulnerability Map³⁶

³² Ordnance Survey Map. 1: 50,000.

³³ Historical Maps including County series 6" Sheet 89 NE, Ordnance Survey historical maps dating from 1888-1997

³⁴ Geological Survey of England and Wales, Sheet 48 NE, 1" to 1 mile. 1882. Crown copyright.

³⁵ British Geological Survey. Records from borehole database. Borehole National grid reference: TM2439 3460

- Public records available from the Environment Agency³⁷

9.2.3. Site walkover inspections were conducted by CARD in 2001.

9.2.4. The intrusive investigation, conducted by Card Geotechnics, was undertaken in August 2001 and January 2002, in general accordance with the requirements of BS5930:1999³⁸ and BS10175³⁹. The investigations comprised of:

- 25 No. trial pits (TP1-TP25) excavated to a depth not exceeding 4.6m bgl in August 2001, and
- 38 No. trial pits (TP1A to TP38A) excavated to a depth not exceeding 4m bgl in January 2002.

9.2.5. An exploratory hole location plan is presented within Figures 9.1 and 9.2.

9.2.6. Representative soil and groundwater samples were retrieved during the site investigation for laboratory analysis. At the time of the intrusive investigation the scope of the testing was determined with reference to ICRCL 59/83 Guidance note – Guidance on the assessment and redevelopment of contaminated land⁴⁰.

9.2.7. Various technical guidance documents have been produced in the UK for the assessment of ground conditions. At the time of the investigation at the site the key documents for assessment included:

- Contaminated Land, Department of Environment, Transport and the Regions (DETR) Circular 02/2000⁴¹
- Circular on intervention values for soil remediation. Ministry of Housing, Spatial Planning and Environment, The Netherlands⁴²

³⁶ National Rivers Authority. 1995. 'Policy and Practice for the Protection of Groundwater. Groundwater Vulnerability Map. Sheet 33. East Suffolk.' 1:100,000. Crown copyright

³⁷ Public records available from the Environment Agency. 'What's in Your Backyard?' <http://www.environment-agency.gov.uk/maps/> and 'Recorded pollution incidences within a 1km radius

³⁸ British Standards Institute. 1999, Code of Practice of Site Investigations. British Standard 5930:1999

³⁹ British Standards Institute. 2001. Investigation of Potentially Contaminated Site – Code of Practice. British Standard 10175:2001

⁴⁰ Department of Environment Food and Rural Affairs. 1987. ICRCL 59/83 Guidance note – Guidance on the assessment and redevelopment of contaminated land. (2nd Edition).

⁴¹ Department of Environment Food and Rural Affairs. 2000. DETR Circular 02/2000. Contaminated Land: Implementation of Part IIA of the Environmental Protection Act 1990. HMSO.

9.2.8. Current documents include:

- Contaminated Land, Department of Environment, Transport and the Regions (DETR) Circular 02/2000⁴¹
- Contaminated Land Research Reports (CLR) 6-11⁴³
- Contaminated Land Advice Notes (CLAN) 1/02 and 2/05⁴⁴
- R&D Publications TOX1 to TOX25⁴⁵
- Science Reports SGV1 to SGV16⁴⁶

9.2.9. The Government's objectives for contaminated land are set out in DETR Circular 02/2000. These are:

- To identify and remove unacceptable risks to human health and the environment;
- To bring damaged land back into beneficial use; and
- To ensure that the cost burdens faced by individuals, companies and society as a whole are proportionate, manageable and economically sustainable.

9.2.10. Science Reports SGV1 to SGV16⁴⁶ set out Soil Guidance Values (SGVs) for different land uses, which are screening values, below which the risk to human health is considered to be tolerable or minimal. SGVs are generic assessment criteria for the assessment of human health risks from contaminated land and include a number of precautionary assumptions. Exceedance of a SGV indicates that further assessment is required and that remediation may be necessary.

⁴² Ministry of Housing, Spatial Planning and the Environment. 2000. Circular on Target Values and Intervention Values for Soil Remediation. DBO/07494013, 9th May 1994. Bilthoven, The Netherlands: Ministry of Housing, Spatial Planning and the Environment.

⁴³ Department for Environment, Food and Rural Affairs and the Environment Agency. 'Contaminated Land Research Reports (CLR) 6-11'. HMSO.

⁴⁴ DEFRA. Contaminated Land Advice Notes (CLAN) 1/02 ('Withdrawal of ICRCL Guidance Note 59/83 (2nd Edition)' and 2/05 ('Soil Guideline Values and the Determination of Land as Contaminated under Part IIA')

⁴⁵ Department of Environment, Food and Rural Affairs and the Environment Agency. 'R&D Publications TOX 1 to TOX 25'. Environment Agency.

⁴⁶ Science Department for Environment, Food and Rural Affairs and the Environment Agency. 'Science Reports SGV1 to SGV 16'. Environment Agency

- 9.2.11. As it is intended to develop the site with mixed residential and leisure facilities with associated areas of soft landscaping and hardstanding, the chemical results have been reassessed against the SGVs for the 'residential without plant uptake' land use category. Currently these guidelines are only available for a select number of substances, namely: arsenic, cadmium, chromium, selenium, nickel, lead, inorganic mercury, toluene, ethylbenzene and phenol.
- 9.2.12. The chemical test results have also been compared to the values given in the Sludge Regulations⁴⁷. These regulations provide pH-dependent limiting concentrations for a number of contaminants and are intended for use in evaluating the suitability of sludge applied to agriculture soils. They are useful in assessing the general risk to plant growth posed by phototoxic metals within the soil.
- 9.2.13. Where published UK guidance values are not available, the results have generally been compared to Generic Assessment Criteria (GAC) for human health, which have been published by CIEH⁴⁸ and derived using the same methodology as the SGVs. Where CIEH values are not available the site specific values, SSVs published by Atkins⁴⁹ using 'ATRISK' model have also been included for assessment purposes, where applicable.
- 9.2.14. Where historic PAH data required assessment, screening is carried out against the Dutch⁵⁰ intervention values, derived using a risk based model for both human and ecotoxicological effects. As the value is not based on UK endorsed protocols, definitive conclusions may require further detailed testing and assessment.
- 9.2.15. Assessment against the risk based assessment criteria, i.e., SGVs, GAC, SSVs etc. is carried out at the 95th percentile on the sample mean (designated US₉₅), which is considered to represent a reasonable worst-case scenario.
- 9.2.16. At the time of the investigation groundwater contamination results were compared to Dutch Target Levels⁵¹. Groundwater results have been reassessed for the purpose of the Environmental Statement and were compared to the more current

⁴⁷ HMSO. 1989. 'The Sludge (Use in Agriculture) Regulations, 1989'.

⁴⁸ CIEH Generic assessment criteria for human health risk, LQM/CIEH 2006.

⁴⁹ ATRISK^{SOIL} – www.atrisksoil.co.uk

⁵⁰ Circular on Target values and intervention values for soil remediation DBO/1999226863, Ministry of Housing, Spatial Planning and the Environment Agency, The Hague, 4th February 2000.

⁵¹ Dutch Guidelines, 1994. Environmental Quality Guideline in the Netherlands – A review of environmental quality objectives and their policy framework in the Netherlands. Risk Assessment and Environmental Quality Division, Directorate for Chemicals, External Safety and Radiation Protection, Ministry of Housing, Spatial Planning and Environment, The Hague, The Netherlands, 1994.

Environmental Quality Standards (EQS) for freshwater⁵² due to the proximity of the River Stour and the River Orwell. The values have also been compared to the EC Drinking Water Values⁵³; however the site does not lie within a groundwater Source Protection Zone for drinking water.

9.3. Baseline Conditions

Geological Conditions

- 9.3.1. A review of published geological maps indicates that the site is underlain by superficial Glacial Sand and Gravel (Kesgrave Sand and Gravel) overlying London Clay.
- 9.3.2. The intrusive investigations at the site have generally confirmed the published geology.
- 9.3.3. There is Made Ground of variable thickness and composition across the site, with a maximum thickness of 1.8m. The variable Made Ground generally comprised of topsoil, demolition rubble and backfill comprising clay, sand and gravel with fragments of brick, concrete, slate, metal, wood, plastic, charcoal, pipe and glass. There were also some areas where the Made Ground comprised of white chalk with flints and areas of tarmacadam bound road surfacing.
- 9.3.4. The Kesgrave Sand and Gravels, when encountered, generally comprised of loose to medium dense variably clayey and silty sands with some gravels. At the contact with the London Clay, some areas consisted of medium dense sand cemented by precipitated iron. This horizon has a thickness between 0.5m and 4.75m.
- 9.3.5. The London Clay encountered was typically a firm to stiff, occasionally very stiff slightly silty clay with some sand partings. London Clay was encountered at depths between 0.2mbgl and 4.4mbgl. Due to the final depths of the trial pits London Clay was only proven to 4.6mbgl.

Hydrology and hydrogeology

- 9.3.6. The proposed development site is bordered to the south by the River Stour and to the north by the River Orwell.

⁵² Environment Quality Standards (EQS) for freshwater. List 1 and List 2 Substances. EC Dangerous Substances Directive (76/464/EEC).

⁵³ EC Drinking Water Values. The Water Supply (Water Quality) Regulations 2000. In accordance with EC Directive 98/83/EC.

- 9.3.7. The groundwater vulnerability map for the area (Ref. 9.5) indicates that the site lies on a minor aquifer of intermediate leaching potential. This is related to the sand and gravels, and indicates that pollutants have the potential to move through the surface deposits, and the deposits have little ability to attenuate diffuse pollutants.
- 9.3.8. Groundwater was encountered within the Kesgrave Sands and Gravels at depths between 1.0mbgl and 3.8mbgl. The groundwater was generally encountered as seepages. Minor perched waters were noted within the Made Ground at 1.75m.

Site History

- 9.3.9. The Ordnance Survey (OS) County Series map of 1888⁵⁴ shows the site to be agricultural fields. The B1456 Shotley to Ipswich Road is present and leads to the Bristol Arms Inn. The only other development is Bricker's Cottage to the north west of the site. A well is also located on the site (where the hospital is located in the 1902 map).
- 9.3.10. The 1902 OS map records the site as the Royal Naval Training Establishment. The topography of this period matches that of current plans and the steep section near the marina is shown as tree cover. A cricket ground, pavilion, and gymnasium are all shown to occupy the northern and central areas of the site. There is also a hospital to the south of the site which appears to be the largest structure present. The hospital is dated as being built in 1900 from Royal Naval Records held within the Records Office⁵⁵. Septic tanks are present on the south-eastern edge of the site.
- 9.3.11. The 1924 to 1925 OS map shows continued development of the Naval College with numerous building structures within the site. Two water towers are shown as cylindrical structures and are consistent with those of the present day. These are recorded on later surveys as Martello Towers, but are unlikely to be so, and correspond to the 1909-1915 records of Shotley's new water supply from Public Records Office documents⁵⁴. Further documentation describes the failure of cast iron water mains at HMS Ganges in 1948⁵⁴.
- 9.3.12. No significant changes are recorded within the site between the mid 1920s and the mid 1970s.

⁵⁴ Historical Maps including County series 6" Sheet 89 NE, Ordnance Survey historical maps dating from 1888-1997

⁵⁵ The National Archives, Public Record Office, Kew, Richmond, Surrey. PROCAT catalogue references. References: ADM 116/568; ADM 116/1256; ADM 249/812; Work 43/438/22, 25 and 23; WO 78/2776, 4174 and 4051; ADM 178/74.

- 9.3.13. The 1989 OS map shows a significant reduction in the number of buildings and site clearance within the site. A hotel and marina have been constructed to the east of the site replacing a chapel and sports ground.
- 9.3.14. Records and plans showing towers and batteries (gun emplacements) which protected Orwell Haven and Harwich to the south of the River Stour are kept at the Public Records Office two of which are dated as 1863 and 21.09.1883⁵⁴. Records of the National Rifle Association Imperial Challenge Shield Competition⁵⁴ indicate that rifle use may have taken place on the site in the 1930s.

Ground Contamination

- 9.3.15. Investigations have indicated the presence of elevated concentrations of metals and polycyclic aromatic hydrocarbons (PAH) generally in the Made Ground, or in the very near surface natural soils, at the site.
- 9.3.16. An isolated hotspot of elevated concentrations of copper has been identified in the east of the site. The concentration is not elevated enough to cause harm to human health but is at a level which is phytotoxic to plants.

Groundwater contamination

- 9.3.17. Analysis of groundwater from the Kesgrave Sands and Gravels aquifer has shown that only low concentrations of contaminants are typically present.

9.4. Potential Effects

- 9.4.1. The desk study and supplementary intrusive investigations have confirmed the presence of elevated concentrations of contaminants within the Made Ground, and near surface natural soils, at the site.
- 9.4.2. The following sensitive receptors have been identified:
- Construction workers
 - Neighbours
 - Future users of the site
 - Flora and fauna
 - Underlying aquifer
 - Surface water

- Building structures and services

9.4.3. The site contamination will only pose a risk to these receptors if there is a pollution linkage (pathway) between the source of the contamination and the receptors. A source-pathway-target model has been used to evaluate the magnitude and significance of environmental risks posed by ground contamination.

9.4.4. The predicted impacts during the preparation and construction phase are summarised in Table 9.1 below. The magnitude and the significance of the impacts has been assessed pre-remediation and pre-mitigation, taking into account the nature of the intended development.

Table 9.1: Predicted impacts (preparation and construction phase)

Aspect	Description of impact	Extent				Duration & Nature	Type	Significance
		L	D	R	N			
Population	Health problems for construction workers from contact with contaminated soil	*				S to L, IR	Adverse	Moderate
	Health problems for neighbours from deposition of contaminated dusts and/or vapour release	*				S to L, IR	Adverse	Minor
Resources	Loss of soil through disposal to landfill ¹	*				L, IR	Adverse	Minor

Reduction in groundwater quality from infiltration of water through contaminated soil	*	*			S to M, R	Adverse	Minor
Reduction in surface water quality (River Stour and River Orwell)	*	*			S to M, R	Adverse	Minor

Key: Geographical Extent (L=Local, D=District, R=Regional, N=National, I=International)
Duration & Nature (S=Short term, M=Medium term, L=Long term, P=Permanent, R=Reversible, IR=Irreversible)

9.4.5. The predicted impacts during the operational phase are summarised in Table 9.2 below. The magnitude and the significance of the impacts has been assessed pre-remediation and pre-mitigation, taking into account the nature of the intended development.

Table 9.2: Predicted impacts (operational phase)

Aspect	Description of impact	Extent				Duration & Nature	Type	Significance
		L	D	R	N			
Population	Health problems for occupiers from contact with contaminated soil, water and soil gases	*				L, IR	Adverse	Moderate

	Health problems for maintenance workers from contact with contaminated soil	*			S to L, IR	Adverse	Moderate
Flora & Fauna	Difficulty establishing healthy vegetation at the site	*			L, R	Adverse	Moderate
Resources	Reduction in groundwater quality from infiltration of water through contaminated soil	*	*		L, R	Adverse	Minor
	Reduction in surface water quality (River Stour and River Orwell)	*	*		L, R	Adverse	Minor
Structures	Deterioration of buried concrete from sulphates in the ground	*			L, IR	Adverse	Minor
	Deterioration of buried pipes and permeation of contaminants	*			M to L, IR	Adverse	Moderate

Key: Geographical Extent (L=Local, D=District, R=Regional, N=National, I=International)
Duration & Nature (S=Short term, M=Medium term, L=Long term, P=Permanent, R=Reversible, IR=Irreversible)

9.5. Mitigation Measures and Residual Effects

- 9.5.1. Mitigation measures should be incorporated into the development scheme to reduce the potential for negative impacts to occur and to promote long-term beneficial impacts.

Re-use of excavated soils

- 9.5.2. Soil may be excavated during the preparation and construction phases and where possible, some of the arisings should be re-used within the development. Re-use of the arisings will reduce the amount of material disposed to landfill and will limit vehicle movements.

Above ground storage tank removal

- 9.5.3. Removal of the above ground tanks at the site will be required. Any associated impacted soils surrounding the tanks will be excavated and removed off site for disposal to a suitably licensed landfill facility.

Disposal of surplus soils

- 9.5.4. Where ever possible material will be re-used on site. However, surplus soils will require off site disposal. Chemical testing has indicated that the Made Ground comprises of non-hazardous waste. Surplus soils will be disposed to an appropriate, licensed landfill facility.

- 9.5.5. From October 2007, non-hazardous waste must be pre-treated prior to disposal. Pre-treatment is required to reduce the volume, to reduce the hazardous nature and to facilitate handling and/or to enhance recovery.

Isolation of residual contamination

- 9.5.6. The proposed building structures and areas of hardstanding will form a physical barrier above the residual soils, which will prevent the future site users from coming into contact with the soils. The hardstanding will also reduce infiltration and thereby limit migration of contaminants into the underlying aquifer. In addition, substantial quantities of Made Ground and near surface natural soil will be removed during the preparation and construction phases.
- 9.5.7. Some areas of open landscaping are proposed, therefore an engineered capping layer should be provided. This capping layer would comprise a layer of clean topsoil/subsoil, which will act as a barrier above the underlying soils and provide a

growth medium for site vegetation. Imported soil should only come from an approved source and should be tested to ensure that it is clean prior to delivery to site. A local source should be used, where possible, to minimize vehicle movements.

Protection of services and buried concrete

- 9.5.8. Residual organic contamination may have a negative impact on buried pipes, resulting in deterioration of the pipes and permeation of contaminants. This would then have a negative impact on the site users. This can be mitigated by utilising appropriate pipe material in accordance with guidance provided by WRAS⁵⁶. Pipes should be formed from copper, ductile iron or polythene/aluminium compound (PE/AL/PE) that will prevent deterioration. Polyethylene pipes should not be used at the site.
- 9.5.9. The potential for long-term negative impacts on buried concrete from pH value and sulphate conditions can be controlled through an appropriate concrete mix design.

Residual Impacts and Conclusions

- 9.5.10. If the above mitigation measures are implemented, there should be no significant, adverse residual impacts from contamination. There may be minor adverse impacts during the preparation and construction phase (e.g. localised dust and vapour release and loss of soil to landfill), however these can be managed and kept to a minimum and are not considered to be significant.
- 9.5.11. The removal of areas of high contamination would represent a benefit to the site, the groundwater and by extension the surrounding district. The residual impacts after mitigation are summarised in Table 9.3 and 9.4 below.

⁵⁶ The Selection of Materials for Water Supply Pipes to be laid in Contaminated Land. Water Regulations Advisory Scheme. October 2002. No. 9-04-03. Issue 1.

Table 9.3: Predicted impacts (preparation and construction phase, post-mitigation)

Aspect	Description of impact	Mitigation Measure	Residual Impact				Significance		
			Extent	Duration & Nature	Type				
			L	D	R	N			
Population	Health problems for construction workers from contact with contaminated soil and water	1.Implementation of site safety procedures 2.Use of suitable PPE	*				S to L, IR	Negligible	-
	Health problems for neighbours from deposition of contaminated dusts and/or vapour release	Good site practice	*				S to L, IR	Adverse	Minor
Resources	Loss of soil through disposal to landfill ¹	Treatment and reuse of contaminated soil	*				L, IR	Adverse	Minor
	Reduction in groundwater quality from infiltration of water through contaminated soil	1.Hard-standing development 2.Capping on development	*	*			S to M, R	Negligible	-
	Reduction in surface water quality(River Stour and River Orwell) from contaminated run-off	Good site practice	*	*			S to M, R	Negligible	-

Key: Geographical Extent (L=Local, D=District, R=Regional, N=National, I=International)

Duration & Nature (S=Short term, M=Medium term, L=Long term, P=Permanent, R=Reversible,

IR=Irreversible)

Note: 1 – Impact applies where contaminated soil intended for off-site disposal

Table 9-4 Predicted impacts (operational phase, post-mitigation)

Topic Area	Description of impact	Mitigation Measure	Residual Impact				Significance		
			Extent	Durati on & Natur e	Type				
			L	D	R	N			
Populati on	Health problems for occupiers from contact with contaminated soil, water and gases	1.Capping 2.Contamina ted soil removal during construction	*				L, IR	Negligibl e	-
	Health problems for maintenanc e workers from contact with contaminated soil and water	1.Soil remediation 2. Contaminat ed soil removal during construction 3.Protection of services	*				S to L, IR	Negligibl e	-
Flora & Fauna	Difficulty establishing healthy vegetation at the site	Imported topsoil in landscaped areas	*				L, R	Negligibl e	-
Resourc es	Reduction in groundwater quality from infiltration of water through contaminated soil	Capping and general development	*				L, R	Negligibl e	-
	Reduction in surface water quality (River Stour and River Orwell)	Capping and general development	*	*			L, R	Negligibl e	-
Structur es	Deterioratio n of buried concrete from sulphates in the ground	Use of appropriate concrete design mix	*				L, IR	Negligibl e	-

	Deterioration of buried pipes and permeation of contaminants	1. Use of appropriate pipe material (e.g.copper, ductile iron).	*				M to L, IR	Negligible	-
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Key: Geographical Extent (L=Local, D=District, R=Regional, N=National, I=International)

Duration & Nature (S=Short term, M=Medium term, L=Long term, P=Permanent, R=Reversible,

IR=Irreversible)

Conclusion and Summary

- 9.5.12. The detailed design of the mitigation measures should be agreed with the regulators and inspection visits should be undertaken during construction to ensure that the measures are being carried out in compliance with the agreed protocol.
- 9.5.13. Prior to the works, a Remediation Method Statement will be prepared which will detail the mitigation measures to be carried out. A Validation Plan will also be prepared, which will detail the type and frequency of inspection visits, the information to be provided and the testing to be undertaken, Following the mitigation works, the information obtained during the visits will be incorporated into a Validation Report, which will be made available to the regulatory authorities of evidence of works conducted at the site.

10. Landscape and Visual

10.1. Introduction

10.1.1. This chapter sets out the findings of the landscape and visual assessment (LVIA) for the proposed redevelopment of the site. Specifically the assessment has:

- Reviewed the planning documentary context of the site;
- Assessed local site circumstances, especially the features and character of the site and their setting in landscape terms;
- Assessed what views are available to/from the site and the way in which the site is seen in it's landscape context;
- Reviewed the development proposals for the site⁵⁷ and;
- Assessed the effects of the development in landscape terms, on the character, features and fabric of the townscape, and the views available towards it.

10.2. Assessment Methodology and Criteria

10.2.1. This assessment also considers any likely cumulative effects arising from the reuse or potential redevelopment of the buildings and land within this wider area in the knowledge of the 2003 outline planning application for this wider area (B/03/01085/OUT).

10.2.2. It has also been considered relevant to consider the cumulative effects of an extant outline planning permission for 150 houses at Shotley Marina granted in 2000 (B/91/00723/OUT). This site was further granted reserved matters approval in 2005 including the siting, design and external appearance of the dwellings (B/03/01744/RES). It is understood that the permission allows for development in 2 areas:

- The 'Marina Frontage' comprising 67 dwellings in four blocks over three to four storeys behind the marina basin at the base of the cliff and immediately below the Scheduled fort, and

⁵⁷ EDP has given consideration to the following plans made available to the planning team by 28th June 2007:

- Clague Drawing 18504A/102 'Overall Site layout';
- BUJ Architects Drawing 662 SK 060919 'HMS Ganges - Survey Plan' (September 2006);
- Savills Drawing 'Scoping Figure 1.1' (marked 'Reserved Matter Red Line').

- The 'Peninsula Housing' comprising 83 dwellings in houses and apartments over three storeys at the northern end of the marina basin.
- 10.2.3. From a preliminary review of the plans accompanying this application⁵⁸, it is understood that the design of the Marina Housing is contemporary with external materials including facing brickwork, render and horizontal timber cladding, powder coated steel detailing and significant areas of glazing. Approximately 1ha of public open space around the Martello Tower M (to the north east of the application site) is proposed.
- 10.2.4. Proposed access to the marina requires the developer to provide a link road to the B1456 across the HMS Ganges site (through the application site).
- 10.2.5. The north easter part of Shotley Fort lies within the Marina Housing Land and there is no requirement to address the preservation of the Fort or the Cannot Wall.
- 10.2.6. The LVIA assessments are conducted in accordance with the principles set out in:
- (i) Landscape Assessment Guidance for England and Scotland published by the Countryside Commission and Scottish Natural Heritage in May 2002 (reference CAX 84); and
 - (ii) Guidelines for Landscape and Visual Impact Assessment (second edition) produced by IEMA in 2002.
- 10.2.7. The scope of the assessment has involved the following core activities:
- A review of relevant planning policy related to landscape and heritage issues. This includes a desktop study and web search of relevant background documents, maps and aerial photography. Where possible, information has also obtained information about relevant landscape-related designations such as Tree Protection Orders, Conservation Areas and parks and gardens listed on English Heritage's Register of Listed Parks and Gardens and Listed Buildings;
 - Desktop study of relevant LPA publications and relevant landscape character assessments for the proposed development and surroundings. Field assessment of the character and fabric of the proposed development and its surroundings;
 - Photographic survey and visual appraisal of the proposed development site and its surroundings, including consideration of views available to and from the Site (the field survey was undertaken during the summer months and so has not

⁵⁸ EDP was provided with Wincer Kievenaar Partnership drawing 2999/12 showing the proposed layout of buildings on the Marina.

been undertaken in full accordance with published best practice which advises that, wherever possible, field survey should be undertaken in winter months when visibility is at it's best. However, for the reasons given later, the timing of the field assessment is not considered to materially affect the overall conclusions regarding the landscape and visual effects of the proposed development);

- A review of proposals for the re-development of the site;
- Analysis of the landscape and visual effects arising from the development and informed professional judgements about the significance of those effects based on the nature of receptors, the magnitude of change and the sensitivity of the receiving environment;
- Summary and conclusions.

10.2.8. A comprehensive glossary of landscape terms and definitions is given in Appendix 10.1. A full description of the methodology is provided in Appendix 10.2.

10.3. Baseline Conditions

10.3.1. An appreciation of the significance in landscape terms of any development starts with an understanding of the planning context within which any such development is to be tested for its acceptability. The statutory development plan which applies to the site is the Babergh Local Plan Alteration No. 2 (2006).

10.3.2. A review of relevant planning policy and landscape designations focuses on Local Plan policy since such policy is more specific to the site. The Suffolk Structure Plan 2001 and the East of England Plan (timetabled for publication in August 2007) are also relevant but not considered to be at odds to the landscape related policies set out in the Local Plan. It should also be noted that recently published revised national guidance in the form of PPSs; any superseding or overriding policies not identified in Development Plan policy have been identified and considered.

10.3.3. The visual assessment further considers potential effects to sites to the north and south of the estuary (Suffolk Coastal District Council and Tendring District Council). A brief review of policy has confirmed that landscape sensitivities are consistent with those covered by Babergh local plan policy and therefore no separate assessment has been made.

Policy Review

- 10.3.4. The site boundary is illustrated on Figure 8.1. EDP have conducted a data trawl of relevant landscape designations, with the following findings:

Landscape Designations

- 10.3.5. The proposed development site (indicated on Figure 8.1) lies adjacent to the Suffolk Coast and Heaths Area of Outstanding Natural Beauty (AONB). Planning Policy Statement 7 (Sustainable Development in Rural Areas, 2004) contains policies pertaining to the sustainable development of rural areas and so, in the main, is not relevant to this assessment. However, the statement also contains policy relevant to maintaining the quality of the rural environment and nationally designated areas. Paragraph 21 of PPS7 notes that:

“Nationally designated areas comprising [inter alia] ...AONBs have been confirmed by the government as having the highest status of protection in relation to landscape and scenic beauty.”

- 10.3.6. There is no reference within PPS7, the statute or local plan policy (Policy CR02) regarding development within the visual setting of such designated areas. However, it is accepted that consideration should be also given to development which has the potential to affect the visual context of those areas. On site visual appraisal indicates that the existing site is partially visible from areas of the AONB to the east and west of the River Orwell.
- 10.3.7. Rural landscapes are protected generally through Policy CR1. More specifically, the *“unique character and ecology of the Stour and Orwell estuaries”* is recognised by Policy CR19 of the Local Plan.
- 10.3.8. There are no Special Landscape Areas (as identified in the local plan) affected by the proposed development.

Listed Buildings and Scheduled Ancient Monuments

- 10.3.9. Policies CN10 and CN27 of the Local Plan refers to development within the setting of Listed Buildings⁵⁹ and Scheduled Ancient Monuments⁶⁰ (SAM's) respectively.

⁵⁹ To be considered in the context of S66(1) of the Planning (Listed Buildings and Conservation Areas) Act 1990 – ‘...shall have special regard to the desirability of preserving the building or its setting or any features of special architectural or historic interest which it possesses’.

⁶⁰ Ancient Monuments and Archeological Areas Act 1979; PPG 16, paragraphs 8 and 27.

There are understood to be three Grade II listed buildings within the vicinity of the application site. Two of these are also SAM's, with a third SAM located in the central/ north-eastern part of the site (as identified on Figure 6.1);

10.3.10. The **ceremonial mast** (LB No. 6/54) originating from HMS Cordelia lies approximately at the centre of the site (TM 248 338). Erected in 1907, this 43m mast is visible from areas to the north and south of the Stour and Orwell estuary although is rarely visible from the Shotley peninsula itself due to intervening topography and vegetation. It is, however, clearly visible from School Road at the existing entrance to the HMS Ganges site.

10.3.11. **Martello Tower L** (LB No. 6/55 and SM 202) originates from the Napoleonic War and was built between 1810 and 1812. The building lies in the southern part of the application site at approximately TM 248 336. The structure has been heavily modified from its original form with the addition of a water tower, signal cabins and a signal mast. The physical extent and immediate setting of this structure is uncertain due to the level of land forming which has occurred in the intervening years. It is understood that the structure was originally encircled by a moat and outer glacis.

10.3.12. **Martello Tower M** (LB No. 7/56 and SM 203) lies approximately 50m outside of the north-eastern edge of the application site (TM 251 341). Built at the same time as Martello Tower L, the structure has also been greatly modified with a water tower placed on top. It should however be noted that this Martello Tower is outside the application boundary.

10.3.13. **Shotley Fort** (SM 30638) is located in the central area of the application site at approximately TM 250 339. It is understood that the fort was built to defend Harwich Haven and originally comprised a seven-sided wall and outer ditch. As with Martello Tower L, the physical extent and immediate setting of the fort is unknown although the extent of the Scheduled Ancient Monument is believed to have been configured to the line of the outer ditch⁶¹.

10.3.14. These features have been assessed in respect of their sensitivity, setting and proposed landscape treatment within the overall layout and design.

Conservation Areas

10.3.15. There are no conservation areas within close proximity to the application site. Potential impacts resulting from increased levels of traffic on the B1456 are considered in **Chapter 6** of this ES (Archaeology and Cultural Heritage).

⁶¹ GIS records obtained from the National Monuments Record (NMR) in Swindon.

Other Issues

10.3.16. The site does not materially affect the qualities or amenity of any sites on the English Heritage Register of Parks and Gardens of Historic Interest. Public Rights of Way are similarly not considered to be directly affected by the proposed development although views from all public vantage points and protected landscapes are considered through the visual assessment.

Landscape Character

10.3.17. Landscape Assessment is comprised of a study of two separate but inter-linked issues:

- **Landscape character** is the physical makeup and condition of the urban environment. It arises from a distinct, recognisable and consistent pattern of physical and social elements, aesthetic factors and perceptual aspects.
- **Visual amenity** is the way in which the site is seen; views to and from the site, their direction, character and sensitivity to change.

10.3.18. This section addresses landscape character issues; visual amenity issues are addressed in the following.

10.3.19. This section summarises any relevant published landscape assessments which contribute to a better understanding of the site's landscape character context. Such assessments provide a helpful contextual understanding of the site's landscape character, but rarely deliver an adequate site-specific assessment of landscape character. This requires a site-specific landscape character assessment, which has also been undertaken and which is described below.

Sub-regional Character Assessment

10.3.20. The landscape of England has been subject of a nationwide Landscape Character Assessment. The Countryside Agency, in conjunction with English Nature, produced 'The Character of England: Landscape, Wildlife and Natural Features' which divides the English countryside into 159 separate Countryside Character Areas (CCA's).

10.3.21. The site lies on the southern edge of CCA 82 – Suffolk Coast and Heaths (relevant extracts of which are included at Appendix 10.3) the main features of which include:

- *“Largely unspoilt mosaic of estuaries, saltmarsh, grazing marsh, reedbed, river valleys, arable, heath and woodland, with strong coastal influence, e.g. shingle spits and ridges resulting from longshore drift.*
- *Large commercial ports of Harwich and Felixstowe and seasonal influx of yachts to the rivers and harbours provide interest and variety of scale along the estuaries, with influence of seabirds, wind and intertidal mud flats.*
- *Sparsely settled, with small nucleated villages and isolated farmhouses. Brick buildings with colour washed walls and pantiles as typical features.*
- *Coastal towns and villages form the focus of tourist activity, especially where combined with sailing.*
- *Impact of major development: Felixstowe docks, Sizewell nuclear power stations and the associated infrastructure, and military bases.”*

10.3.22. The assessment picks up on the busy influence of marine traffic on the Stour and Orwell estuaries and notes that:

“The natural harbour formed at the confluence of these two rivers has had a major impact on the visual appearance of the estuaries and inland, as both river and road transport developed to further trade. The historic industrial influence of the Stour navigation is now lost amid cricket-bat willows and meadows, but Harwich, Felixstowe and Ipswich have all developed as important commercial ports.”

10.3.23. In considering the future of the wider landscape, the CCA notes that the redevelopment of former military facilities is likely to have a significant impact although the nature of these effects is not discussed. In this broad context, the landscape sensitivities are considered to be the character and identity of small nucleated villages on the peninsula and the focus of tourist activity around Shotley Gate.

County and District Character Assessment

10.3.24. Landscape Character studies are underway at both the County (Suffolk) and District (Babergh) levels. These studies are incomplete and not available for public use.

Historic Character Assessment

10.3.25. An interpretation of the history of Shotley Gate and the HMS Ganges site, based on historic map regression and SMR references is presented in Chapter 6 of this ES (Archaeology and Built Heritage). The evidence suggests that the origins of the

settlement related to a ferry crossing to Harwich. The 1926 map further illustrates that the main residential areas of Shotley Gate were constructed subsequent to the naval training base which at one time constituted the only built form and infrastructure across the majority of the application site.

Landscape Character Assessment

- 10.3.26. An extensive site visit was conducted during June 2007 in clear weather conditions. The individual elements of the site were noted, as was the condition of features thereon. Differences in the composition and the character of the site's physical components were noted as well as their sensitivity to and ability to accommodate change.
- 10.3.27. The application site occupies approximately 16.6ha within the HMS Ganges former naval training base. At its north-western corner (adjacent to B1456) the site reaches over 23m AOD falling to approximately 3.5m in the south west corner adjacent to King Edward VII Drive. The site has a gently sloping aspect broadly to the East, occupying the majority of the tip of the peninsula. The topography of the site is illustrated on Figure 10.2.
- 10.3.28. Road access from the site is along School Road and thence the B1456 and Ipswich; the road providing the main access to the 'mainland' from the peninsula. The site is currently closed to the public although offers the potential for extensive and high quality views of Harwich Harbour.
- 10.3.29. The proposed development site contains a significant number of semi-derelict buildings within a transient landscape setting containing extensive areas of foundations and building waste, remnant garden and landscaped areas, former road networks and historic remains (principally, Shotley Fort and the Martello Tower). The development history of buildings on site appears to be complex, with a significant complex of hospital, educational and military structures occupying various parts of the site. However, it is clear that at one time or another the great majority of the application site has been developed, particularly in the south.
- 10.3.30. Semi mature vegetation on site provides likely ecological value, particularly for reptiles (a detailed description of the nature and distribution of habitats on site is contained in Chapter 8). The nature and extent of grassland, scrub and semi-mature trees is considered to be temporary due to the rate of growth of invasive pioneer species and the destructive management practices required to control them. A long term solution is clearly needed to ensure a sustainable and productive use of the site alongside the important heritage and ecological features identified thereon.

- 10.3.31. The application site and the wider HMS Ganges complex contains a significant number of mature trees which vary greatly in species, location and orientation but generally serve to add structure and definition to the various parts of the site. There are also a number of Scots Pines on site; these specimens are of particular importance, being typical of the heathland landscapes of the wider regional context. However, there are also trees within and adjacent to the Scheduled Ancient Monuments which are causing damage to those structures and should be removed where possible.
- 10.3.32. There are no water bodies on site which are considered to be significant in landscape terms.
- 10.3.33. The application site boundary is irregular within the wider HMS Ganges site.
- 10.3.34. **To the north**, the proposed development site is bordered by a public footpath and hedge line which generally follow the higher ground on the tip of the peninsula. Beyond the hedgerow, the land falls away into the open fields and reclaimed farmland of the Orwell estuary (the Suffolk Coast and Heaths AONB). The farmed landscape to the north is of high landscape quality and value and is furthermore well visited, the riverside walk forming part of the Stour and Orwell Walk National Route.
- 10.3.35. **To the east and south**, the proposed development site is bordered by lands associated with Shotley Marina and its access road, King Edward VII Drive. In the north east corner, the application site boundary follows rising land immediately to the rear of the main Marina. As described in Section 2, it is understood that this land has an extant permission for residential development. Further south, the application site boundary closely follows the line of King Alfred VII Drive although there is a margin of steeply rising wooded scrub and grassland between. Shotley Marina is well utilised by both patrons and visitors alike, offering views across Harwich Harbour and pedestrian connectivity between the Stour and Orwell valley's (the Stour and Orwell Walk National Route). The Harbour is likewise heavily used by both recreational and commercial traffic although it is the later which dominates the estuary with some of the largest ports in the UK to the north and south of the river mouth.
- 10.3.36. **To the west**, the proposed development site loosely borders Shotley Gate, a community of approximately 600 residents in approximately 300 dwellings with a variety of small community and tourist facilities. To the south west, the application site boundary follows the eastern edge of Bristol Hill Caravan Park, a well wooded and visually enclosed private community. North of this lies Battery Lane and School

Lane, both of which provided access to the HMS Ganges site from the village. A number of residences and converted flats (including the Old Schoolhouse, refurbished in 1987) face the HMS Ganges site across School Lane. However, the majority of the buildings and land immediately to the east of School Lane lies outwith the application site and screen significant parts of the proposed development area. Between Shotley Gate Stores and Post Office and Gate Farm Road (on the B1456), the application site boundary runs behind existing large buildings on site (largely screening the application site) and through open grassland to the road.

Interim Conclusions in Respect of Landscape Character

- 10.3.37. The application site lies within the former naval training facility of HMS Ganges and is contiguous with that area. The site has very limited intervisibility with immediately adjoining areas (see Section 4) and is considered to be capable of accommodating significant change through redevelopment. As such, the site offers considerable opportunity to improve the fabric of the landscape through the removal of incongruous features, the introduction of a long term land use and the provision of a landscape setting for the benefit of users and the public. There are also opportunities for greater public access and increased permeability for local residents and visitors alike through the provision of new public open space and in providing connectivity between the Marina and Shotley Gate.
- 10.3.38. Valued elements on site include the abundance of mature trees, which greatly screen views of the remaining buildings and general developed nature of the application site. It is considered that tree cover should be retained wherever possible within and adjacent to the application site.
- 10.3.39. Water tanks atop the Martello Towers form prominent and unusual landmarks, particularly from and across the Harbour waters. The historic elements of these towers are important historic references although their original and intended form is disfigured by the water storage features and would benefit greatly from their removal. The leaking water tanks have been found to damage the structure of the original fortifications. The setting of these structures is considered to extend both to their immediate landscape situation, their visual connectivity with Harwich Harbour and their visual connectivity with each other as originally intended in their placement.
- 10.3.40. The existing form of Shotley Fort represents a significantly altered aberration from the original 1860's structure. Development associated with the naval training facility,

two World Wars and subsequent neglect have left their impression on the Fort. The original Carnot line and defensive ditch which mark the physical extent of the site are now extremely difficult to discern, lying partly outside of the proposed development site. Although sensitive due to its historic value, the structure would benefit greatly from a degree of restoration and the redefinition of the original line of the defences. The Fort is currently well vegetated and it is understood that the underground battery provides a significant resource for bats. It is therefore likely that any eventual landscape design will need to carefully consider the needs of the protected species alongside those for the preservation and enhancement of the structure itself.

- 10.3.41. It is recognised that the analysis of landscape character and sensitivity to change should be considered beyond the site boundary where appropriate. The application is bound by law to the red line agreed with the original outline permission.

Visual Amenity

- 10.3.42. This section describes the views available to and from the site, their distribution, character and sensitivity to change. EDP has conducted an assessment of the views available to and from the site by walking and driving, as appropriate, local roads, public open spaces and rights of way.
- 10.3.43. The best practice guidance (cited in paragraph 1.9 of this report) recommends that such assessments are carried out in the winter months. Given the degree of tree and hedgerow cover both within and adjacent to the site, it is accepted that this represents a shortcoming of the assessment. However, the views available to and from the HMS Ganges site are principally affected by the topography and consideration has been given to the influence of leaf cover from all locations. Overall, it is not considered that the timing of the site visit substantially affects the conclusions of this assessment.
- 10.3.44. The 'visual envelope' (VE) of a site is the area of land from which all or part of the site can be seen. The VE of a site is normally greater in winter (when trees have no leaves) although in practice, buildings and perennial vegetation greatly limit the views available at all times.
- 10.3.45. Within the VE, there are many different views of the proposed development site. The distribution of the best and most significant views is illustrated on Figure 10.3 while the views themselves are shown in Figures 10.4 to 10.16. These viewpoints have been selected to best represent the variety of views available from public vantage points towards the site. The VE of the application site has been established

through a combination of computer modelling and an on-the-ground visual appraisal from potential vantage points in the local area (see table 10.1 below).

Table 10.1: Representative Views

	Reference and details	Reason for selection
Y	Photoviewpoint 1 – Bathside Bay <i>Approximately 1.85km south of application site boundary.</i>	Long views across Harwich Harbour from main north facing residential areas of Harwich (Dovercourt).
Y	Photoviewpoint 2 – Harwich Quay <i>Approximately 1.25km south east of application site boundary.</i>	Long views across Harwich Harbour from central landward side and ferry internode (Outer Part of Town Westward).
Y	Photoviewpoint 3 – Orwell Estuary <i>Approximately 680m north of application site boundary.</i>	Views of Harwich Harbour and Shotley Peninsula from Area of Outstanding Natural Beauty (AONB).
Y	Photoviewpoint 4 – Footpath north of application site <i>Outside of but adjacent to northern edge of application site boundary.</i>	Close views of northern side of application site from within Area of Outstanding Natural Beauty (AONB) and from Stour and Orwell Walk.
Y	Photoviewpoint 5 – Shotley Marina (AONB) <i>Approximately 200m north west of application site boundary.</i>	Middle distance views of the northern edge of the application site from Stour and Orwell Walk (within AONB). Martello Tower 'M' is clearly visible.
Y	Photoviewpoint 6 – B1456/Great Harlings <i>Approximately 70m north west of application site boundary.</i>	The B1456 forms the principal route to Shotley Gate. Upon entering the village, the application site (proposed entrance) adjoins the road.
Y	Photoviewpoint 7 – B1456/ Kitchener Way <i>Approximately 225m west of application site boundary across the open land.</i>	The western boundary of the HMS Ganges site affords views across grassland to the application site.
Y	Photoviewpoint 8 – B1456/ Caledonia Road <i>Outside of but adjacent to application site boundary.</i>	Existing access to HMS Ganges site from B1456. Neighbouring residences along Caledonia Road and School Road
Y	Photoviewpoint 9 – School Road <i>Outside of but adjacent to application site boundary.</i>	From the southern end of School Road (adjoining Battery Lane) there are views into the application site towards Martello Tower 'L'.
Y	Photoviewpoint 10 – King Edward VII Drive <i>Approximately 20m south of application site boundary.</i>	Steeply rising ground behind the Marina access road offers glimpses of buildings on the application site.

	Reference and details	Reason for selection
Y	<p>Photoviewpoint 11 – Laundry Road Entrance</p> <p><i>Approximately 55m south east of application site boundary.</i></p>	<p>Steeply rising ground behind the Marina access road offers glimpses of buildings on the application site (Including on of the only glimpses of Martello Tower ‘L’ from the waterfront.</p>
Y	<p>Photoviewpoint 12 – Shotley Marina Ferry Terminal</p> <p><i>Approximately 125m east of application site boundary.</i></p>	<p>Views across Shotley Marina to steeply rising ground leading to Shotley Fort.</p>
Y	<p>Photoviewpoint 13 – Shotley Marina North</p> <p><i>Approximately 270m north east of application site boundary.</i></p>	<p>Views across Shotley Marina to steeply rising ground on the Peninsula and Martello Tower ‘M’.</p>

10.3.46. Views are typically experienced along a continuum from local routes, open spaces and vantage points and have therefore been grouped into the following categories which broadly cover the main geographical areas from which the application site is visible.

10.3.47. **Y Viewgroup 1: Harwich Harbour and Town.** From the water, and in views across the water, the gentle topography of the Shotley Peninsula appears well vegetated, although clearly suggests a relatively high degree of human occupation and activity. Shotley Marina and other waterside infrastructure towards the village infer that the Shotley Gate area is intimately connected to the marine environment; the positioning of the Martello Towers reflecting the strategic position of the site in defending the harbour. The application site occupies a significant extent of the tip of the peninsula, from the coastal strip to the highest ground - although this slight rise in ground levels is overborne by the physical dominance of large trees on and around the application site. Several of the large buildings associated with the naval training base are visible from various locations to the south of the estuary (Figures 10.4 and 10.5).

10.3.48. From the southern side of the harbour, the application site is visible approximately from Parkeston (Harwich International Port) around Bathside Bay to the Quay at ‘Outer part of town Westward’. The views are enjoyed by a large number of local residents, visitors and workers. The greatest sensitivity is inherent on those persons living in positions with vantage over the bay (mainly restricted to residences to the south of Bathside Bay) and tourists enjoying the character of the quayside environment at the northern tip of Harwich. The later group extends to recreational sailors operating in the harbour area and users of the foot ferry which runs between

Ha'penny Pier at Harwich to Shotley Marina. These views are considered to be of **medium sensitivity** to development on the application site due to the intervening distance and large scale industrial activities operating from Parkeston and Felixstowe.

- 10.3.49. **Viewgroup 2: Orwell Estuary.** The Orwell estuary is an extremely high quality visual environment due to the natural and historic farming influences which have combined to create a highly characteristic experience for residents and visitors alike. Within the designated area, there is little evidence of recent development although the activities of man have undoubtedly left a significant impact on the fabric and appearance of the landscape. Only the tops of buildings and vegetation at the northern end of the application site are visible from the AONB (Figures 10.6 to 10.8). The water tower atop Martello Tower 'M' provides a local landmark demarcating the strategic vantage offered by the end of the peninsula.
- 10.3.50. Limited parts of the application site are visible from both the east and west of the Orwell as far as the bend in the river west of Trimley St Mary where the Stour and Orwell Walk National Route runs along the waterside. There are also longer distance views from Fagbury Cliff (behind Felixstowe container port) and west facing parts of Trimley St Mary. These views are mainly enjoyed by local residents and visitors walking along the water frontage and are considered to be of **medium/ high sensitivity**, reflecting the acknowledged visual quality and designated status of the AONB, the scope of views of the application site, and the existing presence and condition of structures on the applications site.
- 10.3.51. **Viewgroup 3: Shotley Gate.** From the north, the north western corner of the application site runs adjacent to the **B1456 south of Gate Farm Road**. In this location, the application site is significantly screened by the dense and tall hedgerow although the situation would be materially altered with the introduction of a roundabout and new access to the HMS Ganges site as proposed (Figure 10.9). Further south, between Kitchener Way and Lower Harlings, boundary vegetation becomes less profuse and the viewer is afforded views across fields (tall grassland at the time of visiting) to buildings associated with the former training facility (Figure 10.10). From **Caledonia Road** (itself within the application site) the large pillars and cast iron entrance gates to HMS Ganges allow views into the application site and further south, there are further views across open space to Martello Tower 'L' (Figure 10.11). Bristol Hill Park (private) prohibits further public views of the site and it is considered likely that the mature hedgerow and other intervening vegetation

prohibit significant intervisibility between the Park and the application site to the east.

10.3.52. Views of the application site from Shotley Gate are greatly limited due to topography, intervening vegetation, and built form on the HMS Ganges site. These eastwards views are generally of medium/low quality, the boundary treatment and buildings on the HMS Ganges site reflecting the utilitarian nature of the site and the intention to keep the public out of the site. Viewers are principally restricted to local residents either within their homes or moving about the village. Drivers on the B1456 are engaged by the road corridor and are unlikely to focus on the application site. These viewers are considered to be of **medium/ low sensitivity** to changes affecting the visual context of the application site.

10.3.53. **Viewgroup 4: Shotley Marina and King Edward VII Drive.** King Edward VII Drive runs from the bottom of Bristol Hill to Shotley marina along the sea defence at the base of the cliff. Despite the close proximity of vantage points there are very limited views of the application site, principally due to topography, but also mature areas of vegetation. To the south, Martello Tower 'L' provides a visual reference in a number of locations although even this is only glimpsed through trees (Figures 10.13 and 10.14) Further north around the Marina the reclaimed area also shares very limited views of the application site as, despite being set back from the cliff, the increased scale of the steep bank below Shotley Fort hides any views of land or buildings beyond (Figures 10.15 and 10.16).

10.3.54. Views of the application site from Shotley Marina and its approach road are extremely limited due to intervening topography and vegetation. Viewers include tourists and users of the Marina who are principally there to enjoy the scenic value of the Harbour and coastline. These views are considered to be of **medium/ low sensitivity** due to the focus of views (outwards onto the Harbour and along the coastline) and limited visibility of the site or buildings thereon.

Interim Conclusions in Respect of Visual Issues

10.3.55. The application site occupies rising ground on the end of the Shotley Peninsula. A combination of topographic, vegetative and built features combine to greatly limit views of the site from public vantage points within immediately adjoining areas within the village of Shotley Gate, the waterfront and Marina and the Orwell Estuary to the north (designated as an Area of Outstanding Beauty). From neighbouring areas, views of the application site constitute views of mature vegetation and overmature boundary hedgerows with glimpses of built form (although the majority

of buildings within the HMS Ganges site visible from Shotley Gate do not form part of the application site). In this context, the application site is relatively unconstrained in visual terms and capable of accommodating a significant degree of redevelopment within the general footprint of extant buildings and vegetative framework.

10.3.56. A significantly greater degree of visibility can be experienced from the waters of Harwich Harbour and Harwich; with distant views also likely from areas around Felixstowe. From these locations, the application site appears in the context of existing redundant buildings on the HMS Ganges site (significantly screened by mature trees and vegetation on site) and the wider setting of the settlement of Shotley Gate. The application site is considered to be potentially capable of redevelopment without visual harm from these wider locations subject to appropriate limits on building heights and the retention of mature trees and other vegetation which provide screening and continuity with the well wooded appearance of Shotley Gate.

10.4. Potential Effects

10.4.1. This section contains a description of the development followed by the assessment of effects and preliminary conclusions in respect of landscape and visual matters.

10.4.2. Some of the above ground 20th Century buildings, structures and infrastructure within the application site will be demolished and crushed for reuse as hard core substrate within the **site clearance** phases – the Martello Tower and ceremonial mast are to be retained and integrated into the layout.

10.4.3. **Ground levels** will largely be consistent with existing levels across the site (base heights have been taken from existing ground levels for the purposes of assessment and for producing verified views). The proposed buildings are no more than 3-storeys in height with the majority at 2 storeys. This situation is broadly similar to the existing HMS Ganges buildings located on other parts of the masterplan area.

10.4.4. **Access** will be taken from a roundabout interconnecting with the B1456 in the north western corner of the site (south of Gate Farm Road) and from the existing access and the proposed link road to the marina.

10.4.5. The **landscape** setting will likely be cleared of the majority of debris and accessible foundations. Where appropriate, subsurface structures may be retained *in situ* with suitable top soil treatments to allow for amenity landscape areas. Open areas are

expected to be open or wooded grassland. The nature of the grassland is expected to vary from manicured amenity areas to long grassland with features suitable for the retention of ecological value (hibernacula for the retention of reptile populations).

- 10.4.6. Outside of the proposed housing areas, trees are to be generally retained within the landscape. Exceptions to this may include the removal of scrub and trees around and on top of the Scheduled Ancient Monuments where root growth may cause damage to the structure of those features. The existing hedges on the northern boundary of the proposed development site, including the TPO trees, will be retained and supported by further planting. It has been recommended that new tree planting (with native trees of local provenance if available) be considered in combination with the visual and ecological proclivities of the site.
- 10.4.7. Within the proposed housing areas, there will be a degree of tree loss although there have evidentially been attempts to retain large specimens wherever possible. The current layout plans illustrate that there is a significant quantity of tree planting proposed within and adjoining the housing areas.

Landscape and Visual Assessment

- 10.4.8. This section describes the anticipated effects of the proposed development and assesses the significance of those effects in landscape terms. A fuller explanation of the assessment process is given in Appendix 10.2. For brevity and simplicity, the assessment process is summarised below.
- 10.4.9. The objective of the process described in this Section is to determine whether the proposed development will have any 'significant' effects on the character of the landscape and the visual amenity of those looking at it. The assessment process combines objective methodology and subjective professional judgement.
- 10.4.10. The effects of a proposed development on the character of the landscape and on visual amenity can be positive, neutral or negative⁶². A landscape effect is considered to be 'significant' if the effect is moderate/major or greater. 'Significance' is a product of the sensitivity of the receiving environment combined with the magnitude of the change experienced.
- 10.4.11. The anticipated effects of the development proposed are summarised below for landscape character effects and visual effects respectively.

⁶² It is for this reason that the term 'effects' is used and not 'impacts', since the use of the word 'impact' tends to imply a negative effect.

Significance of Effects on Landscape Character

- 10.4.12. The baseline study has identified that the majority of the 20th Century buildings and infrastructure associated with the former HMS Ganges site is of little landscape value. Subject to the satisfactory resolution of ecological matters (protected species), the proposed removal of such buildings within the application site is not considered to result in the loss of important landscape features and the provision of a long term and sustainable land use will partially restore the functionality of the former naval training base adjacent to the settlement of Shotley Gate.
- 10.4.13. **Open areas** currently contain a number of mature trees, scrub and over-mature grassland over building debris and foundations. Whilst these areas have recognised existing ecological value, a long term solution is required which offers public and private open space for the public whilst preserving ecological value and wider visual sensitivities in the future. Following the removal of some of the existing structures and debris (which is likely to be an extremely destructive process), it is envisaged that the combination of amenity grassland and rough grassland, with appropriate structures provided for reptiles, will provide long term landscape solutions to the mutual benefit of biodiversity, new residents and visitors to the site.
- 10.4.14. The retention, replacement and reinforcement of **tree belts** across the site should be given further attention in the consideration of the scheme as these features serve an important function in screening existing and proposed built form, and in preserving the sparse wooded character of Shotley Peninsula in views across Harwich Harbour. The proposed development will retain the majority of trees on the application site and will not affect vegetation on the southern and eastern sides of the HMS Ganges site which significantly screen the development area and characterise the wooded nature of the Peninsula. Whilst the current level of information is sufficient to assess the likelihood of significant landscape and visual effects (the proposed areas of built form encroaching onto the footprint of a limited number of trees), it may be necessary for the decision making authority to consider a request for further information in order to assess the value and protection of trees within the wider landscape subsequent to the agreement of a detailed landscape scheme.
- 10.4.15. **Public access** to open areas offers a substantial benefit pursuant to the implementation of the proposed development. The application site is currently not generally experienced by visitors or residents and so the perceived landscape harm is limited to those accessing the site for maintenance purposes (and occasional

training exercises). However, there are key features on site, principally the Martello Tower and Shotley Fort, which have the potential to offer residents and visitors a valuable resource through a greater understanding of the historical military significance of the Peninsula whilst enjoying the views associated with their strategic positioning across Harwich Harbour. The significant expanse of open space potentially available within the application site and wider HMS Ganges site offers the further potential for a significant landscape/ parkland resource.

10.4.16. The Scheduled Ancient Monument of Shotley Fort is to be retained and enhanced within the site layout. A 10m undeveloped buffer area around the perimeter of the designated boundary in order to provide a construction safety margin and landscape setting to the feature. The Management Plan will seek to address a number of issues in relation to the Fort including:

- Requirements of protected species and habitats;
- Identification of the precise boundary of the fort;
- Nature and extent of surviving historic fabric;
- Deterioration in the condition of surviving historic fabric;
- Conservation and protection of original features, fixtures and fittings; and
- Landscape setting and public amenity.

10.4.17. The exact measures to be employed in realising these objectives are yet to be defined as further survey work will be required to determine the exact extent of the Fort (this is described further in the Management Plan). However, the restoration of the Fort is considered to be a significant benefit of the proposed development. The proposals will transform the Fort from a publicly unknown, physically damaged and deteriorating structure into a visitor attraction and local resource capable of offering public enjoyment for the long term, alongside the conservation and better understanding of a historical feature. The management plan addresses the key issues and identifies a sustainable solution for the integration of the Fort within the HMS Ganges redevelopment.

10.4.18. To the south of the application site, **Martello Tower 'L'** is also to be retained and enhanced through the redevelopment proposals. The boundary of the Scheduled Ancient Monument extends not only to the limits of the building but also to the encircling area which encompasses the remains of the glacis at the outer edge of the moat. The scheme design closely follows the edge of the Scheduled Ancient Monument boundary with a minor access road and footpath with further public open space beyond the road. It is considered that the design offers a compromise

between the efficient use of space and providing a landscape setting to the potential extent of the wider earthworks beyond the moat (which have now largely been removed by past development). Careful consideration will be needed to ensure that the construction of the encircling road and footpath does not compromise the physical integrity of the outer moat wall.

10.4.19. The Management Plan addresses the following issues in relation to the Martello Tower:

- Requirements of protected species and habitats;
- Long term stability and integrity of the structure; and
- Landscape setting and public amenity.

10.4.20. It is understood that the building contains habitat for a number of bat species. The environmental conditions (moisture and temperature) are further understood to be responsible for the presence of these species and the maintenance of these conditions is therefore paramount (see Chapter 8).

10.4.21. The original Martello Tower forms only the base of the current structure. It has been recommended that the water tower and associated brick structure be removed to restore the 18th Century Tower to its original proportions. This proposal will result in the loss of not only the water tower (serving as a local landmark), but also the signal cabins and mast on the southern side which once guided boats into the estuary. Whilst the loss of these features could be seen as undesirable, it is considered that the substantial benefit of restoring the Tower outweighs the loss and ensures its longer term integrity. (Furthermore, it is considered likely that in the medium term this work would be required anyway as the condition of the water tower and cabins deteriorated beyond repair.)

10.4.22. The immediate landscape setting of the Martello Tower has been considered in the scheme design through the retention of open space within the Scheduled Ancient Monument boundary and through the set back and orientation of buildings which reflect the circular symmetry of the Tower. The intervening space allows for the appreciation of the Tower and its vantage across Harwich Harbour towards Dovercourt. The Management Plan outlines recommendations for the clearance and enhancement of the moat and glacis for both visual and conservation objectives. These measures will allow visitors and residents to enjoy the Martello Tower in a formal setting, integrated within the development area and thenceforth forming an extremely desirable feature within the local streetscape.

- 10.4.23. The wider setting (constituting the vantage for which the Tower was originally intended) is restored through the removal of the water tower and signal cabin and the retention of the view splay to the south and southeast. It is understood that a line of sight will be retained between the Tower and Shotley Fort or Martello Tower 'M'.
- 10.4.24. No public access to the Martello Tower will be given in order to conserve and protect the original features for the long term. The main building will be secured through the use of gated metal grilles and a further lockable perimeter fence will be installed to deter recreational abuse of the structure.
- 10.4.25. Subject to the recommendations of the Management Plan and further consultation on the exact measures to be employed, the proposed development is considered to offer a high value long term solution for Martello Tower 'L'; this constitutes a significant beneficial effect pursuant to the development.

Conclusions in Respect of Landscape Issues

- 10.4.26. This assessment has identified significant long term benefits to the fabric of the landscape within and adjoining the application site which will follow the implementation of the proposed scheme.
- 10.4.27. Whilst these benefits are tangible, the absence of an equivalent solution for the entirety of the HMS Ganges site suggests that these benefits could be further enhanced through the development of a masterplan for the whole site. It is therefore recommended that the application be considered favourably (in light of outline planning consent B/88/01560/OUT) and comparatively alongside future proposals for the HMS Ganges site and neighbouring areas.

Significance of Effects on Visual Amenity

- 10.4.28. The assessment of individual views is given on Figures 10.4 to 10.16. The assessment of effects is discussed based on geographic areas (Viewgroups) as defined in Section 4.
- 10.4.29. In general terms, visual amenity effects resulting from the construction stages are considered to be consistently adverse as there are few, if any, aspects of the construction process which could be considered positive. These effects will be temporary. Post construction, the scheme has been weighed against the existing context in the determination of the nature (beneficial or adverse) of effects. Generally, the buildings and their landscape setting is considered to be positive. Other issues pertinent to views from different locations within the VE are discussed below.

- 10.4.30. **Y Viewgroup 1: Harwich Harbour and Town.** The assessment found that construction activities would result in moderate to minor adverse effects, principally due to the likelihood of views of cranes and clearance activities and scaffolding during that period.
- 10.4.31. Once operational, an increased density of development will be perceptible on the Peninsula. The new buildings will generally replace, and be seen in the context of, a number of former naval buildings. Being of similar size and scale, these will not attract undue prominence in views across the water. The screening effect of mature trees on the south and east of the site will continue to break up and integrate the development within wider views, and the development will be perceived in much the same way as Shotley Gate further to the west.
- 10.4.32. A minor adverse effect has been identified through the visual assessment. It is considered that the nature of this effect is neutral in respect of the benefits offered by the removal of existing incongruous features and the replacement of a marginally greater extent of development area.
- 10.4.33. **Y Viewgroup 2: Orwell Estuary.** Development and construction activities within the north eastern part of the development site will be visible from various locations along the estuary as far as Trimley St Mary.
- 10.4.34. Temporary moderate (+) to slight effects are expected during the construction and completion of the northern part of the site (adverse and beneficial respectively). New buildings are of a similar scale to the existing structures and therefore are not expected to attract undue attention. However, the extension of built form eastwards towards Martello Tower 'M' will increase the perception of built form on the HMS Ganges site. The visual effect of this extra development is not incongruous within the setting of the developed edge of Shotley Gate (particularly when compared to the scale of industrial development to the north of the estuary) but will require sensitive treatment in the landscape design of the northern boundary.
- 10.4.35. **Y Viewgroup 3: Shotley Gate.** The visual assessment has identified effects of moderate to minor significance along the Shotley Gate/ HMS Ganges interface (adverse and beneficial during construction and operation respectively). In general, the site is well screened due to boundary vegetation, naval training buildings which do not form part of the application, and the aspect of the land which slopes away from the village. The most pronounced effects are considered likely at the proposed entrance to the site south of Gate Farm Road where a new roundabout will affect the character of the B1456 and permit further views in the development. The

existing visual context of the application site from the village is poor – the proposed development will do little to address this as the majority of buildings and intervening spaces lie outside of the application site boundary. However, effects are considered to be generally positive with perception (both direct and indirect) of increased activity on the HMS Ganges site following a prolonged period of inactivity and neglect.

10.4.36. **Y Viewgroup 4: Shotley Marina and King Edward VII Drive.** From the marina and access road, the proposed development is not likely to be visible from the majority of areas. There may be glimpses of rooflines in some locations, and the removal of the water tower from Martello Tower 'L' will reduce the perception of built form on the site. Despite this, there will likely be visible evidence of increased activity on site through increase activity and interconnectivity with the site.

10.4.37. Effects of minor adverse to negligible significance have been identified from these areas.

Conclusions in Respect of Visual Issues

10.4.38. 'Significant' visual effects are considered to be moderate to major or higher (see Appendix 10.2). Despite the size and aspect of the application site, it is particularly well concealed by topography, vegetation and built form – no significant effects (either positive or negative) have been identified as a result of the proposed development. Where moderate and minor adverse effects are likely, these are not pronounced and are capable of conciliation with sensitive landscape design and retention of mature trees.

Cumulative Effects

10.4.39. The advantages of redeveloping further buildings and land associated with the former HMS Ganges site have been referred to above. Whilst the redevelopment of the entirety of the site would increase the visibility of redevelopment activities from Shotley gate, it is considered that the potential advantages of redeveloping the wide site are overwhelming in delivering a long term solution for the former naval training base.

10.4.40. The permitted scheme for new residential development at Shotley Marina has a number of implications for the consideration of the proposed scheme. The scale and location of the proposed development will be prominent around, and in views of, the Marina. It will also form a strong visual marker on the western termination of the Orwell Estuary and will be prominent in views from the AONB (Stour and Orwell

Walk). The uncompromisingly modern architecture will stand in contrast to the residential scale and traditional materials of Shotley Gate. It is not considered that there will be any direct landscape or visual conflict between the development proposals, the character of each befitting the context; the Marina development will strongly connected (both physically and in character) to the yachting and boating activities with the proposed development forming a extensive residential scale settlement pattern contiguous with Shotley Gate).

10.5. Mitigation Measures and Residual Effects

- 10.5.1. Details of the construction methodology and programme are set out in Chapter 5. It is recommended that a form of construction management plan be agreed with the Planning Authority so as to secure a range of primary mitigation measures recognising best practice in modern construction techniques. It is inherent in the use of Planning Conditions that issues specific to landscape and visual effects, best practice site management, maintenance and housekeeping will be implemented to minimise visual effects during the demolition and construction works. Such measures may include the erection of suitable site hoarding and protective screening although the obviously incongruous sight of tall cranes is an unavoidable consequence of modern construction practices and mitigation of such effects is unlikely.
- 10.5.2. The design builds on previous design development for the site. Landscape and visual issues have been extensively analysed and tested against planning policy in devising a scheme which addresses a number significant environmental issues. EDP has been involved in the design process since April 2007 and has contributed to, and been witness to, a number of design alterations addressing setting, visual and arboriculture issues. A significant degree of mitigation of effects has therefore been considered in the evolution of the scheme and is therefore reflected in the assessment above.
- 10.5.3. No specific monitoring is proposed for landscape and visual effects following completion of the proposed development although construction activities and the implementation of a suitable landscape scheme are presumed to be subject to monitoring by the planning authority to ensure adherence to agreed standards and works.

- 10.5.4. The scheme has been designed around conservation of environmental constraints as recognised by CABI and Housing Corporation guidance. The development proposed will achieve this objective without significant landscape and visual affects.
- 10.5.5. This study has followed best practice guidance appropriate to the level of assessment required. The proposals are not considered to conflict with any landscape issues or designated area policies in national or local development plan policy, specifically policies CN10 and CN27 (historic features) or CN01 and CN02 (landscape character, visual amenity and Areas of Outstanding Natural Beauty) of the Babergh Local Plan.

Table 10.1 Visual Assessment – OPA		Sensitivity	Magnitude		Significance	
			Construction	Operation	Construction (temporary)	Operation
Y VP1	Bathside Bay. View from footpath at Dovercourt	Medium	Moderate/ Slight	Slight	Moderate/ Minor	Minor
Y VP2	Harwich Quay. View from Quay next to Ha'penny Pier	Medium	Moderate/ Slight	Moderate/ Slight	Moderate/ Minor	Minor
Y VP3	Orwell Estuary. View from National Route looking south	Medium/ High	Slight	Slight	Moderate	Moderate
Y VP4	Footpath north of application site. View along northern boundary towards Felixstowe.	Medium/ High	Moderate	Moderate	Moderate (+)	Moderate (+)
Y VP5	Shotley Marina North. View towards Marina and Shotley Gate.	Medium/ High	Slight	Slight	Moderate/ Minor	Moderate/ Minor
Y VP6	B1456/Great Harlings. View towards Gate Farm Road and north west corner of application site.	Medium/ Low	Substantial/ Moderate	Substantial/ Moderate	Moderate	Moderate
Y VP7	B1456/Kitchener Way. View across HMS Ganges site to applications site.	Medium/ Low	Moderate/ Slight	Slight	Moderate/ Minor	Minor
Y VP8	B1456/Caledonia Road. View down existing access road to HMS Ganges.	Medium/ Low	Moderate/ Slight	Slight	Moderate/ Minor	Minor (+)
Y VP9	School Road. View into application site and towards Martello Tower 'L'	Low	Moderate	Moderate	Moderate/ Minor (+)	Moderate/ Minor
Y VP10	King Edward VII Drive. View from shorefront road inland towards application site.	Medium/ Low	Slight/ negligible	Slight/ negligible	Minor	Minor
Y VP11	Laundry Road Entrance. View towards former secondary road access to HMS Ganges site.	Medium/ Low	Slight/ negligible	Slight/ negligible	Minor	Minor
Y VP12	Shotley Marina Ferry Terminal. View across marina to Shotley Fort and towards application site.	Low	Negligible	Negligible	Negligible	Negligible
Y VP13	Shotley Marina North. View across Marina to Martello Tower 'M' and towards application site.	Low	Slight	Slight	Minor	Minor

Y Viewgroup 1: Harwich Harbour and Town
Y Viewgroup 3: Shotley Gate

Y Viewgroup 2: Orwell Estuary
Y Viewgroup 4: Shotley Marina and King Edward VII Drive.

11. Noise and Vibration

11.1. Introduction

11.1.1. This chapter addresses the potential effects of the proposed development on noise in the area surrounding the proposed development site. The assessment includes a summary of the noise environment and identifies mitigation measures where appropriate for significant effects that may arise as part of the proposed development.

11.2. Assessment Methodology and Criteria

11.2.1. This assessment is based on previous work undertaken in April 2003 for another planning application. It has been updated to take account of the changes in the quantum of development and an updated transport assessment.

Background

11.2.2. The likelihood of noise disturbance has been found to be dependent on the degree by which the noise from an activity exceeds a maximum level established by convention or, exceeds the existing sound level in the area by a significant amount. This assessment therefore considers the sound level, or change in sound level, if any, which would occur at the most noise sensitive time of the day or night should the development proceed.

11.2.3. PPS1 'Delivery Sustainable Development' (2005) sets out the Governments' national policies on different aspects of land use planning in England. The content of PPS1 is material to decisions on individual planning applications. In section 19, it notes:

"Planning authorities should seek to enhance the environment as part of development proposals. Significant adverse impacts on the environment should be avoided and alternative options which might reduce or eliminate those impacts pursued. Where adverse impacts are unavoidable, planning authorities and developers should consider possible mitigation measures. Where adequate mitigation measures are not possible, compensatory measures may be appropriate. In line with the UK sustainable development strategy, environmental costs should fall on those who impose them – the "polluter pays" principle."

11.2.4. A noise assessment must therefore include a comparison of predicted noise levels either from a development, or to which a development would be subjected, against objective advice contained in PPG's and other guidance documents. The criteria against which this development must be judged is whether noise generated by the construction and/or

operation of the development would cause “significant adverse impacts on the environment” or harm to the amenities of existing residents or other industrial or commercial users.

11.2.5. In addition to the consideration of the effect of the proposed development on the existing environment it is necessary to consider the effect of existing noise climate on the sensitive elements of the proposed development i.e. the future occupants of the proposed development.

Establishing the Baseline

11.2.6. As part of the previous assessment, a 3-hour noise survey was undertaken at locations around the proposed development site in accordance with the guidance document Calculation of Road Traffic Noise (CRTN). These locations are:

- Receptor Location 1a: Four metres from the kerb of the B1456 at the location of the proposed roundabout to the northwest of the proposed development site.
- Receptor Location 2: On Caledonia Road at the existing old entrance to HMS Ganges facility.
- Receptor Location 3: At the southwestern entrance on Caledonia Road
- Receptor Location 4: On the river frontage at the base of the existing steps.
- Receptor Location 5: On the river frontage at the junction of the of the Marina access road.

11.2.7. Receptor locations 1a and 2 are used as a worst-case for assessing the effects of the scheme on the nearest residential areas. Receptor locations 3 to 5 are used to characterise the site itself and are not considered further.

11.2.8. Noise measurements were undertaken using a Bruel and Kjaer Grade 1 Sound Level Meter Type 2231, which was calibrated before and after use. The calibration did not alter over the period of the survey. The meter was set to record the direct measurement of the following noise parameters:

- L_{A10} : The A-weighted sound level exceeded for only 10% of the time. This is usually used for the assessment of road traffic noise.
- $L_{Aeq,T}$: The A-weighted equivalent continuous sound level over a period of time, T. This is the average sound energy level and is used to describe the ambient sound level in the area.

- L_{A90} : The A-weighted sound level exceeded for 90% of the time. This is usually referred to as the background sound level.
- L_{AMAX} : The maximum A-weighted sound level which occurred during the sample period.

11.2.9. Calibration of this instrument is traceable to national standards through the United Kingdom Accreditation Service (UKAS) system. A more detailed description of acoustic terminology is contained in Appendix 11.1.

11.2.10. These receptor locations have been supplemented by considering the effect on noise that changes in traffic volumes may have at certain junctions assessed in the transport assessment in accordance with guidance in the Design Manual for Roads and Bridges (DMRB). These locations are:

- Receptor Location 1b: At the main access into the proposed development site.
- Receptor Location 6: The junction of the B1456 and Glebe Lane in Shotley Gate.
- Receptor Location 7: The junction of the B1456 and Pin Mill Road in Chelmondiston.
- Receptor Location 8: The junction of the B1456 and Woodlands in Chelmondiston.
- Receptor Location 9: The junction of the B1456 and the B1080 between Woolverstone and Freston.
- Receptor Location 10: The junction of the B1456 and the A137 on the southern edge of Ipswich.

11.2.11. For new residential receptors generated by the proposed development, generic locations are used for the 'northern part of the site' and the 'southern part of the site'.

Construction Noise

11.2.12. PPG24 'Planning and Noise' discusses noise from construction sites by referring to BS5228 Parts 1-4 'Noise Control on Construction and Open Sites' (1987 and updated in 1997). Part 2 of BS5228 is useful in providing a guide to noise control legislation from construction, whilst Part 1 gives basic information together with methods of calculating construction noise levels.

11.2.13. The Control of Pollution Act 1974 gives local authorities powers for controlling noise from construction sites. Section 60 allows a local authority to serve a notice of its requirements for the control of site noise. This notice may include specification of plant that is or is not to be used, hours during which the construction can be carried out, and levels of noise emission. Section 61 allows a contractor or developer to take the initiative and agree with the local authority the methods of construction, steps to minimise noise and hours of work.

11.2.14. BS5228 Part 1 discusses criteria for setting noise control targets. Whilst not stating noise levels for daytime working, BS5228 does state that the acceptability is likely to depend on site location, existing ambient noise levels, duration of site operations, hours of work, attitude of the site operator, noise and vibration characteristics, and effect on buildings.

11.2.15. Taking into account the recommendations contained in BS5228 the existing noise climate of the area and the distance to residential properties, it is considered that an acceptable criteria on the site boundary for daytime operations would be 70dB L_{AeqT} where T is the normal working day of 0800 - 1800 hours Monday to Friday, and 0800-1300 hours on a Saturday. To allow for short term noisy operations, any one hour period during the working day should not exceed 75dB $L_{Aeq,1hr}$ on the site boundary.

Operational Mechanical Plant Noise

11.2.16. The proposed development will not include any substantial mechanical plant. Small air conditioning extractors etc. would have noise emissions limited by standard conditions to ensure the amenity of any nearby properties. As such no significant impact could occur from this source. It is therefore not considered further in this assessment.

Operational Delivery Vehicles

11.2.17. The proposed development includes various facilities that will require deliveries. However, for the most part, these will use smaller flat bed trucks rather than heavy goods vehicles. This is due to the necessary regularity of the deliveries and the road links to the site. As such delivery vehicles are unlikely to make a discernible additional noise to that assessed as part of the general road traffic noise (see below).

11.2.18. Delivery vehicles will likely to operate reversing alarms. There is a general acceptance of the noise this activity may generate so long as it is not excessive and does not occur so often that it almost becomes part of the background noise, or that it occurs during unsocial hours. The level of deliveries is unlikely to be so great that this could occur and therefore the likelihood of this generating a significant adverse effect is extremely unlikely. Therefore it is not considered further in this assessment.

Operational Road Traffic Noise

11.2.19. Annex 1 of PPG24 sets out Noise Exposure Categories (NEC) for new residential development from various sources, including transport sources. The descriptions of each NEC are set out in Table 11.1 below.

Table 11.1: Noise Exposure Categories

NEC	Description
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

11.2.20. Recommended free field noise levels specifically for road traffic are defined in PPG24 and set out in Table 11.2 below.

Table 11.2: Recommended NEC in Relation to Road Traffic

Noise Levels Corresponding To NECs For New Dwellings LA _{eq,T} dB				
Noise source	Noise Exposure Category			
	A	B	C	D
Road traffic:				
0700-2300	<55	55-63	63-72	>72
2300-0700	<45	45-57	57-66	>66

11.2.21. As well as these thresholds, the change in noise may also be significant. PPG24 notes that changes in noise levels of less than 3dBA are not perceptible under normal conditions and changes of 10dBA are equivalent to a doubling of loudness. It is widely accepted that this guidance encompasses changes in noise levels in the LA_{eq,T} index in relation to traffic noise.

11.2.22. Table 11.3 provides criteria that are generally accepted as measuring the significance of noise impacts.

Table 11.3: Noise Impact Assessment Criteria

Change in noise level LA _{eq,T} dB	Response	Impact
<3	Imperceptible	None
3-5	Perceptible	Slight/marginal
6-10	Up to a doubling of loudness	Significant
11-15	Over a doubling of loudness	Substantial
>15	-	Severe

11.2.23. PPG24 makes reference to BS8233 'Sound Insulation and Noise Reduction for Buildings - Code of Practice' (1987, revised in 1999) for general guidance on acceptable noise levels within buildings. Table 5 of BS8233 gives recommendations for indoor ambient noise levels in spaces when they are occupied. For living areas this is a range of 30 to 40dB LA_{eqT} and for bedrooms a range 30 to 35dB LA_{eqT} for 'good' or 'reasonable' conditions respectively. The sound insulation for an open window of 15dBA gives the equivalent external values.

Vibration

11.2.24. Vibration measurements of road traffic movements were carried out using a Bruel and Kjaer 2511 Vibration Meter in 2003. These measurements were taken on the footpath to the rear of noise measurement location 1 discussed earlier.

11.2.25. For vibration as it may affect buildings, the guidance contained in BS7385 Part 2 (1993) is used. For vibration, as it may affect human exposure, the guidance contained in BS 6472 (1992) is used.

11.3. Baseline Conditions

Noise Survey

11.3.1. The existing noise climate at sensitive receptors 1a to 5 is controlled either by road traffic noise or with the background being influenced by noise from the dockyards at Felixstowe and Harwich. Details of the measurements obtained are set out in Table 11.4.

Table 11.4: Results of Noise Monitoring Survey from April 2003 Assessment

Receptor	L _{AMAX}	L _{Aeq}	L _{A90}	L _{A10}	Comments
1a	91.1	63.7	37.5	66.0	Car horn
	82.6	62.2	37.5	64.5	
	80.9	61.9	36.0	64.5	
2	71.4	48.3	37.5	49.5	
3	56.1	44.4	41.5	46.5	Parkestone Quay activity
3	52.7	44.7	40.5	48.0	Parkestone Quay activity
4	70.9	53.3	44.5	55.5	
5	73.8	58.3	47.0	59.0	3 vehicles passing; waves on shore

11.3.2. The results from receptor 1a indicates a typical low traffic flow situation with the L_{A10} and L_{Aeq} noise levels substantially higher than the L_{A90} noise level, which is not the case for the other locations. Receptor 2 is influenced by noise from Parkstone Quay whereas that at Receptors 4 and 5 are influenced by the sound of waves onto the shore.

Vibration Survey

11.3.3. The results of vibration measurements at receptor location 1 due to road traffic were below the instrument threshold values. Vibration levels were therefore:

- Vibration Dose Value (VDV) = < 0.001m/s^{1.75}
- Peak Particle Velocity (PPV) = < 0.1m/s

11.4. Potential Effects

Construction Noise to Existing Receptors

11.4.1. The construction of the proposed development would be likely to require various types of construction and earth moving equipment. Information on likely noise levels from such plant is available from BS5228 Part 1 (1997).

11.4.2. The nearest residential properties to the boundary of the site would be approximately 20m away, on the other side of the B1456 or the mobile home site off Caledonia Road. To achieve the acceptable noise criteria at the site boundary of 70dB LA_{eqT}, plant noise levels at a reference point 10m within the site boundary should not exceed 76dB LA_{eq}. This assumes the plant would be operating for a full day; should the plant be operating for less than this the level could be increased.

11.4.3. BS5228 indicates that much of the plant required in the construction of the development would exceed this criterion without appropriate mitigation. This would result in a significant negative, but temporary, impact.

Operational Road Traffic Noise to Existing Receptors

11.4.4. The potential source of noise from the proposed development is from the additional road traffic likely to be generated. From the traffic predictions provided by JMP Consulting, the change in noise climate due to road traffic can be calculated for the assessment year of 2012. Table 11.5 sets out the results for the AM and PM peak hours, taking into account the predicted traffic flow for the extant Marina permission and the existing lawful residential institutional use for the site.

Table 11.5: Change in Noise Levels Resulting From Increased Traffic from the Proposed Development

Receptor	Road Link	Period	Impact Change	Significance
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1a	B1456 North	AM	+1.6 dB	Imperceptible
		PM	+2.6 dB	Imperceptible
	B1456 South	AM	+0.3 dB	Imperceptible
		PM	+0.4 dB	Imperceptible
2	B1456 North	AM	+1.5 dB	Imperceptible
		PM	+2.4 dB	Imperceptible
	B1456 South	AM	+0.2 dB	Imperceptible
		PM	+0.4 dB	Imperceptible
	Caledonia Road	AM	+2.2 dB	Imperceptible
		PM	+3.5 dB	Slight/Marginal

11.4.5. The B1456 provides the main route to and from the town centre of Ipswich or the A14 trunk road and beyond. It effectively forms the main spine road along the Shotley Peninsular passing through the villages of Woolverstone and Chelmondiston. On its approach to the southern boundary of Ipswich it passes a number of residential properties before its junction with the A137.

11.4.6. JMP Consulting have predicted the traffic flow at the junction of the B1456 and the A137 and also at the junction of the B1456 and the B1080 in the Freston area. Similar predictions have been made for the junction of the B1456 with Glebe Lane, Woolverstone; the Pin Mill Road, Chelmondiston; and Woodlands, Chelmondiston. With this data it is possible to calculate the noise from road traffic at properties along the route both with and without the proposed development.

11.4.7. Houses along the route are located at various distances from the kerb of the road. There are very few immediately adjacent to the road and a number approximately 4m from the kerb with the vast majority further than this from the noise source.

11.4.8. Calculations have been conducted using the CRTN to predict the façade noise levels for properties 4m from the kerb, with a 180 degree view of the road, as illustrated in Table 11.6.

Table 11.6: CRTN Analysis of Receptor Locations 1b, and 6 to 10.

Receptor	Junction	Junction Arm	2012 Predicted LA _{10,18hr}		
			Before	After	Change
1b	Site Access	B1456N	65.5 dB	67.5 dB	+2.0 dB
		B1456S	57.9 dB	58.7 dB	+0.8 dB
6	B1456/Glebe Lane	B1456E	69.4 dB	70.3 dB	+0.9 dB
		B1456W	69.5 dB	70.3 dB	+0.8 dB
		Glebe Lane	-	-	+0.0 dB
7	B1456/Pin Mill Road	B1456E	67.5 dB	68.4 dB	+0.9 dB
		B1456W	67.7 dB	68.6 dB	+0.9 dB
		Pin Mill Road	-	-	+0.0 dB
8	B1456/Woodlands	B1456E	68.2 dB	69.4 dB	+1.2 dB
		B1456W	68.4 dB	69.6 dB	+1.2 dB
		Woodlands	-	-	+0.0 dB

9	B1456/B1080	B1456N	70.2 dB	70.9 dB	+0.7 dB
		B1456E	69.5 dB	70.3 dB	+0.8 dB
		B1080	65.7 dB	66.0 dB	+0.3 dB
10	B1456/A137	A137N	73.8 dB	74.0 dB	+0.2 dB
		A137S	74.3 dB	74.5 dB	+0.2 dB
		B1456	71.4 dB	71.9 dB	+0.5 dB

11.4.9. At no location are the noise levels or the change in noise level such as to meet the requirements of the Noise Insulation Regulations for the award of grants.

Operational Noise to New Residential Properties

11.4.10. Properties most affected by the predicted noise levels would be those nearest to the roundabout junction onto the B1456, those adjacent to the main access road and the link road to the proposed marina development. Table 11.7 provides the results of the CRTN method, using the traffic flows predicted by JMP Consulting for the peak hours, factored for the daily pattern on the B1456.

Table 11.7: CRTN Results for New Residential Properties

Location	LA _{eq,16hr}	NEC Category
Northern Part of the Site	53 dB	A
Southern Part of the Site	57 dB	B

11.4.11. Table 11.1 shows that for areas located within NEC A, noise need not be considered as a determining factor in the planning application. Therefore, the impact on new properties in the northern part of the site is not significant. Areas located in NEC B should be taken into account in determining the planning application; however, this is in relation to ensuring appropriate mitigation rather than the appropriate of residential development in this area. Therefore the impact in the southern part of the site is considered minor/slight but easily mitigated, which is discussed further below.

Vibration

11.4.12. There would be no significant source of vibration during the construction period, assuming conventional construction practices. The majority of residential properties nearest to the development are on the western side of the B1456 a distance of at least 70m. These properties would therefore not be likely to experience any measurable vibration impact during the construction period. Best practice would be needed for the construction of the proposed properties in the southwest corner of the development adjacent to the mobile home park. However, even if this wasn't the case the impact is unlikely to be significant.

11.4.13. Equipment involved in the general operation of the proposed development, such as ventilation plant, would not be a major source of vibration. The distances would be such that any residual ground borne vibration would be attenuated well before reaching residential or other commercial properties.

11.4.14. The result of the vibration survey and predicted traffic flows indicates that vibration due to road traffic would not affect the amenity of future residents or their properties, or any commercial properties.

11.5. Mitigation Measures and Residual Effects

Construction Noise

11.5.1. To achieve the necessary noise levels for construction plant it would be necessary to consider all plant to be used around the site. Due to this requirement and the location, a consent will be sought under Section 61 of the Control of Pollution Act 1974, where it must be demonstrated that the best practicable means of construction are to be used. Contractors would then need to monitor noise levels during the construction phase to ensure the criteria for noise described in the Section 61 Agreement are satisfied.

Operational Road Traffic Noise to Existing Properties

11.5.2. Receptor location 2 is predicted to be subject to a slight/marginal impact. This level of impact is not significant enough to require mitigation, being only just perceptible. Under the requirements of the Noise Insulation Regulations no properties meet the conditions for the award of grants.

Operational Noise to New Residential Properties

11.5.3. Only a minor/slight significant impact was identified to properties proposed in the southern part of the proposed development site. This will be mitigated through appropriate design of the dwellings to ensure internal noise levels set out in BS8233 are achieved. As a result of this the impact would be fully mitigated.

Vibration

11.5.4. Due to the low predicted levels of construction and operational vibration and the intervening distance between the site and the majority of residential properties, no specific vibration mitigation measures are considered necessary.

12. Micro-Climate

12.1. Introduction

12.1.1. This chapter addresses the likely pedestrian comfort and safety within the proposed development site.

12.2. Assessment Methodology and Criteria

12.2.1. The assessment is based on drawing information, covering the main residential areas, understanding that the proposed development will be no greater than 3 storeys in height with no single blocks of large extent in footprint.

12.2.2. The assessment also draws on BMT's considerable professional experience in the assessment of wind effects in the built environment in the UK, including detailed assessment of low-level schemes in relatively exposed locations.

12.3. Baseline Conditions

12.3.1. In the absence of any dominant structures causing downdraughts or strong channelling of winds, it is expected that the pedestrian level wind conditions will generally be dictated by the exposure of the various zones within the masterplan.

12.4. Potential Effects

12.4.1. The residential zones are located along the north and west sides of the site and are generally sheltered from prevailing south-westerly and westerly winds by the existing housing, of similar massing, to the west.

12.4.2. Wind conditions within the residential zones, and along the tree lined avenues, are thus expected to be suitable for at least leisurely strolling and pedestrian ingress/egress to the buildings, although the northern zone is exposed to north-easterly winds, which are common in early spring and bring old dry winds. The proposed development site would thus benefit from a soft landscaping buffer along the northern boundary.

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- 12.4.3. Private garden spaces benefit from hard and soft landscaping which will create suitable conditions for prolonged periods of outdoor seating, particularly for the properties at the south side of the site.
- 12.4.4. The proposed bowling green, situated in the centre and northern parts of the site respectively, are partially sheltered from prevailing south-westerly and westerly winds and are expected to be suitable for such sporting activities.

12.5. Mitigation Measures and Residual Effects

- 12.5.1. The introduction of the buildings and soft landscaping of the proposed development is expected to have a minor beneficial impact on wind conditions due to the increased shelter provided. With the introduction of recreational activities, pedestrians are however expected to be more sensitive to the local wind conditions although this perception may be slightly attenuated by expectation of the wind conditions associated with coastal areas. In order to ensure that the proposed development has no significant impact on the pedestrian level wind environment soft and hard landscaping proposals will be designed in order to provide an appropriate level of shelter.
- 12.5.2. The proposed development is not expected to significantly impact on wind conditions within the surrounding area.

13. Socio-Economic

13.1. Introduction

13.1.1. This chapter addresses the potential social-economic effects the proposed development may have on the area around the proposed development site. The assessment includes a summary of the current conditions found within the area and identifies mitigation measures where appropriate.

13.2. Assessment Methodology and Criteria

13.2.1. The EIA Regulations identify in Schedule 4 the need to describe,

“...aspects of the environment likely to be significantly affected by the development, including, in particular, population...[and] material assets”.

13.2.2. The Good practice guidance for EIA makes further recommendations for the analysis of the effects on ‘Human Beings’⁶³. The guidance recommends that two main topic areas should be considered. The first is an exercise in cross referencing with the rest of the EIA to assemble an overall measure of the impact on human health and well-being. The second covers particular impacts that relate to society or economy, such as population changes and consequent demands on services or the effect on employment and town centre vitality and viability.

13.2.3. Due to the specific nature of the proposed development it is not deemed necessary to assess the impacts on employment and town centre vitality and viability. This is due to both the nature of the development itself, that of a Retirement Village and the location of the proposed development, outside of any secondary or tertiary centres.

13.2.4. The assessment therefore focuses on the need for the proposed development and the potential for significance effects on social infrastructure (namely healthcare and education) associated with it.

⁶³ DETR. (1996). Preparation of Environmental Statements for Planning Projects that Require Environmental Assessment: A good Practice Guide. HMSO

13.3. Baseline Conditions

Demand for Private Retirement Accommodation

- 13.3.1. At the time of the outline planning permission it was estimated that approximately 10 million retired people were living in Britain, with approximately half being owner occupiers. Concurrently, there was a clear trend emerging indicating that an increasing number of people were retiring earlier, often in their 50's.
- 13.3.2. The recession of the 1980's had an adverse impact on the house building market while purpose built housing for sale to the retired was seen as an increasing market⁶⁴. This was an area that was traditionally the provision of charities and local government. Much of this housing was provided on a rental basis and for those groups that were identified as being of housing need. The owner occupier market was neglected in the provision of retirement housing.
- 13.3.3. The current market climate indicates an even greater need for development such as a Retirement Village than at the time of the original outline permission. Between 1961 and 2001 there was an increase in the population aged 65 and over by 51%, with 9.4 million people aged 65 and over at the time of the 2001 Census. Research also shows that there will be more people aged 65 and over than are aged under 16 by 2014 as the average lifespan continues to increase⁶⁵.
- 13.3.4. Figure 13.1 below shows the population predictions per age group and demonstrates that the trend of an aging population. In particular an upward trend can be identified within the 75 and over age group.

⁶⁴ Savills Research

⁶⁵ Joseph Rowntree Foundation "Planning for Continuing Communities: Issues and Good Practice", Robin Tetlow, 2006.

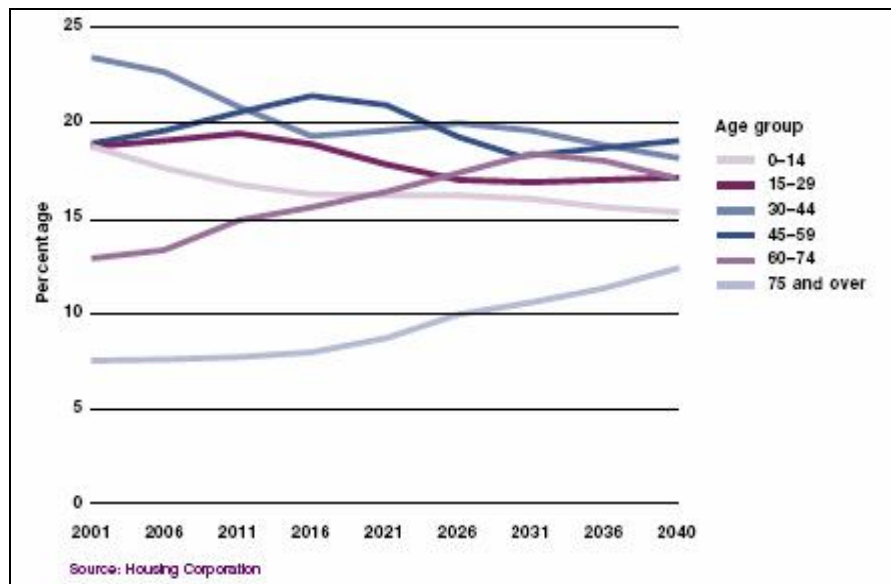


Figure 13.1: Aging Population

(Source: Joseph Rowntree Foundation)

13.3.5. The Between 1991 and 2001, nursing and residential care homes in Great Britain decreased by 11%.

Healthcare

13.3.6. Dr Dineen and Partners serves the peninsula and has 5GPs spread across three surgeries which is estimated to equate to 4.38 full time equivalent GPs. The population of the peninsula according to the 2001 Census is 7,707. This equates to a ratio of 1,760 patients per GP, which compares well to the average ration of 1,800 patients per GP set out in the National GP Contract.

13.3.7. The proposed development site is located within the jurisdiction of the Suffolk PCT, which was formed following the amalgamation of the four Suffolk PCTs in October 2006. Consequently, there is currently no information available on how the PCT is doing in relation to national targets. However, for reference, the previous Suffolk Costal PCT did achieve its target for ensuring that the population could gain access to a GP within 48 hours.

13.4. Potential Effects

13.4.1. In terms of a potential impact of the proposed development there is general acknowledgment that there is a lack of current research in the field. However, the Joseph Rowntree Foundation⁶⁶ concludes that:

“Health and social service providers in host locations may be concerned that the establishment of a retirement village will increase the demands for services in a locality. Concerns about increased demands on health and social services may be overstated, and may be related to whether a village serves a predominantly local population or draws from further afield. How increased numbers of older people translate into demands for services is a key question that is not readily answered by currently available evidence. Evidence does, however, suggest that retirement villages play a role in maintaining and promoting health, provide opportunities for more efficient delivery of community services, and provision of interim and rehabilitative care.”

13.4.2. In the same report it is also suggested that Retirement Villages offer many advantages to service providers, although in some instances it is accepted that these may not be local to the proposed development site.

13.4.3. The total population generated by the proposed development is likely to be less than that of a standard open market scheme. This is because the demographic of the proposed development is focussed on those aged 50 and over, the likelihood of children is very limited. Also, there is a greater possibility of single person occupation. Therefore, given the current healthcare provision on the peninsula is sufficient to meet the needs of the existing population, and that the additional population is likely to be relatively small, the direct effects on existing healthcare services are not likely to be significant.

13.5. Mitigation Measures and Residual Effects

13.5.1. The ‘Planning of Continuing Care in Retirement Communities’⁶⁷ states that:

“...contributions to certain types of provision that are not related to the type of housing being provided, for example children’s play areas and education facilities, should be avoided.”

13.5.2. The Retirement Village is highly unlikely to generate a population that would create an additional demand on school places, therefore no mitigation is proposed.

⁶⁶ Joseph Rowntree Foundation, “Making the Case for Retirement Villages”, Karen Croucher, 2006)

⁶⁷ Joseph Rowntree Foundation “Planning for Continuing Communities: Issues and Good Practice”, Robin Tetlow, 2006.

13.5.3. Given the number of GP practices within the local area and the facilities provided with the proposed development it is not thought that there will be a significant impact on the health care system.

14. Transportation

14.1. Introduction

- 14.1.1. This chapter discusses the transportation conditions prevailing around the proposed development site and changes to those conditions that can be expected to arise as a result of the proposed development.
- 14.1.2. The Reserved Matters application for the proposed development is not accompanied by a stand-alone Transport Assessment (TA) report, as this was not a condition of the outline planning consent granted in September 1997. Typical elements of a TA report, however, are presented in this chapter for information and completeness
- 14.1.3. The chapter provides an overview of the assessment methodology and criteria; it accurately establishes the transport baseline for the site and the surrounding area; it identifies the potential traffic and transport impacts arising from the proposed development and it then identifies potential mitigation measures.

14.2. Assessment Methodology and Criteria

- 14.2.1. This section outlines the methodology and criteria used in the assessment of the potential traffic and transport impacts of the proposed development.
- 14.2.2. It focuses on the operation of the proposed development; but it also considers the potential traffic-related impacts arising from the temporary construction phase.
- 14.2.3. Extensive pre-application discussions with Suffolk County Council (SCC), as Local Highway or Transport Authority have been held. The proposed development was discussed with SCC (as well as BCC) at a meeting held on 24 April 2007. A follow-on meeting with SCC was held on 3 July 2007; meeting discussions included the EIA-based transport assessment of the proposed development. Details are included at Appendix 14.1.
- 14.2.4. Throughout extensive pre-application discussions with SCC, the principal concern has been the potential impact of additional traffic on the operation, safety and environment on the length of the B1456 corridor, from Shotley Gate to its terminus at the A137 / B1456 roundabout junction at Wherstead, with specific reference to the AM Peak (08:00 – 09:00) and PM Peak (17:00 – 18:00) hourly periods.

- 14.2.5. The transport baseline for the proposed development site and the surrounding area (focussing on the B1456 corridor) has been established using both primary and secondary data sources. Details of how the information was gathered and their contribution to the overall assessment methodology are provided below and in the Baseline Conditions section of this chapter.
- 14.2.6. The use of traffic count survey data for specific junctions on the local highway network to accurately establish the baseline has been discussed and agreed with SCC. SCC has confirmed that existing traffic count data held is appropriate and sufficiently up to date for assessment purposes.
- 14.2.7. Traffic count surveys have been carried out at the following locations (in chronological order):
- B1456 Bristol Hill / Caledonia Road junction, Shotley Gate (February 2002);
 - B1456 / B1080 junction, the 'Freston Crossroads' (May 2003);
 - A137 / B1456 junction, the 'Wherstead Roundabout' (June 2003);
 - B1456 / Pin Mill junction, Chelmondiston (March 2005);
 - B1456 / Woodlands junction, Chelmondiston (March 2005);
 - B1456 / Glebe Lane junction, Woolverstone (March 2005); and
 - B1456 link count, immediately east of Freston Crossroads (March 2005).
- 14.2.8. The assessment also uses Automatic Traffic Count (ATC) data for the B1456 provided by SCC. The ATC site is located on the B1456 north-west of Chelmondiston village. This data have been used to assess existing traffic volumes and recent trends on the local highway network.
- 14.2.9. The traffic count survey data (which has been collected over a range of months) have been factored up to the month of July, as this is the busiest month on the local highway network. This is due to an increase in travel during the summer season, given the site's Suffolk coastal location. This seasonal uplift has been discussed and agreed with SCC; the seasonality traffic factors were provided by SCC for this purpose.
- 14.2.10. Personal Injury Accident (PIA) statistical data for the local highway network in relation to the B1456 has been obtained from SCC. PIA data from April 2004 to March 2007 are detailed in the Baseline Conditions section of this chapter.

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- 14.2.11. A pedestrian survey was carried out by Count On Us on all arms of the B1456 Bristol Hill / Caledonia Road priority junction on Wednesday 27 February 2002 over a nine hour period in total; details are provided below.
- 14.2.12. The physical extent of the assessment or study area has also been discussed and agreed with SCC, with the specific identification of junctions on the B1456 that need to be assessed. This is considered in further detail below.
- 14.2.13. The principles of the trip generation assessment, reported below, have also been discussed and agreed with SCC, specifically the use of vehicle trip rates. The identification of trip rates for the proposed development is considered in further detail below.
- 14.2.14. The proposed development comprises retirement homes, including assisted living apartments, and a care facility. Given the nature of these land uses, where a much lower proportion of residents will be economically active, the trip generation characteristics are likely to be less 'peaky', particularly with reference to the morning 'rush hour'.
- 14.2.15. It is noted that the retirement homes within the proposed development are available for people over 55 years old. Whilst this younger age band entry level is in place, discussions with retirement village operators indicate that the take up of homes in similar developments is significantly higher, typically 70+ years old.
- 14.2.16. It is also noted that on-site facilities, such as the leisure facilities and club house, are for use by retirement village residents only, i.e. internal trips. These on-site facilities will help reduce the travel demands of the proposed development.
- 14.2.17. Vehicle trip rates are numerical values (generally survey-based) assigned to specific land uses that predict the number of vehicle trips that will be generated within a defined time period. Trip rates are influenced by a range of variables, including land use, development mix, parking availability, public transport accessibility and local traffic conditions.
- 14.2.18. The trip generation assessment has used industry-standard software, where appropriate, for example the TRICS® (Trip Rate Information Computer System) database, with reference to the 2006 *TRICS® Good Practice Guide*.
- 14.2.19. The trip generation assessment has assessed the cumulative impact of a number of elements, comprising:
- The likely potential vehicle trip generation of the proposed development;
 - The likely potential vehicle trip generation of the extant C2 residential institutional use on part of the former HMS Ganges site; and

- The likely potential vehicle trip generation of the consented Marina housing scheme.

14.2.20. For the assessment of the proposed new B1456 roundabout junction giving access to the proposed development, the assessment also includes the following:

- The likely potential diversion of traffic currently accessing Shotley Marina via the B1456 Bristol Hill / Queen Victoria Drive / King Edward VII Drive, through Shotley Gate village.

14.2.21. The likely potential diversion Shotley Marina traffic has been included in the assessment of the proposed site access as a 'worst case' assessment.

14.2.22. The potential diversion of existing Shotley Marina traffic, which currently routes via the B1456 Bristol Hill / Queen Victoria Drive / King Edward VII Drive, has been identified using the approach and assumptions previously agreed with SCC.

14.2.23. The basis for calculating the potential diversion of existing Shotley Marina traffic is the traffic count survey carried out at the B1456 Bristol Hill / Caledonia Road junction in February 2002. The observed traffic flow on the B1456 Bristol Hill (North) junction arm has been used.

14.2.24. The critical assessment periods have also been discussed and agreed with SCC; these are the weekday AM Peak (08:00 – 09:00) and PM Peak (17:00 – 18:00) hourly periods.

14.2.25. The trip rate assumptions are considered briefly in turn. Trip rates for the AM Peak (08:00 – 09:00) and PM Peak (17:00 – 18:00) hours are provided.

14.2.26. A range of trip rates have been developed for the different elements of the proposed development. These are shown in Table 14.1 below.

Table 14.1: Peak Hour Vehicle Trip Rate Summary for the Proposed Development

Description	Vehicle Trip Rates					
	AM Peak (08.00 – 09.00)			PM Peak (17.00 – 18.00)		
	In	Out	Total	In	Out	Total
Retirement Homes, (1-3 bedroom units)	0.12	0.54	0.66	0.41	0.17	0.58
Assisted Living Apartments	0.14	0.05	0.19	0.05	0.07	0.12
Care Facility	0.17	0.12	0.29	0.08	0.16	0.24
Retirement Homes (4-5 bedroom units ¹)	0.17	0.75	0.92	0.57	0.23	0.80
Manager's House ²	0.14	0.60	0.74	0.46	0.18	0.64

1. Based on TRICS® data for houses privately owned, Private/moderate/large houses (3+ bedrooms).

2. Based on a 20% reduction of trip rate for moderate/large dwellings. Applies to small/affordable dwellings.

- 14.2.27. The trip rate for the one / two / three bedroom unit retirement homes is derived from vehicle trip generation data by age group presented in Appendix 3 of the SCC Executive Committee Report (dated 5 April 2005) entitled *HMS Ganges Retirement Community – Traffic Generation Calculations* ('SCC Committee Report'). This is included at Appendix 14.2 for information.
- 14.2.28. The SCC analysis reported in the SCC Committee Report uses 2001 Census data for the Babergh District to identify the change in traffic generation characteristics for the area against the 55+ age group. This data has been used to derive a factor (0.72) which has been applied to the TRICS®-based vehicle trip for private residential houses previously agreed with SCC (i.e. 0.92 per unit AM Peak two-way).
- 14.2.29. The trip rate for the small number of four / five bedroom unit retirement homes is based on the TRICS® vehicle trip rate for large / moderate private residential houses previously agreed with SCC (see paragraph 14.16).
- 14.2.30. The trip rate for the assisted living apartments is based on TRICS® data extracted for the Residential / Sheltered Accommodation land use category. TRICS® data are included at Appendix 14.3 for information. It is noted that the JMP TRICS®-derived two-way vehicle trip of 0.19 per unit for the AM Peak hour is very close to the equivalent SCC trip rate of 0.18 per dwelling identified in the SCC Committee Report.
- 14.2.31. The trip rate for the Manager's house is based on the TRICS® vehicle trip rate for small / affordable residential houses / flats previously agreed with SCC (i.e. 0.74 per unit AM Peak two-way). This is based on an agreed 20% reduction of the 0.92 trip rate identified above.
- 14.2.32. The trip rate for the 60 bedroom care facility is based on TRICS® data extracted from the Health / Nursing Homes land use category. TRICS® data are also included at Appendix 14.3. A total of six TRICS® sites were selected to develop this trip rate.
- 14.2.33. As noted above, the proposed development includes a club house and leisure facilities which are for use by residents of the proposed development only. It is therefore assumed that these elements generate internal trips only.
- 14.2.34. Trip rates for the extant C2 residential institutional use on part of the Former HMS Ganges Site have been derived from TRICS®. These are shown in Table 14.2, included at Appendix 14.4. The TRICS® data are extracted from the Education / Residential School land use category. TRICS® data are included at Appendix 14.3 for information.

- 14.2.35. The trip rates for the 162 unit Marina housing scheme are based on the TRICS®-derived vehicle trip rates previously agreed with SCC (i.e. 0.92 / 0.74 per unit AM Peak two-way). This trip generation assessment was also used in the JMP TA Report for the Proposed Spine Road across the Former HMS Ganges Site, dated 20 July 2007. These trip rates are shown in Table 14.3, included at Appendix 14.4.
- 14.2.36. As noted above, the likely potential diversion Shotley Marina traffic has been included in the assessment as a 'worst case' assessment for the proposed site access junction only (see paragraph. 14.23).
- 14.2.37. The assessment years have been discussed and agreed with SCC. SCC has confirmed the use of a 2007 base year and a 2012 future assessment year. The 2012 future assessment year complies with guidance contained within the Department for Transport (DfT) / Communities and Local Government (CLG) *Guidance on Transport Assessment* (March 2007). This identifies a future assessment year of no less than five years after the date of registration of a planning application (4.47).
- 14.2.38. The assessment considers the following scenarios:
- 2007 Base Year: i.e. traffic survey data factored up to 2007 with no committed / proposed development;
 - 2012 Do Nothing: i.e. traffic survey data factored up to 2012 with existing development (the extant C2 residential institution use on part of the Former HMS Ganges Site) *plus* committed development (the Marina housing scheme); and
 - 2012 Do Something: i.e. traffic survey data factored up to 2012 with the existing development (the extant C2 residential institution use on part of the Former HMS Ganges Site) *plus* the committed development (the Marina housing scheme) *plus* the proposed development.
- 14.2.39. The 2012 Do Something scenario has been tested both using the existing highway network configuration and with potential off-site highway improvement measures developed by JMP, which have previously been agreed in principle with SCC. The junctions include the B1456 / B1080 and the B1456 / A137.
- 14.2.40. It is noted that two further scenarios, 2010 Do Nothing and 2010 Do Something, were developed for the assessment of potential traffic-related air quality impacts in Chapter 5.
- 14.2.41. The use of traffic growth factors from DfT's TEMPRO database has been discussed and agreed with SCC to apply to the (seasonally-adjusted or uplifted) traffic survey data. Local

(i.e. for rural areas in Babergh District) TEMPRO factors have been used to growth the traffic survey data to the 2012 future assessment year identified above. TEMPRO (Version 5.0) has been used; it is available on the DfT website.

14.2.42. Predicted AM Peak and PM Peak vehicle trips have been assigned to the local highway network along the B1456 corridor in accordance with distribution assumptions previously discussed and agreed with SCC. SCC has confirmed that it is appropriate and acceptable to retain these assumptions. These distribution assumptions are summarised below.

14.2.43. In relation to the likely diversion of the existing Shotley Marina traffic for the assessment of the proposed site access junction (see paragraph 14.23), the following traffic distribution assumptions have been applied:

- One-third (i.e. 33%) of the seasonally-adjusted 2007 traffic flow in Shotley Gate is assumed to be generated by Shotley Marina and this marina-related traffic is assumed to access / egress Shotley Marina via the proposed new B1456 roundabout junction giving access to the proposed development.
- Two-thirds (i.e. 66%) of the seasonally-adjusted 2007 traffic flow in Shotley Gate is assumed to be local access traffic to / from the village. This local access traffic will not be diverted via the proposed development's site access and is therefore assumed to continue north / south on the B1456 Bristol Hill to / from Shotley Gate.

14.2.44. In relation to both the predicted potential traffic generated by the extant C2 residential institution use on part of the Former HMS Ganges Site; the committed development (the Marina housing scheme) and the proposed development, the following traffic distribution assumptions have been applied:

- All (i.e. 100%) of the above traffic is assumed to use the proposed development's site access.
- Inbound / outbound traffic is distributed according to the following assumptions: 95% to / from the B1456 (North) to / from Ipswich; 5% to / from the B1456 Bristol Hill to / from Shotley Gate village.

14.2.45. Trip assignment spreadsheet output is included at Appendix 14.5 for information. The assessment locations are identified above (see paragraph 14.10).

14.2.46. The trip assignment spreadsheets include the following worksheets for each assessment location:

- Surveyed traffic flows;
- Seasonally-adjusted traffic flows (to July);
- Seasonally-adjusted traffic flows growthed to the 2007 Base Year (using TEMPRO factors);
- Seasonally-adjusted traffic flows growthed to the 2010 for air quality assessment purposes (using TEMPRO factors);
- Seasonally-adjusted traffic flows growthed to the 2012 future assessment year (using TEMPRO factors);
- Proposed development traffic flows;
- Consented Marina housing and extant C2 residential institutional use traffic flows;
- Combined traffic flows for the proposed development, the consented Marina housing and the extant C2 residential institutional use;
- 2010 Do Nothing scenario for air quality assessment purposes (see paragraph 14.41);
- 2012 Do Nothing scenario (see paragraph 14.41);
- 2010 Do Something scenario for air quality assessment purposes (see paragraph 14.41); and
- 2012 Do Something scenario (see paragraph 14.41).

14.2.47. The highway capacity assessment has been undertaken using the latest available versions of industry standard highways geometry assessment software packages, i.e. ARCADY Version 6.0, Release 4.0 (for roundabouts); PICADY Version 6.0, Release 4.0 (for priority or T-junctions) and LINSIG Version 1.2.7.0 (for isolated signalised junctions). The scope of the highway capacity assessment has been discussed and agreed with SCC.

14.2.48. Highway capacity is the key indicator of highway network performance. The Ratio of Flow to Capacity (RFC) value is a theoretical indicator of junction capacity. Typically, when the RFC value on a junction approach exceeds 85% / 90%, that approach is considered to be overcapacity or of 'high sensitivity'.

14.2.49. SCC normally accepts a maximum RFC value of 85% on the local highway network. A significant traffic impact is therefore identified as one which results in an RFC value exceeding this SCC-identified 85% threshold or criterion.

14.2.50. The following locations on the local highway network have been assessed (from south to north):

- The proposed new B1456 roundabout junction giving access to the proposed development;
- B1456 / Pin Mill junction, Chelmondiston;
- B1456 / Woodlands junction, Chelmondiston;
- B1456 / Glebe Lane junction, Woolverstone;
- B1456 / B1080 junction, the 'Freston Crossroads'; and
- A137 / B1456 junction, the 'Wherstead Roundabout'.

14.2.51. The trip generation assessment has assessed Observed turning movements at the above five existing junctions have been applied to predicted traffic for the purposes of assessment.

14.3. Baseline Conditions

Local Highway Network

14.3.1. The existing vehicular access / egress to / from the site is via a gated point, located at the eastern end of Caledonia Road and the northern end of School Road (see below). Caledonia Road is designated public highway; School Road is a private road.

14.3.2. The site is currently not publicly accessible; it is fenced and gated.

14.3.3. The western end of Caledonia Road, which currently gives vehicular access to the proposed development site, connects with the B1456 Bristol Hill, forming a priority junction (or T-junction) with vehicular priority given to traffic on the B-road. The B1456 Bristol Hill runs broadly north / south through Shotley Gate village, terminating to the south at the village's southern extremity, outside the Bristol Arms Public House and Shotley Pier.

14.3.4. The southern end of the B1456 Bristol Hill gives access to Queen Victoria Drive to the east, which in turn gives access to King Edward VII Drive. Queen Victoria Drive / King Edward VII Drive provides vehicular access / egress to the existing Shotley Marina; the carriageway design is low standard and, to all intents and purposes, forms a single track road with no

segregated footway. For sections of Queen Victoria Drive / King Edward VII Drive, there is a vertical drop from the sea wall on the southern/eastern side, with no parapet fencing or safety barrier in place.

B1456

- 14.3.5. The B1456 is the principal vehicular route across the Shotley Peninsula, which gives access to a network of local unclassified roads on the peninsula. The B1456 is designated a District Distributor Road and comprises a single carriageway. A description of the route of the B1456 starting from Shotley Gate up to its junction with the A137 is provided below.
- 14.3.6. The B1456 is a single carriageway road which runs from Shotley Gate village broadly north-westwards along the length of the Shotley Peninsula. The B1456 passes through the linear villages of (from south-east to north-west) Shotley Street, Chelmondiston and Woolverstone.
- 14.3.7. West of Woolverstone village, the B1456 forms a priority junction with another B-road, the B1080, with vehicular priority given to traffic on the B1456. The B1456 / B1080 junction is located directly east of Freston village and is known locally as the 'Freston Cross-roads'.
- 14.3.8. North of the B1456/B1080 junction, the B1456 continues northwards, running parallel with the western bank of the River Orwell and under the Orwell Bridge. This stretch of the B1456 running directly alongside the River Orwell is known locally as 'The Strand'.
- 14.3.9. The B1456 terminates at its junction with the A137, which comprises a lit roundabout junction referred to as the 'Wherstead Roundabout'.
- 14.3.10. The A137 continues northwards towards Ipswich, giving access to the city centre. South of the A137/B1456 junction, the A137 gives access to the A14(T) Trunk Road via a grade separated junction, which skirts the southern and western fringes of Ipswich. South of the A14(T), the A137 continues in a south-westerly direction, giving access to Brantham and Manningtree, Essex, beyond.
- 14.3.11. To the east, the A14(T) gives access to the Felixstowe; to the west it gives access to the A12(T) and Harwich, via the A120(T). The A14(T) runs across Orwell Bridge. This strategic road network is shown in Figure 14.1, included at Appendix 14.6.

Traffic Flows

- 14.3.12. Automated Traffic Count (ATC) data has been used to assess current traffic volumes and recent trends on the local highway network. ATC data are summarised in Table 14.4 below.

Table 14.4: B1456 Two-way Weekday ATC Traffic Flows (2002 to 2006)

Time Period	B1456 Two-way Weekday Traffic Flow/Year				
	2002	2003	2004	2005	2006
AM Peak	502	477	486	No data	512
PM Peak	505	483	485	No data	452
12 Hour	4,447	4,229	4,302	No data	4,298
24 Hour	5,348	5,179	5,383	No data	5,233

(Source: Suffolk County Council)

- 14.3.13. The ATC data show no obvious trends in traffic levels over the five year period from 2002 to 2006. Two-way B1456 traffic flows for the AM Peak (08:00 – 09:00) have marginally increased overall from 502 to 512 vehicles between 2001 and 2006, although there is considerable fluctuation in the intervening years. Conversely, two-way B1456 traffic flows for the PM Peak (17:00 – 18:00) have decreased from 505 to 432 vehicles for the same time period, again with a degree of fluctuation.
- 14.3.14. Table 14.4 above also indicates that, generally, 12 hour (07.00 to 19.00) and 24 hour (00.00 to 24.00) traffic flows have decreased on the B1456 between 2002 and 2006.
- 14.3.15. The ATC data show that there has not been any significant change in traffic conditions on the B1456 within the last five years.
- 14.3.16. As noted above (see paragraph 14.10), traffic surveys have been carried out at a number of locations on the B1456. These survey locations are shown in Figure 14.2, included at Appendix 14.6.
- 14.3.17. Table 14.5 of Appendix 14.4 summarises the results of traffic survey counts. Vehicular activity ranges from a count high of 2,016 two-way traffic flow during PM Peak hour on the Wherstead Roundabout to a count low of only 42 vehicles during the PM Peak hour at the Bristol Hill / Caledonia Road junction.

Road Safety

- 14.3.18. PIA data for a three year or 36 month period from the start of April 2004 to March 2007 were supplied for the full length of the B1456, in addition to all public highway in Shotley Gate village itself.
- 14.3.19. PIA data were obtained for both links (lengths of road) and cells (defined areas of local roads) for the local highway network. This PIA data for the period April 2004 – March 2007 have been analysed and summarised in Table 14.6 below. PIA data are included in full at Appendix 14.7.

14.3.20. Table 14.6 below provides a breakdown of the number of accidents occurring on defined sections of the B1456 between April 2004 – March 2007. Table 14.6 shows that a total of 29 accidents took place, with 26 slight, two serious and one fatal accident.

Table 14.6: PIA Summary by Location (April 2004 – March 2007)

Location	No. Accidents by Severity			
	Fatal	Serious	Slight	Total
South of A137 (Urban)	0	0	2	2
South of A137 (Rural)	0	1	9	10
B1456/B1080 junction	0	0	2	2
Woolverstone	0	0	0	0
Woolverstone to Chelmondiston	0	0	2	2
Chelmondiston	0	0	1	1
Chelmondiston to Shotley	0	0	4	4
Shotley	1	1	1	3
Shotley to Shotley Gate	0	0	4	4
Shotley Gate	0	0	1	1
Total	1	2	26	29

(Source: Suffolk County Council)

14.3.21. Table 14.7 (of Appendix 14.4) shows the number of casualties, by severity and year, resulting from the accidents identified for April 2004 – March 2007. Table 14.4 shows that, of the total 29 accidents which occurred between April 2004 – March 2007, a total 51 casualties resulted, with 47 (92%) slight casualties, 3 (6%) serious casualties and 1 (2%) fatalities. Figure 14.5 in Appendix 14.6 shows a map of casualties by severity.

14.3.22. SCC has previously commented that the contributory factors to the fatal accident included young drivers, excessive vehicle speed and intoxicants; and that this accident was not necessarily the result of highway factors.

Public Transport Provision

14.3.23. Shotley is currently characterised by a low level of public transport accessibility. The nearest mainline rail station is located in Ipswich, approximately 17kms away to the north-west of the site.

14.3.24. It is noted that mainline rail stations are located at both Harwich (Harwich Town Station & Harwich International) and Felixstowe, but from the site these are situated across the waters of Harwich Harbour.

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- 14.3.25. Trains from Ipswich run southwards to London (Liverpool Street Station), via Manningtree, Colchester and Chelmsford, and northwards to Norwich. A connecting service between Ipswich and Felixstowe runs for these London and Norwich services. Rail services are provided by One Railway.
- 14.3.26. During weekdays, there are typically 2 trains per hour serving Norwich, with the last train departing Ipswich at approximately 00.48 hours. Southbound trains to London run more frequently (between 2 to 4 trains per hour, depending on the time of day); with the last train leaving Ipswich at 23.38 hours. At weekends there are frequent services from Ipswich to London with 4 trains / hour, however a reduced train service operates at weekends, with approximately 1 train / hour towards Norwich.
- 14.3.27. Trains from Harwich International and Harwich Town connect with the Norwich to London (Liverpool Street) line in the Manningtree area. Weekday trains are less frequent, with an hourly service in both directions.
- 14.3.28. Shotley is served by a local scheduled bus routes, Number 97b operates between Ipswich, Chelmondiston and Shotley Gate and Number 98 operates between Ipswich, Erwarton and Shotley Gate, both giving access to Ipswich Station. An hourly service is provided Mondays to Saturdays, with the last bus from Ipswich to Shotley Gate departing at 22.45. The last bus from Shotley Gate to Ipswich departs at 23.16. These local bus routes are shown in Figure 14.3, included at Appendix 14.6.
- 14.3.29. A reduced Sunday service is available for the 97b / 98 bus routes, with five daily services in each direction. The last Sunday bus from Ipswich to Shotley departing at 17.10. The last bus from Shotley Gate to Ipswich departs at 18.20 on Sundays.
- 14.3.30. An existing bus stop facility is conveniently located within a minute's walk of the site.
- 14.3.31. Bus access in Shotley and the wider Shotley Peninsula has been significantly enhanced by the *Buzabout* initiative. The *Buzabout* transport network was originally funded by the Government's Rural Bus Challenge and was the result of a survey carried out amongst the residents of Shotley Peninsula.
- 14.3.32. The main purpose of the *Buzabout* network is to provide everyone with the opportunity to travel both within the peninsula and beyond. This has been achieved by linking community transport with regular bus, rail and ferry services.
- 14.3.33. The *Buzabout* network includes a Community Car (for the cost of a bus fare), which allows customers to access destinations not served by conventional bus services, or at a time they don't run. This Community Car seats a total six passengers. *Buzabout* priority journeys

specifically help customers get to work in employment centres (e.g. Ipswich, Manningtree and Hadleigh) before 9.00am. *Buzabout* also offers a door-to-door Dial-A-Ride and Community Transport Hire service for the local community. *Buzabout* also offers convenient access for both wheelchairs and pushchairs alike.

- 14.3.34. Whilst Shotley is located at the south-eastern most tip of the Shotley Peninsula, the Harwich Harbour Foot Ferry (hereon in referred to as the 'foot ferry') currently links Shotley, Harwich and Felixstowe.
- 14.3.35. The foot ferry currently operates between Shotley Gate village, Harwich and Felixstowe connecting Suffolk and Essex. The foot ferry offers 21 timetabled departures per day on weekdays and 6 timetabled departures per day on weekends. In addition to the departures there is private hire water-taxi service which operates outside normal timetable hours. The foot ferry currently has a maximum capacity of twelve passengers.
- 14.3.36. The foot ferry does not operate throughout the year. A seasonal service runs on a 7 days a week basis from early May to the end of September (subject to safe weather conditions). The foot ferry is therefore in need of improvement if it is to become a reliable option for commuters.
- 14.3.37. At Shotley Gate village, the foot ferry currently uses a pontoon facility located within Shotley Marina, directly east of the site. The existing foot ferry pontoon is located close to Shotley Marina's reception building.

Pedestrian & Cycle

- 14.3.38. Walking is a potentially attractive mode of travel in the Babergh District, particularly given its relatively flat terrain. The site is positioned within a rural and coastal environment and there is significant potential for leisure-based walking trips or walk trips to nearby amenities, given the high quality local environment. Existing pedestrian links include a pedestrian footway along the B1456 route.
- 14.3.39. Other designated walking routes around Shotley Gate, include bridleways along Lower Harlings and School Road just off the B1456 Bristol Hill and; the National Trail / Long Distance route which runs down the B1456 Bristol Hill towards Shotley Pier and then heads along King Edward VII Drive up to the Shotley Marina and heads up towards Chelmodiston and Woolverstone.
- 14.3.40. It is noted that the proposed development site is currently fenced and gated and not publicly accessible to local pedestrians.

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- 14.3.41. A site inspection along the full length of the B1456 was previously carried out on Tuesday 1 and Wednesday 2 November 2005. This inventory recorded the location of pedestrian footways and other pedestrian facilities.
- 14.3.42. The following observations are made in relation to the pedestrian network in the vicinity of Shotley Gate (updated during the most recent June 2007 site visit):
- There is continuous lit footway provision through Shotley Gate village;
 - There is continuous footway provision between Shotley Gate and Shotley Street villages on the north/east side of the B1456; a section of this footway is off-line from the B1456 carriageway approaching Shotley Street village; and
 - There is continuous lit footway provision through Shotley Street village.
- 14.3.43. The surveys carried out by Count On Us on all arms of the B1456 Bristol Hill / Caledonia Road in February 2002 recorded pedestrian crossing movements (differentiating children, adults and elderly) within 20 metres of the side road centre lines. The results are summarised in Table 14.8, included at Appendix 14.4.
- 14.3.44. In summary, the survey identifies a total of 78, 4 and 225 pedestrian crossing movements across Caledonia Road, B1456 Bristol Hill (North) and B1456 Bristol Hill (South) over the total nine hour survey period respectively.
- 14.3.45. Currently there are limited cycle facilities in Shotley. The carriageway width of the B1456 generally precludes the introduction of cycle lanes (advisory or mandatory) along this route. There is however The Suffolk South Route B, which runs through Shotley Gate village, in close proximity to the site.
- 14.3.46. Route B runs from Shotley Gate village northwards to Shotley Street Village, where it splits in two. One route runs via Chelmondiston village, and the other route via Erwarton, both split routes then reconnect at Holbrook village. The route runs along sections of the B1456, but the majority of the route runs on minor roads across the Shotley Peninsula.
- 14.3.47. The nearest existing national cycle routes are the Sustrans National Cycle Route 1 and the Suffolk Coastal Cycle Route, near Felixstowe. Neither of these routes give access to Ipswich and they are, essentially, leisure routes as opposed to forming part of an inter-urban network for work-based trips by cycle. Its route is shown in Figure 14.4 included in Appendix 14.6.
- 14.3.48. The only proposed cycle route in the general area is the Sustrans National Cycle Route 51, which runs from Felixstowe to Ipswich, with the foot ferry service providing a direct connection.

14.3.49. The fully classified traffic count surveys referred to above (paragraph 14.10) include observations of pedal cycle movements. These movements (i.e. total number of cycles observed throughout the whole survey period) are summarised in Table 14.9 (see Appendix 14.4) and indicate a very low level of pedal cycle movements on the local highway network.

14.4. Potential Effects

14.4.1. This section considers the potential likely traffic and transport impacts arising from the proposed development with reference to the methodology and criteria presented above.

Vehicle Movements

14.4.2. This section identifies the vehicle movements generated by the proposed development; the C2 residential institutional use and the consented Marina housing scheme, based on the trip rates identified above.

14.4.3. The vehicle trip rates in Table 14.1 have been applied to the proposed development; the results are shown in Table 14.10 below. Trip generation spreadsheet output is included at Appendix 14.8 for information.

Table 14.10: Proposed Development Peak Hour Vehicle Trip Summary

Description	No. Vehicle Trips					
	AM Peak (08.00 –			PM Peak (17.00 –		
	In	Out	Total	In	Out	Total
Retirement Homes (age 55+), 1-3 bedroom units	41	184	225	140	57	197
Assisted Living Apartments	7	3	10	3	4	7
Care Facility	10	7	17	5	9	14
Retirement Homes 4-5 bedroom units ¹	2	7	9	5	2	7
Manager's House ²	1	0	1	0	0	0
	61	201	262	153	72	225

1. Based on TRICS® data for houses privately owned, Private/moderate/large houses (3+ bedrooms).

2. Based on a 20% reduction of trip rate for moderate/large dwellings. Applies to small/affordable dwellings.

14.4.4. In the AM Peak (08:00 – 09:00) hour, the proposed development generates a total of 262 two-way vehicle trips. In the PM Peak (17:00 – 18:00) hour, it generates a total of 225 two-way vehicle trips.

- 14.4.5. It is noted that at the February/March 2006 Public Inquiry regarding the Former HMS Ganges site, SCC identified trip generation of 252 total two-way vehicle trips for the 404 retirement homes (+55 years) for the AM Peak; the JMP equivalent figure of 262 is very close to this SCC figure.
- 14.4.6. Again, it is noted that the above trip generation for the proposed development is based on the low age band entry level of 55+ years old for retirement home eligibility. As discussed above (14.109), discussions with retirement village operators indicate that the take up of homes in similar developments is significantly higher, typically 70+ years old. The potential vehicle trip generation identified above is therefore very much a 'worst case'.
- 14.4.7. The vehicle trip rates in Table 14.2 included in Appendix 14.4 have been applied to the extant C2 residential institutional use on part of the Former HMS Ganges Site; the results are shown in Table 14.10, included at Appendix 14.4.
- 14.4.8. In the AM Peak (08:00 – 09:00) hour, the C2 residential institutional use generates a total of 225 two-way vehicle trips. In the PM Peak (17:00 – 18:00) hour, it generates a total of 44 two-way vehicle trips.
- 14.4.9. The vehicle trip rates in Table 14.2 of Appendix 14.4 have been applied to the consented Marina housing scheme; the results are shown in Table 14.11, included at Appendix 14.4.
- 14.4.10. In the AM Peak (08:00 – 09:00) hour, the consented Marina housing scheme generates a total of 125 two-way vehicle trips. In the PM Peak (17:00 – 18:00) hour, it generates a total of 108 two-way vehicle trips.
- 14.4.11. The combined or cumulative vehicle movements of the above three elements, i.e. the proposed development; the C2 residential institutional use and the consented Marina housing scheme, are summarised in Table 14.12 below.

Table 14.12: Proposed B1456 Site Access Road Total Peak Hour Vehicle Trip Summary

Description	No.Vehicle Trip					
	AM Peak (08.00 –			PM Peak (17.00 –		
	In	Out	Total	In	Out	Total
Proposed development	61	201	262	153	72	225
Marina Housing Scheme	24	101	125	78	30	108
C2 Use Class	142	83	225	17	27	44
Total	227	385	612	248	129	377

14.4.12. In the AM Peak (08:00 – 09:00) hour, a total of 612 two-way vehicle trips result from the three elements identified above. In the PM Peak (17:00 – 18:00), a total of 377 two-way vehicle trips result from the four elements identified above.

14.4.13. The potential 'worst case' traffic generated by the proposed development accounts for 42% and 59% of the total combined traffic identified above for the AM Peak and PM Peak hourly periods respectively.

14.4.14. As noted above, the assessment of the proposed site access junction also considers the Shotley Marina diverted traffic, as a 'worst case', using the distribution assumptions identified above (see paragraph 14.115). For the 2007 Base Year (see 14.41), in the AM Peak (08:00 – 09:00) hour, the Shotley Marina diverted traffic generates a total of 75 two-way vehicle trips. In the PM Peak (17:00 – 18:00) hour, it generates a total of 57 two-way vehicle trips.

Trip Generation & Assignment

14.4.15. The predicted potential traffic generated by the proposed development; the C2 residential institutional use and the consented Marina housing scheme, as well as the Shotley Marina diverted traffic, have been assigned to the local highway network using distribution assumptions identified above (paragraph 14.46 & 14.47) for the AM Peak (08:00 – 09:00) and PM Peak (17:00 – 18:00).

14.4.16. The following section presents the findings of a capacity assessment.

Capacity Assessment

14.4.17. This section reports the findings of the junction capacity assessment work along the B1456 corridor. The extent of the capacity assessment has been discussed and agreed with SCC; the six junction locations are identified above (see paragraph 14.53).

14.4.18. The software (see paragraph 14.50) outputs are included in full at Appendix 14.9 for information. The results for the AM Peak (08:00 – 09:00) and PM Peak (17:00 – 18:00) hours are also summarised in the following tables, included at Appendix 14.2:

- **Table 14.13:** AM Peak Maximum RFC Values by Scenario;
- **Table 14.14:** AM Peak Maximum Queue Lengths by Scenario;
- **Table 14.15:** PM Peak Maximum RFC Values by Scenario; and
- **Table 14.16:** PM Peak Maximum Queue Lengths by Scenario.

- 14.4.19. The proposed new B1456 roundabout junction giving access to the proposed development ('site access') has been modelled ARCADY. The results show a maximum RFC value of 0.441 (44%) and 0.326 (33%) in the AM and PM Peak hours respectively for the 2012 Do Something scenario. This is well within capacity so the potential impact is considered to be negligible.
- 14.4.20. It is concluded that the cumulative impact of the predicted traffic flows for the 2012 Do Something scenario will not have an adverse impact on the operation of the proposed site access.
- 14.4.21. The B1456 / Pin Mill junction, the B1456 / Woodlands junction and the B1456 / Glebe Lane junction have all been modelled using PICADY. The results show the following maximum RFC values by junction for the 2012 Do Something scenario:
- B1456 / Pin Mill: 0.072 (7%) and 0.058 (6%) for the AM and PM Peaks respectively;
 - B1456 / Woodlands: 0.107 (11%) and 0.342 (34%) for the AM and PM Peaks respectively; and
 - B1456 / Glebe Lane: 0.000 (0%) and 0.009 (1%) for the AM and PM Peaks respectively.
- 14.4.22. The above results are well within capacity. It is concluded that the cumulative impact of the predicted traffic flows for the 2012 Do Something scenario is negligible on the operation any of these three priority junctions.
- 14.4.23. The B1456 / B1080 priority junction has been modelled using PICADY. The results show a maximum RFC value of 0.768 (77%) and 0.421 (42%) in the AM and PM Peak hours respectively for the 2012 Do Something scenario with the existing highway configuration. This is within capacity and the impact is considered to be moderate.
- 14.4.24. The potential improvement of the B1456 / B1080 priority junction has also been modelled using PICADY. The results show a maximum RFC value of 0.754 (75%) and 0.404 (40%) in the AM and PM Peak hours respectively for the 2012 Do Something scenario with the improved highway configuration. The potential improvement provides additional highway capacity and road safety benefits.
- 14.4.25. It is concluded that the cumulative impact of the predicted traffic flows for the 2012 Do Something scenario can be accommodated within the capacity of the existing B1456 / B1080 junction configuration. It is noted that in this scenario the junction is approaching, but not exceeding, capacity. The increase in traffic flow at this junction may potentially have a

moderate adverse impact on road safety without the potential junction improvement scheme.

- 14.4.26. The existing configuration of the A137 / B1456 roundabout junction has been modelled using ARCADY. The results show a maximum RFC value of 0.668 (67%) and 0.820 (82%) in the AM and PM Peak hours respectively for the 2007 Base Year scenario with the existing highway configuration. This junction is therefore currently operating close to capacity in the PM Peak hour.
- 14.4.27. The results also show a maximum RFC value of 0.854 (85%) and 0.884 (88%) in the AM and PM Peak hours respectively for the 2012 Do Nothing scenario with the existing highway configuration.
- 14.4.28. The results show a maximum RFC value of 1.023 (102%) and 0.962 (96%) in the AM and PM Peak hours respectively for the 2012 Do Something scenario with the existing highway configuration. This junction would therefore be over capacity in both the AM and PM Peak hours with the existing highway configuration and is considered to have a significant adverse impact even without the proposed development.
- 14.4.29. The potential signalisation of the A137 / B1456 junction has also been modelled using LINSIG. The results show a maximum RFC value of 0.786 (79%) and 0.787 (79%) in the AM and PM Peak hours respectively for the 2012 Do Something scenario with the proposed signalisation. The potential signalisation of the junction mitigates the negative capacity impacts identified above in paragraph 14.131.
- 14.4.30. The potential signalisation of the A137 / B1456 significantly reduces the maximum queue length between the 2012 Do Nothing and Do Something scenarios in the AM Peak hour, when it reduces from 32 to 14 in the AM Peak. In the PM Peak hour it remains a similar length, 16 and 18 in the 2012 Do Nothing and 2012 Do Something scenarios respectively.
- 14.4.31. It is noted that vehicle queue lengths are common to all signalised junctions which allow a regulated flow of traffic, which is why the RFC value is well within the junction capacity.

Pedestrians, Cyclists & Public Transport

- 14.4.32. The proposed development will have a positive impact on pedestrian, cyclist and public transport access in Shotley Gate village.
- 14.4.33. The site is currently fenced, gated and not publicly accessible. The proposed development includes pedestrian footways and a shared pedestrian footway / cycle way along the length of the proposed access road through the site, which will increase general accessibility,

including access to local bus and ferry services operating within Shotley Gate. The proposed development also includes pedestrian / cycle links to / from Caledonia Road, which is also a proposed emergency access.

- 14.4.34. The proposed development includes a range of traffic calming / management measures to create a safe, low speed environment, including the use of kerb build outs; surface treatments at local access junctions and shared surfacing, to reduce vehicle speeds.

Demolition & Construction

- 14.4.35. The proposed development's temporary demolition and construction phase is likely to generate a significant number of heavy goods vehicle (HGV) movements, as well as the movement of other specialist equipment.
- 14.4.36. Although temporary, this could have a potential adverse impact on the operation and safety of the B1456 if this phase is not managed properly, in accordance with the relevant legislation and best practice (e.g. Considerate Construction) guidelines. This is considered further below.
- 14.4.37. It is anticipated that the majority of construction traffic would access / egress the site via the B1456, given its District Distributor designation.

14.5. Mitigation Measures and Residual Effects

- 14.5.1. A Travel Plan is a process for managing change in travel behaviour and seeks to encourage and enable sustainable transport behaviour of the residents of the proposed development.
- 14.5.2. It is anticipated that a Travel Plan condition will be imposed to require further details on the preparation, implementation and monitoring of a Travel Plan for the site to be submitted and full compliance with these details.
- 14.5.3. The Travel Plan is expected to include the following, *inter alia*:
- Appointment of a Travel Plan Co-ordinator;
 - Provision of current public transport information (bus, rail, taxi etc.), including user-friendly maps, timetables and promotional leaflets on a well-location information point within the retirement village;

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- Provision of high-quality maps of safe pedestrian / cycle routes (including leisure routes) in the local area and supporting promotional material;
 - Provision of 'starter packs' for retirement village residents with inclusion of the above transport information;
 - Development of a lift share initiative; and
 - Development of a car club initiative.

Construction Management Plan

14.5.4. The development of a Construction Management Plan (CMP) for the proposed development will ensure that potential adverse traffic and transport impacts during the temporary construction phase are mitigated and monitored.

14.5.5. It is anticipated that a Construction Management Plan (CMP) will be imposed to require further details on the development of a CMP for the site to be submitted and full compliance with these details.

14.5.6. The CMP is expected to include the following, *inter alia*:

- Agreement of appropriate construction vehicle routes with BDC and SCC;
- Agreement of days / hours of site operation to manage construction vehicle movements and minimise nuisance;
- Provision of wheel-wash facilities to minimise dust generation; and
- Use of a banksman to ensure safe vehicular access / egress to / from the site.

