ENVIRONMENTAL STATEMENT

VOLUME 2

PROPOSED RESIDENTIAL DEVELOPMENT WITH ASSOCIATED COMMUNITY FACILITIES AT PINHOE QUARRY

PREPARED FOR PINHOE QUARRY LLP BY PCL PLANNING LTD.

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1.0 Introduction

1.1 Overview

1.1.1 This Environmental Statement (ES) has been compiled by a multi-disciplinary team drawn from a number of specialist consultancies. The team and their roles are set out in table 1.1 below.

Table 1.1 Consultancy Team

Topic / Responsibility	Name	Company	Telephone number	e-mail address
Overall EIA Management and Co-ordination	David Seaton	PCL Planning Ltd	01392 363812	d.seaton@pclplanning.co.uk
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EIA Process

Legislative Background

1.1.2 The undertaking of an Environmental Impact Assessment (EIA) and subsequent preparation of an Environmental Statement (ES) is required to accord with the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 (hereafter referred to as the 'EIA Regulations'). These regulations implement European Council Directive 85/337/EEC as amended by Directive 97/11/EC, adopted in March 1997 and affected in March 1999.

1.1.3 Supporting the Regulations, DETR Circular 02/99 provides guidance aimed at Local Authorities with respect to EIA procedure and the preparation of Environmental Statements.

Format

1.1.4 This ES comprises three volumes. This document (Volume 2) provides the main body of the ES. It explains the baseline conditions for the application site, the method statement for the assessment, and the findings. It should be read in conjunction with the accompanying Technical Appendices which are set out in Volume 3.

1.1.5 The EIA Regulations also require a Non-Technical Summary (NTS) of the ES. Accordingly, the NTS forms Volume 1 of this ES. It explains the main components of the ES for the benefit of those unfamiliar with the EIA process.

1.1.6 Copies of the Environmental Statement and Non-Technical Summary can be seen at:
Exeter City Council
Planning and Building Control
Paris Street
EXETER
EX1 1JN

1.1.7 Copies in CD format can also be purchased for £20 each from:

Pinhoe Quarry LP
Greendale Court
Clyst St Mary
EXETER
EX5 1AW

Screening

1.1.8 As an infrastructure project with an area greater than 0.5 hectares, the proposed development falls within the definition of Schedule II of the Environmental Impact Assessment (EIA) Regulations and is, therefore, potentially EIA development.

1.1.9 The only designations within and adjacent to the application area are a County Wildlife Site (CWS) and two Regionally Important Geological Sites (RIGS). Whilst these designated areas are not likely to be the subject of significant impacts, the applicant considers that the scale of this development indicates that it is appropriate for an Environmental Statement (ES) to be prepared. The screening opinion of Exeter City Council has not, therefore, been sought as regards the need for an ES to be undertaken.

Scoping

1.1.10 Prior to the preparation of this ES, a Scoping Opinion was prepared by the applicants under Regulation 10 of the EIA Regulations and issued to Exeter City Council and consultees in September 2010. The purpose of this Scoping Opinion was to agree the breadth of the EIA and the specific content of the subsequent ES, in particular, the technical chapters contained herein (chapters 4 – 11). The purpose of the request for a Scoping Opinion is to ensure the applicants provide all the necessary information at the outset to enable the Local Planning Authority to determine the associated planning application within the statutory timescales.

1.1.11 At the time of writing no response has been received to this request.

1.2 Assessment of Environmental Effects

1.2.1 Since there is no universally recognised approach to assessing 'significance' this Environmental Statement adopts common assessment criteria and terminology. To avoid repetition this approach is set out in appendix 1.1. Individual topic chapters in this ES have used this approach, unless otherwise clearly stated in the first section of each subject chapter.

1.3 Site Location and Description

Location

1.3.1 Pinhoe Quarry is located within a residential area in Pinhoe, approximately 3.5km north-east of Exeter City Centre. Access to the site is achieved via Harrington Lane and is located approximately 2km from Junction 29 of the M5 and the A30. The site is centred on National Grid Ref SX 955 947 as shown on the Site Location Plan in Appendix 1.2.

1.3.2 The natural landform of the site was a south facing hillside rising from 51.0m AOD in the south-west corner close to Harrington Lane to 94.0m AOD on the northern boundary close to Church Lane. The land above the quarry rises up to the local high point of Beacon Hill at approximately 120.0m AOD. The quarry occupies the centre of the site and has a floor level of 45.0 to 50.0m AOD. The lowest point is in the sump area in the south eastern corner at 36.0m AOD. The side slopes are steep with gradients ranging from 1 in 1,2 to 1 in 2.0

1.3.3 The site is owned by Pinhoe Quarry LLP and the full ownership extends to approximately 54.8 acres (22.2 hectares) of which the permitted mineral extraction area (including the quarry) comprises approximately 40.7 acres (16.5 hectares) the remainder being principally adjoining undisturbed pasture land. Refer to the Application Site Plan and Site Aerial Photo in Appendix 1.3.

1.3.4 The permitted mineral extraction area includes two pasture fields and the stables located in the north-eastern part of the site and which are currently let for grazing.

1.3.5 The south western corner of the quarry comprises made ground which has been partially restored to woodland. The material deposited comprises principally quarry waste, reject bricks and sand.

1.3.6 A water collection sump is located in the south-east portion of the quarry. Surface water run-off and groundwater seepage are collected in the sump prior to being pumped via pipeline into a small watercourse adjoining the quarry boundary in the south-east corner.

1.3.7 Several public footpaths are located around the quarry boundary. Footpath No 50 runs along the western boundary of the site and links to Footpath No 53 which runs along the northern and eastern boundaries eventually linking back to Harrington Lane to the south.

1.3.8 The aerial photo, Appendix 1.3 shows the main site features.

Existing Operations

1.3.9 Activites at the quarry are currently covered by the ROMP planning permission (ref 00/1278/25) dated 30 April 2001 which "allows for the extraction of clay and subsequent restoration of the resultant void space to surrounding ground levels".

1.3.10 Restoration materials imported into the site are restricted to those of a non-organic and non toxic nature ie inert waste. There is a requirement to restore the site no later than 22 February 2042.

1.3.11 The current quarry void is estimated to be 1.8 million cubic metres and will require in the order of 3.2 million tonnes of inert waste to be imported to fully restore the site. It is estimated that this could take up to 20 years to complete. A separate planning application will be made to Devon County Council to discharge relevant conditions relating to the landfill operation which Pinhoe Quarry LLP intends to proceed with if the development proposal applied for does not go forward.

1.3.12 Whilst operational activities at the quarry are currently at a low level previously the quarry supplied the Carboniferous Culm Measure shales of the Crackington Formation for use in the manufacturing of bricks at the former brickworks situated to the south of Harrington Lane. The brickworks ceased production in December 2006 and is now closed.

Site Surroundings

1.3.13 The nearest residential properties to Pinhoe Quarry are located adjacent to the southern boundary of the site along Harrington Lane. In addition there are individual properties to the west of the quarry on Cheynegate Lane. There are further properties on Church Hill and Church Lane which run to the east and north of the site and the cemetery associated with St Michael and All Angels Church is sited adjacent to the northern boundary of the Quarry.

Statutory Designations

1.3.14 There are no sites of statutory designation (e.g. Sites of Special Scientific Interest, Areas of Outstanding Natural Beauty, Special Protection Areas) within a two kilometre radius of Pinhoe Quarry. However, land to the north and west of the quarry is designated as a County Wildlife Site and two Regionally Important Geological Sites (RIGS) lie within the boundary of the Quarry itself.

1.3.15 There are four listed buildings to the north of the quarry and a further three adjacent to the south west corner of the site.

1.3.16 A public right of way (Footpath No 50), which runs from Beacon Down to the north of the site to Eastern Field to the south of the site, adjoins the western boundary of the site. A spur of this footpath (No 53) also runs along the northern and eastern boundary of the site and links into Harrington Lane.

1.3.17 With reference to the Environment Agency website Pinhoe Quarry does not lie within a Flood Risk Zone. The site does not lie within a Groundwater Source Protection Zone. The Environment Agency map Groundwater Vulnerability of South Devon Sheet 49 shows the majority of the site to overly a minor aquifer of intermediate permeability. The extreme south western edge of the site overlays a minor aquifer of high permeability.

1.4 The Planning Application

1.4.1 The planning application will comprise the following suite of documents:

- Forms
- Planning Statement
- Design and Access Statement (DAS)
- Statement of Community Involvement (SCI)
- Environmental Statement (Volumes 1,2 and 3).
- Location Plan
- Application Fee

1.5 Need for the Development

1.5.1 There is a significant need for new housing development to be provided within the administrative boundary of Exeter. This need is explained in more detail in the population chapter of this statement.

2.0 Proposed Development

2.1 The Proposal

2.1.1 The development proposal involves the extraction and use of approximately 700,000 m3 of in-situ material including the remaining mineral reserves but not to remove them from the site. Instead the excavated material will be utilised to both raise the quarry floor and reshape the quarry margins within the site to create a platform suitable for a mixed use development including a significant proportion of new homes.

2.1.2 It is proposed to develop a residential community of up to 380 dwellings with a mix of housing types supported by community facilities within the reprofiled site. This would include a community building; a medical facility, including GP and dentist services; a nursery/crèche; and a small retail outlet providing everyday essentials for the new community and the existing local community. The Illustrative Site Masterplan is provided as Appendix 2.1.

2.1.3 The application area for the proposal extends to 18.1 hectares (44.8 acres). The area includes the whole of the permitted mineral extraction area plus a small triangular section of land on the western boundary of the site and regrading of land adjoining the quarry margins on the east and south-east boundaries. Refer to Application Site Plan in Appendix 2.2. The proposed development platform profile is shown on Drawing 500 (Appendix 2.3). and the accompanying cross-sections provided in Appendix 2.4. It is anticipated that this earthworks phase will take in the order of 18 – 24 months to complete.

2.1.4 Initial development works would include reprofiling the quarry to create a development landform that reconnects the site with its natural setting, this would include comprehensive landscaping and planting of the reprofiled landform along with enhancement of the designated wildlife areas adjoining the site and the creation of new habitat within and adjoining the site. An appropriate drainage system would be created to manage both surface water and groundwater with appropriate drainage features built into the overall development design.

2.1.5 Areas located on the quarry margins will be excavated to enable a sympathetic landform to be created that will merge with the surrounding environment and topography.

2.1.6 Reprofiling of the quarry will require permanent diversion of part of the public footpath (No.50) on the western boundary of the site and part of the public footpath (No 53) on the eastern boundary of the site. Both footpaths will be reinstated along landscaped routes including incorporation of new Devon bank features where appropriate. The current footpath locations and proposed diversions are shown on the Public Rights of Way Plan Appendix 2.5. New sections of public footpath will also be provided as part of the development proposals.

2.1.7 Regrading of the quarry margin on the western boundary (to achieve compatible ground levels) will also result in the loss of a small area of the County Wildlife Site. However, this will be mitigated by the provision of new habitat and green space areas as part of the development and proposed enhancement of other parts of the County Wildlife Site, particularly the northern field, which is considered to be of greatest ecological value (Refer to Chapter 5 Biodiversity).

2.1.8 The ecological report also found that the site has low significance with respect to protected species. The creation of new ponds would provide an enhanced habitat for reptiles.

2.1.9 The public realm and green infrastructure within and adjoining the proposed development would be integrated to allow the site to reconnect with both its urban and rural edges, providing green habitat corridors as well as formal and informal open space for the new community. A 'geo park' would incorporate and highlight the RIGS geological features of the site as part of the public realm network. New and improved pedestrian and cycle routes through the development would provide strong connections to Pinhoe and the wider area as well as including a new route to St Michael & All Angels church.

2.2 Alternatives

2.2.1 Whilst the EIA Regulations indicate that the alternatives considered by the applicant should be reported in the ES, Circular 02/99, at paragraph 83, notes that the EIA Directive and the EIA Regulations do not expressly require the developer to study alternatives.

2.2.2 The site benefits from an extant planning permission (Ref 00/1278/25) to use the site for mineral extraction and subsequent restoration of the resultant void to surrounding ground levels through importation of inert waste materials as outlined in the section entitled 'Existing Operations'. It is appropriate, therefore, to include a consideration of the key issues arising in relation to this currently permitted use as a comparison to the proposed development.

2.2.3 The two key benefits of the proposed development are:

- The site can be brought back into beneficial use much sooner through implementation of the proposed development as opposed to the restoration of the site by landfilling with inert waste which could take up to 20 years.
- The use of on site material will be used to reprofile the quarry for the proposed development. As such this removes the prospect of long term HGV traffic through Pinhoe which would otherwise be generated by the landfill restoration operation.

2.2.4 In terms of site layout there are few alternatives. The existing access points into the site are utilised in order to reduce impact upon the site frontage. Finished levels within the site restrict the alternatives for the road pattern that can be accommodated within the site. Therefore the approach taken to site layout, that is explained in greater detail in the Design and Access statement that accompanies this application is the only realistic option to internal site planning having regard to site constraints of levels, drainage and sustainability criteria.

3.0 Planning Policy Framework

3.1 Development Plan

3.1.1 The Planning and Compulsory Purchase Act 2004 (Section 38(6)) provides that decisions shall be taken in accordance with the development plan unless material considerations indicate otherwise. The development plan comprises:

- The Regional Spatial Strategy – RPG10 (September 2001)
- The saved policies of the Devon Structure Plan 2001-2016 (Adopted October 2004) [DSP]
- The saved policies of the Devon Minerals Local Plan (Adopted June 2004) [DMLP]
- The saved policies of Exeter Local Plan First Review 1995 – 2011 [ELP]

Regional Spatial Strategy – RPG 10 (September 2001)

3.1.2 RPG 10 is currently the Regional Spatial Strategy for the South West (RSS).

3.1.3 Policy SS 2 (Regional Development Strategy) advises that Principle Urban Areas (PUAs) are considered to offer the best opportunity for accommodating the majority of development in the most sustainable manner. Exeter is a defined PUA. Policy SS2 states *inter alia* that:

- *".....The aim should be to concentrate most development at the PUAs:*
- *Development should primarily take place within the defined PUAs"*

3.1.4 Policy SS15 deals specifically with the role and objectives for Exeter. It states *inter alia* that:

> *"Local authorities, developers, infrastructure and transport providers and other agencies should work together to achieve the following for Exeter:*
> - *developing the role of the city as the main commercial, cultural and service centre for the central part of the region;*
> - *developing the city's role as a focal point for strategic economic investment, having regard to the need to expand and diversify the local economy and economic base;*
> - *providing for additional housing to support this enhanced role;"*

3.1.5 The starting point for the level of housing to be provided is set out in Policy HO 1 which sets out that over the period 1996 – 2016 4,300 dwellings per annum should be provided in Devon and that an additional allowance should be made for dwelling losses that will occur during the plan period.

Devon Structure Plan 2001-2016 (adopted October 2004)

3.1.6 Under the provisions of the Planning and Compulsory Purchase Act 2004 the majority of policies of the above plan have been saved. The provisions of the relevant saved policies are set out below.

3.1.7 The overall strategic direction of the DSP is set by Policy ST1.

3.1.8 ST3 deals with the self sufficiency of Devon's communities.

3.1.9 ST4 deals with infrastructure provision.

3.1.10 Policy ST5 sets the development priority for the period 2001 – 2016. The PUAs are to be the primary focus for strategic development.

3.1.11 Policy ST10 sets out the key priorities for Exeter over the plan period and these are:

- developing and diversifying the economy, particularly to the east of Exeter
- providing for a significant scale of additional housing
- improving local transport networks

3.1.12 Policy ST17 of the DSP deals with levels of Housing and Employment growth and requires, *inter alia*, the provision of 6,700 dwellings within Exeter in the period 2001 to 2016 at an annual average of 450 dwellings per annum and 85 Ha of employment land over the same period.

3.1.13 Policy CO1 defines broad Landscape Character Zones. The site sits within the Exeter and Estuary Fringe Character Zone.

3.1.14 Policies CO7 and CO8 give guidance on heritage matters.

3.1.15 There are a number of polices in the DSP that give guidance on more detailed design matters that are more directly related to reserved matters, but are addressed in the supporting documents submitted with the application. These policies are:

- ST18a Mix and Type of Housing
- CO6 Quality of New Development
- TR2 Co-ordination of Land Use/travel Planning
- TR5 Hierarchy of Modes and Transport Assessment

3.1.16 In addition relevant Mineral policies within the Structure Plan will need to be addressed including:

I. Policy MN1 – Safeguarding Mineral Resources
II. Policy MN2 – Environmental Effects of Mineral Working

3.1.17 It should be noted that Devon County Council, as Mineral Planning Authority has determined that the remaining mineral reserves "are of little economic importance on the basis of quality, the closure of the brick manufacturing plant and the distance to the nearest operational brickworks" and as such no longer require safeguarding. Refer to letter from Devon County Council in Appendix 3.1.

3.1.18 Policy MN2 seeks to ensure that "land which has been subject to mineral working should be reclaimed at the earliest opportunity in order to maintain or where possible enhance its long term usefulness, quality and appearance and take into account relevant landscape character issues". The proposed development meets this policy objective.

3.1.19 Also of relevance is Policy CO9 – Biodiversity and Earth Science Diversity which seeks to conserve the extent and nature character of Devon's biodiversity and earth science resource and realize opportunities for their enhancement. The development proposal meets the requirements of this policy objective.

Exeter Local Plan First Review (adopted March 2005)

3.1.20 The ELP covers the period up to 2011. Under the transitional arrangements for the replacement of local plans with Local Development Frameworks (LDFs) the majority of policies from the ELP have been saved. In the Government Office of the South West (GOSW) covering letter dated 14/03/2008 that accompanied the saving direction, Exeter City Council were advised that:

> *"Following 31st March 2008 the extended policies should be read in context. Where policies were adopted some time ago, it is likely that material considerations, in particular the emergence of new national and regional policy and also new evidence, will be afforded considerable weight in decisions. In particular, we would draw your attention to the importance of reflecting policy in Planning Policy Statement 3 Housing and Strategic Housing Land Availability Assessments in relevant decisions."*

3.1.21 The ELP was prepared under the provisions of the Planning and Compensation Act 1991 and Planning Policy Guidance Note 12, and makes specific reference to PPG3 (not PPS3, June 2010).

3.1.22 The ELP was prepared in accordance with the previous RPG (issued in 1994) and the previous DSP (superseded in October 2004). The housing needs evidence that supports the ELP was published in 2001 and updated in 2003. The ELP was finally adopted in March 2005.

3.1.23 Relevant polices of the ELP are AP1, AP2, H1 H2, T2, LS1.

3.1.24 There are a number of polices in the ELP that give guidance on more detailed design matters which are addressed in the supporting information provided with the application. These policies are:

- H7, which deals with accessible dwellings
- L4, which deals with play space provision
- T2, which deals with accessibility of new housing
- LS1, which deals with the landscape setting of the city
- EN4, which deals with flood risk
- EN5, which deals with noise sensitive development
- DG1, which deals with design issues

- DG4, which deals with density and amenity issues
- DG5, which deals with open space
- DG6, which deals with car parking and vehicle circulation

3.1.25 The Council's decision notice records that the application is contrary to policies ST1, ST3, and ST4 of the DSP and policy H2 of the ELP.

The Devon County Minerals Local Plan

3.1.26 The key matter to be addressed in the context of the Minerals Local Plan relates to Policy MP13 – Development in Mineral Consultation Areas which principally relates to safeguarding of mineral reserves. This matter has been addressed as outlined above in relation to the County Structure Plan Mineral policies and it is acknowledged that there is no mineral policy constraint in principle.

3.1.27 Also of relevance is Policy MP10 - Maintenance of the County's Nature Conservation Resource. The site adjoins a County Wildlife Site (CWS) and contains two Regionally Important Geological Sites (RIGS). Mitigation and enhancement of these features will be addressed as part of the development proposals and is considered in more detail in Chapters 5 (Biodiversity) and Chapter 6 (Geology/Soil/Land Quality) of this ES.

3.1.28 Policy MP16 relates to Non-Mineral Development in Buffer Zones. The mineral reserves at Pinhoe are no longer required to be safeguarded and as such the proposed development is not considered to be contrary to this policy.

3.1.29 Policy MP56 seeks to ensure that land is reclaimed at the earliest opportunity to facilitate beneficial after-use of the site.

Exeter Local Plan First Review (adopted March 2005)

3.1.30 This plan covers the period up to 2011. Under the transitional arrangements for the replacement of local plans with Local Development Frameworks (LDFs) the majority of policies from this plan have been saved.

3.1.31 The plan was prepared in accordance with the previous RPG (issued in 1994) and the previous Structure Plan (superseded in October 2004). The housing needs evidence that supports the plan was published in 2001 and updated in 2003. The plan was finally adopted in March 2005.

3.1.32 There are a number of polices in the local plan that give guidance and are relevant to the proposed development. These policies are:

H7 Accessible dwellings
L4 Play space provision
T2 Accessibility of new housing
LS1 Landscape setting of the city
EN4 Flood risk
EN5 Noise sensitive development
DG1 Design issues
DG4 Density and amenity issues
DG5 Open space
DG6 Car parking and vehicle circulation
LS5 Sites of Local Interest for Nature Conservation or a Regionally Important Geological Site

3.2 Other Material Considerations

National Planning Policy

3.2.1 The following Government guidance notes are relevant:

PPS1 Delivering Sustainable Development (and climate change supplement)
PPS3 Housing
PPS5 Planning for the Historic Environment
PPS9 Biodiversity and Geological Conservation
PPG13 Transport
PPG14 Development on Unstable Land
PPS16 Archaeological Planning
PPS17 Planning for Open Space, Sport and Recreation
PPS22 Renewable Energy (2004)
PPG23 Planning and Pollution Control
PPS24 Planning and Noise

PPS25 Development and Flood Risk

3.2.2 In addition the proposed development will have regard to the recently adopted Residential Design SPD prepared by Exeter City Council.

Emerging Policy

RSS Review

3.2.3 The Secretary of State published proposed changes for public consultation in July 2008. The review deals with the period up to 2026.

3.2.4 The Proposed Changes version of the draft RSS sets a target for housing delivery in the Exeter HMA of 55,400 dwellings over the period 2006-2026, of which 15,000 are to be provided in Exeter City Council administrative area.

3.2.5 Those dwellings are to be provided at the annual average rate of 2,770 dwellings per annum, of which 750 dwellings per annum are to be provided within the Exeter City Council administrative area.

3.2.6 Policy H1 deals with housing affordability. It sets a regional target of 10,000 dwellings per annum to be provided (35%) and states that Development Plan Documents should specify targets for affordable housing provision in the wider context of maintaining an overall five year housing land supply.

Emerging Core Strategy

3.2.7 The Exeter Core Strategy Proposed Submission, July 2010 states that:

> *"The Council therefore concludes that a housing requirement of 12,000 houses up to 2026 is justified by work done to assess housing need but is also appropriate to the locally determined capacity of the environment to accommodate more housing growth."* (paragraph 4.5, page 16).

3.2.8 This proposed requirement equates to 600 dwellings per annum.

Other Non-Statutory Guidance

By Design: Urban Design in the Planning System: Towards Better Practice (2000)

3.2.9 This document does not set out policy but rather aims to encourage better design and to be a companion to PPG's.

3.2.10 Urban design is the art of making places for people. This is a wide ranging factor which includes the way places work, how they look and other factors such as community safety. Good urban design is rarely brought about by a local authority prescribing physical solutions, or by setting rigid or empirical design standards, but by approaches which emphasise design objectives or principles. The document therefore sets out and considers 7 objectives of urban design:

- *Character*: a place with its own identity;
- *Continuity and Enclosure:* a place where public and private spaces are clearly distinguished;
- *Quality of the Public Realm:* a place with attractive and successful outdoor areas;
- *Ease of Movement:* a place that is easy to get to and move through;
- *Legibility:* a place that has a clear image and is easy to understand;
- *Adaptability:* a place that can change easily; and
- *Diversity:* a place with variety and choice.

3.2.11 The guidance goes on to comment that these objectives are abstract and may only have an impact on people's lives when translated into development. Accordingly it then sets out eight aspects of development form, which together with the principles listed above are intended to encourage writers of policy and guidance and decision makers to ask a series of questions and go deeper than generalisations.

4.0 Noise

4.1 Methodology and Scope

Scope

4.1.1 This chapter assesses the noise and vibration impact associated with the construction and operation of the proposals. The chapter has been prepared by 24 Acoustics Ltd, on behalf of Pinhoe Quarry LLP.

4.1.2 The assessment takes into account impact of noise from construction activities on the existing residential properties in the area and the impact of the existing ambient noise environment on the proposed new residential dwellings. It also considers the noise impact created by the additional traffic movements associated with the proposed development and compares with the existing baseline position.

4.1.3 All noise levels in this report are quoted in dB relative to 20 µPa. A definition of the acoustical terms used in this assessment is provided in volume 3, technical appendix 4.1.

Effect of Construction Noise on Existing Residential Properties

4.1.4 Planning Policy Guidance 24 (PPG 24), Planning and Noise (September 1994) provides guidance on how the planning system can be used to minimise the adverse impact of noise without placing unreasonable restrictions on development or adding unduly to the costs and administrative burdens of business.

4.1.5 It is considered that the proposed works for the quarry re-grading (in noise terms) could be regarded as long-term construction site works and it is therefore considered appropriate, in the first instance, to consider the noise impact in terms of the guidance of British Standard 5228. 'Code of Practice for Noise and Vibration Control on Construction and Open Sites', Part 1 Noise, British Standards Institution, 2009. It is also appropriate to assess the noise impact from the works in terms of the requirements of Minerals Policy Statement (MPS 2), 'Controlling and Mitigating the Environmental Effects of Mineral Extraction in England, Annex 2: Noise, March 2005.

4.1.6 PPG 24 states that detailed advice on assessing noise from construction sites can be found in BS 5228. This standard is particularly relevant to the assessment of noise from construction activities (and equally applies to noise on open sites such as ground works and quarrying operations).

4.1.7 BS 5228 makes reference to a number of factors which are likely to affect the significance and acceptability of construction site noise. These are:

a) Site location;
b) Existing ambient noise levels;
c) Duration of site operations;
d) Hours of work;
e) Attitude of the site operator;
f) Noise characteristics of plant and machinery.

4.1.8 It is generally recognised that for industrial noise the likelihood of complaints is related to the difference between the noise from the industrial source and the existing background noise level. BS 5228, however, recognises that the relationship between response and noise level differences may well be different for construction noise activities, and a greater difference may be tolerated when it is known that the operations are of a relatively short duration. It would be anticipated that the longer the construction activities are scheduled for, the closer the perception of a construction site to a permanent industrial facility, particularly if the construction activities take place at night. It is therefore important to consider the duration of the proposed works in addition to the hours of construction working within the context of the development area. Within the context of the proposed Pinhoe Quarry works, as the works will occur over a period of up to approximately two years, it is considered more appropriate to assess the noise impact using the guidance of MPS 2.

4.1.9 MPS 2 provides guidance on the assessment and mitigation of noise from surface mineral operations. MPS 2 suggests a noise limit (at the nearest noise-sensitive property) of 10 dB L_{Aeq} greater than the $L_{A90,\ 1\ hour}$ background noise level during the daytime period or, where this would place an unreasonable burden on the mineral operator, an absolute noise limit of 55 dB $L_{Aeq,\ 1\ hour}$.

Based upon this the following impact magnitude scale has been derived (refer to table 4.1).

Table 4.1: Operational Noise Impact Criteria

Impact Magnitude, Operational Noise Level, dB $L_{Aeq, 1\ hour}$			
Substantial	**Moderate**	**Slight**	**Negligible**
> 55 dB $L_{Aeq, 1\ hour}$ or > 10 dB above average daytime L_{A90} background noise level (whichever is lower)	Between 1 and 9 dB above the average daytime $L_{A90, 1\ hour}$ background noise level	Between 0 and 9 dB below average daytime $L_{A90, 1\ hour}$ background noise level	> 10 dB below average daytime $L_{A90, 1\ hour}$ background noise level

Effect of Existing Noise on Proposed Residential Properties

4.1.10 The effect of existing noise from road traffic on the proposed new residential properties at Pinhoe Quarry should be assessed using the Noise Exposure Categories of PPG24 which are identified as A, B, C or D. Proposed development sites are categorised according to the noise levels on the undeveloped site during the day and night-time periods. Noise levels are stated in terms of the time-averaged or Leq noise levels during the day (07:00- 23:00 hours) and at night (23:00- 07:00 hours).

4.1.11 For sites exposed to noise from road traffic the LAeq noise levels in dB(A) corresponding to the different categories are shown in Table 4.2.

Table 4.2 Noise Levels (dBA) Corresponding to the Noise Exposure Categories for New Dwellings (Road Traffic/ Mixed Sources)

NOISE EXPOSURE CATEGORY	**A**	**B**	**C**	**D**
07:00- 23:00	<55	55- 63	63- 72	> 72
23:00- 07:00	<45	45- 57	57- 66	> 66

4.1.12 The significance (in planning terms) to be attached to the site Noise Exposure Categories is summarised below:

A Noise need not be a determining factor in granting planning consent;

B Noise should be taken into account when determining planning applications;

C Planning permission should not normally be granted, although in some cases it may be appropriate to give consent with conditions;

D Planning permission should normally be refused.

4.1.13 The noise levels within each NEC apply to the noise levels on the undeveloped site at the position of the proposed dwellings, at a height of between 1.2 and 1.5 m above ground level.

4.1.14 A further stipulation of PPG24 is if noise levels at night regularly exceed 82 dB L_{Amax} (slow time weighting) several times in any hour, the site should be categorised as being in NEC C, regardless of the $L_{Aeq,8\ h}$ (except where the $L_{Aeq,\ 8hr}$ already puts the site in NEC D).

4.1.15 At night, and with respect to sleep disturbance, it is the resultant noise levels inside properties which are of more significance. PPG24 also makes reference to British Standard 8233 *'Sound Insulation and Noise Reduction for Buildings – Code of Practice'* [4.4] which provides general guidance on acceptable noise levels with buildings. In sleeping areas the recommended maximum indoor ambient noise levels range from 30 dB L_{Aeq} (good conditions) to 35 dB L_{Aeq} (reasonable conditions). These correspond to external noise levels of 40- 45 dB(A) L_{Aeq} with windows open. If the noise of concern contains distinctive characteristics, then these may need to be lower. In addition BS 8233 also recommends that noise levels should not regularly exceed 45 dB $L_{Amax,f}$ in bedrooms at night to provide a 'good' internal acoustic environment.

4.1.16 Similar advice is provided in a report to the World Health Organisation *Guidelines for Community Noise'* (1999). This states that to avoid negative effects on sleep, the internal L_{Aeq} sound pressure level during the sleeping period should not exceed 30 dB L_{Aeq} for continuous noise and should not exceed 45 dB $L_{Amax,f}$. It follows on that the recommended night-time noise levels

outside of dwellings should not exceed 45 dB L_{Aeq} or regularly exceed 60 dB $L_{Amax, f}$ to enable residents to sleep with bedrooms open.

4.1.17 The World Health Organisation also provides guidance on noise levels in external amenity spaces. This states that 'few people are moderately annoyed' with external noise levels (in balconies, gardens and terraces) which are below 55 dB $L_{Aeq, 16}$ hour.

4.1.18 Table 4.3 below summarises the derived noise impact magnitude semantics for existing noise affecting the proposed new properties.

Table 4.3: Operational Noise Impact Magnitude

Impact Magnitude, Operational Noise Level, dB $L_{Aeq, 1 hour}$			
Substantial	**Moderate**	**Slight**	**Negligible**
D	C	B	A

Effect of Noise from Increased Vehicle Movements Associated with the Operation of the Site

4.1.19 Noise from the potential increase in traffic during the works can be assessed based upon the calculation procedures of the Department of Transport publication 'Calculation of Road Traffic Noise' (1988)

4.1.20 The Department of Transport document 'Design Manual for Roads and Bridges' (DMRB) [6] provide a method for the assessment of road traffic effects by predicting the change in the $L_{A10,18hr}$. A similar approach was set out in its precursor, the "Manual of Environmental Appraisal for Trunk Road Assessments".

4.1.21 The DMRB rates impacts through consideration of the change in L_{A10} by noise change bands. These are similar to the original noise change bands presented in the Manual for Environmental Appraisal (MEA) (DOT 1983), with an additional band being included for an increase of 1- 3 dB, which the DMRB states as giving rise to appreciable short term benefits. It does not, however, indicate whether the change is significant. Noise change bands comparable with those recommended in the MEA are therefore used for the rating of noise

impact. The limits of the bands have also been altered slightly to avoid the ambiguity in the MEA bands at the 5 and 10 dB noise change levels, which overlap.

4.1.22 A change of 3 dB or more in the $L_{A10,\ 18\ hr}$ is considered to be a significant impact. An increase of 3 dB would occur when acoustic energy due to the proposal is equal to the baseline ambient noise level and is described as 'slight'. It is often considered useful to categorise the degree of impact according to the extent of the predicted noise change. This is frequently implemented by the use of semantic descriptors associated with noise change bands. A commonly adopted scale is shown in Table 4.4.

Table 4.4: Impact Magnitude for Rating of Noise Impact, Road Traffic Movements

Predicted Change in $L_{Aeq,\ 18hr}$	Semantic Scale Rating
Increase of less than 3 dB	Negligible increase
Increase of 3- 5 dB	Slight increase
Increase of 6- 10 dB	Moderate increase
Increase of 11- 15 dB	Substantial increase

4.2 Baseline

4.2.1 All existing residential receptors in the area are considered to have a high sensitivity to noise. Baseline noise surveys have been undertaken at four locations which are considered acoustically representative of the nearest residential properties to the site. The locations are described below.

- Location 1: Southern site boundary with 72 Harrington Lane;
- Location 2: Eastern site boundary, considered acoustically equivalent to Hill Cottages;
- Location 3: Northern site boundary, considered acoustically equivalent to Beacon House;
- Location 4: Western site boundary, considered acoustically equivalent to Pinhill View;

4.2.2 In addition a further unattended noise survey was undertaken at Location 5 near the southern site boundary with Harrington Lane at the location of the proposed nearest residential property to the site.

4.2.3 The figure in volume 3 technical appendix 4.2 shows the noise survey locations.

4.2.4 Unattended continuous noise surveys were undertaken between 14th and 22nd July 2010 (Locations 1-3) and between 28th September and 6th October 2010 (Locations 4 and 5). The following instrumentation was used during the surveys:

- 3 Rion NL-31 precision sound level meters;
- Rion NL-32 precision sound level meter;
- Bruel and Kjaer Type 4231 acoustic calibrator.

4.2.5 All instrumentation used complies with the Type 1 accuracy requirements of IEC 60651. All sound level meters were installed on tripods at a height of approximately 1.5 m above ground level. Environmental windshields were fitted. The instruments were set up to log noise levels unattended in samples of 5 minutes in terms of the overall A-weighted $L_{eq,}$ L_{90} and L_{max} indices. The instrumentation was calibrated before and after the survey in accordance with the manufacturer's instructions. No drift in calibration was recorded. The weather during the surveys was generally dry with negligible winds although some periods of adverse weather did occur. These have been removed from the analysis.

4.2.6 The noise survey results are shown graphically in the figures in volume 3, technical appendix 4.3 and are summarised in Tables 4.5 (Locations 1-4) and 4.6 (Location 5) overleaf. The measured 5 minute values at Locations 1-4 have been used to calculate hourly daytime values, in accordance with the guidance of MPS 2 and BS 4142 and the $L_{Aeq,\ 16\ hour}$ daytime noise level and $L_{Aeq,\ 8\ hour}$ night-time noise level has been calculated from the data recorded at Location 5 in order to assess the impact of the existing noise environment on the proposed new dwellings.

Table 4.5 Summary of Noise Survey Results, Location 1-4 (07:00 and 18:00 hours, weekdays and 07:00 and 12:00 hours on Saturdays)

Receptor Location	Period	Sound Pressure Level, dB					
		$L_{Aeq,\ 1\ hour}$			$L_{A90,\ 1\ hour}$		
		Min	Max	Ave	Min	Max	Ave
Location 1. Southern boundary with 72 Harrington Lane	Week	47	54	50.9	40	50	44.7
	Sat am	43	54	49.8	33	41	38.2
Location 2. Eastern site boundary. Considered acoustically equivalent to Hill Cottages	Week	44	56	49.5	39	49	43.8
	Sat am	38	55	49.1	34	38	35.6
Location 3. Northern site boundary. Considered acoustically equivalent to Beacon House	Week	42	63	52.4	37	60	43.3
	Sat am	36	53	47.0	32	35	33.5
Location 4 Western site boundary. Considered acoustically equivalent to Pinhill View	Week	39	56	36.3	30	47	38.7
	Sat am	45	47	35.9	38	43	41.4

Table 4.6 Summary of Noise Survey Results, Location 5

Date	Period and Sound Pressure Level, Db		
	Day	Night	Night
	$L_{Aeq, 16\ hour}$	$L_{Aeq, 8\ hour}$	Typical $L_{Amax,f}$
28/09/2010	--	50	68
29/09/2010	59.2	48.6	68
30/09/2010	59.1	53.7	69
01/10/2010	60.7	49.5	68
04/10/2010	57.6	48.7	68
05/10/2010	57.9	51.5	69
Average	58.3	50.3	--

4.3 Likely Impacts

Effect of Construction Noise on Existing Residential Properties

4.3.1 Noise contours showing the noise level across the site for the east and west phase re-grading (at 1.5 m above local grade level) are shown in volume 3 appendix 4.4. The calculated noise levels represent a worst-case assessment at a point during the regrading works near completion (when the topography of the site is such that there will be limited natural acoustic screening between the work site and the residential receptor properties). The calculated noise levels at each receptor for each phase are shown in Table 4.7 below.

Table 4.7 Calculated Noise Levels, Site Re-grading Works

Receptor	Phase and Sound Pressure Level, dB $L_{Aeq, 1\ hour}$	
	East Phase	West Phase
Harrington Lane	48	50
Beacon House	45	41
Wotton Cottages	39	49
Pulling Road	51	42
Pinhill View	42	51
Hill Cottages	48	41

4.3.2 The calculations indicate that the noise level is unlikely to ever exceed the 55 dB $L_{Aeq,\ 1\ hour}$ MPS 2 suggested noise limit. In order to assess the impact magnitude the operational noise level, relative to the background noise level has been calculated. This is detailed below in Table 4.8 below.

Table 4.8 Range of Impact Magnitudes, Site Regrading Works

Receptor	Weekday		Saturday	
	Difference between $L_{Aeq,1\ hour}$ site noise level and average $L_{A90,\ 1\ hour}$ background noise level, dB and Impact Magnitude		Difference between $L_{Aeq,1\ hour}$ site noise level and average $L_{A90,\ 1\ hour}$ background noise level, dB and Impact Magnitude	
Harrington Lane	3 to 5	Moderate	9 to 12	Moderate-substantial
Beacon House	-2 to 2	Slight-moderate	8 to 11	Moderate-substantial
Wotton Cottages	1 to 10.3	Moderate-substantial	-2 to 8	Slight-moderate
Pulling Road	-2 to 6	Slight-moderate	4 to 12	Moderate-substantial
Pinhill View	4 to 12	Moderate-substantial	1 to 9	Moderate
Hill Cottages	-3 to 4	Slight-moderate	5 to 12	Moderate-substantial

4.3.3 The assessment indicates that the noise impact magnitude during works occurring in the week at the majority of receptors will vary between 'slight' and 'moderate' according to the nature of the works, the phase and the receptor. The exception to this, however, will be the noise impact magnitude at Wotton Cottages and Pinhill View which could be 'substantial' at times. On Saturday mornings the background noise level at all receptors was significantly lower than that measured during the weekday periods and, as a result, the impact magnitude will be greater than that during the week. Some works during the final regrading of the site will be 'substantial'. It should be noted that the

calculations are presented as a worst-case scenario and 'substantial' impacts will only occur if the site topography provides a direct line of sight between the working area and the receptor properties.

4.3.4 The noise from works associated with the construction of the new dwellings will include noise from mobile plant and machinery, generators and power tools. It is 24 Acoustics' experience that the noise associated with the construction of new housing will be significantly lower than the regrading of the site and it is considered that a noise impact between 'negligible' and 'moderate' could occur.

Effect of Existing Noise on Proposed Residential Properties

4.3.5 The existing noise environment in the area during the day is dominated by road traffic using the Harrington Lane and by other, more distant traffic. The assessment indicates that the proposed residential properties closest to Harrington Lane will be subject to noise levels in Noise Exposure Category B of PPG 24 during the day and at night. The proposed properties which are located further from Harrington Lane will be subject to lower levels of ambient and the majority will fall within NEC A of PPG 24.The figures in volume 3 Appendix 4.5 show contours of the noise exposure categories for the daytime and night-time periods.

The effect of the existing noise environment on the proposed new residential development will therefore vary between 'slight' and 'negligible'.

Effect of Noise from Increased Vehicle Movements Associated with the Operation of the Site

4.3.6 Calculations of noise change relating to site-based traffic movements have been undertaken for the opening year, based upon the operational traffic data included in Chapter 11. The noise changes have been calculated for the base case (growthed to 2017) and compared to the anticipated total flow in this year.

4.3.7 The anticipated changes in noise levels at residential properties located on routes into the site have been calculated based upon the traffic flows, percentage heavy vehicles and traffic speeds. All calculations have been

undertaken in accordance with the procedures outlined in the Department of Transport Memorandum 'A Calculation of Road Traffic Noise' (CRTN) [4.8]. The calculations in Table 4.9 indicate the following increase in road noise level, as a result of the increased traffic flows.

Table 4.9 Changes in Road Traffic Noise Level

Road	Increase in Noise Level, dB $L_{A10,\ 18\ hour}$
Harrington Lane	0.6
Chancel Lane	0.5
Church Hill	0.3

4.3.8 The calculations indicate that there will be no significant change in noise level at any of the roads approaching the site over the 18 hour assessment period. Calculations have also been undertaken to determine the increase in noise level over morning and afternoon peak hour period. This indicates that the maximum increase would be no more than 2 dB $L_{A10,\ 1hour}$.

4.3.9 The overall effect of the increase in noise associated with road traffic using the site is expected to be negligible.

4.4 Proposed Mitigation

Mitigation of Construction Noise on Existing Residential Properties

4.4.1 The greatest impacts will occur for operations on Saturdays (when background noise levels are lower) and when there is no acoustic screening between the work area and the receptor locations. Consequently, it is recommended that regrading works are not undertaken on Saturdays within 100 m of sensitive residential receptor properties (Wotton Cottages and Pinhill View) and consideration is given to the erection of temporary acoustic screens to hoard the worksite from residential receptors (when there would otherwise be direct line of sight).

4.4.2 In addition to the above, it should be noted that at all times during the works the operator will be expected to:

- Use best practicable means (as defined in Section 72 of the Control of Pollution Act, 1974) to reduce noise from the operations to a minimum;
- Maintain plant regularly, ensuring that any noise-reducing measures (such as silencers or enclosures) are properly fitted and used correctly;
- Work with the local neighbours to keep them informed of the proposed working schedule, including the times and duration of any abnormally noisy activity that may cause concern.

4.4.3 These measures will reduce any adverse effects as far as practicable.

Mitigation of Existing Noise on Proposed Residential Properties

4.4.4 The site has been designed and the properties orientated to ensure that noise from the Harrington Lane premises does not cause disturbance to the occupants of the new residential properties. The properties nearest to Harrington Lane will, however, be affected by noise from road traffic. Acoustic glazing and alternative means of ventilation in terms of acoustically-attenuated passive wall vents (so that residents may occupy the dwellings comfortably with windows closed) will be specified for all relevant properties to achieve the "good" standard of BS 8233 (of no more than 30 dB $L_{Aeq,\ 16\ hours}$ during the day and 30 dB $L_{Aeq,\ 8\ hours}$ or regularly exceeding 45 dB $L_{Amax,f}$ at night). Where necessary, acoustic screening will also be provided to ensure that the ambient noise level in external amenity spaces does not exceed 55 dB $L_{Aeq,\ 16\ hour}$.

4.4.5 These measures will prevent any adverse impacts upon the occupiers of the proposed new dwellings.

Mitigation of Noise from Increased Vehicle Movements Associated with the Operation of the Site

4.4.6 The increase in noise level from road traffic associated with the new development will be negligible and no mitigation is considered necessary.

4.5.1 Residual Impacts

4.5.2 The noise levels associated with the regrading of Pinhoe Quarry may generate a substantial noise impact at some receptor locations during periods when works occur near to receptors and when they have line of sight to the receptors. Realistically this will only occur towards the completion of the regrading works. The impact of this may be mitigated by ensuring that works do not occur within 100 m of sensitive receptor properties on Saturdays and by considering the use of temporary acoustic screens if necessary. The residual effect of this is likely to be neutral-intermediate.

4.5.3 The assessment has indicated that the new residential properties nearest to Harrington Lane will be exposed to noise levels from road traffic which is likely to generate a 'slight' noise impact. This may be mitigated by the specification of acoustic glazing and alternative means of ventilation. The residual effects will be neutral.

4.5.4 The increase in road traffic movements associated with the residential development will be negligible and the residual effects of this will be neutral.

4.5.5 The residual impacts are summarised in Table 4.10 (overleaf).

Table 4.8 Residual Noise Effects

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
Construction Phase- Final Site Regrading								
Harrington Lane	High	Moderate-substantial	Adverse Direct Reversible	Intermediate-major	Restrict works within 100 m of residential properties (when there is line of sight to the properties) to weekdays only, use temporary screens where necessary to reduce line of sight	Slight-moderate	Minor-intermediate	High
Beacon House		Slight-substantial		Minor- major		Negligible-moderate	Neutral-intermediate	
Wotton Cottages		Slight-substantial		Minor- major		Negligible-moderate	Neutral-intermediate	
Pulling Road		Slight-substantial		Minor- major		Negligible-moderate	Neutral-intermediate	
Pinhill View		Moderate-substantial		Intermediate-major		Slight-moderate	Minor-intermediate	
Hill Cottages		Slight-substantial		Minor- major		Negligible-moderate	Neutral-intermediate	
Impact of Existing Noise on New Residential Units								
New residential units	High	Negligible-slight	Adverse Direct Permanent	Neutral-minor	Installation of acoustic glazing and alternative means of ventilation where required	Negligible	Neutral	High
Impact of Increased Traffic Noise on Existing Residential Properties								
All residential receptors on nearby traffic routes	High	Negligible	Adverse Direct Permanent	Neutral	None required	Negligble	Neutral	High

4.6 Summary

4.6.1 The noise impact assessment associated with the regrading and construction of new housing of Pinhoe Quarry has indicated that the increase in noise level from the additional road traffic associated with the proposals will be negligible and will not create any residual impact.

4.6.2 The noise impact magnitude from some regrading operations will vary between 'negligible' and 'moderate' (according to the receptor and working area location). On the basis that regarding operations work near to residential receptors does not occur on Saturday mornings at operations within 100 m of residential properties the residual effects of the proposal are considered to be 'neutral' for a small proportion of the time when working in close proximity to housing on weekdays.

5.0 Biodiversity

5.1 Methodology and Scope

5.1.1 This chapter has been prepared by Sunflower Ecology and sets out details of the ecological environment at Pinhoe Quarry and surrounding land that would be affected by the proposed development of the site for housing. The chapter provides an assessment of existing habitat conditions, predicts impacts of the development and indicates mitigation that is planned to enhance the site's biodiversity.

5.1.2 The assessment focuses on the proposed development area within the footprint of Pinhoe Quarry. Consideration is also given to land that surrounds the site, particularly land to the north and west of the quarry that forms part of the Beacon Hill County Wildlife Site.

5.1.3 A previous ecological survey of the quarry and land to the west and north was carried in 1999 by CPN as part of a Review of Old Mineral Permissions (ROMP) 00/01278/25

5.1.4 The Institute of Ecology and Environmental Management (IEEM) guidelines for the assessment of ecological impacts recommend that the process of identifying the characteristics of the impacts should be made explicit by considering the following when describing impacts: confidence in predictions, positive or negative, magnitude, extent, duration, reversibility, timing and frequency, and cumulative effects.

5.1.5 Recommendations contained within the IEEM guidelines for the prediction of ecological impacts and their characterization have been followed in broad terms.

5.2 Baseline

5.2.1 Baseline data was collected by a combination of desk-top study and site surveys. The desk-top study included analysis of data records supplied by the Devon Biodiversity Records Centre, the Devon Bat Group and the report of a previous ecological survey undertaken in 1999 by CPN.

5.3 Likely Impacts

Habitats and populations

5.3.1 A series of Extended Phase 1 Habitat Surveys were undertaken by Dr Peter Beale of Sunflower Ecology in July to September 2009. These surveys followed the Joint Nature Conservation Committee's methodology for extended Phase 1 Habitat Surveys. The surveys included the quarry and landscaped areas within it, two fields and a riding stable to the north-west, an abandoned and overgrown orchard and an area of unmanaged grassland below Pinn View. The survey also included an area of permanent pasture to the west and north-west of Beacon House and the Church.

5.3.2 The last named would be unaffected by the proposals and the enclosure below Pinn View would be similarly unaffected – except by enhanced management. The results of all these surveys are presented in a compendium report as an appendix 5.1 to the Environmental Statement

Quarry Floor and Slopes

5.3.3 About four fifths of the quarry is sparsely vegetated and it would appear that the northern face has been re-graded comparatively recently to leave a safe angle of repose. The slope consists of metamorphosed and layered sandy mudstones, some of which are blocks from hard strata while much is broken down into thin flakes or friable material. This provides a challenging substrate for vegetation, but shrubs and trees like *Buddleia davidii*, sallow, birch and Italian alder are able to colonise these steep surfaces readily. All three produce large quantities of small wind-borne seeds and the re-graded surfaces provide abundant opportunities for seeds to lodge and germinate.

5.3.4 Some native herbs like fleabane, rosebay willowherb and scentless mayweed are opportunistic colonisers of bare ground, especially where it is kept moist by seepages from groundwater. The greatest abundance of shrubs and herbs are found on the quarry floor where spring water feeds patches of sallow and alder, with soft rush, greater reedmace, figwort, teasel, greater willowherb, stinging nettle, brambles. Small seepages that run into the sump pond support a range of mosses, liverworts, creepy jenny and toad rush.

5.3.5 There are areas within the quarry floor and along the centre and edges of tracks that have not been disturbed for a few years. Bird's-foot trefoil has become established in these areas with some herb and grass communities.

5.3.6 Generally, the southern and eastern sides of the quarry appear to have remained undisturbed for the longest period and a track that runs around the perimeter, behind a bank of discarded bricks for much of its length, is well vegetated with bird's-foot trefoil, fleabane, self heal, scentless mayweed, teasel, square-stalked St John's wort, ragwort and creeping thistle.

5.3.7 The quarry floor and slopes are, however, of little ecological value and considered to be an area of **low** sensitivity. Any value they have is very local and can readily be replicated elsewhere.

Streams and Ponds

5.3.8 There is one large pond of around three quarters of a hectare and a smaller pond, located on the quarry floor. The ponds, particularly the small pond to the north of the large sump pond in the south east of the site, will be attractive to a range of insects, like dragon and damsel flies, and have been shown to be breeding grounds for palmate newts, some smooth newts and common toads. A small pond located within the partially restored area in the south-west corner of the site is an ecological feature of very local importance. As such, the ponds are considered to be of **low** sensitivity.

Surrounding Vegetation

5.3.9 The hedges that surround the north western and north- eastern sides of the quarry are recently planted hawthorn hedges. The shelter and screening

woodlands that have been planted along the southern boundary of the quarry are recent and they consist of a combination of conifers, like Monterey pine, with a range of native and exotic broadleaves. These woods appear to have been planted on a combination of quarry waste and discarded bricks. The strip of plantation that adjoins Harrington Lane consists of two parts; the first contains oak, ash, field maple, hawthorn and blackthorn. This strip would be retained. The second is made up, in the main, of ash with English elm. A block of plantation of more open character adjoins Cheynegate Lane at the western end of the land that runs with the quarry. Much of the planting was carried out on landfill and nettles with ground ivy thrive under the thin canopy of birch and ash. A block of mixed conifer and broadleaved plantation lies to the north of the strip of woodland. The Monterey pines have outgrown many of the broadleaves that have died and fallen. White poplars are able to compete with the pines and there are now some sizeable trees within the wood. Finally, to the north of these is an alder plantation that runs up to the lip of the quarry. Common and grey alders dominate this strip, but are replaced by Italian alders on the lip of the quarry.

5.3.10 Since all of these are comparatively recent plantings, their ecological value is limited. The field layer in these various plantations is dominated throughout by shade-tolerant stinging nettles with ground ivy forming dense carpets in places. There are very few woodland herbs that are normally associated with established broadleaved woodland. The area of made-up ground in the south-west corner of the site, with the exception of the strip native trees, would be reprofiled as part of the proposed earthworks and incorporated into the development as open space.

5.3.11 The two fields that lie above the quarry and the riding stable are within the footprint for the development and the plan would be to excavate the clay reserves from these enclosures in order to reprofile levels within the overall area of the Quarry. The pasture within both fields is species-poor and years of horse and pony grazing have degraded the sward. The hedge that divides the fields is also species poor and the hedge that divides the fields from a public footpath to the north and east is a monoculture of hawthorn.

5.3.12 A section of the County Wildlife Site on the eastern side of the intermittent stream that runs down from the Beacon is an abandoned orchard with an earth bank and footpath at the top of the slope. A few old apple trees survive to the east of the stream, but it has become very overgrown with blackthorn and brambles. Very little open habitat remains and this part of the CWS would be incorporated into the reprofiled area. The earth bank has a number of oak trees, holly and other shrubs growing on it. A strip of naturally regenerated, but recent, woodland lies between the lane and the lip of the quarry.

5.3.13 A block of damp grassland, derelict cherry, plum and apple orchard lies to the west of the small stream. The majority of this part of the CWS lies outside the footprint of the development, but it would be unaffected by ground works or building. It may, however, be possible to use part of a steep and bramble covered slope within this parcel of land to relocate a badger sett, if this proves to be necessary.

5.3.14 The impact of the proposed development on the vegetation of the quarry site, given that much of it consists of introduced species, is considered to be of **low** sensitivity. The same is true of the two fields attached to the riding stable and the small eastern part of the CWS. Given the scale of the landscape planting that is planned, the habitat value would be enhanced by the proposed development.

Breeding Birds

5.3.15 The most likely breeding sites for a range of garden birds like robin, wren, chaffinch, blue and great tits, blackbird and woodpigeon will be trees and shrubs in hedgerows, clumps of scrub and woodlands. Moorhens breed on the large sump pond, which is surrounded with sallows and other vegetation attractive to these birds.

5.3.16 None of these are endangered or protected species. The impact of the proposed development on the bird population of the quarry site is considered to be of **low** sensitivity. Given the scale of the landscape planting and pond creation that is planned, the habitat value of the quarry would be enhanced.

Amphibian and reptile surveys

5.3.17 Amphibian and reptile surveys were carried out by Dr. David Fee of Ambios Ecology. The surveys were carried out using the Amphibian and Reptile Conservation Trust and Froglife's standard and recognized methodologies. Torching and netting were used between March to July 2010, to locate amphibians in the large sump pond and within a small pond above it.

5.3.18 Common toads and palmate newts were found in March and early April, whereas some smooth newts were recorded in June and July. Large numbers of toad tadpoles were recorded in April and May.

5.3.19 Reptiles were surveyed by use of 120 artificial refuges (mats of slate underfelt). These were placed throughout the quarry, in sunny areas close to low vegetation. Recording was started in early August and continued until the end of October 2010. The survey identified a very small number of juvenile slow worms along the eastern boundary of the site. No slow worms or other reptiles were recorded within the quarry itself. The full results of the herpetological survey report are set out within appendix 5.2 of this Environmental Statement.

5.3.20 The impact of the proposed development on the reptile and amphibian populations within the Pinhoe Quarry site is considered to be very local and therefore of **low** sensitivity. The existing sump pond will be replaced with a shallow pond with planted margins as well as an additional similar pond to be surrounded by intermittent wetland. Both will provide better habitats for breeding amphibians. Given the scale of the landscape planting that is planned, the habitat value of the site would be enhanced.

Bat surveys

5.3.21 Bat surveys were carried out within the quarry by Dr. David Fee in June and July 2010. Bat records for the area were obtained from the Devon Bat Group. Recording was carried out along transects and at static locations, using a combination of Heterodyne Batbox Duet, Anabat detectors and recording equipment. The site was found to be only of local significance for bats, which were using peripheral woodland and boundary hedges for foraging.

5.3.22 The full results of the bat survey report are set out within appendix 5.3 of this Environmental Statement.

Badger activity surveys

5.3.23 Badger activity surveys were carried out by Dr. David Fee In June and July 2010 using the standard methodology for badger surveys which involved careful walking of the site and sett observations. One sett has been identified within the site, in an area of made ground near the south-western boundary. Despite its size, this did not prove to be a breeding sett and only one badger was recorded as emerging from the sett on one occasion. It is considered that this is likely to be an annex or subsidiary sett.

5.3.24 The full results of the badger survey report are set out within appendix 5.4 of this Environmental Statement.

5.4 Proposed Mitigation

5.4.1 The site is of low-medium value (as summarised in Table 5.1) as a habitat and many of the areas within it that have been landscape planted or have re-vegetated naturally, tend to be dominated by introduced tree and shrub species. Landscape plans for green areas within the development will concentrate wherever possible on the use of native species. Gardens will be planted with exotics and these will bring variety and food sources to insects, invertebrates and birds. The development includes allotment gardens and green corridors, both of which will be valuable for the enhancement of biodiversity.

5.4.2 The large sump pond and the small pond will be replaced with two new ponds, these will be designed and planted to optimize habitat conditions. The pond at the south-eastern end of the site will be constructed to allow it to be drained by gravity. The new ponds will be surrounded by areas of intermittent wetland and shelter planting that will be designed to create ideal conditions for amphibians and reptiles during the breeding season and when they have left the water.

5.4.3 Part of the County Wildlife Site on the western side of the site would be incorporated into the development, but the remaining block of derelict orchard, woodland and grassland on the western side of the small stream would fall outside the footprint of the development and remain undisturbed.

5.4.4 The block of pasture comprising part of the CWS located north of the site also falls outside the footprint of the development, but the intention is to bring this into more effective management to enhance its value for butterflies and other wildlife. This field is already used for informal recreation and it is a valuable local amenity. This field is part of the Beacon Hill County Wildlife Site, but this is definition rather than a designation with statutory recognition. CWS status confers little protection in practical terms, nor does it ensure appropriate or effective management.

5.5 Residual Impacts

5.5.1 The residual ecological impacts are summarised in Table 5.1 overleaf:

Table 5.1 Residual Ecological Effects

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
Loss of the quarry floor and slopes habitats	Low	Slight	Negative initially, but with high potential for enhancement	Low	Within the landscape plans	Negligible	Neutral	High
Loss of pastures by the riding stable	Low	High	Loss of poor quality pasture and species-poor hedge	Low	Enhancement within the landscape plans	Negligible	Neutral	High
Loss of landscape plantings on the site	Low	High	These areas tend to be dominated by non-native tees and shrubs	Low	Native species will dominate landscape plantings within the green areas	Negligible	Beneficial	High
Loss of on-site ponds	Low	Slight	Infilling will lead to loss of existing ponds	Low	Creation of two ponds with greater wildlife value	Negligible	Beneficial	High
Disturbance of breeding birds	Low	Slight	Loss of existing vegetation within the quarry and surrounding areas within the footprint of the development	Low	Provision of a greater range of nesting and feeding opportunities within the landscaped green areas. gardens	Negligible	Minor beneficial	High
Loss of bat foraging areas	Low	Slight	Hardly any loss of bat foraging areas would occur	Low	Bat foraging likely to be enhanced within the green areas of the site	Negligible	Neutral	High
Loss of amphibians and reptile habitats	Low	Slight	Existing ponds to be drained and replaced	Low	New ponds will provide enhanced habitats	Negligible	Minor beneficial	High
Loss of badger sett and foraging areas	Medium	Slight	The sett is a subsidiary or annex	Low	A relocation sett can be created in part of the CWS if this is needed	Negligible	Neutral	High
Loss of a small section of the County Wildlife Site	Medium	Slight	The existing area is overgrown and has lost much of its initial value	Low	Additional habitats will be created within the site and other parts of the CWS are to be managed to enhance its wildlife value	Slight	Minor beneficial	High

5.6 Summary

5.6.1 Development of the site including infilling of two ponds, clay extraction within the two north-eastern fields, reprofiling of a small part of the Beacon Hill County Wildlife Site and areas of restored land that have been landscaped, will result in some losses in the short-term. Plans for the site include a significant amount of landscape planting, two new ponds and a significant amount of green space. In the longer-term this will result in the site have an enhanced biodiversity value. The site will also provide homes for people who will enjoy the surroundings in which they live.

6.0 Geology/Soil/Land Quality

6.1 Methodology and Scope

Site Investigation Methodology

6.1.1 A phased investigation approach has been adopted. This includes:

- Geoenvironmental Desk Study (see Appendix 6.1)
- Ground Investigation Report (see Appendix 6.2)
- Geotechnical Assessment Interpretive Report (see Appendix 6.3)
- Report on RIGS (see Appendix 6.4)
- Excavation and Compaction Trial Report (see Appendix 6.5)

6.1.2 The desk study included review of the following:

- Historic mapping
- Topographic mapping
- Geological mapping
- Review of previous quarry stability assessments
- Proprietary environmental database

6.1.3 The targeted intrusive investigation included:

- Trial Pitting
- Rotary Core Drilling
- Installation of groundwater and ground movement monitoring equipment

6.1.4 A geotechnical assessment of the existing site conditions and the proposed development platform was undertaken to identify geotechnical hazards and mitigation measures. The details of this assessment were further refined with a Trial Earthworks Compaction exercise.

Assessment Methodology

6.1.5 For the purpose of the Environmental Statement and to maintain consistency, the significant geotechnical risks will be assessed in accordance with a set nomenclature based on Receptor Sensitivity and Magnitude of Impact. The following table provides a qualitative basis for assessing receptor sensitivity.

Table 6.1: Assessing Receptor Sensitivity

Receptor / Sensitivity	Future Site Users	Surrounding Land Uses	Construction Workers	Built Environment
High	Residential, allotments, play areas	Residential, allotments, play areas, designated or protected areas e.g. RIGS	Extensive earthworks and demolition of buildings	Historic buildings/ settlement sensitive structures
Medium	Commercial, landscaping or public open space areas	Commercial, landscaping or public open space areas	Limited earthworks	Buildings, including services and foundations
Low	Industrial buildings, car parking	Industrial buildings, car parking	Minimal disturbance of ground	Infrastructure

Determination of Magnitude and Significance of Impacts

6.1.6 The following table defines the magnitude of impact on the receptors.

Table 6.2 General Methodology for Assessing Magnitude

Magnitude of Impact[1]	Description
Substantial	Impact resulting in a considerable change in the baseline condition of a specific receptor/attribute with severe undesirable/desirable consequences
Moderate	Impact resulting in a discernible change in the baseline condition: • Of a specific receptor/attribute with undesirable/desirable consequences; or • With the potential to cause statutory objectives to be exceeded
Slight	Impact resulting in discernible change in the baseline condition of a specific receptor/attribute with undesirable/desirable conditions that can be tolerated

6.1.7 The following table compares the sensitivity of the receptors with the magnitude of the impact.

Table 6.3: Significance of the Impact

Sensitivity of Receptor	Magnitude of Impact			
	Substantial Impact	Moderate Impact	Slight Impact	Negligible Impact
Very High	Major	Major – Intermediate	Intermediate	Minor
High	Major – Intermediate	Intermediate	Intermediate – Minor	Neutral
Medium	Intermediate	Intermediate	Minor	Neutral
Low	Intermediate – Minor	Minor	Minor – Neutral	Neutral

[1] Note: impact magnitude can be either positive or negative

6.2 Baseline

Geology

6.2.1 Pinhoe Quarry is located within the Crackington Formation of Carboniferous Age. The rock is typically observed to comprise shale interbedded with sandstone layers. The ratio of shale:sandstone is between 3:1 and 4:1, and the sandstone beds are typically 0.05m thick with occasional beds up to 0.5m.

6.2.2 The shale and sandstone beds dip to the north at angles ranging from 30 to 60 degrees. The beds display tight folds, where the steeply inclined beds have been inverted revealing distinctive sedimentary features.

6.2.3 The site contains two areas designated in the Devon County Council Regionally Important Geological Sites (RIGS) document. One, labeled Area 1, located on the west side of the quarry and the other, Area 2, located on the south side.

6.2.4 The quarry slopes are steep and considered meta-stable to unstable in the medium to long-term. Slope instability will result in the natural loss of both RIGS areas. Preservation of Area 1, which is already largely obscured due to slope weathering and degradation, is not considered feasible and this area will therefore be lost whether the site is developed on not. Preservation of Area 2 is feasible within the context of the proposed development layout, although measures will be required to stabilise the existing feature. Recent slope movement has already resulted in the loss of part of the face. Without intervention this feature will also be lost as a result of inherent slope instability.

6.2.5 A detailed assessment of the RIGS areas has been carried out by Dr Richard Scrivener, consultant Geologist with particular knowledge of the Crackington Formation and formerly head of British Geological Survey in Exeter. His report is presented as Appendix 6.4.

Soil

6.2.6 The soils within the development site include the following:

- Topsoil over Head/drift deposits in the north east corner of the site.

- Stockpiled soils containing highly weathered shale and sandstone placed at the base of the quarry.
- Made ground comprising quarried arisings unsuitable for brick making and waste/reject bricks and other general debris from the brickmaking process deposited in the south west corner of the site.

6.2.7 The proposed development will aim to maximize the reuse of resources at the site by achieving a near neutral earthworks balance. This includes:

- Stockpiling and preservation of topsoil for re-use in residential gardens, subject to appropriate quality testing and acceptable chemical concentrations for residential land use with plant up-take.
- Segregation of soils and classification as general fill to be undertaken in accordance with Specification for High Works. Soils meeting the specification requirements will be used as a bulk general fill for backfilling to achieve the required restoration of the quarry.
- Unsuitable materials will be segregated and classified for either improvement for re-use or waste classification for disposal.

6.2.8 Excavation, transport, stockpiling and re-use of the soils may release dust and silt. This may result in a short term environmental impact requiring consideration of potential impacts and mitigation measures.

Land Quality

6.2.9 The existing site contains made ground in the south west corner of the site. The composition of this has been observed locally in side slopes and excavations. This predominantly consists of brick, gravel, sand, silt and clay, with localised pockets of organics.

6.2.10 The development platform will be constructed using conventional earthworks equipment, where material is won from the north east and western areas of the site and transported, placed and compacted over the remainder of the site. This will be undertaken in a controlled and systematic manner in order to create a development platform at the desired level to facilitate the proposed residential development.

6.3 Likely Impacts

Geology

6.3.1 The potential environmental impacts relating to the geology and proposed development include:

- Quarry slope instability (long-term) – slope instability is already apparent within the site and will continue and potentially worsen if the site is left in its current redundant state.
- Natural erosion and loss of the RIGS largely resulting from the instability referenced above.
- Pyritic shales within the rock mass that may contain oxidisable sulphides that can result in aggressive conditions for buried concrete infrastructure.
- There is a remote possibility that the acidic conditions generated by oxidation of the sulphides could result in release of ground gas.
- Re-use and compaction of the shale and sandstone as a general fill for the bulk earthworks to create the development platform resulting in a fill mass that could potentially settle under self-weight.
- Groundwater pressures are likely to equalize in the long-term which will result in rising groundwater levels in the placed and compacted fill. This has the potential to induce both collapse settlement and long-term creep settlement.

Soil

6.3.2 The Head deposits in the north east corner display high volume change potential. This presents a risk of future movement if placed beneath structural foundations.

6.3.3 The earthworks are likely to result in the generation of dust during prolonged dry periods.

6.3.4 The made ground soils are likely to contain locally unsuitable materials for re-use. These will require segregation, assessment of re-use options and waste classification where disposal is required.

6.3.5 The soils utilised for bulk filling will be compacted to a method specification for the particular class of engineering fill. The soil will however be prone to immediate and long-term self-weight and structural load settlement.

Land Quality

6.3.6 The proposed development platform will be classed as a brownfield site. The platform will consist of a significant thickness of general engineered fill. This will be placed and compacted in a systematic manner; however, the resulting platform will still be subject to the following potential hazards:

- Self weight settlement
- First inundation collapse settlement
- Structural load induced settlement
- Differential settlement across high-walls

6.3.7 Appropriate screening, selection, placement and compaction of the bulk engineering fill will significantly reduce the risk of a source of potential ground gas, nonetheless this potential impact requires consideration. Ground gas may be generated as a result of recent organic matter in the ground or as a result of carbonaceous organics that could be present in the shales.

6.3.8 Similarly, there is an off-site landfill to the south of the site that has the potential to impact on the subject site. Ground gas monitoring carried out to date does not indicate that this risk exists.

Table 6.4: Environment Effects, Receptors and Nature of Impacts

Environmental Effects	Receptor	Nature of impacts
Quarry slope instability	Built Environment	Failure of slopes resulting in damage to drainage and residential property resulting in potential injury and medium to high remediation and repair costs.
Natural erosion/ destruction of RIGS	Wider community.	Potential loss of RIGS.
Pyritic shales	Built Environment	Potential oxidation of sulphides resulting in soluble sulphate attack on buried concrete.
Rising groundwater within fill platform	Future and surrounding land use	Reduction in effective stress resulting in collapse settlement of fill.
High volume change soils	Built environment	Seasonal ground movement resulting in subsidence of structures.
Dust generation during earthworks	Surrounding land uses	Dust inhalation by construction workers, or dust migration towards surrounding area.
Made ground potential for gas generation	Future site users	Degradable materials within placed and compacted fill generating ground gas with potential to migrate into future buildings.
Self weight settlement of site won shale used for bulk filling	Built Environment	Long-term settlement of the fill platform.
First inundation collapse settlement	Built Environment	Immediate short term collapse settlement resulting in potential damage to future structures, roads and services.
Structural load induced settlement	Built Environment	Medium to long-term settlement resulting in damage to structures, roads and services.
Differential settlement across high-walls	Built Environment	Subsidence resulting in differential settlement of structures causing raft founded structures to tilt.

6.4 Proposed Mitigation

6.4.1 The following table identifies the proposed mitigation measures for the likely impacts presented in the previous section.

Table 6.5: Likely Impacts and Mitigation Measures

Likely Impacts	Mitigation
Quarry slope instability	Long-term slope angles cut to a stable slope of 1:2.5 with trench drains placed to collect observed spring/ seepages.
Natural erosion/ destruction of RIGS	Areas 1 and 2 are likely to be lost as a result of natural slope instability and associated erosion. Area 1 will be abandoned. Preservation of a portion of Area 2 to create a "Geo Park" will require slope stabilization measures to be implemented.
Pyritic shales	Additional testing to determine form of pyrite and potential for oxidation of sulphides. Results of further testing will define mix design for buried concrete.
Rising groundwater within fill platform	This is anticipated and ground improvement measures will include pre-inundation and pre-loading surcharge to mitigate affects.
High volume change soils	Head deposits are not suitable for engineering fill and will be re-used in landscaped areas and options to provide a clay lining for the ponds.
Dust generation during earthworks	The scale and magnitude of the earthworks is unlikely to be sufficient to generate significant quantities of dust. Dust suppression will be undertaken during dry periods. This is likely to require the use of a tractor towed bowser with sprinkler.

Table 6.5: Likely Impacts and Mitigation Measures (cont)

Likely Impacts	Mitigation
Made ground potential for gas generation	Unsuitable material will be segregated and removed from the engineering fill thus removing any potential source of degradable material likely to generate soil gas. There is a risk, albeit slight, that oxidation of the shales could give rise to ground gas and it is therefore suggested that ground gas monitoring wells are installed in the surcharge fill and monitored to determine a gas screening value and apply NHBC Traffic Light system to allow selection of appropriate protection measures.
Self weight settlement of site won shale used for bulk filling	Use site won general fill and placed in layers as specified with appropriate compaction.
First inundation collapse settlement	Placed general fill wet of optimum and undertake ground improvement pre-inundation trial to determine potential and magnitude and use results to design full scale ground improvement measures.
Structural load induced settlement	Restrict future dwelling foundations to lightweight rafts. Ground improvement by pre-loading surcharge required with monitoring instruments to record magnitude of compression and generation and dissipation of excess porewater pressures.
Differential settlement across highwalls	Restrict future dwelling foundations to lightweight rafts. Excavate and re-grade high-walls to a suitable angle to minimize differential settlement. This is required on the west and south sides of the pond.

6.5 Residual Impacts

6.5.1 The following table presents the estimated magnitude of residual impacts, based on the identified mitigation measures.

Table 6.6: Residual Impacts and Significance

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
Quarry slope instability	Medium	Moderate	Medium-high cost remediation and repairs	Moderate	Long-term slope angles cut to 1:2.5 with trench drains placed to collect observed spring/ seepages.	Slight	Minor
Natural erosion/ destruction of RIGS	Medium	Slight	Low cost	Minor-moderate	Areas 1 and 2 are likely to be lost as a result of natural slope instability and erosion. Preservation of a portion of Area 2 is proposed and will require slope stabilization measures to be implemented.	Slight	Minor
Pyritic shales	Medium	Slight	Low cost remediation and repairs	Minor-moderate	Additional testing to determine form of pyrite and potential for oxidation of sulphides.	Slight	Minor
Rising groundwater within fill platform	High	Moderate	Medium cost remediation and repairs	Moderate	This is anticipated, ground improvement measures will include pre-inundation and pre-loading surcharge to mitigate affects.	Slight	Intermediate to minor

Table 6.6: Residual Impact (cont)

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
High volume change soils	Medium	Moderate	Medium cost remediation and repairs	Intermediate	Head deposits are not suitable for engineering fill and will be re-used in landscaped areas and options to provide a clay lining for the ponds.	Slight	Minor
Dust generation during earthworks	High	Slight	Chronic affects/ low cost	Intermediate to minor	The scale and magnitude of the earthworks is unlikely to be sufficient to generate significant quantities of dust. Dust monitoring required to confirm this. Dust suppression will be undertaken during dry periods and subject to monitoring results. This is likely to require the use of a tractor towed bowser with sprinkler.	Negligible	Neutral
Differential settlement across highwalls	Medium	Substantial	High cost remediation and repairs	Intermediate	Restrict future dwelling foundations to lightweight rafts. Re-grade highwalls to a suitable angle to minimize differential settlement.	Moderate	Intermediate

Table 6.6: Residual Impact (cont)

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
Made ground potential for gas generation	High	Slight to moderate	Low to Medium cost	Intermediate	Unsuitable material will be removed from the engineering fill thus removing any potential to generate soil gas. There is a slight risk that oxidation of the shales could give rise to ground gas; it is suggested that gas monitoring wells are installed in the surcharge fill and monitored to determine a gas screening value to allow selection of appropriate protection measures.	Negligible	Neutral
Ground gas from off-site former landfill (at its closest 50m to the south in the Ibstock brickworks property)	High	Slight	Low cost remediation and repairs	Intermediate	Monitor and establish need or otherwise for ground gas protection measures in new dwellings.	Negligible	Neutral

Table 6.6: Residual Impact (cont)

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
First inundation collapse settlement	Medium	Substantial	High cost remediation and repairs	Intermediate	Place general fill wet of optimum and undertake ground improvement pre-inundation trial to determine potential and magnitude and use results to design full scale ground improvement measures.	Moderate	Intermediate
Structural load induced settlement	Medium	Substantial	High cost remediation and repairs	Intermediate	Restrict future dwelling foundations to lightweight rafts. Ground improvement by pre-loading surcharge required with monitoring instruments to record magnitude of compression and dissipation of excess porewater pressures.	Moderate	Intermediate
Settlement of site won shale used for bulk filling	Medium	Substantial	High cost remediation and repairs	Intermediate	Use site won general fill and placed in layers as specified with appropriate compaction and robust site control.	Slight	Minor

6.6 Summary

6.6.1 The preceding assessment indicates that the potential impacts associated with the re-profiling of the former quarry are predominantly minor and all can be addressed by appropriate engineering design and control during the earthworks phase.

6.6.2 The nature of the proposed re-profiling minimises wider environmental impact by operating a neutral earthworks balance thus limiting commercial vehicle movements on and off site importing fill or exporting mineral.

6.6.3 The two RIGS areas within the quarry will be lost due to instability and natural weathering if the site remains in a redundant state. The redevelopment option facilitates enhancement of one of the two sites with improved access and greater chance of longer term preservation; this should be regarded as a clear benefit.

7.0 Water Quality and Quantity - Hydrogeology

7.1 Methodology and Scope

Water Quality - Site Investigation Methodology

7.1.1 A phased investigation approach has been adopted. This includes:

- Geoenvironmental Desk Study (see Appendix 6.1)
- Ground Investigation Report (see Appendix 6.2)

7.1.2 The targeted ground investigation included:

- Trial Pitting
- Rotary Core Drilling
- Installation of groundwater and ground movement monitoring equipment

7.1.3 Ongoing monitoring is being carried out to provide data on groundwater levels and groundwater quality beneath the site.

Assessment Methodology

7.1.4 For the purpose of the Environmental Statement the Receptor Sensitivity and Magnitude of Impact tables are defined below in terms of potential impact on groundwater, which in turn feeds surface water and abstractions.

Table 7.1: Assessing Receptor Sensitivity

Receptor / Sensitivity	Groundwater	Surface-water	Abstractions	Built Environment
Very High	Internationally important features	Internationally important features	Internationally important features	Proposed fill platform forming foundation stratum for dwellings.
High	Source Protection Zones and baseline flow for streams supporting sensitive eco-systems	Low flow conditions in streams supporting sensitive eco-systems	Groundwater for drinking water supply for human consumption	Proposed fill platform forming foundation stratum for road and drainage
Medium	Primary Aquifer	High volume streams and rivers with potential for dilution	Groundwater for spray irrigation	Surface water ponds
Low	Secondary Aquifer	Man-made channels, ditches, and surface water drainage pipes	Groundwater for industrial use.	Soakaways

Determination of Magnitude and Significance of Impacts

7.1.5 The following table defines the magnitude of impact on the receptors.

Table 7.2 General Methodology for Assessing Magnitude

Magnitude of Impact[2]	Description
Substantial	Impact resulting in a considerable change in the baseline condition of a specific receptor/attribute with severe undesirable/desirable consequences
Moderate	Impact resulting in a discernible change in the baseline condition: • Of a specific receptor/attribute with undesirable/desirable consequences; or • With the potential to cause statutory objectives to be exceeded
Slight	Impact resulting in discernible change in the baseline condition of a specific receptor/attribute with undesirable/desirable conditions that can be tolerated

Table 7.3: Significance of the Impact

Sensitivity of Receptor	Magnitude of Impact			
	Substantial Impact	Moderate Impact	Slight Impact	Negligible Impact
Very High	Major	Major – Intermediate	Intermediate	Minor
High	Major – Intermediate	Intermediate	Intermediate – Minor	Neutral
Medium	Intermediate	Intermediate	Minor	Neutral
Low	Intermediate – Minor	Minor	Minor – Neutral	Neutral

Water Quantity

7.1.6 Because of the changes to the ground levels during quarrying and the fact that surface water runoff in the quarry was pumped off site intermittently an alternative to the traditional method of quantifying existing surface water runoff from the site was agreed with the Environment Agency (EA).

7.1.7 Agreement was reached with the EA instead to use the consented restoration plan for the quarry as a starting point of calculating the existing surface water

[2] Note: impact magnitude can be either positive or negative

runoff as this would match closely the original ground profiles before quarrying commenced.

7.1.8 Using the Flood Estimation Handbook 3, ADAS 345, Institute of Hydrology Report 124 and an EA runoff calculation method developed for steep small catchments in Devon and Cornwall the Greenfield undeveloped surface water runoff for the site was calculated using each of the methods between the 1 in 2 year storm and the 1 in 100 year storm with a 30% allowance for increased rainfall due to climate change influence.

7.2 Baseline

Water Quality

7.2.1 Information provided by the Environment Agency indicates that the Crackington Formation is classed as a Secondary A Aquifer (formerly minor aquifer). These are fractured rocks that do not have a high primary permeability and whilst they do not provide large quantities of water for abstraction they can be important for local supplies and in providing base flows to rivers. The nearest principal aquifer is approximately 800m to the east.

7.2.2 The Environment Agency mapping indicates that the site in not located in a Source Protection Zone.

7.2.3 Groundwater levels within the site will be artificially lowered by the dewatering carried out as part of the mineral extraction. As the site is filled, so these groundwater levels will be expected to rise and stabilise.

7.2.4 Baseline groundwater monitoring was undertaken and reported in Clarke Bond Ground Investigation (appendix 6.2). This included general groundwater quality analysis on twelve groundwater samples. This identified two potential source zones:

- Localised area of made ground in south west corner of the site (Ammonium, TPH).
- Surface water runoff from roads entering site via the ephemeral waterfall towards the east side of the site (Chloride).

Water Quantity

7.2.5 The different methods of Greenfield runoff calculation were compared and the flow rates for the EA's own method chosen as the preferred baseline for comparing the runoff from the developed site area.

7.2.6 The restoration contours showed that the site sits astride a ridge line with approximately 45% shedding west and 55% east to separate tributaries of the Pin Brook.

7.2.7 An additional flow allowance was also calculated for the immediate land area catchment north of the site which currently drains into the quarry void via a pipe in Church Lane. This area is approximately 8.5ha.

7.2.8 The calculations and catchment area plans for each of the three areas considered in the baseline flows are included in the accompanying Flood Risk Assessment (FRA) appendix 7.1.

7.3 Likely Impacts

Water Quality

7.3.1 The following table presents the site-specific Environmental Effects, the relevant receptors and the nature of the impacts.

Table 7.4: Environment Effects, Receptors and Nature of Impacts

Environmental Effects	Receptor	Nature of impacts
Excavation of Pinhoe Clay Pit	Groundwater in secondary aquifer.	Reduction in groundwater levels due to continued pumping of water from the base of the pit.
Made ground in southwest corner of application area	Groundwater in secondary aquifer.	Reduction in water quality due to potential contamination from waste deposits if present.
Existing Highway run-off entering site via stream and ephemeral waterfall	Groundwater in secondary aquifer	Chloride in groundwater in monitoring wells on east side of quarry. The source of which is likely to be road salt washed into the site via Highway drainage to ephemeral stream.
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	Groundwater in secondary aquifer	Potential contamination within inert backfill materials. Potential for oxidation of sulphides.
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	Surface water streams and ditches	Increased baseflow following rise in groundwater levels, resulting in additional potential for flood risk.
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	Built Environment	Long-term equalization of groundwater levels resulting in potential for collapse settlement and long-term creep settlement
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	Built Environment	Increased groundwater levels resulting in reduced effective stress and increased potential for slope instability.

Water Quantity

7.3.2 The increase in surface water runoff as a result of reprofiling and urbanising the site would lead to an increase in flood risk downstream in the Pin Brook and one of its tributaries. Additional runoff from the urban areas would exacerbate flooding downstream through an urban area.

7.3.3 The increase in flood risk would be both in relation to the peak flow runoff during a rainfall event and the frequency of flooding that occurs because of the additional flows throughout a range of rainfall events.

7.4 Proposed Mitigation

7.4.1 The baseline groundwater monitoring is ongoing but data to date suggests potential for rising groundwater within the fill mass as the site is reprofiled and areas filled. It is intended that groundwater monitoring will be continued to allow an increasingly accurate picture of water levels to be established and, in particular, any seasonal variations.

7.4.2 The desk study data report does not indicate any groundwater abstractions within the immediate vicinity and the site is not in a Source Protection Zone. Site investigation works to date do not indicate significant contamination within the made ground areas on site (although localised areas of minor contamination have been recorded) and consequently the risk of contaminant mobilisation impacting on nearby groundwater abstractions is minimal. Mitigation will be provided by the remediation of any contaminated materials identified in the made ground area as part of the earthworks reprofiling together with a close watching brief during the earthworks to ensure that any localized areas not identified to date are dealt with appropriately.

7.4.3 The potential for impact on slope stability has been addressed in the geotechnical assessment of the site and the finished reprofiled slope angles take due account of potential groundwater pressures. In addition the earthworks contract will include provision for the installation of slope drainage on an *ad hoc* basis as the groundworks proceed.

7.4.4 The risk of collapse settlement being induced in the fill mass as a result of rising groundwater, or indeed surface water ingress, has been identified and will be mitigated by appropriate earthworks acceptability control (keeping fill materials wet of optimum) and also by trialing controlled fill inundation as part of the earthworks process.

7.4.5 Risks to existing and future drainage infrastructure will be addressed by appropriate flood risk assessment. The potential risk to supply to base flows on surrounding watercourses is believed to be insignificant as groundwater movement from and beyond the site is not anticipated to be impacted by the proposed works.

Table 7.5: Likely Impacts and Mitigation Measures

Likely impacts	Mitigation
Reduction in groundwater levels due to continued pumping of water from the base of the pit.	The backfilling of the quarry will raise the current site levels, resulting in a long-term equalization of groundwater levels. Placement of attenuation ponds and drainage to deal with surplus surface water.
Reduction in water quality due to potential contamination from made ground.	Screening and segregation of waste to remove any bio-degradable materials if present and win engineering fill for re-use and recovery in the development platform. This is likely to provide a benefit.
Chloride in groundwater in monitoring wells on east side of quarry. The source of which is likely to be road salt washed into the site via Highway drainage to ephemeral stream.	Surface water drainage scheme to channel water though and out of the development zone is likely to provide a benefit.
Potential contamination within inert backfill materials. Potential for oxidation of sulphides.	Selection and testing of acceptable engineering fill for re-use as backfill within the fill platform. Construction Quality Assurance (CQA) will be undertaken during placement. Additional testing of the site won material to assess the potential for sulphide oxidation.

Increased baseflow following rise in groundwater levels, resulting in additional potential for flood risk.	Surface water drainage and attenuation ponds will be designed and installed.
Long-term equalization of groundwater levels resulting in potential for collapse settlement and long-term creep settlement	An acceptable engineering fill will be placed and compacted wet of optimum, pre-inundation trials will be undertaken together with preloading surcharge.
Increased groundwater levels resulting in reduced effective stress and increased potential for slope instability.	Slope stability assessment has identified a long-term stable slope angle of 1v:2.5h with trench drains placed in areas of observed seepages and a drainage system installed to collect and channel surface water away from the slopes.

Water Quantity

7.4.6 The propose site layout has been developed from input by each of the consultants working on the project. At an early stage the quantity of surface water runoff based on a estimated percentage developed site area was used to calculate the proposed runoff from the site once developed.

7.4.7 This area and runoff flow rate was used to size two attenuation / infiltration ponds, one within the eastern site catchment area and one in the western site catchment area.

7.4.8 The eastern catchment calculations included the extra runoff from the north and Church Lane currently routed through the pumping system in the quarry.

7.4.9 The overall strategy and scale of ponds was submitted to the EA and agreed in December 2009.

7.4.10 Since then the development masterplan has evolved and the surface water runoff calculations amended slightly to recognise the changes.

7.4.11 The final pond sizes and proposed runoff calculations are included in the accompanying FRA appendix 7.1. The ponds have been designed to hold the 1 in 100 year rainfall event plus a 30% increase for climate change influence. A freeboard above the predicted maximum water level of 300mm has been included in the calculations.

7.5 Residual Impacts

Water Quality

Table 7.6: Residual Impacts

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
Excavation of Pinhoe Clay Pit	Low	Slight	Reduction in groundwater levels due to continued pumping of water from the base of the pit.	Minor	The backfilling of the quarry will raise the current site levels, resulting in a long-term equalization of groundwater levels. Placement of attenuation ponds and drainage to deal with surplus surface water.	Slight	Minor-Neutral
Made ground in south west corner of application area	Low	Moderate	Reduction in water quality due to potential contamination from waste deposits.	Minor	Screening and segregation of engineering fill for re-use and recovery in the development platform. This is likely to provide a benefit.	Slight	Minor-Neutral

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
Existing Highway run-off entering site via stream and ephemeral waterfall	Low	Slight	Chloride in groundwater in monitoring wells on east side of quarry. The source of this is likely to be road salt washed into the site via highway drainage to ephemeral stream.	Minor	Surface water drainage scheme to channel water through and out of the development zone is likely to provide a benefit.	Slight	Minor - Neutral
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	Low	Moderate	Potential contamination within inert backfill materials. Potential for oxidation of sulphides.	Minor	Selection and testing of acceptable engineering fill for re-use as backfill within the fill platform. Construction Quality Assurance (CQA) will be undertaken during placement to limit risk of contamination. Additional testing of the site won material to assess the potential for sulphide oxidation.	Slight	Minor - Neutral

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	Medium	Moderate	Increased baseflow following rise in groundwater levels, with resultant additional potential for flood risk.	Intermediate	Surface water drainage and attenuation ponds will be designed and installed.	Slight	Minor
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	High	Substantial	Long-term equalization of groundwater levels resulting in potential for collapse settlement and long-term creep settlement	Major - intermediate	An acceptable engineering fill will be placed and compacted wet of optimum, pre-inundation trials will be undertaken together with preloading surcharge.	Slight	Intermediate - Minor

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects
Rising groundwater levels following backfilling, restoring and re-profiling clay pit	High	Moderate	Increased groundwater levels resulting in reduced effective stress and increased potential for slope instability.	Intermediate	Slope stability assessment has identified a long-term stable slope angle of 1v:2.5h with trench drains placed in areas of observed seepages and a drainage system installed to collect and channel surface water away from the slopes.	Slight	Intermediate - Minor

Water Quantity

7.51. The proposed surface water ponds will from part of the public open space. They have been designed to hold a nominal amount of water most of the time to provide some ecological value. During times of rainfall the ponds will fill up with the higher developed site runoff flows but discharge only at a set Greenfield runoff rate that matches the Greenfield rate for the consented restoration plan. i.e. no residual impact downstream in the tributaries or Pin Brook catchment.

7.6 Summary

Water Quality

7.6.1 It is anticipated that groundwater levels will rise as the site is reprofiled and the site levels raised. Impacts on the wider environment are neutral there being no sensitive receptors in the immediate vicinity. Potential on-site impacts can be addressed by appropriate engineering of the earthworks.

Water Quantity

7.6.2 The development of this site will enable the existing and proposed surface water runoff regime to be managed in a way that will not increase flood risk on or off site.

8.0 Air Quality

8.1 Methodology and Scope

8.1.1 This section of the ES assesses the potential impact upon air quality associated with the proposed extraction of material and construction of the development platform within Pinhoe Quarry. Consideration is also provided for any impact associated with the subsequent construction of up to 380 dwellings and associated community facilities.

8.1.2 The primary impact from quarrying, infilling operations and construction is the generation of mineral dusts. Excavation, transportation, tipping and processing activities can produce fugitive emissions of these dusts. However, their impact may be minimised by using a number of established mitigation methods. In addition, the local geology, hydrogeology and local topography, along with the physical properties of the extracted material, dictate the potential for a site to generate dust.

8.1.3 The guiding principal in relation to dust and other emissions associated with quarrying and construction is that "*…emissions should, as far as possible, be controlled, mitigated or removed at source*" (Minerals Policy Statement 2, the Office of the Deputy Prime Minister, 2005). This principal forms the basis for this assessment

8.1.4 The assessment also reviews baseline air quality in the vicinity of the site and considers the impact of pollutants from vehicle emissions associated with the development. It includes recommendations for mitigation as appropriate.

Policy and Standards

8.1.5 The primary guidance on aspects of controlling and mitigating the environmental effects of minerals extraction in respect of dust is set out in is set out in Minerals Policy Statement 2 (MPS 2), Controlling and Mitigating the Environmental Effects of Minerals Extraction in England, Annex 1: Dust. Office of the Deputy Prime Minister, 2005 This document requires the consideration of deposited dust and PM10. Additional guidance is provided in Control and Measurement of Dust and PM10 from the Extractive Industries (Minerals Industry Research Organisation – MIRO, 2010)

8.1.6 and Development Control: Planning for Air Quality; Environmental Protection UK, 2010.

8.1.7 Consideration must also be given to pertinent air pollutants as defined within the UK National Air Quality Strategy DEFRA: The Air Quality Strategy for England, Scotland, Wales and Northern Ireland, 2007.

8.1.8 The National Air Quality Strategy (NAQS) sets objectives for pollutants that have the potential to give cause for concern. The pollutants contained in current regulation include: nitrogen dioxide, particles (PM_{10}), sulphur dioxide, carbon monoxide, lead, benzene, 1-3 butadiene, whilst pollutants that have objectives set but are not currently included in regulation include $PM_{2.5}$, polycyclic aromatic hydrocarbons (PAHs) and ozone. Local Authorities are required to periodically review and assess the current and future quality of air in their areas. Where it is determined that an air quality objective is not likely to be met within a relevant time period, the authority must designate an Air Quality Management Area (AQMA) and produce a Local Action Plan.

8.1.9 The pollutants pertinent to this development are presented below.

Deposited dust

8.1.10 Dust can be generated by numerous activities associated with quarrying and construction. It can potentially be derived from soil stripping and overburden removal; the extraction of the resource; transportation of material on-site; material processing; wind erosion from dry, unvegetated surfaces; vehicle movements and their exhaust emissions. However, the guiding principal "*…that dust emissions should, as far as possible, be controlled, mitigated or removed at source*" must be re-iterated.

8.1.11 Dust is generally perceived as being a nuisance when a deposit accumulates and rapidly soils a surface. However, the level at which soiling becomes a nuisance is highly subjective. As a result, there are no universally agreed standards for dust impact. Notwithstanding, mean rates of dust deposition, based upon gravimetric values, are generally used to indicate any potential nuisance impact. Unofficial guideline values suggest a mean average rate of 200 milligrams per day for a square metre is often adequate criteria on which to base an assessment The Environmental Effects of Dust from Surface Mineral Workings, Dept. of Environment Minerals Division, 1995.

Fine particles (PM_{10})

8.1.12 Particulate matters with an aerodynamic size equivalent of 10μm (microns) or less have the potential to cause adverse health effects in susceptible individuals. Effects include respiratory morbidity, cardiovascular illness, asthma and mortality. These particles can enter the thoracic region of respiratory system, and indeed, the fraction smaller than 1μm may penetrate the alveoli of the lung.

8.1.13 Particulate matter may be created through chemical reactions of atmospheric gases, be directly emitted into the air as soot and fly ash from combustion sources, be mineral-based particles derived from agricultural, construction and mining activities or may be from non-anthropogenic sources such as sea salt and biological detritus. These

particles are collectively termed PM_{10} and can be local, regional and transboundary phenomena.

8.1.14 The National Air Quality Strategy (NAQS) objective for PM_{10} presently sets an annual gravimetric mean of 40 micrograms per cubic metre ($\mu g/m^3$) with $50\mu g/m^3$ measured as a 24-hour mean, not to be exceeded more than 35 times per annum.

Nitrogen dioxide

8.1.15 Oxides of nitrogen are principally comprised of nitric oxide (NO) and nitrogen dioxide (NO_2). Oxides of nitrogen, termed NO_x, are typically derived from the combination of atmospheric nitrogen and oxygen in the high temperature combustion of fuels such as petrol and diesel. NO_x is therefore frequently associated with emissions from vehicles. The majority of NO_x is emitted from combustion processes as NO (typically over 90%), a relatively innocuous substance that rapidly oxidises to NO_2 in ambient air. However, only NO_2 is associated with adverse health effects such as respiratory morbidity. As a result, NO_2 measurements are included within the NAQS. This sets an annual mean of $40\mu g/m^3$ and an hourly mean of $200\mu g/m^3$, not to be exceeded more than 18 times per year.

Assessment methodology

8.1.16 The significance of an environmental impact is determined not only by the magnitude of the impact but also by the sensitivity of the receptor. Examples of receptor sensitivity for assessing the impact from dust are provided in MPS2 are presented below in Table 8.1.

Table 8.1 Dust sensitive facilities

High Sensitivity	Medium Sensitivity	Low Sensitivity
Hospitals and clinics Retirement homes Hi-tech industries Painting and furnishing Food processing	Schools Residential areas Food retailers Glasshouses and nurseries Horticultural land Offices	Farms Light and heavy industry Outdoor storage

8.1.17 The significance of an environmental impact for both dust and vehicular emissions may be determined by considering the relationship between the magnitude of impact and the sensitivity of the receptor (see Table 8.2). An impact may be positive or negative.

Table 8.2 Impact significance criteria

Magnitude of impact	Sensitivity		
	High	**Medium**	**Low**
Substantial	Major	Intermediate	Minor
Moderate	Major	Intermediate	Minor
Minor	Intermediate	Minor	Negligible
Insignificant	Negligible	Negligible	Negligible

8.1.18 The type, size, shape and density of dust particles combined with wind speed, direction, local topography and hydrogeology are parameters that can dictate the dispersion of dust emissions. This results in any meaningful modelling of fugitive dust being very crude and having limited worth. Indeed, the most significant factor that can affect dust dispersion is the application of effective dust suppression. However, in general, smaller particles have the potential to be entrained within airflow for longer, thereby dispersing over a wider area. MPS2 states: *"Large dust particles, (greater than 30µm), which make up the greatest proportion of dust emitted from mineral workings, will largely deposit within 100m of source. Intermediate-sized particles (10 to 30µm) are likely to travel 200 to 500m. Smaller particles (less than 10µm) which make up a small proportion of the dust emitted from most mineral workings, are only deposited slowly but may travel 1000m or more. Concentrations decrease rapidly on moving away from the source, due to dispersion and dilution".*

8.1.19 The above criteria are a key comportment for assessing the magnitude of potential impacts of the proposed development. They are incorporated in the methodology criteria for assessing magnitudes of impact, presented in Table 8.3.

Table 8.3 Methodology for Assessing Magnitude of Impacts on Air Quality

Magnitude	Description	Examples
Substantial	Impact resulting in a considerable change in environmental conditions with severe undesirable/desirable consequences on the receiving environment as a result of the development.	• Area affected is less than 10m from an active construction site. • Large risk that emissions will generate statutory nuisance complaints, resulting in formal action. • Variation in predicted concentration of more than 10% of the air quality criterion.
Moderate	Impact resulting in a discernable change in environmental conditions with undesirable/desirable conditions or possibly causing statutory objectives to be exceeded, as a result of the development.	• Area affected is within 100m of a major active construction site. • Medium risk that emissions will generate statutory nuisance complaints, resulting in formal action. • Variation in predicted concentration of 5-10% of the air quality criterion.
Slight	Impact resulting in a discernable change in environmental conditions with undesirable/desirable conditions that can be tolerated, as a result of the development.	• Area affected is between 100m and 1,000m of a major active construction site or up to 100m from a minor active construction site, a demolition site or compound. • Small risk that emissions will generate statutory nuisance complaints, resulting in formal action. • Variation in predicted concentration of 1-5% of the air quality criterion.
Negligible	No discernable change in environmental condition, as a result of the development.	• from any minor construction activity or 1,000m from any major construction activity. • Little or no cause for nuisance complaints to be made. • Variation in predicted concentration of less than 1% of the air quality criterion.

8.2 Baseline

8.2.1 The section provides a review of the existing air quality in the vicinity of the proposed site in order to provide a benchmark against which to assess potential impacts associated with the development.

Dust

8.2.2 The baseline dust environment in the vicinity the development will be influenced by the presence of the consented operations at Pinhoe Quarry. Whilst there is a requirement in the current consent to implement dust control measures during the quarry operations there is no requirement to monitor either dust or PM_{10} attached to the current consent, as such there is no empirical data available. Notwithstanding this, there have not been any complaints received by the quarry operators or Local Authority regarding dust nuisance from the quarry.

NAQS Pollutants

8.2.3 Local authorities are required to periodically review and assess the current and future quality of air in their areas. Where it is determined that an air quality objective is not likely to be met within the relevant time period, the authority must designate an Air Quality Management Area (AQMA) and produce a local action plan. Consequently, Exeter City Council undertakes an ongoing assessment of air quality within their area of jurisdiction. This process has indicated that concentrations of NO_2 exceed the levels specified within the NAQS at a number of locations throughout the city. As such, in April 2007 an AQMA was declared, which incorporates most of the major road network in Exeter City Centre. Detailed Assessments of air quality undertaken by Exeter City Council identified traffic emissions along congested routes to be responsible.

8.2.4 Pinhoe Quarry is located approximately 0.7km north of the eastern most extent of the Exeter AQMA. Consideration is therefore given to the potential impact from traffic associated with the development.

8.2.5 As part of their commitment to Local Air Quality Management, Exeter City Council maintain a network of NO2 diffusion tube monitoring locations throughout the city Air Quality Progress Report for Exeter City Council (April 2010)

8.2.6 These are located in areas that have been deemed to require further assessment of NO2 concentrations. The nearest monitoring is undertaken along Beacon Lane, Beacon Heath, approximately 0.25km west the site boundary and 0.4km from the existing quarry entrance. A further monitoring site at Pinhoe Road (Fairfield Avenue) is approximately 0.8km south of the development site on the boundary of the AQMA. Both 'roadside' locations generated annual mean concentrations that were well within the requirements of the Air Quality Strategy (Table 8.4). As such, it is reasonable to assume that similar or lower concentrations would be anticipated at the development site.

Table 8.4 Nitrogen Dioxide Diffusion Tube Monitoring Results from Exeter City Council

Site Name	Within AQMA?	2009 Monitored NO_2 Concentration ($\mu g/m^3$) (1)	Data Capture (%)
Beacon Heath (Beacon Lane)	No	23.8	100
Pinhoe Road (Fairfield Avenue)	On boundary	25.7	100

NOTE: (1) Bias corrected using a factor of 1.05 calculated from a collocation study of diffusion tubes sited with the Exeter Roadside AURN monitor.

8.2.7 With the absence of empirical data immediately adjacent to the site, background pollutant concentration data has been obtained from the UK National Air Quality Archive Background Air Pollution Maps http://www.airquality.co.uk

8.2.8 These 1 km grid resolution maps are derived from a complex modelling exercise that takes into account emissions inventories and measurements of ambient air pollution from both automated and non-automated sites. Mapped background pollutant concentration data for the grid square covering Pinhoe Quarry (UK NGR: 295500, 94500) are presented in Table 8.5. This indicates that there are no background exceedences of the relevant NAQS Objectives in any year.

Table 8.5 Predicted Background Concentrations at Proposed Development Site

Pollutant	Predicted Background Concentration ($\mu g/m^3$)	
	2010	2017
NO_x	13.14	9.77
NO_2	10.31	7.84
PM_{10}	15.22	14.70

8.2.9 All other pollutants included within the Air Quality Strategy, including PM10, were found to be below the relevant NAQS Objectives and

therefore no further AQMAs have been declared within Exeter. This will have included operational activities at Pinhoe Quarry where the 2010 annual mean background concentration of PM10 was estimated to be 15.2µg/m3, with a projected 2017 background concentration of 14.7µg/m3. The 2010 concentration is 38% of the annual mean air quality objective concentration of 40µg/m3.

8.3 Likely Impacts

8.3.1 The proposed development is principally within the current Pinhoe Quarry footprint, which has a planning consent for mineral extraction and reclamation, the latter utilising imported inert waste for landfill. It should, therefore, be noted that the impact associated with the earthworks construction, housing construction and residential phases will entail fewer HGV movements overall, whilst this development will also be undertaken for a substantially shorter duration than for the consented option. As such the potential impact upon the immediate vicinity will be reduced.

8.3.2 The impacts associated with the different phases of the development will be distinct. During the construction phases the most significant potential impact will be associated with the generation of fugitive dust. Post residential development has the potential to be associated with exhaust emissions from vehicles. This section considers the potential generation of dust and NAQS pollutants and identifies sensitive receptors.

Dust

8.3.3 Dust can be generated by numerous activities associated with quarrying and construction. It can potentially be derived from:

Soil stripping and overburden removal

8.3.4 Prior to the extraction of shale and sandstone at the site, soil to be stripped and any overburden removed. This period has the potential for dust generation. However, the duration of these activities will be

limited whilst the impact is similar to agricultural operations such as ploughing (see reference 5).

Mineral extraction.

8.3.5 The extraction of the shale and sandstone will utilise a shovel and dozer and has the potential to generate dust when the material is dry and friable. This is especially pertinent when operating at upper benches and will require appropriate mitigation. However, potential fugitive dust emissions from this source will be reduced as the material is extracted at increased depth.

Vehicle Movements and their Exhaust Emissions.

8.3.6 Excavation of material from active faces will be loaded into dump trucks with 20 to 30 tonne capacity and transported to the infill area. It is anticipated that there will be routine vehicle movements to and from the working face during the proposed 2 years of site operation. Mitigation measures are especially pertinent when vehicle movements are in the vicinity of sensitive receptors.

8.3.7 Transportation of material along internal haul roads during both earthworks and property construction has the greatest potential to generate mineral dust during dry weather. Recommendations regarding mitigation for vehicles and mobile plant are covered in section 8.4. It should be noted that there will be minimal HGV movements onto the public highway during the earthworks construction phase. However, any uncleaned vehicles leaving the site also have the potential to deposit mud and dirt along the access road and onto the public highway. Subsequent vehicle movements may produce an impact from re-suspended dust. Mitigation measures, including vehicle cleaning facilities are outlined in 8.4.

Wind erosion from dry, unvegetated surfaces.

8.3.8 There is the potential for stockpiles, roadways and unvegetated surfaces to produce dust emissions during dry, windy conditions. This would require mitigation measures outlined in section 8.4.

Earthworks construction to create the development platform.

8.3.9 The emplacement of excavated materials into the current void to construct the development platform will be undertaken in two phases: The western half (zone 1) and subsequently the eastern half (zone 2). The handling of this material is covered in section 8.4.

Construction of residential properties.

8.3.10 Although building activities generally create less impact upon the local environment than quarrying and earthworks, specific activities such as block cutting have the potential to generate dust.

Locations of potential impact - dust

8.3.11 In accordance with MPS2, consideration should be given to any receptors within 1000 metres of any dust generating operation. However, any fugitive dust generated from Pinhoe Quarry will impact upon potentially sensitive receptors located around the periphery of the site. The majority of these are residential properties along Harrington Lane and associated arterial roads, properties off Church Hill, Cheynegate Lane and Beacon Lane. These, along with two schools at 350 metres and 650 metres distant are receptors identified as having 'medium' sensitivity to dust in accordance with MPS2 (see Table 8.1). One receptor falls into the 'high' category, a care home located some 900 metres to the southeast These are summarised in Table 8.6.

Table 8.6 Identified Dust Sensitive Receptors

Dust Receptor	Potential Sensitivity	Approximate Distance from Site Boundary and Compass Direction	
		Distance (m)	Direction
Residential properties, Harrington Lane	Medium	30	South
Residential properties, Pulling Road	Medium	15	South-east
Residential properties, Wotton Cottages	Medium	15	South-west
Residential properties, Cheynegate Lane	Medium	60	South-west
Residential properties, Beacon House	Medium	80	North
Residential properties, Pinhill View	Medium	80	West
Beacon Down Farm	Low	250	North
Home Farm	Low	300	East
Residential properties, Park Lane	Medium	350	North-east
Pinhoe Church of England Primary School	Medium	350	South-east
Pinhoe Trading Estate	Medium	400	South
Pinhoe Garage	Medium	570	South-east
St James and Willowbrook Schools	Medium	650	South-west
Tremona Care Home	High	900	South-east

8.3.12 The nearest and therefore most sensitive receptors surround the southern curtilage of the site. These are along the northern side of Harrington Lane, Cheyne Rise, Matthews Court and Pulling Road, along with the southern end of Chayne Lane, which are all within 30 metres of the quarry boundary. Although there will be a degree of amelioration provided by mature foliage along site boundary and the predominant southwest airflow experienced in this part of the United Kingdom will tend to carry any dust away from these receptors, appropriate mitigation measures will nonetheless be required. These are outlined in section 8.4 and will negate the impact of dust at these properties.

8.3.13 Receptors on the northern side of the site include Beacon House, adjacent to St Michaels Church, Beacon Down Farm, Home Farm, residential properties along Cheynegate Lane to the north-west, Home Farm and residential properties towards the north of Park Lane, which is situated to the north-east. Those receptors to the north and east have the potential to be effected by the prevailing south-west winds. However, a degree of amelioration will be afforded by the topography of the site, whereby the development is undertaken at a lower level to these receptors. Notwithstanding, the development will require proactive dust control measures outlined in section 8.4 of this statement.

Locations of potential impact - NAQS Pollutants

8.3.14 The NAQS states that Air Quality Objectives only apply at locations where the public may be exposed to pollution for a sufficient period for there to be any measurable health effect. The averaging period and air quality pollutant involved will determine which locations are considered to be sensitive receptors. For NO_2 and PM_{10} typical locations include: Residential properties, hospitals, schools; and care homes. Within the context of this development receptors will be in the vicinity of the site (see Table 8.6) and along the public highway. The latter include road links identified in the Traffic Assessment: Harrington Lane, Chancel Lane, Langaton Lane, Summer Lane and Beacon Lane.

8.3.15 PM_{10} may be derived from regional and local inputs. Local sources may include emissions from residential properties, industry and vehicle exhausts. There is potential for activities associated with Pinhoe Quarry development to generate an impact upon local PM_{10}, along with an impact from vehicular emissions. However, this has not been identified during ongoing air quality assessments undertaken by Exeter City Council. This combined with the low background values, implies PM_{10} is not significant at this location.

8.3.16 During the construction of the development platform, the majority of vehicle exhaust emissions will be on-site, associated with the daily vehicle movements to and from the working face. There will be negligible movement of HGVs onto the public highway. In comparison, the alternative operations such as landfill will generate up to an additional 150 HGV movements per day onto the public highway. HGVs have significantly higher PM_{10} and NO_2 emission rates than smaller vehicles.

8.3.17 It is anticipated that there will be a slight increase in HGV movements associated with the building construction phase of the development but this will be short term.

8.3.18 Once the residential properties have been development it is anticipated that this could contribute an additional 1450 movements per day, but significantly, reduce HGV movements by up to 150 per day. The latter will contribute towards ameliorating the effects of increased Light Duty Vehicle movements (cars, motorcycles etc). There is the potential for further benefits associated with the instigation of appropriate public transport systems.

8.3.19 Traffic flows in the vicinity of the site have been identified in the Transport Assessment and are summarised in Table 8.7. These road links and their associated receptors have the potential to be affected by vehicle emissions associated with the development.

Table 8.7 Traffic Flows (24 hour)

Link	Baseline without development	Baseline with development	Change in traffic flows (%)
Harrington Lane between site access and Chancel Lane	10,403	11,897	14
Chancel Lane between Harrington Lane and Pinhoe Road	7,126	8,065	13
Harrington Lane between Chancel Lane and Church Hill	5,941	6,489	9
Church Hill between Harrington Lane and Langaton Lane	8,097	8,620	7
Harrington Lane between site access and Summer Lane	10,363	11,464	11
Summer Lane between Harrington Lane and Whipton Road	8,807	8,929	1
Beacon Lane between Calthorpe Road and Harrington Lane	16,790	17,757	6

8.3.20 The estimated 2010 background NO_2 concentration for the grid square containing Pinhoe Quarry is 10.3µgm^3, which is 26% of the annual mean objective concentration of 40µg/m^3. The projected annual mean concentration for 2010 is 7.8µg/m^3. Measured concentrations at roadside locations along Beacon Lane, which is a continuation of Harrington Lane, and Pinhoe Road (Fairfield Avenue) recorded annual mean concentrations of 23.8µg/m^3 and 25.7µg/m^3 respectively for 2009. These represent 59% and 64% of the annual mean objective concentration. These are well within the air quality objective and would require a substantial change in traffic volumes to breach the objective.

8.3.21 It is, therefore, concluded that the proposed development will not have a significant impact on local air quality.

8.4 Proposed Mitigation

8.4.1 The following suppression methodologies are recommended for the site:

- Mobile plant will be regularly serviced and equipped with effective exhausts to minimise fume emissions.
- Haul roads will be adequately maintained.
- A water bowser will be used during dry conditions on the access road, haul roads and any other trafficked areas.
- All commercial vehicles should pass through a wheel washing facility prior to leaving the site where site conditions indicate a risk of deposition of material onto the public highway.
- In the unlikely event that dust or mud from the quarry has been deposited on the public highway, a road sweeper will be employed.
- When the site is operational, the Unit Manager or instructed site personnel should undertake daily inspections of the access road and public highway in order to identify the need for any cleaning requirement.
- All loads entering and leaving site should be covered.
- A vehicle speed control of 15 mph will be implemented on access and haul roads.
- Water sprays or surface binders will be utilised to maintain damp surfaces on exposed tip and stockpile faces during dry and windy weather.
- Loading and unloading of vehicles should ensure drop heights are minimised. This is especially pertinent at the quarry face and emplacement of material during the earthworks construction of the development platform.
- Cutting, grinding and sawing activities associated with construction of the residential development will be undertaken away from sensitive receptors or utilise appropriate suppression.
- Stand-off distances between dust generating activities and receptors should be optimised wherever possible.

- In order to reduce on-site vehicle emissions, vehicles will switch off engines when appropriate.
- All site employees will receive appropriate training in order to ensure that they are conversant with the site dust control strategy.

8.5 Residual Impacts

8.5.1 The following Table 8.8 presents the estimated magnitude of residual impacts based on the identified mitigation measures (please see over).

Table 8.8 Air Quality Effects

Environmental Effect	Sensitivity of Receptor (s)	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
DUST – during construction phases								
Residential properties, within 100m	Medium	Moderate	Negative	Intermediate	Section 8.4	Slight	Neutral	High
Residential properties, within 100 to 1000m	Medium	Slight	Negative	Minor	Section 8.4	Negligible	Neutral	High
Pinhoe Church of England Primary School	Medium	Slight	Negative	Minor	Section 8.4	Negligible	Neutral	High
St James & Willowbrook Schools	Medium	Negligible	Negative	Minor	Section 8.4	Negligible	Neutral	High
Pinhoe Trading Estate	Medium	Negligible	Negative	Minor	Section 8.4	Negligible	Neutral	High
Tremona Care Home	Medium	Negligible	Negative	Minor	Section 8.4	Negligible	Neutral	High
NAQS Pollutants – during construction phases								
Properties along Harrington Lane	Medium	Negligible	Positive	Minor	Section 8.4	Negligible	Neutral	High
NAQS Pollutants – post construction phases								
Properties along Harrington Lane	Medium	Slight	Negative	Minor		Slight	Slight	Medium

8.5.1 In order to ensure the effectiveness of the dust suppression measures and demonstrate compliance nuisance guidance, a proactive monitoring regime will be implemented. A detailed Dust Action Plan and Scheme will be produced pursuant to planning permission.

8.6 Summary

8.6.1 The primary air quality impact associated with the proposed development is from potential emissions of fugitive dust. However, the application of appropriate mitigation measures should ensure there is **negligible** dust impact. In order to ascertain the effectiveness of the dust suppression measures a detailed Dust Action Plan and Scheme will be produced pursuant to planning permission. This will include periodic assessments of dust deposition in order to demonstrate compliance with published limits for rates of dust deposition.

8.6.2 Consideration has also been given to any impact associated with vehicle movements on the public highway, both from the construction phases and those affiliated with the residential dwellings. There would be minimal movement of HGVs onto the public highway associated with these. The benefits of this may be considered against alternative uses for the quarry, such as importing inert waste for landfill, an activity that would potentially generate an additional 150 HGV movements per day. HGVs have significantly higher PM_{10} and NO_2 emission rates than smaller vehicles. This comparative reduction would contribute towards ameliorating the effects of increased car movements associated with the residential development. This proposal also benefits from construction phases being for a considerably shorter duration than the potential alternative landfill use for the quarry.

9.0 Material Assets

9.1 Methodology and Scope

9.1.1 An Archaeological and Cultural Heritage Desk-Based Assessment of the Proposed Residential Development with Associated Community Facilities At Pinhoe Quarry was undertaken by GK Heritage Ltd. The desk-based assessment has been used to inform the baseline for this chapter of the ES. The desk-based assessment has been included in Appendix 9.1

9.1.2 Impact assessment has been carried out through the consideration of baseline conditions in relation to the elements of the scheme that could cause cultural heritage impacts. Baseline conditions are defined as the existing environmental conditions and in applicable cases, the conditions that would develop in the future without the scheme.

9.1.3 No standard method of evaluation and assessment is provided for the assessment of impact significance upon cultural heritage, therefore a set of evaluation and assessment criteria have been developed using a combination of the Secretary of State's criteria for Scheduling Monuments (Planning Policy Statement 5: Planning for the Historic Environment, May 2010), Design Manual for Roads and Bridges (DMRB), Volume 11, Part 3, Section 2, HA 208/07 and Transport Analysis Guidance (TAG Unit 3.3.9, Heritage of Historic Resources Sub-Objective). Professional judgement is used in conjunction with these criteria to undertake the impact assessment. The criteria for assessing value and magnitude of impact are outlined below.

Table 1 Assessing the Value of Cultural Heritage Features

Value	Examples
Very High	World Heritage Sites, Scheduled Monuments of exceptional quality, or assets of acknowledged international importance or can contribute to international research objectives
	Grade I Listed Buildings and built heritage of exceptional quality
	Grade I Registered Parks and Gardens and historic landscapes and townscapes of international sensitivity, or extremely well preserved historic landscapes and townscapes with exceptional coherence, integrity, time-depth, or other critical factor(s)

High	Scheduled Monuments, or assets of national quality and importance or than can contribute to national research objectives
	Grade II* and Grade II Listed Buildings, Conservation Areas with very strong character and integrity, other built heritage that can be shown to have exceptional qualities in their fabric or historical association.
	Grade II* and II Registered Parks and Gardens, Registered Battlefields and historic landscapes and townscapes of outstanding interest, quality and importance, or well preserved and exhibiting considerable coherence, integrity time-depth or other critical factor(s)
Medium	Designated or undesignated assets of regional quality and importance that contribute to regional research objectives
	Locally Listed Buildings, other Conservation Areas, historic buildings that can be shown to have good qualities in their fabric or historical association
	Designated or undesignated special historic landscapes and townscapes with reasonable coherence, integrity, time-depth or other critical factor(s)
	Assets that form an important resource within the community, for educational or recreational purposes.
Low	Undesignated assets of local importance
	Assets compromised by poor preservation and/or poor survival of contextual associations but with potential to contribute to local research objectives.
	Historic (unlisted) buildings of modest quality in their fabric or historical association
	Historic landscapes and townscapes with limited sensitivity or whose sensitivity is limited by poor preservation, historic integrity and/or poor survival of contextual associations.
	Assets that form a resource within the community with occasional utilisation for educational or recreational purposes.
Negligible	Assets with very little or no surviving cultural heritage interest.
	Buildings of no architectural or historical note.
	Landscapes and townscapes that are badly fragmented and the contextual associations are severely compromised or have little or no historical interest.

Table 2 Assessing the Magnitude of Impact on Cultural Heritage Features

Magnitude of Impact	Typical Criteria Descriptors
Substantial	**Negative:** Impacts will damage or destroy cultural heritage assets; result in the loss of the asset and/or quality and integrity; cause severe damage to key characteristic features or elements; almost complete loss of setting and/or context of the asset. The assets integrity or setting is almost wholly destroyed or is severely compromised, such that the resource can no longer be appreciated or understood.

	Positive: The proposals would remove or successfully mitigate existing damaging and discordant impacts on assets; allow for the restoration or enhancement of characteristic features; allow the substantial re-establishment of the integrity, understanding and setting for an area or group of features; halt rapid degradation and/or erosion of the heritage resource, safeguarding substantial elements of the heritage resource.
Moderate	**Negative:** Substantial impact on the asset, but only partially affecting the integrity; partial loss of, or damage to, key characteristics, features or elements; substantially intrusive into the setting and/or would adversely impact upon the context of the asset; loss of the asset for community appreciation. The assets integrity or setting is damaged but not destroyed so understanding and appreciation is compromised.
	Positive: Benefit to, or restoration of, key characteristics, features or elements; improvement of asset quality; degradation of the asset would be halted; the setting and/or context of the asset would be enhanced and understanding and appreciation is substantially improved; the asset would be bought into community use.
Slight	**Negative:** Some measurable change in assets quality or vulnerability; minor loss of or alteration to, one (or maybe more) key characteristics, features or elements; change to the setting would not be overly intrusive or overly diminish the context; community use or understanding would be reduced. The assets integrity or setting is damaged but understanding and appreciation would only be diminished not compromised.
	Positive: Minor benefit to, or partial restoration of, one (maybe more) key characteristics, features or elements; some beneficial impact on asset or a stabilisation of negative impacts; slight improvements to the context or setting of the site; community use or understanding and appreciation would be enhanced.
Negligible / No Change	**Negative:** Very minor loss or detrimental alteration to one or more characteristics, features or elements. Minor changes to the setting or context of the site. No discernible change in baseline conditions.
	Positive: Very minor benefit to or positive addition of one or more characteristics, features or elements. Minor changes to the setting or context of the site No discernible change in baseline conditions.

9.2 Baseline

9.2.1 This study has been undertaken taking into consideration the historical and archaeological background of the proposed development area. The sources consulted were:

- Devon County Councils Historic Environment Record (HER);
- West Country Studies Library
- Devon Records Office
- National Monuments Record (NMR);
- Devon County Council and English Heritage for designated sites;

- Historic mapping including relevant Ordnance Survey Maps; and
- Appropriate documentary sources and archaeological journals.
- Historic mapping including relevant Ordnance Survey Maps; and
- Appropriate documentary sources and archaeological journals.

9.2.2 In addition to the above a site walkover survey was undertaken on August 11th 2010.

9.2.3 This baseline section has been summarised from the archaeological and cultural heritage desk-based assessment (Appendix 9). The reader is referred to this document for further details. Site numbers within the text refer to the site numbers on Figure 01 and within Appendix C of the desk-based assessment (Appendix 9).

Designated Sites

9.2.4 There are no World Heritage Sites, Registered Battlefields, Conservation Areas or Registered Parks and Gardens within 500m of the site.

9.2.5 There are 13 Listed Buildings within a 500m radius. There is one Grade II* listed building, Church of St of St Michael and all the Angels (18). There are also two grade II listed Barns to the west of the site 11 and 12. None will be directly affected by the proposals.

Archaeological and Historical Background

9.2.6 There is a scatter of hand-axes from the Lower Paleolithic that have been found within the Exeter area, but the majority are of Upper Paleolithic date and are from South Devon, such as Kent's Cavern some 30km southwest of the site.

9.2.7 Latterly Mesolithic, Neolithic and Bronze Age finds do predominate in the wider Exeter area. One find the "Pinhoe Hoard" notes a deliberate burial of items dating to the Bronze Age (8). This suggests that within the local area there was a consistent prehistoric presence that dated from the Mesolithic through to the Iron Age.

9.2.8 Approx 1km to the north west of the site is Stoke Hill a large hill rising to the north of Exeter. It is significant as the site of both an Iron Age hill fort and a later Roman signal station. There is scant recorded evidence for Roman activity within the study area with the main city focus concentrated on Roman Isca (Exeter). However, there are a couple of Roman fortlets within sight of the fortress at Ide (SX8888) to the south-west and Stoke Hill (SX9295) some 1km west of the site.

9.2.9 Pinhoe in 1001 was a small rural village. The Vikings reached the village as they marched north. The English army was almost certainly gathered on Beacon Hill to the north. From this naturally defensive position they could look south over the Clyst Valley up which the Vikings were advancing.

9.2.10 It was somewhere on the open hillside above the River Clyst north of Pinhoe that the Battle of Pinhoe was fought. However, details of the fighting are scarce.

9.2.11 With regard to the area of the quarry it is likely that this area was inhabited by a number of small farms and smallholdings during the medieval and that the land was used both for grazing and crop.

9.2.12 With regard to industry in the immediate area there is evidence of brick and tile making in Exeter since Roman times, and the recent archaeological excavations at Princesshay have uncovered a Roman site, close to the city wall, that was used for tile making. The quarrying of clay moved away from the city centre in medieval times towards the area around Newtown and further out to the east of the city in Polsloe and Pinhoe.

9.2.13 It is likely that the area during the Post Medieval was utilised in much the same way as it had been during the medieval. Certainly the current landscape has evolved from medieval fieldscape to the current post medieval enclosure type. Other than farming one of the main industries within the area would have been that of mineral extraction.

9.2.14 Historically, clay for brickworks was predominantly produced in Exeter and East Devon and to a lesser extent, in Plymouth and Torbay. Today, however, quarries for brick clay are no longer required following closure of the associated brick works at Steer Point in South Hams and Pinhoe in Exeter.

9.3 Likely Impacts

9.3.1 The proposed development has avoided physically impacting on the location of any cultural heritage sites recorded on the Historic Environment Record.

9.3.2 The impact assessment has been undertaken in accordance with the methodology outlined in Section 9.1.3. The significance of effect has been determined by the combination of value and magnitude of impact as outlined in the above methodology.

Archaeological Sites

9.3.3 There are no archaeological sites recorded on the NMR or HER within the development site. There is considered a **negligible** potential to record sites of any date within the development area due to the almost complete paucity of evidence from the surrounding region and the removal of land associated with the quarry.

9.3.4 Because of the present nature of the quarry site and the project objectives suggested for the site in order to create a development platform there is no potential for archaeological features dating from the Prehistoric to the Post medieval to be affected. Equally the project redline boundary does not extend to areas that are outside of the present permissions of the current void space with the exception of a small triangular section to the west of the site that is likely to be of low archaeological value considering its size, nature and position and the regrading of the quarry edges to the west of the site. Thusly the value of the site is considered **Negligible** for archaeology and **no change** is expected in the archaeological baseline of the site other than the removal of the quarry itself as a feature.

Built Heritage

9.3.5 The quarry is sufficiently screened from all listed buildings within the study area. The Church Of St Michael And All Angels (18) does have a view from the tower facing south but the church is sufficiently set back that its current setting will not change. However, notwithstanding the existing quarry the church setting is a consideration when assessing any potential residential development within the present quarry area.

9.3.6 The church is set within a rural landscape and any future development within the existing site may be cumulative to the existing Pinhoe development envelope and impact the overall setting of the church. However, the screening that at presents separates the church from the quarry does enable the current setting of the church to exist in isolation to the quarry site. If development does proceed it is strongly recommended that this screening is kept in place to offset any potential visual impact on the church's overall historic setting. Such screening would allow for an overall **negligible** effect for the setting of the church. In addition to the church similar setting issues will effect the grade II listed barns to the west of Cheynegate (11,12) although it is likely that the existing screening will be sufficient to protect the Barns current setting and **no change** is anticipated for these structures.

Historic Landscape Character

9.3.7 The site is located on the southern slope of a distinctive hill and ridge feature. The agricultural areas are defined by mature hedgerows or areas of woodland. Roads and tracks are sometimes sunken or bounded by developed hedgerows and hedgerow trees. The majority of the surrounding fieldscapes are of Post-medieval date and laid out in the C18th and C19th, they are commonly typified by surveyed dead-straight field boundaries. Medieval fields enclosures probably enclosed with hedge-banks during the Middle Ages are predominant to the north. The built up areas are predominantly post-medieval residential or industrial uses and the boundaries between each sector are sometimes indistinct. There are also areas of open space, which are commonly sports and recreation grounds mostly dating to the 18th and 19th centuries. Due to the built up nature to the south of the site at Pinhoe the proposed development will not impact on the historic landscape of the immediate area and only a

negligible change will occur, it is also noted that the restoration of the quarry to enable development will have a beneficial impact for the overall landscape and allow the area to equate to the cumulative development of Pinhoe itself.

Post Development Impacts and Effects

Archaeological Remains

9.3.8 There are not anticipated to be any ongoing direct, physical impacts as a result of the post development phase of the project.

Historic Landscape Features and Character

9.3.9 There are not anticipated to be any additional direct, physical impacts as a result of the development on any historic landscape features or character.

9.4 Proposed Mitigation

9.4.1 Any mitigation measures should be undertaken in accordance with a Written Scheme of Investigation, agreed in advance with the planning authorities in conjunction with Exeter City Council Planning Department and following the Institute for Archaeologist's Standards and Guidance documents.

Development Planning

9.4.2 No additional development planning mitigation is proposed other than the sympathetic screening of St Michael And All Angels church to the north of the site.

Development Works

9.4.3 With regard to mitigation it is recommended that no further archaeological work is undertaken. However, it is recommended that any existing buildings associated with quarrying be recorded to English Heritage Level 1. Level 1 is essentially a basic visual record, supplemented by the minimum of information needed to identify the building's location, age and type. Level 1 survey will generally be of exteriors only, although they may include superficial interior inspection for significant features. Only if circumstances and objectives allow will any drawings be produced, and these are likely to take the form of sketches. A Level 1 record will typically consist of: drawings, photography,

written accounts. The unmitigated magnitude of impact on any industrial structures associated with the quarry would be substantial negative and the nature of the effect will be direct, permanent and irreversible.

Operational Mitigation, Compensation & Enhancement Measures

9.4.4 No operational mitigation, compensation or enhancement measures are recommended for the proposed development as these have already been identified within the design mitigation measures.

9.5 Residual Impacts

Table 3 Material Asset Effects

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
Recording of Structures associated with quarrying	Low	Moderate – Negative	Direct, Permanent, irreversible	Minor-Adverse	English Heritage Level 1 survey to record remains and surrounding context.	Slight negative	Minor adverse-neutral	High
Visual Impact on Listed Buildings	Medium	Moderate – Negative	Direct, permanent, irreversible	Moderate - Adverse	Adequate screening of development from listed buildings by way of utlising current natural hedgerows and trees.	Slight – negative	Minor adverse – neutral	High
Visual Impact Historic	Medium	Slight Negative	Direct, permanent, irreversible	Minor Adverse	No suggested	Slight Negative	Minor Adverse	High

Landscape								
Restoration of Current Quarry Void	Low	Substantial Positive	Direct, Permanent, irreversible	Neutral	-	Minor	Major Positive	High.

9.6 Summary

9.6.1 Cultural heritage assessment for the proposed quarry redevelopment has included a desk-based assessment. The proposed development has a Low potential to impact upon any identified archaeological and historic landscape remains. The proposed development will impact positively upon the cumulative historic landscape character of the area as the existing quarry will be removed as a feature and the area brought back into the urban focus of Pinhoe with the addition of a geo park that will highlight the natural history of the area.

9.6.2 A series of mitigation measures to be implemented during the construction planning and construction stages have been proposed. These mitigation measures will allow the residual magnitude of impact to be reduced in the majority of cases. The main areas of potential impact will be on the listed buildings with particular reference to the Church of St Michael and All Angels and as part of the mitigation strategy for this building it has been recommended that sympathetic screening is designed into the development utilising existing trees and hedgerows to offset any visual impact on the churches overall historic setting. The only other residual effect, which is considered significant, is the impact upon any remaining buildings associated with the quarrying industry at the site during operation this is considered to be minor adverse-neutral and a Level 1 Building Survey of these features has been recommended before their removal.

10.0 Landscape

10.1 Methodology and Scope

10.1.1 This chapter has been prepared by Sarah Planton of SLR Consulting and assesses the existing landscape and visual impact of Pinhoe Quarry, and the potential impacts of the proposed development. Where potential adverse impacts are identified, measures are proposed to avoid, reduce or mitigate for those impacts.

10.1.2 The format of the assessment was based on the principles within the Countryside Agency's Landscape Character Assessment Guidance (2002), and the Landscape Institute and Institute of Environmental Management and Assessment's "Guidelines on Landscape and Visual Impact Assessment" (2002), hereinafter referred to as the GLVIA.

10.1.3 A study area of up to 5km surrounding the site centre has been adopted for this assessment. Initially a desktop study was undertaken to review the relevant publications, maps and plans. This was followed by computer modelling to calculate the Zone of Theoretical Visibility (ZTV) to identify potential viewpoints (appendix 10.1).

10.1.4 The ZTV modelling was followed by fieldwork in June 2010 to verify the data derived from the model, and to undertake a photographic study of potential viewpoints. The weather conditions were clear and suitable for assessing all views.

10.1.5 Photographs illustrating views from a selected series of viewpoints were taken using a Nikon D70 digital camera. The camera was set to a focal length which is the equivalent of a 50mm lens for a 35mm format camera. The main views are panoramic and it was therefore considered appropriate to present the photographs in this way. The panoramic views consist of series of photographic frames merged together using industry standard software.

10.1.6 The potential significance of landscape and visual impacts is determined by combining the magnitude of the potential impact and the sensitivity of the landscape and visual receptors to change in the standard format as identified elsewhere in this document

10.1.7 This process is not a quantitative process; there is not an absolute scoring system. Instead, the correlation of the two factors, although reflecting recognised features and methods of working outlined in this report, is in the end a matter of professional judgement.

10.1.8 Table 10.1, below, provides a brief definition of the full range of significance criteria. Both landscape and visual impacts can be adverse (regarded as harmful), beneficial (regarded as an enhancement) or neutral in nature. An impact is described as being of 'neutral' significance if it would be in keeping with the general character of the surroundings, such as an industrial development within an industrial context.

Table 10.1: Description of Significance Criteria for Landscape and Visual Impact

Level of Significance	Definition
No Impact	The proposed scheme has no effect on landscape or visual receptors.
Negligible	The proposed scheme is largely appropriate in its context, or it would be very difficult to differentiate from its surroundings and would affect very few or no receptors.
Negligible/Slight	The proposed scheme would result in minimal change to the landscape, or would be difficult to differentiate from its surroundings and would affect few receptors.
Slight	The proposed scheme would cause a barely perceptible impact, on either landscape or visual amenity and would affect few receptors.
Slight/Moderate	The proposed scheme would cause changes to the landscape, which would not be clearly noticeable, and would affect a limited number of receptors
Moderate	The proposed scheme would cause a noticeable difference to the landscape, and would affect several receptors. However, this change would not alter the essential character of the local landscape or that of the view.
Moderate/Substantial	The proposed scheme would cause a very noticeable difference to the landscape, and would affect several or many receptors. This change would therefore alter the character of the landscape in this locality, or the character of a view.

Level of Significance	Definition
Substantial	The proposed scheme would change the character and/or appearance of the landscape for a long period of time or permanently. It would affect many receptors. This change would therefore alter the character of the landscape in this locality, or the character of a view.

10.2 Baseline

Landscape Baseline - Existing Landscape Appraisals

10.2.1 The site is within the 'Devon Redlands' within the Countryside Agency's National Landscape Character Assessment. It is covered at regional level by the Devon Landscape Plan published in 2002. However the more detailed East Devon and Blackdown Hills AONB and East Devon District Council Landscape Character Assessment & Management Guidelines published in 2008 does not include the site, as it is outside the area, but does provide some guidance as to potential future landscape character.

10.2.2 The site is located within Exeter City, for which there is currently no full landscape assessment. Exeter City Council has published some landscape related guidance in the form of the Exeter Fringes Landscape Sensitivity and Capacity Study but expressly excludes the disturbed area of the site. The report does however have some relevance as it assesses the sensitivity of the surrounding area, and it is therefore considered that the site should be assessed in relation to it. The surrounding land is within Area 8 of their assessment which concludes that the "Area acts as prominent backcloth and setting to the city linking to other areas", and as such it is considered to be a highly sensitive location. The report recognises that the trees and hedgerows on the upper levels of this area are particularly prominent, whilst adding "The quarry is a detractor to the south".

10.2.3 A full assessment of the landscape characteristics of the site itself and the surrounding area has therefore been undertaken, addressing the key aspects set out in the guidance. This concludes that the site has few of its original characteristic features remaining, and a valid planning permission for mineral

extraction. It is comparatively well enclosed and has little impact on the adjacent area but does not enhance the overall character of the area.

Visual Baseline

General Visibility of the Application Site

10.2.4 The visibility of the application site was initially assessed by a desktop study of Ordnance Survey maps in order to identify potential viewpoints. This was followed by 3D computer modelling and calculation of the zone of theoretical visibility (ZTV) of the existing topography and for the development proposals all in accordance with the method statements provided in Section 10.1 of this Statement.

10.2.5 The ZTVs shown in appendix 10.1 are based on modified terrain models as the baseline DTM model has been added to by mapping the main structural vegetation of the area. It does not however include local scale vegetation such as hedges etc or buildings. Therefore the assessments of visibility has been developed using a combination of ZTV modelling and field work to map any intervening buildings.

10.2.6 Views of the main portion of the existing site are restricted due to the low levels within the main pit area. As the site is situated on rising ground there are some very long distance views from the south, but conversely there are no views from the north and north-east due to the adjacent ridge line. The views from the west and east are from ground at comparable levels and the local woodland and mature hedgerows provide significant screening from many potential viewpoints. From the closer viewpoints to the south the site will form a small element of the overall northern ridgeline behind Exeter as can be seen on Photograph 2 (appendix 10.1).

10.2.7 The views of the proposed development will potentially become slightly greater than the existing site due to the enlarged footprint and the regrading works to be undertaken, although it should be borne in mind that most of the working in this area is already permitted. The baseline ZTV therefore is useful to provide a comparative tool for the ZTV of the development.

10.2.8 A series of viewpoints have been selected as representative and have been investigated in detail. These are summarized in Table 10.4 of the Landscape and Visual Impact Assessment (appendix 10.1), which also assesses their sensitivity based on the standard criteria.

10.2.9 The overall conclusions of the visual assessment of the existing site is that it has comparatively few views into it due to the surrounding landform and vegetation, from all locations except from longer distance views to the south. Even where views were identified from the baseline ZTV, the majority of these were significantly restricted by intervening local scale vegetation and buildings.

10.3 Likely Impacts

10.3.1 The elements of the proposals that are likely to create a landscape impact are the initial works, as there will be a need to remove some of the existing undisturbed site vegetation to create a suitable overall landform, and the final levels that will result in a slightly larger footprint than the existing quarry. The proposals to return the site to residential and community use set in a framework of new open space with woodland, pools/wetland features within the water management proposals and new public access routes will provide opportunities for substantial landscape benefits.

10.3.2 The longest lasting visual impact is however likely to be associated with the revegetation of the outer slopes of the site and the future residential use of the site. The site regrading will be completed in 2 years or less, and once the site has been restored and successfully re-vegetated it will cease to be the visual detractor that it is at present. It should then contribute positively to the setting of the northern edge of Exeter City.

10.3.3 There are also likely to be effects arising from the regrading works in the short term, and the potential for limited visual disturbance resulting from the location of the facilities and the loss of existing vegetation.

10.3.4 The potential indirect effects would be associated with the connection of the site drainage to the wider drainage in the form of pipework and manhole construction, the lighting and vehicular activity associated with the longer term mixed use development.

10.4 Proposed Mitigation

Inherent Landscape Measures

10.4.1 The proposed changes to the landscape of the site are likely to enhance the local landscape character from the outset, with the re-introduction of a landscape structure across the whole site and further measures to improve some of the adjoining land also in the Company's ownership. The retention of existing boundary vegetation wherever possible will help facilitate its integration into the wider landscape.

10.4.2 The proposal to supplement the main landscape structure with new areas of tree and hedge planting and wetland areas, within the early stages, and the green infrastructure designed to be included in the new development areas, will contribute to the landscape enhancement and will allow for the creation of a new landscape character in this location.

10.4.3 There are also opportunities to create a variety of habitats suitable for wildlife within the site. Chapter 5.0 Biodiversity identifies the range of habitat types that could be created. The use of shrub and ground cover planting on the banks, the creation of small watercourses and wetlands would complement the need for surface water attenuation within the site regrading. The creation of the proposed Devon bank alongside the winterbourne on the western side of the site and the proposals to manage some of the adjacent land in a more environmentally beneficial manner will also contribute to an improved and sustainable landscape character.

Inherent Visual Measures

10.4.4 There would be distinct visual benefits to the restoration of this site to a sustainable afteruse. The removal of the present red scar in the landscape apparent from viewpoints to the south of the site would remove a significant

detractor from the northern Exeter skyline, and help to reinforce the green buffer that the City Council have identified in their 'Exeter Fringes Landscape Sensitivity and Capacity Study'.

10.5 Residual Impacts

Residual Landscape Impacts

10.5.1 The application site is regarded as having a low overall sensitivity to development. The magnitude of change is considered to be high and beneficial due to the large scale changes proposed. It is likely that there will be some adverse impacts that arise in local areas of the site during the implementation of the development, but the scale of these would be minimised by the short timescale for the regrading, resulting at most in a medium and temporary adverse magnitude.

Residual Visual Impacts

10.5.2 The potential visual effects of the proposed development on the surrounding landscape and in particular the views from identified viewpoints, have been assessed with the aid of plans and site assessment, and are described in detail in the Landscape and Visual Impact Assessment report in Appendix 10.3.

10.5.3 The magnitude of the visual effects has been considered in accordance with the standard criteria and with the aid of the photographs, 3-D models and the ZTV. A summary of the visual effect of the main development proposals is summarised in Table 10.2 below.

Table 10.2 Landscape and Visual Effects

Environmental Effect	Sensitivity of Receptor	Impact Magnitude	Nature of Impact	Significance	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
Loss of characteristic landscape	Low	Low	Removal of existing vegetation	Low adverse	New site wide landscape structure	High	Moderate beneficial	High
Change to V1	Medium	Negligible	Slight increase in disturbed ground visible	Slight adverse	New re-vegetated back slope of site will blend into surroundings	Low	Slight/Moderate beneficial	High
V2	Medium	Negligible	Slight increase in disturbed ground visible	Slight/Moderate adverse	New re-vegetated back slope of site will blend into surroundings	Low	Slight/Moderate beneficial	High
V3	High	Low	More disturbed ground visible	Moderate adverse	New re-vegetated back slope of site will blend into surroundings	Low	Moderate beneficial	High
V4	Medium	Negligible	More disturbed ground visible	Slight/Moderate adverse	New re-vegetated back slope of site will blend into surroundings	Low	Slight/Moderate beneficial	High
V5	High	Negligible	Loss of vegetation would make site more visible	Moderate adverse	Landscape scheme will remove all views of unrestored site	Low	Moderate beneficial	High
V6	Medium	Negligible	Loss of vegetation would make site more visible	Slight/Moderate adverse	Landscape scheme will remove all views of unrestored site	Low	Slight/Moderate beneficial	High
V7	High	Low	Loss of vegetation would make site more visible	Moderate adverse	Landscape scheme at entrance will provide new vistas	Medium	Moderate/substantial beneficial	High
V8	High	Low	Some regrading work will be visible	Slight/Moderate adverse	Improved CWS site will improve outlook	Negligible	Slight/Moderate beneficial	High

V9	High	Low	Some regrading work will be visible	Slight/Moderate adverse	No long term view into site	Negligible	Slight/Moderate neutral	High
Footpath 53	High	High	New footpath route through immature site will be detrimental	Substantial adverse	New route and landscape will enhance footpath route and outlook	High	Significant beneficial	High
Footpath 50	High	Medium	Part new footpath route across immature site will be detrimental	Moderate/substantial adverse	Amended route and landscape scheme will enhance footpath route and outlook	Medium	Moderate/substantial beneficial	High
Properties Cheynegate Lane	Medium to high	Low	Site regrading will open up views across site	Slight/Moderate adverse	New landscape scheme will reduce impact of views in longer term	Low	Slight/Moderate neutral	High

10.6 Summary

10.6.1 The landscape and visual elements of the existing site and its surroundings have been assessed in accordance with the published Guidelines. Examination of the site shows that it retains very little of the characteristic landscape features it would have originally had and the existing landscape within the application area has been assessed as of low sensitivity to change.

10.6.2 The potential visibility of the proposed development has been assessed by means of ZTV models for the existing and proposed levels of the site, and a series of viewpoints were selected to represent the views from locations around the site.

10.6.3 The proposed development scheme has been considered in terms of its potential landscape and visual impacts, both during and following the operational phases.

10.6.4 The proposals will have a beneficial impact on the landscape of the area upon completion of the scheme, with the re-introduction of vegetated slopes, and pools with small watercourses and grassland forming a strong green framework to the new development.

10.6.5 The visual impact of the regrading operations will be limited in duration but it will result in some adverse impacts, and in some new views being opened up as the site is integrated into the surrounding landscape. However, provided that the final landform is re-vegetated successfully, this will result in beneficial visual impacts for these views in a relatively short period of time.

10.6.6 Therefore, there will be no adverse impacts on the landscape or visual amenity of the area arising from the development proposal for the site with longer term benefits for the area once the development is completed.

11.0 Traffic and Transport

11.1 Methodology and Scope

Introduction

11.1.1 This chapter has been prepared by Peter Brett Associates LLP (PBA) and assesses the traffic and transport effects of the proposed development. It documents the work that has been undertaken to assess the potential environmental effects of this traffic, along with other transportation and access effects (e.g. effects on pedestrians and cyclists).

11.1.2 This chapter also describes the assessment methodology, utilising an assessment year of 2017 for the local road network, as agreed with Devon City Council (DCC) and the Highways Agency (HA). The baseline conditions at the site; the mitigation measures to prevent, reduce or off-set effects; and the likely significant effects after these measures have been employed are identified.

11.1.3 The planning permission for the site allows for restoration through inert waste landfill, which would entail HGV's delivering fill material to the site. Current estimates of the traffic effects of the landfill restoration suggest that this could generate in the order of 156 HGV movements each working day, over a period of 20 years. This restoration has therefore already been considered as committed development in local transport planning. Consequently this chapter assesses the net effect of the proposed residential development, taking into account the HGV traffic which would otherwise be generated by the consented landfill operation, as agreed with DCC and the HA.

11.1.4 The information set out within this chapter is based on the Transport Scoping Statement (TSS), Transport Assessment Report (TAR) and Draft Travel Plan (TP), which contain a detailed analysis of the transport issues and mitigation measures. These documents have also been prepared by PBA and are provided as Appendix 11.1 and 11.2 respectively. It is intended that this chapter provides the reader sufficient information to understand any potentially

significant traffic and transport effects of the proposed development, but should further information/detail be required the reader is referred to the TAR.

Standards and Guidelines

11.1.5 The methodology utilised in this chapter is consistent with the requirements of the Town and Country Planning (Environmental Impact Assessment) (England and Wales) Regulations 1999 ('the EIA Regulations'), drawing upon the following guidance:

- Guidelines for the Environmental Assessment of Road Traffic published by the Institution of Environmental Assessment in 1993 (now the Institution of Environmental Management and Assessment),
- Manual for Environmental Appraisal published by the Department for Transport (DfT),
- Volume 11 of the Design Manual for Roads and Bridges – Environmental Assessment (Highway Agency et al), and
- Guidance on Transport Assessments (DfT / Department for Communities and Local Government, 2007).

Scoping & Consultation

11.1.6 In accordance with the above, the assessment has considered potentially significant environmental effects in relation to: severance, driver delay, pedestrians and cyclists, fear and intimidation, safety, public transport and public rights of way.

11.1.7 PBA has consulted with DCC, the local highway authority, and the Highways Agency, who are responsible for the Strategic Road Network, including the M5 motorway and its junctions, to agree the scope of the TAR and TP, and subsequently throughout the assessment process.

11.1.8 The EIA Regulations require that the development that is subject to the EIA be considered in the context of, and in aggregate with, other proposed local developments. It has therefore been agreed that the TAR, and therefore this chapter of the ES, needs to consider the following committed developments:

- Pinbrook Recycling Centre – located in Pinhoe. Traffic flows have been extracted from Parsons Brinckerhoff's TAR (2008) for this development,

- Coldstore Residential Development– located on Chancel Lane with construction of the development commencing in March 2010. Traffic flows and assignment have been extracted from WSP's TAR (2007),
- Cranbrook Residential Development – One of the East of Exeter developments located east of Junction 29 of the M5 motorway. Traffic flows and assumptions have been provided by DCC,
- Skypark Employment Development – One of the East of Exeter developments. Traffic flows and assumptions have been provided by DCC, and
- Science Park Employment Development – One of the East of Exeter developments. Traffic flows and assumptions have been extracted from the TAR.

11.1.9 As set out above the site benefits from a planning consent for quarrying and subsequent restoration. As an extant consent, the traffic generated by the restoration works, along with these other committed developments has been included within the baseline conditions set out in this chapter.

Assessment Scenarios

11.1.10 This assessment has considered potential effects during the construction and operation of the proposed development. This assessment focuses on 2017, in line with the DfT's technical guidance for the assessment of development impacts on the local road network.

11.1.11 The assessment entails a comparison for 2017 of a 'do something' scenario (i.e. the implementation of the proposed development) with a 'do nothing' scenario (i.e. predicted traffic flows in 2017 without the implementation of the proposed development, but with traffic associated with the identified consented developments). Therefore the effect of the proposed development could be identified and assessed, separate to any increase in background traffic that is not associated with the proposed development.

11.1.12 In order to accurately assess the operational impact of HGV's on the local road network, it has been agreed with DCC and the HA that the technical

assessment will be undertaken on the basis of 'Passenger Car Units' (PCU's). The use of PCU's within traffic modelling works allows for the increased size and reduced maneuverability of larger vehicles to be accurately accounted for. A car is counted as 1 PCU, whereas an HGV associated with the consented restoration scheme is counted as 2 PCU's.

Assessment of Construction Effects

11.1.13 The construction of the development is considered in 2 distinct phases. Firstly, the earthworks required within the site to provide the development platform. Secondly, the subsequent development of residential units and associated uses on the re-profiled site.

11.1.14 The detailed proposals for the first phase of the development (re-profiling) are predicted to generate a very small number of vehicular movements, associated with plant and workforce movements only.

11.1.15 Furthermore, and given the outline nature of the planning application for the second phase of the scheme, there is limited information available on the proposed construction works. The traffic and transport effects of the proposed development would be dependent on various factors including, the programme and phasing of construction works, import/export of construction materials and construction processes adopted.

11.1.16 Consequently a qualitative assessment has been made of the potentially significant traffic and transport effects of Phases 1 and 2 of the proposed construction works. This has been based on an estimation of reasonable worst case conditions and has sought to consider those aspects of the constructions works that could lead to significant effects. The assessment has drawn upon PBA's experience of assessing the environmental effects of similar developments to that proposed at Pinhoe Quarry.

11.1.17 Suitable management and control measures have been identified which it is proposed should be incorporated into a Code of Construction Practice (CoCP) to manage the construction works.

Study Area

11.1.18 An EIA should focus on the potentially significant environmental effects of a development. While the proposed development would generate traffic that would use roads across a very wide area, including the Strategic Road Network, potentially significant effects would be far more localised.

11.1.19 Therefore, although the TAR sets out a detailed analysis of the traffic and transport effects of the development over a wider geographic area, the study area for the ES has been identified drawing, conservatively, on the thresholds for fear and intimidations and severance set out in Table 11.1 and 11.2.

11.1.20 Consequently the study area includes the road links that are in close proximity to the site where the potential impact will be of the greatest and for which 'do something' flows would be 10% greater than 'do nothing' flows for at least one of total traffic flows and HGV flows. These links are as follows (and are illustrated on Figure 11.1):

- Link 1 – Harrington Lane between the site access and Chancel Lane;
- Link 2 – Chancel Lane / Venny Bridge between Harrington Lane and Pinhoe Road;
- Link 3 – Harrington Lane between Chancel Lane and Church Hill;
- Link 4 – Church Hill between Harrington Lane and Main Road;
- Link 5 – Harrington Lane / Beacon Lane between the site access and Summer Lane;
- Link 6 – Summer Lane between Beacon Lane and Whipton Village Road;
- Link 7 – Beacon Lane between Calthorpe Road and Summer Lane.

11.1.21 Such conditions are summarised below with full details provided in the TAR.

Significance Criteria

11.1.22The significance criteria has been drawn upon the Guidelines for Environmental Assessment of Road Traffic including, for the assessment of fear and intimidation, the thresholds summarised in Table 11.1, which are based upon the conclusions of Crompton and Gilbert's Pedestrian Delay Annoyance and Risk (1981).

Fear and Intimidation

11.1.23 For the assessment of fear and intimidation, the thresholds summarised in Table 11.1, are based upon the conclusions of Crompton and Gilbert's Pedestrian Delay Annoyance and Risk (1981).

Table 11.1 Fear & Intimidation Thresholds

Degree of Hazard	Average traffic flows over 18hr day	Total 18hr HGV flow	Average vehicle speed over 18hr day (mph)
Extreme	32,400	>3,000	>20
Great	21,600-32,400	2,000-3,000	15-20
Moderate	10,800-21,600	1,000-2,000	10-15

Severance

11.1.24 Severance is described as the perceived division of a community that may arise when a road link runs through an existing settlement. This can occur when a road becomes too heavily trafficked, making crossing the road a problem, or when a new route physically divides existing land. It is particularly relevant to situations where access to an essential amenity is impaired. The Manual of Environmental Appraisal published by the DfT sets out a range of indicators for determining the significance of severance. These figures have been derived from studies of major changes in traffic flow and therefore should be used cautiously in any environmental assessment. The impact on severance of the increase in traffic can be quantified as outlined in Table 11.2.

Table 11.2 Severance Indicators

11.1.25 As above for severance, the magnitude of change on a road link is defined as follows:

- Large: Change in total traffic, HGV or hazardous load flows of over 60%

Indicator	Change in traffic flows
Large	>60%
Moderate	30-60%
Slight	10-30%

- Moderate: Change in total traffic, HGV or hazardous load flows of 30-60%
- Slight: Change in total traffic, HGV or hazardous load flows of 10-30%
- Negligible: Change in total traffic, HGV or hazardous load flows of less than 10%.

11.1.26 In addition to the above, as the percentage impact is a function of the base flows, trigger levels in terms of absolute levels of increase have been introduced to prevent minor changes on links with low baseline flows from being considered more significant. An effect, therefore, is only considered to occur if the baseline traffic flow is increased to any of the levels shown in Table 11.1.

11.1.27 Categories of receptor sensitivity have been defined from the principles set out in the Guidelines for the Environmental Assessment of Road Traffic, including the following:

- The need to identify particularly groups or locations which may be sensitive to changes in traffic conditions;
- The list of affected groups and special interests set out in the guidance;
- The identification of links or locations where it is felt that specific environmental problems may occur; and
- Such locations '*… would include accident blackspots, conservation areas, hospitals, links with high pedestrian flows etc*.'

11.1.28 These have been used to outline in broad terms the sensitivity of receptors to traffic for the categories identified in this chapter, although in detail, each receptor assessed may have a different sensitivity to each specific effect.

11.1.29 Although not specifically identified within the guidelines as being sensitive for these categories it has been assumed that individual residential and employment areas have low sensitivity.

11.1.30 High sensitivity receptors include:

- Schools, colleges and other educational institutions;
- Retirement/care homes for the elderly or infirm;

- Roads with no footway that may be used by pedestrians; and
- Accident blackspots.

11.1.31 Medium sensitivity receptors include

- Hospitals, surgeries and clinics;
- Parks and recreation areas;
- Shopping areas; and
- Roads with narrow footway that may be used by pedestrians.

11.1.32 Low sensitivity receptors include:

- Open spaces;
- Tourist/visitor attractions;
- Historical buildings; and
- Churches and other places of worship.

11.1.33 The magnitude of effects and receptor sensitivity have then been compared to estimate the significance of the effect, as set out in Table 11.3. As there are no published standard criteria, Table 11.3 includes a range of criteria to allow the specific characteristics of each effect to be considered on an individual basis, within the structure of the receptor/magnitude approach.

Table 11.3: Significance Criteria

Magnitude	Sensitivity of Receptor			
	High	**Medium**	**Low**	**Negligible**
Large	Major	Major/ Moderate	Moderate/ Minor	Minor/ Insignificant
Moderate	Major/Moderate	Moderate	Minor	Minor/ Insignificant
Slight	Moderate	Moderate/Minor	Minor/Insignificant	Insignificant
Negligible	Minor/ Insignificant	Minor/ Insignificant	Insignificant	Insignificant

Assumptions and Technical Deficiencies

11.1.34 The assessment of traffic and transport effects in this ES is based on the TAR. The assumptions and technical deficiencies used in the preparation of the TAR are set out in the TAR. The following are of particular significance for the EIA:

- It is proposed that the development will have two site accesses and it is assumed in the TAR and this chapter that the accesses are co-located and distribution of the development will be equally distributed from both site accesses.
- The distribution of the development traffic has been calculated using adjusted 2010 turning counts. In agreement with DCC and the HA, an adjustment has been made to the distribution, calculated from the 2010 surveys, due to the committed East of Exeter developments coming forward in the future.
- The TAR focuses on assessing effects during peak hours (08:00-09:00 and 16:45-17:45), while the EIA considers effects over 18 hour days (06:00-24:00). Peak hour traffic data from the TAR has therefore been used to calculate 18 hour flows using a factor based on automated traffic counters (ATC).
- The proposed development should be completed by 2017. As explained above this chapter has assessed the effects of proposed development on the local road network in 2017. It has been assumed that the proposed development is complete and fully occupied in 2017.

11.1.35 In addition, given the lack of information available at this stage with regards to the construction works, it has only been possible to undertake a qualitative assessment of the likely construction effects.

11.2 Baseline

11.2.1 Baseline conditions are set out below for each of the links within the study area.

Link 1 – Harrington Lane between the Site Access and Chancel Lane

Highway Network

11.2.2 The site (quarry) is currently accessed via a Priority T-Junction onto Harrington Lane. Harrington Lane runs directly to the south of the site with one lane in either direction. This link runs between the existing site access and Chancel Lane to the east. The carriageway has a 20mph speed limit and the carriageway width ranges from approximately 6.0m to 7.3m. To help manage traffic speeds along Harrington Lane, there are localised narrowings / raised platforms with informal pedestrian crossing points either side of the junction with Chancel Lane.

Pedestrians and Cyclists

11.2.3 This stretch of Harrington Lane has footways on both sides of the road, with drop kerbs facilitating crossing. In respect of cycling, Harrington Lane has been identified by DCC as a 'quieter road suitable for cycling'.

Safety

11.2.4 Review of the Personal Injury Collision (PIC) data for the past five years (11/01/2005 to 28/11/2009) established that 2 PIC's occurred on this link; one of which was recorded as slight and the other serious. The slight collision occurred approximately 100 metres east of the site access, with the data citing poor road surface as the cause. The serious PIC also occurred approximately 100 metres east of the site accesses and involved two cars, with the data citing excessive speed as the cause.

Link 2 – Chancel Lane / Venny Bridge between Harrington Lane and Pinhoe Road

Highway Network

11.2.5 Chancel Lane joins Harrington Lane approximately 250m east of the site access and provides a link through to Venny Bridge to the south, thus providing a route into Whipton along the B3212 and a secondary route into Exeter city centre, via Pinhoe Road.

11.2.6 Chancel Lane is a two-lane carriageway approximately 6.5m wide and is subject to a 20mph speed limit. At the point where Chancel Lane crosses the railway, the width drops to approximately 3m (single-lane) over the railway

bridge before widening again to approximately 5m. The railway bridge has reduced forward visibility due to its vertical alignment, together with a weight restriction preventing HGV use.

11.2.7 Venny Bridge connects the bottom of Chancel Lane with Pinhoe Road and is also subject to a 20mph speed limit. Venny Bridge is approximately 6m – 7m wide with some on-street car parking along its length. Venny Bridge connects with Pinhoe Road via a Priority T-Junction.

Pedestrians and Cyclists

11.2.8 Footpaths are provided along Chancel Lane until the bridge where there are no footpaths towards Venny Bridge. There is however an off-road shared cycle and pedestrian path that runs north of the railway line between Chancel Lane and Summer Lane, towards Exeter city centre.

11.2.9 On Venny Bridge, a footway is provided on the northern side of the road, connecting to dropped kerbs and crossing facilities along Pinhoe Road.

Safety

11.2.10 The PIC data for the past five years identified that six PIC's occurred on this link; two of which were recorded on Chancel Lane and the other four at the junction of Venny Bridge and Pinhoe Road.

11.2.11 Of the accidents on Chancel Lane, one was recorded as serious and the other as slight. The serious PIC occurred when two vehicles collided on the bridge with excessive speed cited as a cause. The slight PIC occurred when a vehicle struck a pedestrian crossing Chancel Lane in the vicinity of De La Rue Way.

11.2.12 Of the four accidents recorded at the Venny Bridge junction with Pinhoe Road, three were recorded as slight and one as serious. All four accidents occured when a driver failed to look properly when pulling out of Venny Bridge onto Pinhoe Road and collided with another vehicle travelling along Pinhoe Road. These results identify that the existing junction arrangement, in the form of a Priority T-Junction, has experienced a trend in similar accidents over the last 5 years and is considered further within the proposed mitigation.

Link 3 – Harrington Lane between Chancel Lane and Church Hill

Highway Network

11.2.13 This link has a 20mph speed limit and the carriageway width ranges from approximately 6.0m to 7.3m. To keep speeds low on Harrington Lane there is an informal crossing point at the junction with Chancel Lane. At the junction with Church Hill there is currently a sign indicating a weight restriction of 7.5 tonnes except for loading. DCC has advised that this restriction is 'except for access'.

11.2.14 Whilst parking restrictions are in place immediately outside of Pinhoe Primary School, there are no parking restrictions to the east of the school on Harrington Lane for 100 metres. This means at peak times, cars can park on either side of the road thus potentially reducing the effective road width to approximately 3.3 metres.

Pedestrians and Cyclists

11.2.15 This stretch of Harrington Lane has footways on both sides with drop kerb facilitating crossing. Approximately 35 metres east of Harringcourt Road there is a zebra crossing which serves Pinhoe Primary School.

Safety

11.2.16 The PIC data for the past five years identified that 2 PIC's occurred; one of which was recorded as fatal and the other serious. The fatal collision occurred in 2005, approximately 100 metres east of Chancel Lane and involved two cars and a motorbike; the data also citing excessive speed, as well as failing to look properly as causes for both collisions.

Link 4 – Church Hill between Harrington Lane and Main Road

Highway Network

11.2.17 This stretch of Church Hill is subject to a 20mph speed limit up to the Pinhoe double-mini roundabouts, where it changes to 30mph. The carriageway width ranges from approximately 6.3m to 7.0m, however on-street parking

alternating between either side of the carriageway means that the effective width can reduce to approximately 5.0m.

Pedestrians and Cyclists

11.2.18 This link has footways with drop kerbs on both sides of the carriageway. Additionally during the primary school morning and afternoon peak times, there is a school crossing patrol officer who provides a formal crossing point across Church Hill. This section of road has also been labeled by DCC as a 'quieter road suitable for cycling'.

Safety

11.2.19 The PIC data for the past five years identified that two PIC's occurred on this link; one was recorded as serious and the other slight. The serious PIC occurred when a vehicle struck a motorcycle making the turn into Harrington Lane, with the slight PIC occurring due to one vehicle colliding with the rear of a stationary vehicle.

Link 5 – Harrington Lane / Beacon Lane between the Site Access and Summer Lane

Highway Network

11.2.20 This link runs between the site access and Summer Lane to the west. Harrington Lane runs directly to the south of the site with one lane in either direction. The carriageway along this link has a 20mph speed limit and the carriageway width ranges from approximately 6.0m to 7.3m.

11.2.21 At the point where the road crosses the Cheynegate Lane Bridge, the carriageway reduces to single file working, with priority to oncoming vehicles from the west. Harrington Lane turns into Beacon Lane to the west of this bridge, with on-street parking fronting the residential properties also effectively reducing the road to single file working along limited sections at some times of the day.

Pedestrians and Cyclists

11.2.22 This stretch of Harrington Lane has footways on both sides with drop kerbs facilitating crossing in close proximity to the bus stops and recently improved footway provision on the southern side of carriageway across Cheynegate Lane Bridge.

11.2.23 However, the footway stops immediately west of the Cheynegate Lane Bridge, with an approximate 30m section of Beacon Lane without footway provision until the footway along the northern side of Beacon Lane with fronting residential properties. This footway continues on the northern side of Beacon Lane along the remainder of this link towards Summer Lane. A footway is provided along the southern side of Beacon Lane from its junction with Arena Park to Summer Lane.

11.2.24 In respect of cycling, Harrington Lane / Beacon Lane has been identified by DCC as a 'quieter road suitable for cycling'.

Safety

11.2.25 The PIC data for the past five years identified that two PIC's occurred on this link; both of which were recorded as slight. The first of these occurred when a vehicle pulled out past a parked vehicle and ended up causing a head on collision with a truck, and the other when a vehicle failed to negotiate a left hand bend and collided with a garage.

Link 6 – Summer Lane between Beacon Lane and Whipton Village Road

Highway Network

11.2.26 Summer Lane runs south from Beacon Lane to Whipton Village Road, with one lane in each direction and has a 20mph speed limit. To keep speeds low on Summer Lane, there are currently two raised speed tables situated either side of the junction into the Sports / ISCA centre. A further two speed tables are located approximately 37 metres from the junction with Beacon Lane and south of the junction of St. James Secondary School.

Pedestrians and Cyclists

11.2.27 Summer Lane benefits from an off-road shared cycle and footpath which runs from Chancel Lane to Summer Lane then to Beacon Lane. Drop kerbs facilitating crossings are provided along Summer Lane.

Safety

11.2.28 As agreed with DCC, the review of PIC's extended as far as the railway line along Summer Lane and therefore no accident data is available from the railway line to Whipton Village Road. The PIC data for the past five years identified that 5 PIC's occurred on this link, to the north of the railway line; all of which were recorded as slight. Three of the PICs occurred at the junction of Summer Lane and Beacon Lane, with the data suggesting that a vehicle pulled out of the junction and collided with an oncoming vehicle, another occurred when a vehicle collided with a motorcyclists and the final collision occurring with a vehicle colliding with a pedestrian.

Link 7 – Beacon Lane between Calthorpe Road and Summer Lane

Highway Network

11.2.29 Beacon Lane provides another link from the site to Pinhoe Road to the south west and is subject to a 20mph speed limit for its entire length. It has 1 lane in each direction, with a carriageway width ranging from approximately 5m to approximately 6.3m along the majority of its length.

11.2.30 Beacon Lane does split to include a wide central reserve either side of its roundabout junction with King Arthur's Road and Guinevere Way, between Beacon Heath Local Centre and the St James School complex. Along this section of Beacon Lane, dedicated parking bays and bus lay-bys are provided on both sides of the road

Pedestrians and Cyclists

11.2.31 To help manage speeds on Beacon Lane and provide for pedestrians, there are multiple dropped kerbs, informal and formal crossing points along Beacon Lane, together with one raised informal crossing point and a raised formal signalised crossing point located at the St James School complex.

11.2.32 Beacon Lane benefits from an off-carriageway cycle lane which extends to the Stoke Arms roundabout to the west.

Safety

11.2.33 The PIC data for the past five years identifies that nine PIC's occurred along this link; with one recorded as serious and eight others as slight. The serious PIC occurred when a vehicle collided with a child. Some of the slight PIC's occurred as a result vehicles failing to stop quickly enough resulting in the vehicle shunting into the vehicle in front.

Public Right of Way

11.2.34 A Public Right of Way (PROW) (between Beacon Down and Eastern Field) adjoins the western boundary of the site, with a spur of the PROW along the northern and eastern boundaries.

Public Transport Network

11.2.35 There are two services which directly serve the site; Stagecoach city service B, which provides a 30 minute frequency service during Monday to Saturday daytimes with no evening or Sunday service, and early morning special route Y which provides two journeys to Pinhoe and the Exeter city centre.

11.2.36 Within the Pinhoe area there are also a number of bus services which are summarised in Table 11.4 below.

Table 11.4: Bus Routes and Frequencies Serving Pinhoe and Passing the Pinhoe Quarry Site

Service (Operator)	Route	Frequency		
		Mon–Sat (Daytime)	Mon–Sat (Evening)	Sun
B (Stagecoach)	Marsh Barton – Alphington Road – City Centre – Union Road – Beacon Heath – Pinhoe – Met Office – Honiton Road P&R – Digby *(Mon-Fri only)*	2 bus per hour (bph)	0 bph*	No service
Y (Stagecoach)	City Centre – Beacon Heath – Pinhoe – Whipton – City	2 - 3 buses before 7am	No service	No service

	Centre (*circular in this direction only*)			
E (Stagecoach)	Lancelot Road – Exeter City Centre - Exwick	6 bph	2 bph	2 bph
F1 (Stagecoach)	Savoy Hill – Exeter City Centre – Exwick Kinnerton Way	3 bph	3 bph	No service
F2 (Stagecoach)	Whipton Summerway – Exeter City Centre - Exwick	3 bph	3 bph	2 bph
K / T (Stagecoach)	Countess Wear – Exeter City Centre – Whipton Barton - Pinhoe	6 bph	3 bph	3 bph
M2 (Stagecoach)	Exeter – Whipton Shops – Honiton Park n Ride	5 bph (Mon – Fri Peaks only)	5 bph (Mon – Fri Peak only)	No service
1, 1A, 1B (Stagecoach)	Exeter – Bradninch – Cullompton – Willand – Uffculme – Halberton - Tiverton	4 bph	1 bph	1 bus every 2 hours

*Last B Service to Pinhoe at 18:46pm.

Existing Traffic Flows

11.2.37 Baseline conditions have been established as part of the TAR for current conditions. However current traffic levels do not provide a suitable baseline for the assessment of the development due to general increases in background traffic over time and that generated by committed developments yet to be built and/or occupied. Therefore the relevant baseline for the assessment is the predicted traffic flows for 2017 for the 'do nothing' scenario (which includes that generated by committed developments, including the permitted Pinhoe Quarry restoration).

11.2.38 The base 18 hour (06:00 – 00:00) traffic flows, that have been calculated for the study area links in the 'do nothing' scenario, are as follows:

- Link 1 – Harrington Lane between the site access and Chancel Lane: 10,403 vehicles (PCU's) with 294 HGV's;
- Link 2 – Chancel Lane / Venny Bridge between Harrington Lane and Pinhoe Road: 7,126 vehicles (PCU's) with 63 HGV's;

- Link 3 – Harrington Lane between Chancel Lane and Church Hill: 5,941 vehicles (PCU's) with 275 HGV's;
- Link 4 – Church Hill between Harrington Lane and Main Road: 8,097 vehicles (PCU's) with 301 HGV's;
- Link 5 – Harrington Lane / Beacon Lane between the site access and Summer Lane: 10,363 vehicles (PCU's) with 126 HGV's;
- Link 6 – Summer Lane between Beacon Lane and Whipton Village Road: 8,807 vehicles (PCU's) with 138 HGV's; and
- Link 7 – Beacon Lane between Calthorpe Road and Summer Lane: 16,790 vehicles with 377 HGV's.

11.2.39 The figures identified for Links 1, 3 and 4 above include the additional 156 daily HGV movements associated with the landfill restoration scheme at Pinhoe Quarry in addition to that observed to currently use these links.

11.3 Likely Impacts

Receptors

11.3.1 The following receptors have been identified adjacent to the seven links that comprise the study area:

- Link 1 – Low sensitivity: residential dwellings and (small) employment area;
- Link 2 – Low sensitivity: residential dwellings and employment area;
- Link 3 – High sensitivity: Pinhoe Primary School, Low sensitivity: residential dwellings and community hall;
- Link 4 – Medium sensitivity: shopping area; Low sensitivity: residential dwellings;
- Link 5 – Low sensitivity: residential dwellings;

- Link 6 – High sensitivity: Willowbank Primary School, St. Luke's Science & Sports College and Leisure Centre & Gym; Low Sensitivity: residential dwellings;

- Link 7 – Medium sensitivity: local centre; Low sensitivity: residential dwellings.

Construction Phase

11.3.2 As set out above, the construction of the development is considered in 2 distinct phases. Firstly, the earthworks required within the site to provide the development platform. Secondly, the subsequent development of residential units and associated uses on the re-profiled site.

11.3.3 As described earlier within the ES, the first phase of the development (re-profiling) is anticipated to last 18 – 24 months and makes use of the existing materials on site to provide a suitable platform for development and does not require the importing of any material from off-site.

11.3.4 On this basis, the re-profiling will generate a very small number of vehicular movements, associated with plant and workforce movements only. The plant will be required to access and egress the site once, being stored on site during the re-profiling. The site will employ a small workforce to operate the plant, but the effect of traffic generated by these staff movements are considered immaterial on the local highway network, with staff encouraged to access the site by sustainable modes and in accordance with the CoCP.

11.3.5 The construction of the second phase of the proposed development will generate traffic that will affect the local road network. Given the quantum of proposed development, likely construction programme and experience of similar developments it is anticipated that volumes of traffic generated during construction would be less than that generated during the operation of the proposed development, however a greater number of HGV movements may be generated.

11.3.6 Effects may arise in relation to fear and intimidation, severance and safety as a result of HGV movements. These effects would be managed through the adoption of CoCP and a designated access route for construction traffic, but it is anticipated that a minor temporary adverse effect may result from the use of the local road network by construction traffic.

11.3.7 The movement of construction traffic should have an insignificant effect on driver delay.

11.3.8 The construction works will include the construction of the two site accesses on Harrington Lane. These construction works would be for very limited time periods and would be designed, managed and phased to minimise any adverse effects. It is likely, however, that a minor adverse effect on driver delay would occur during the construction of each access.

11.3.9 The PROW adjacent to the site will need to be diverted along short sections of both the east and west sides of the quarry during the construction of the development. Disturbance would be kept to a minimum, but there will be a temporary minor adverse effect on pedestrians and reduced amenity of walkers during the diversion period.

Operation Phase

11.3.10 The likely daily 18 hour traffic generated by the proposed development is identified in Tables 11.5 (traffic flows in PCU's) and 11.6 (HGV traffic) below.

Table 11.5: Development Traffic Generation (All Traffic, in PCU's)

Link	Development Traffic	Do Nothing Scenario	Do Something Scenario	Changes in traffic flows
1	1,508	10,403	11,897	14%
2	958	7,126	8,065	13%
3	550	5,941	6,489	9%
4	523	8,097	8,620	7%
5	1,107	10,363	11,464	11%
6	122	8,807	8,929	1%
7	967	16,790	17,757	6%

Table 11.6 HGV Traffic Generation – Actual Vehicle Numbers (not PCU's)

Link	Development Traffic	Do Nothing Scenario	Do Something Scenario	Changes in traffic flows
1	-156	294	138	-53%
2	0	63	63	0%
3	-156	275	119	-57%
4	-156	301	145	-52%
5	0	126	126	0%
6	0	138	138	0%
7	0	377	377	0%

11.3.11 The tables show that the greatest impact of the proposed development in terms of number of vehicles would be on Harrington Lane (Links 1 and 5) and Chancel Lane (Link 2).

11.3.12 As set out above, Pinhoe Quarry has an extant permission which allows for the restoration of the site through the land-filling of inert waste. However, the development proposals (do something scenario) would remove the consented HGV traffic associated with the alternative landfill operation at the site (the do nothing scenario) on Harrington Lane (Links 1 and 3) and Church Hill (Link 4), effectively reducing HGV flows on these links by over 50%.

11.3.13 This section now assesses the potential effect of these changes in traffic on each of the seven links in relation severance, fear and intimidation, pedestrians and cyclists, driver delay and safety. The effect of the proposed development on users of public transport and the PROW are considered for development as a whole rather than for the seven identified links.

Link 1 – Harrington Lane between the Site Access and Chancel Lane

Severance

11.3.14 The proposed development is predicted to increase traffic flows on this link by 14%, although HGV flows would decrease by 53%. Analysis of the increase in general traffic against thresholds identified in Table 11.2 suggests the increase is slight. The receptors adjacent to this link are of low sensitivity. The overall effect should be insignificant. However, the reduction in HGV movements from that associated with the baseline position could be considered as a minor beneficial effect.

Fear and Intimidation

11.3.15 With reference to the thresholds for fear and intimidation, the average traffic flow over an 18 hour day is 11,897 and the total HGV movements are 138. These movements relate to a moderate degree of hazard for both the 'do nothing' and 'do something' scenarios.

11.3.16 As receptors along this link are of low sensitivity and the increase in traffic flows is slight the effect in relation to fear and intimidation should be insignificant. However, the reduction in HGV movements from that associated with the baseline position could be considered as a minor beneficial effect.

Pedestrians and Cyclists

11.3.17 Harrington Lane is identified by DCC as a quieter road suitable for cycling. The slight increase in traffic generated by the proposed development should have an insignificant effect on pedestrians and cyclists. However, and as set out above, the reduction in HGV movements could be considered as a minor beneficial effect for pedestrians wishing to cross Harrington Lane and cyclists wishing to travel along Harrington Lane.

11.3.18 There will also be a minor beneficial effect on pedestrians, especially the mobility impaired, as a result of a raised table-top junction accesses into the development and improved footway provision along this link.

Safety

11.3.19 The PIC data does not identify a pattern of accidents along this link. Given the nature of this link and the slight increase in traffic flows balanced against the decrease in HGV flows, it is considered that the proposed development should have an insignificant effect with regards to safety.

11.3.20 There may however be a minor beneficial effect on safety at the site accesses through improvements works to the road surface. This will be to the benefit of both development traffic and all users of Harrington Lane.

Link 2 – Chancel Lane / Venny Bridge between Harrington Lane and Pinhoe Road

Severance

11.3.21 The proposed development is predicted to increase traffic flows by 13%, with no changes in HGV flows. Analysis of the increase against thresholds identified in Table 11.2 suggests the increase is slight. The receptors adjacent to this link are of low sensitivity. The overall effect should be insignificant.

Fear and Intimidation

11.3.22 With reference to the thresholds for fear and intimidation, the average hourly traffic flows over an 18 hour day is 8,065 and the total HGV movement is 63. These movements relate to a moderate degree of hazard. This is for both the 'do nothing' and 'do something' scenarios.

11.3.23 As receptors along this link are of low sensitivity and the increase in traffic flows is slight the effect in relation to fear and intimidation should be insignificant.

Pedestrians and Cyclists

11.3.24 Footpaths are located on Chancel Lane along the residential area of the road. Along Chancel Lane there is a narrow bridge where there are no footpaths. The emerging Pinhoe Area Access Strategy proposes measures to improve the safety of Chancel Lane bridge for vulnerable road users. Pinhoe Quarry LLP propose to make a financial contribution to DCC to include safety measures for vulnerable road users along Chancel Lane. As a result of these proposals, and balanced against the slight traffic increase on this link, it is considered the traffic generated by the proposed development should have an insignificant effect on cyclists and pedestrians.

Safety

11.3.25 The PIC data does not identify a pattern of accidents along Chancel Lane. Given the nature of this link it is considered that the proposed residential development should have an insignificant effect with regards to safety. However, as identified above, there is an existing safety concern at the Venny Bridge / Pinhoe Road junction, with improvements proposed to accommodate

development generated traffic and improve the safety of the junction, with further detail set out below.

Link 3 – Harrington Lane between Chancel Lane and Church Hill

Severance

11.3.26 The proposed development is predicted to increase traffic flows by 9%, although HGV flows would decrease by 57%. Analysis of the increase in general traffic flows against the thresholds identified in Table 11.2 suggests the increase is negligible. The receptors adjacent to this are of high and low sensitivity. As a result the effect on severance along this link should be insignificant, except for a minor adverse effect close to Pinhoe Primary School. However, the reduction in HGV movements from that associated with the baseline position could be considered as a minor beneficial effect.

Fear and Intimidation

11.3.27 With reference to fear and intimidation, the average hourly traffic flow over an 18 hour day is 6,489 and the total HGV movement is 119. These movements relate to a slight degree of hazard for both the 'do nothing' and 'do something' scenarios.

11.3.28 Pinhoe Primary School is located on this link and is a high sensitivity receptor. On-street car parking typically occurs at the beginning and end of the school day, associated with parents taking children to school. As a result Harrington Lane is narrowed and two way traffic movement can be restricted during the morning peak period. Consequently a minor adverse effect may occur close to Pinhoe Primary School, but the effect on the rest of the link should be insignificant. However, as set out above, the reduction in HGV movements past the school could be considered as a minor beneficial effect.

Pedestrians and Cyclists

11.3.29 Harrington Lane is identified by DCC as a quieter road suitable for cycling. The slight increase in traffic generated by the proposed residential development should have an insignificant effect on cyclists, except close to Pinhoe Primary School at the beginning and end of the school day when on-

street parking occurs limiting the space for cyclists resulting in a minor adverse effect.

11.3.30 However, and as set out above, the reduction in HGV movements could be considered as a minor beneficial effect for pedestrians wishing to cross Harrington Lane and cyclists wishing to travel along Harrington Lane, particularly during the morning school drop off period.

Safety

11.3.31 The PIC data does not identify a pattern of accidents along this link. Given the nature of this link it is considered that the proposed development should have an insignificant effect with regards to safety. The only potential exception to this is Pinhoe Primary School where on-street parking close to the school results in a narrowing of the available carriageway to approximately 3.3m which could lead to a minor adverse effect. However, the removal of HGV's from this link could be considered a minor beneficial effect.

Link 4 – Church Hill between Harrington Lane and Main Road

Severance

11.3.32 The proposed development is predicted to increase traffic flows by 7%, although HGV flows would decrease by 53%. Analysis of the increase in general traffic against the thresholds identified in Table 11.2 suggests the increase is negligible. The receptors adjacent to this link are of medium and low sensitivity. The overall effect should be insignificant. However, the reduction in HGV movements from that associated with the baseline position could be considered as a minor beneficial effect.

Fear and Intimidation

11.3.33 With reference to the thresholds for fear and intimidation, the average hourly traffic flow over an 18 hour day is 8,620 and the total HGV movement is 145. These movements relate to a moderate degree of hazard for both the 'do nothing' and 'do something' scenarios.

11.3.34 As receptors along this link are of low and medium sensitivity and the increase in flows is negligible the effect in relation to fear and intimidation should be insignificant. However, the reduction in HGV movements from that associated with the baseline position could be considered as a minor beneficial effect.

Pedestrians and Cyclists

11.3.35 Church Hill is identified by DCC as a quieter road suitable for cycling. On-street parking can reduce the available width of the road, limiting the space for cyclists. Consequently traffic generated by the development may have a minor adverse effect. However, and as set out above, the reduction in HGV movements could be considered as a minor beneficial effect for cyclists wishing to travel along Church Hill. There should be an insignificant effect on pedestrians due to the footway provision along this link.

Safety

11.3.36 The PIC data does not identify a pattern of accidents along this link. Given the nature of this link it is considered that the proposed development should have an insignificant effect with regards to safety.

Link 5 – Harrington Lane / Beacon Lane between the Site Access and Summer Lane

Severance

11.3.37 The proposed development is predicted to increase traffic flows by 11%, with no increase in HGV flows. Analysis of the increase against the thresholds identified in Table 11.2 suggests the increase is slight. The receptors adjacent to this link are of low sensitivity. The overall effect should be insignificant.

Fear and Intimidation

11.3.38 With reference to the thresholds for fear and intimidation, the average hourly traffic flows over an 18 hour day 11,464 and total HGV movement is 126. These movements relate to a moderate degree of hazard. This is for both the 'do nothing' and 'do something' scenarios.

11.3.39 As receptors along this link are of low sensitivity and the increase in traffic flows is slight the effect in relation to fear and intimidation should be insignificant.

Pedestrians and Cyclists

11.3.40 Harrington Lane is identified by DCC as a quieter road suitable for cycling. Traffic generated by the proposed development should have an insignificant effect on cyclists. There may be a minor beneficial effect on pedestrians, especially the mobility impaired, as a result of a raised table-top junction access into the development and the improved footway provision along this link.

Safety

11.3.41 The PIC data does not identify a pattern of accidents along this link. Given the nature of this link it is considered that the proposed development should have an insignificant effect with regards to safety.

Link 6 – Summer Lane between Beacon Lane and Whipton Village Road

Severance

11.3.42 The proposed development is predicted to increase traffic flows by 1%, with no increase in HGV flows. Analysis of the increase against the threshold identified in Table 11.2 suggests the increase is negligible. The receptors adjacent to this link are of high sensitivity, however the increase in flows is so low that the effect should be insignificant.

Fear and Intimidation

11.3.43 With reference to the thresholds for fear and intimidation, the average hourly traffic flow over an 18 hour day is 8,929 and the total HGV movements is 138. These movements relate to a moderate degree of hazard. This is for both the 'do nothing' and 'do something' scenarios. Due to the negligible increase in traffic flows the increase of the proposed development should be insignificant.

Pedestrians and Cyclists

11.3.44 Summer Lane has an off-road shared cycle and pedestrian path that provide a well-lit alternative route to on-carriageway cycling. Traffic generated by the proposed development should have an insignificant effect on cyclists and pedestrians.

Safety

11.3.45 The PIC data does not identify a pattern of accidents along this link. Given the nature of this link it is considered that the proposed development should have an insignificant effect with regards to safety.

Link 7 – Beacon Lane between Calthorpe Road and Summer Lane

Severance

11.3.46 The proposed development is predicted to increase traffic flows by 6%, with no increase in HGV flows. Analysis of the increase against the threshold identified in Table 11.2 suggests the increase is negligible. The receptors adjacent to this link are of low sensitivity. The overall effect should be insignificant.

Fear and Intimidation

11.3.47 With reference to the thresholds for fear and intimidation, the average hourly traffic flows over an 18 hour day is 17,757 and the total HGV is 377. These movements relate to a moderate degree of hazard. This is for both the 'do nothing' and 'do something' scenarios. Due to the negligible increase in flows and low sensitivity receptors the effect of the proposed development should be insignificant.

Pedestrians and Cyclists

11.3.48 Beacon Lane has an off-road shared cycle and pedestrian path that provide a well-lit alternative route to on-carriageway cycling. Traffic generated by the proposed development should therefore have an insignificant effect on cyclists and pedestrians.

Safety

11.3.49 The PIC data does not identify a pattern of accidents along this link. Given the nature of this link it is considered that the proposed development should have an insignificant effect with regards to safety.

PROW

11.3.50 The footpaths located adjacent to the site will need to be formally diverted on both the east and west sides of the quarry. An improved footpath route around the perimeter of the development will be created utilising some of the existing footpaths and creating new landscaped footpaths. As a result there should be a minor beneficial effect for users of the PROW.

Driver Delay

11.3.51 It is not considered that the increase in vehicles on the road links would cause any significant delay along the links. Junction assessments have been carried out in the TAR on each junction within the study area and have shown that the junctions continue to operate within capacity with the development in both the AM and PM peaks. The only exceptions to this are the Pinhoe double mini-roundabouts, which operate over capacity in the AM peak as well as the Venny Bridge / Pinhoe Road junction during both the AM and PM peak periods. Junction assessments carried out in the TAR have shown that delay will be minor to insignificant due the limited nature of the delay and limited time each day during which the delay could occur.

Public Transport

11.3.52 A number of options have been considered to enhance bus services within the vicinity of the development site, with further information set out below. It is proposed that the service B will be extended to provide an evening and Sunday service for residents. As a result of this and increased patronage which should enhance the viability/profitability of existing services, the effect of the proposed development on public transport should be at least minor beneficial.

11.4 Proposed Mitigation

Site Access

11.4.1 Having regard to the level of residential development proposed, to enable a dispersed distribution of development generated traffic onto Harrington Lane and to ensure future emergency access provision, it is proposed that the development is accessed via two new junctions, with the existing quarry access closed. Both new junctions are proposed to be in the form of a Priority T-Junction with raised table top with informal pedestrian crossings to manage traffic speeds, and prioritise movement by pedestrians, along Harrington Lane.

11.4.2 The locations of these two new access junctions have also been determined by the careful consideration of the masterplan and site layout requirements as well as to ensure that any potential future development to the south of Harrington Lane, at the Ibstock Brickworks, are not prejudiced. Furthermore, the access strategy has been devised to allow for direct pedestrian and cycle connections to any development proposals south of Harrington Lane, should they come forward at a later date.

Construction

11.4.3 A Code of Construction Practice (CoCP) would be prepared to manage the construction processes, the CoCP would be agreed with the local planning authority prior to the commencement of construction works. Measures that would be included in the CoCP are likely to include:

- All construction vehicles would access the site via Harrington Lane;
- Hours of deliveries would be limited to avoid disturbance of local residents;
- Queuing of construction traffic on the public highway would be avoided through appropriate traffic management controls;
- Contractors / staff to be encouraged to access the site by sustainable modes of transport as an alternative to the single occupancy private car.
- All contractor parking would be located within the site; no contractor parking would be permitted in surrounding residential areas;
- The construction of the site accesses would be designed, managed and phased to minimise disturbance to road users and local residents;

- The construction of the site accesses on Harrington Lane would be managed sensitively with regard to adjoining residential properties, pedestrian and cyclists and driver delay;
- PROWs will be diverted and where works could affect the safety of those using them; this would be agreed in advance with the local planning authority;
- Suitable wheel washing facilities would be provided within the site to prevent mud being deposited on local roads as well as regular sweeping of roads, both on and off site will limit the spread of material;
- Every effort will be made to minimise disruption to other road users, including walkers and cyclists during the construction phase by ensuring adequate traffic and safety measures are in place to control all vehicle movements associated with the site.

11.4.4 Overall, best practice would be adopted to minimise the adverse effects of construction.

Walking and Cycling

11.4.5 The site is located in close proximity to a number of footways and cycleways linking to the key facilities and public transport in Pinhoe and further afield. The existing network of footways and cycleways provide a number of route choices via quiet roads with footways, footpaths and cyclepaths.

11.4.6 To link the proposed development to the local area and to encourage walking and cycling, the following specific improvements have been proposed:

- Improvements west of the Cheynegate Lane Bridge will provide an advisory on-carriageway footway highlighting the presence of pedestrians to drivers. This would provide a safer connection between the existing footways and improve 'Safer Routes to School' for the St. James' Secondary School
- Raised table-top access junctions to help manage traffic speeds along Harrington Lane to appropriate levels thereby improving safety for pedestrians and cyclists
- Widening of northern footway on Harrington Lane to 3m width along the frontage of the development, tying into the existing footways to the west and east

- There is also the potential for a walking bus and/or cycle train to provide formal escorts from the site to the local primary school (s). It is proposed that this could be managed and delivered as part of the Residential Travel Plan for the site, together with other associated measures to encourage the adaption of sustainable modes of transport.

11.4.7 In consultation with DCC, Pinhoe Quarry LLP is also prepared to make contributions towards the pedestrian and cycle improvements suggested within the emerging Pinhoe Area Access Strategy. These include cycle signage and parking facilities at Pinhoe Railway Station, soft traffic calming measures on Chancel Lane, measures to improve the safety of Chancel Lane Bridge for vulnerable road users and Pinhoe village centre enhancement scheme.

Public Transport

11.4.8 Harrington Lane does not currently benefit from evening or Sunday bus services and this restricts the ability of residents to use this sustainable mode of transport during these times as well as, arguably, their propensity to consider buses for all journeys as a result of the limited service. With this in mind, a number of options have been developed with full details provided in the TAR:

- Maintaining the existing service
- Expanding the daytime services
- Expanding the evening and Sunday services
- Extending route of Service B and
- Extending another existing route to the site.

11.4.9 The preferred strategy is considered to be the provision of an evening and Sunday service on the eastern section of route B. This strategy is proposed because the provision of an evening and Sunday service would provide the greatest benefit to existing and new residents in the area and at a cost proportionate to the scale of development.

11.4.10 These public transport improvements would meet the needs of the Pinhoe Quarry site and the wider community creating real opportunities to encourage modal shift from the private car to the bus. A lower level of contribution could

therefore be phased over a greater number of years, assisting the longevity of the service and a higher likelihood of viability.

11.4.11 On this basis, it is proposed to offer a financial contribution to DCC, equivalent to the gross cost of providing this service extension for a period of 5 years.

11.4.12 The proposed contribution, equivalent to the gross cost of this service extension, together with the higher likelihood of viability of the service, may also offer DCC the opportunity to review the existing bus service provision within the area and plan a more effective network that would improve public transport penetration / accessibility within the wider Pinhoe area. This would ensure that DCC are able to make best use of resources supporting these local services, including public sector funding, and provide opportunities for improved commercial returns. The combined effect of which could lead to a more effective, efficient and viable network in the longer term.

11.4.13 Furthermore, as part of the improvements to Harrington Lane set out above, it is proposed to provide new high quality bus stop infrastructure within the immediate vicinity of the site.

11.4.14 Incentives will also be offered to encourage the use of local bus services by future residents of the proposed development; this will include the provision of season tickets for new residents and personalised travel planning for both new and existing residents within the Pinhoe area.

Travel Plan

11.4.15 The Travel Plan provides measures to minimise single occupancy car use. The Travel Plan includes a package of hard and soft measures to encourage a shift away from single occupancy car use and a move towards walking and cycling, public transport and car sharing. In promoting and implementing such measures a Travel Plan coordinator will be appointed for the site who will have overall responsibility for implementing the individual measures of the Travel Plan on the site.

11.4.16 An Area Wide Travel Plan is also proposed to cover the existing residential development along Harrington Lane to further promote healthy lifestyles and sustainable vibrant local communities, extending the benefits of the Travel Plan through the local area. The strategy for the properties on Harrington Lane will consist of softer measures based on the provision of information to residents in order to encourage them to change their travel habits.

Highways

11.4.17 As set out above, both site access junctions are proposed to be in the form of Priority T-Junctions with a raised table top to manage traffic speeds along Harrington Lane. Further measures include widening of the northern footway to 3m width along the frontage of the development, tying into the existing footway to the west, extension of existing double yellow lines between the western and eastern access and upgrading of both eastbound and westbound bus stops to include shelter.

11.4.18 It is also proposed to offer a financial contribution to DCC to assist with the delivery of those schemes within the Pinhoe Area Access Strategy that are of benefit to the proposed development and mitigate the impacts of traffic generated by the proposals. This includes soft traffic calming measures along Chancel Lane to better manage traffic flows; and safety measures to manage traffic across Chancel Lane Bridge.

11.4.19 Improvements to the Venny Bridge/ Pinhoe Road junction in the form of a signalised junction arrangement are also proposed with preliminary modeling assessment works undertaken to date. The results suggest that the junction improvements could accommodate the additional traffic generated by the proposed development, improve pedestrian crossing facilities along Pinhoe Road and offer a safety improvement over the existing priority arrangement, by offering vehicles exiting Venny bridge a dedicated phase, removing the requirement to pull out between vehicles travelling along Pinhoe Road.

11.4.20 Early feedback from DCC Officers on the results of the TAR has identified the need for the vehicular access strategy to reflect the potential delivery of the

'Exhibition Way Link' through the adjoining allocated development at Ibstock Brickworks and Exeter City Council (ECC) land.

11.4.21 However, the delivery of the Exhibition Way link is not within the ability of Pinhoe Quarry LLP due to the fact that it requires third party land (by at least 2 separate landholders), further works to determine the ability of the existing bridge to accommodate the vehicular link as well as further development of land necessary to deliver / fund the works.

11.4.22 The TAR and supporting package of measures demonstrates that the proposed development at Pinhoe Quarry can come forward in the absence / in advance of the Exhibition Way link, should this not be delivered as part of the wider development opportunities.

11.4.23 Similarly, it is recognised that the link would be of benefit to the proposed development at Pinhoe Quarry, as an alternative to the identified off-site highway works at the Venny Bridge / Pinhoe Road junction, which would not be required should the Exhibition Way Link be delivered and connect to Harrington Lane.

11.4.24 On this basis, and in accordance with the Pinhoe Area Access Strategy, Pinhoe Quarry LLP propose to make a financial contribution to DCC for the cost of the identified Venny Bridge / Pinhoe Road junction improvement scheme.

11.4.25 Therefore, should the Exhibition Way Link come forward for delivery within the timescales of the Pinhoe Quarry development, the Venny Bridge / Pinhoe Road scheme would not be required and the financial contribution could be used towards the delivery of the Exhibition Way link, thereby offering DCC flexibility in the delivery of highway infrastructure to mitigate the impacts of the development proposals.

11.5 Residual Impacts

11.5.1 The residual impacts are identified in Table 11.5 overleaf.

Table 11.5 Traffic and Transport Effects

Environmental Effect	Sensitivity of Receptor	Additional Mitigation	Residual Impact Magnitude	Residual Significance of Effects	Confidence Level
OPERATIONAL PHASE					
Severance	High to low	A network of enhanced pedestrian and cycle connectivity into the surrounding area.	Slight to negligible	Minor adverse to minor beneficial	High
Fear & Intimidation	High to low	Widening of footway along the frontage of the development. Advisory on-carriageway footway west of Cheynegate Lane Bridge. Potential for walking bus and/or cycle train. Diversion of PROW.	Slight to negligible	Minor adverse to minor beneficial	High
Driver Delay	Low	Improvements to the Venny Bridge/ Pinhoe Road junction and/or DCC proposed highway measures within the Pinhoe Area Access Strategy,	Slight to negligible	Minor adverse to insignificant	High
Pedestrians & cyclists	High	Linkages will be provided to encourage walking and cycling into the local area. Contributions towards pedestrian and cycle measures within Pinhoe Area Access Strategy. Diversion of PROW.	Negligible	Minor adverse to minor beneficial	High
Safety	High	Not required	Negligible	Neutral	High
CONSTRUCTION PHASE					
Construction traffic	High to low	Range of measures identified in CoCP	Slight to negligible	Minor adverse to insignificant	High
Highway works	High to low	Range of measures identified in CoCP	Slight to negligible	Minor adverse to insignificant	High
PROW diversion	Low	Range of measures identified in CoCP	Slight to negligible	Minor adverse to insignificant	High

11.6 Summary

11.6.1 The proposed development will generate traffic on the highway network. This chapter documents the work that has been carried out to assess the potential environmental effects of this traffic.

11.6.2 The chapter considers existing transport conditions at and in the vicinity of the site and then assesses the effect of the development utilising a future assessment year of 2017 base and with development. This assessment has been undertaken drawing on the Transport Assessment Report, submitted as an appendix to the ES.

11.6.3 Environmental effects have been considered in relation to severance, fear and intimidation, pedestrians and cyclists, safety, driver delay, public rights of way (PROW) and public transport. Mitigation measures are proposed in terms of walking and cycling, public transport, highway improvements and a Travel Plan to maximise the potential to travel by modes other than the private car and hence mitigate traffic impact.

11.6.4 The assessment demonstrates that the overall environmental effects arising from the development in transport and traffic terms are considered to be generally minor adverse, insignificant and minor beneficial.

12.0 Population

12.1 Methodology and Scope

12.1.1 The need to provide for human shelter is a key need, but one that is essential if the needs of human society are to be provided for in a socially acceptable manner.

12.1.2 The provision of new housing to meet human needs is a politically charged subject that stimulates considerable local debate.

12.1.3 For these reasons traditionally the level of housing to be provided for in a locality has been determined at the Regional level. Whilst the coalition Government has made clear its' intent to move away from this approach the system still prevails until such time as the much trailed new legislation is enacted.

12.2 Baseline

12.2.1In order that human population needs continue to be met Government policy (PPS3) places a requirement on Exeter City Council to maintain a 5 year supply of deliverable residential land. That requirement is set out in the development plan. The development plan is currently being reviewed via the review of the Regional Spatial Strategy and via the preparation of the Exeter Core Strategy.

12.2.2 The development plan housing requirement is set out in DSP Policy ST17 which sets out the requirement for the Plan period between 2001 and 2016.

12.2.3 Policy ST17 states that there is a requirement to deliver 6,700 new homes in Exeter over the plan period (2001-2016). This is not for a supply of residential land to be available but for a specified number of dwellings to be completed by 2016. This equates to an annual average of 447 dwellings per annum; however Policy ST17 states an average of 450 dwellings per annum.

12.2.4 The review of the development plan is set out in the review of the regional spatial strategy and the emerging Exeter Core Strategy.

12.2.5 In relation to the RSS the Secretary of State published proposed changes for public consultation in July 2008. The review deals with the period up to 2026.

12.2.6 The Proposed Changes version of the draft RSS sets a target for housing delivery in the Exeter HMA of 55,400 dwellings over the period 2006-2026, of which 15,000 are to be provided in Exeter City Council administrative area.

12.2.7 Those dwellings are to be provided at the annual average rate of 2,770 dwellings per annum, of which 750 dwellings per annum are to be provided within the Exeter City Council administrative area.

12.2.8 Policy H1 deals with housing affordability. It sets a regional target of 10,000 dwellings per annum to be provided (35%) and states that Development Plan Documents should specify targets for affordable housing provision in the wider context of maintaining an overall five year housing land supply.

12.2.9 The Exeter Core Strategy Proposed Submission, July 2010 states that:

> *"The Council therefore concludes that a housing requirement of 12,000 houses up to 2026 is justified by work done to assess housing need but is also appropriate to the locally determined capacity of the environment to accommodate more housing growth."* (paragraph 4.5, page 16).

12.2.10 This proposed requirement equates to 600 dwellings per annum.

Available Supply

12.2.11 Up to date information drawn directly from the (Draft) Exeter 2010 Strategic Housing Land Availability Assessment (SHLAA) states that completions to date for the period 31/03/01 to 31/03/10 are 4,610 dwellings. (Completions for the period 31/03/06 to 31/03/10 are 2,245 dwellings).

12.2.12 The information drawn from the (Draft) Exeter 2010 SHLAA identifies a deliverable supply of 1,617 dwellings over the five year plan period 2011-2016 – i.e. there is a surplus of 32 dwellings over the development plan requirement (DCC Structure Plan, Policy ST17) which equates to a 5 year and 1 month supply. This supply figure represents a 2 year supply against the RSS review and a 2.6 year supply against the emerging Core Strategy.

12.2.13 This supply has been calculated by 'counting in' student completions and assessing some large Greenfield sites as deliverable despite the advice of the Council's own SHLAA panel in this matter. If these projected completions are 'netted out' then the deliverable supply falls to a 3.2 year supply when assessed against the development plan, a 1.6 years supply when assessed against the RSS review and a 2.1 years supply when assessed against the emerging Core Strategy.

12.3 Likely Impacts

12.3.1 The likely impacts of not bringing forward a redevelopment of the site for residential use in accordance with development plan and emerging development plan review targets is that the City Council will fail to meet its requirement to provide for a timely supply of new dwellings. This will result in a number of negative impacts upon human society. In summary those impacts are:

12.3.2 Those that are currently unsatisfactorily housed will continue to be so – this includes those living in overcrowded situations (e.g. concealed households).

12.3.3 There will not be a sufficient supply of affordable housing, which will have consequential impacts upon hostel accommodation and rough sleepers since there will be a lack of supply of new affordable homes, placing greater pressure on the restricted supply of hostel places.

12.3.4 A lack of supply of housing will induce house price inflation in the face of sustained demand. There is considerable evidence of sustained demand for new housing in Exeter.

12.3.5 The growth of housing is required to support the planned growth in the Exeter and Exeter sub-regional economy. That growth will be stifled if an satisfactory supply of new housing is not available to support the a growing workforce.

12.3.6 Unless that supply of new housing is located in close proximity to where new jobs are likely to be created this will induce commuting over longer distances, thereby producing an unnecessary increase in Co2 emissions and house price inflation in remote rural locations where wages are less – thereby pricing indigenous housing demands out of the market and leading to a demand to locate affordable housing in those remote, and arguably unsustainable locations.

12.3.7 It is therefore clear that the impact of not delivering a timely supply of new homes will be significantly detrimental i.e a substantial negative effect will occur.

12.4 Proposed Mitigation

12.4.1 No mitigation is proposed in relation to the above impacts since a supply of new homes is necessary on order to avoid these undesirable impacts.

12.5 Residual Impacts

12.5.1 The residual impacts upon shelter for the human population are significant if the proposed residential development does not proceed.

12.5.2 The residual impacts upon the existing population of the area are assessed in the other chapters of this environmental statement

12.6 Summary

12.6.1 The housing requirement for Exeter is significant and the level of deliverable supply is insufficient to meet this requirement.

12.6.2 The impact of not meeting this supply will be significantly detrimental.

12.6.3 The residual impacts of the development process of delivering residential development upon the existing population of the area are assessed in the other chapters of this environmental statement.

13.0 Conclusions

A comprehensive assessment has been made of the likely significant impacts on the environment. The detailed findings are set out above, supported by background studies that are provided in Volume 3 of the ES. The key points are summarised below under specialist subject headings.

13.1 Noise

13.1.1 The noise level from the additional road traffic associated with the proposals would be negligible and not create any residual impact. Some regrading operations may have a moderate impact during the short period when work is near to residential receptors. By precluding work on Sundays and limiting work on Saturday mornings to no closer than 100m of residential properties the residual effects of the proposal are considered to be neutral. This impact would, in any case be temporary.

13.2 Biodiversity

13.2.1 Development of the site would include infilling of two ponds, limited clay extraction, reprofiling of a small part of the Beacon Hill County Wildlife Site and areas of restored land that have been landscaped. This would result in some loss of habitat in the short-term. Existing habitat comprises, however, newly established areas that are only of local significance. Significant landscape planting would be an integral part of the proposals and include two new ponds and a significant amount of green space. In the longer-term this will result in enhanced biodiversity value.

13.3 Geology/Soil/Land Quality

13.3.1 Assessment indicates that the potential impacts associated with the reprofiling of the former quarry can be addressed by appropriate engineering design and control during the earthworks phase.

13.3.2 The two RIGS areas within the quarry will be lost due to instability and natural weathering if the site remains in a redundant state. The development

proposals would facilitate enhancement of one of the two sites with improved access and greater chance of longer term preservation.

13.4 Water Quality and Quantity – Hydrogeology

13.4.1 Impacts on the wider environment are neutral since there are no sensitive receptors in the immediate vicinity. Potential on-site impacts can be addressed by appropriate engineering of the earthworks. The development of this site would enable the existing and proposed surface water runoff regime to be managed in a way that would not increase flood risk on or off site.

13.4.2 The measures proposed represent a substantial benefit for the management of the water environment in the long term.

13.5 Air Quality

13.5.1 The primary air quality impact associated with the proposed development is from potential emissions of fugitive dust. The application of appropriate mitigation measures should ensure there is a negligible dust impact. In order to ascertain the effectiveness of the dust suppression measures a detailed Dust Action Plan and Scheme will be produced. This would include periodic assessments of dust deposition in order to demonstrate compliance with published limits for rates of dust deposition.

13.6 Material Assets

13.6.1The proposed development would impact positively upon the cumulative historic landscape character of the area since the existing quarry would be removed as a feature and the area brought back into the urban focus of Pinhoe.

13.6.2 In addition the creation of a geo park would highlight the natural history of the area.

13.7 Landscape

13.7.1 Examination of the site shows that it retains very little of the characteristic landscape features that it would have originally had and the existing landscape within the application area has been assessed as of low sensitivity to change.

13.7.2 Assessment concludes that the proposals would have a beneficial impact on the landscape of the area upon completion of the scheme, with the re-introduction of vegetated slopes, and pools with small watercourses and grassland forming a strong green framework to the new development.

13.8 Traffic and Transport

13.8.1 Environmental effects have been considered in relation to severance, fear and intimidation, pedestrians and cyclists, safety, driver delay, public rights of way (PROW) and public transport. A Travel Plan would be implemented to maximise the potential to travel by modes other than the private car. Improvements to local public transport services as well as local highway network improvements are also proposed.

13.8.2 On this basis the overall environmental effects arising from the development in transport and traffic terms are considered to be generally minor adverse, insignificant and minor beneficial.

13.9 Population

13.9.1 The housing requirement for Exeter is significant and the level of deliverable supply is insufficient to meet this requirement. Not meeting this supply will be detrimental to the objective of providing satisfactory human shelter. The proposed development would, therefore, be beneficial to meeting this objective.

13.10 Summary

13.10.1 There is no evidence of any significant detrimental effects that will occur should the development proceed. On the contrary there will be harmful effects on the provision of human shelter should the development not succeed.